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Planned Home Births in the United States Have Outcomes Comparable to Planned Birth Center Births for Low-Risk Birthing Individuals

Marit L. Bovbjerg, PhD, MS, Melissa Cheyney, PhD, LDM,† Lauren Hoehn-Velasco, PhD, MA,‡ Diana Jolles, CNM,§ Jennifer Brown, MPH,* Jennifer Stapleton, MA,‖ Courtney Everson, PhD,¶ Susan Stapleton, CNM, DNP,‖ and Saraswathi Vedam, RM, PhD#*

Objective: There are lingering concerns in the United States about home birth. We used 2 large (n = 50,043; n = 62,984), national community birth registries to compare maternal and neonatal outcomes for planned home versus planned birth center births.

Methods: To compare outcomes by intended birth site, we used logistic regressions, controlling for demographic and pregnancy risk variables. Maternal outcomes included intrapartum or postpartum transfer to hospital, hospitalization, cesarean, and hemorrhage; neonatal outcomes included neonatal transfer, hospitalization, neonatal intensive care unit admission, and intrapartum or neonatal death. Analyses were conducted twice, once in each dataset.

Results: Individuals who planned home births had a lower incidence of all types of transfers, compared with those who planned birth center births, but in one dataset only, experienced more cesareans [adjusted odds ratio (95% CI): 1.32 (1.02–1.70); 0.95 (0.88–1.03)]. Planned home birth was associated with lower adjusted odds of maternal hospitalization in one dataset but not the other [0.97 (0.54–1.74); 0.85 (0.76–0.95)], and was not associated with hemorrhage. Neonatal outcomes likewise were either not associated with a planned birthplace or suggested home birth was safer: hospitalization [0.77 (0.53–1.11), 0.90 (0.82–0.98)], neonatal intensive care unit admission [0.54 (0.28–1.00), 0.97 (0.86–1.10)]. There was no observable association with intrapartum or neonatal death: 1.07 (0.68–1.67; only calculated once because of small numbers of events).

Conclusions: Planned home births are as safe as planned birth center births for low-risk pregnancies. Current guidelines advising against planned home births are not supported by these data.

Key Words: home childbirth, birthing centers, community birth

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From the *Epidemiology Program, Oregon State University, Corvallis, OR; †Anthropology Program, Oregon State University, Corvallis, OR; ‡Department of Economics, Georgia State University, Atlanta, GA; §Frontier Nursing University, Versailles, KY; ‖Division of Research, American Association of Birth Centers, Perkiomenville, PA; ¶Colorado Lab, University of Denver, Denver, CO; and #BirthPlace Lab, University of British Columbia, Vancouver, BC, Canada.

M.L.B., M.C., S.V., and S.S are co-first and co-senior authors.

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Correspondence to: Marit L. Bovbjerg, PhD, MS, OSU Public Health, 103 Milam Hall, Corvallis, OR 97331. E-mail: marit.bovbjerg@oregonstate.edu.

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Rates of home birth in the United States have been increasing for 20 years,[1] and community births (birth center or home) now comprise 1 in 50 American births.[2] Historically, concerns about planned home birth have been raised by obstetricians in the United States;[3,4] the most recent Committee Opinion from the American College of Obstetricians and Gynecologists (ACOG) says, "hospitals and accredited birth centers are the safest settings for birth."[5] While the ACOG guidance does go on to acknowledge pregnant women nonetheless can choose planned home birth and recommends circumstances under which that might be safest (singleton, vertex, without a history of cesarean), nonetheless, the foremost obstetric professional organization in the United States recommends against home birth.[5] This is in contrast with both the American College of Nurse-Midwives and the National Academy of Medicine, each of which concludes that either planned home or planned birth center birth is a reasonable option for low-risk pregnancies.[6,7] This manuscript was undertaken specifically to address the issue of relative safety of planned home births, compared with planned birth center births, in the United States.

The ACOG's opinion on home birth references extensive published evidence, most of it based on birth certificate data.[5] However, the ACOG opinion also acknowledges the difficulty in studying the planned place of birth outcomes in the United States if using birth certificate data.[6] The Centers for Disease Control and Prevention publishes a recommended birth certificate, but states are not required to adopt the changes.[8] Those states that do adopt the changes do so on varying timelines, and some states make changes not endorsed by the Centers for Disease Control and Prevention at all.[8] Thus, there are inconsistencies in data by state and over time. In most states, birth certificates do not document the planned place of birth for all infants. This leads to misclassification, conflating data from unplanned (accidental) home births with planned, midwife-attended home births, as well as conflating planned hospital births with intrapartum transfers from community settings to hospitals when complications arose (ie, unplanned hospital births).[6,9]

Thus, when using vital statistics data, researchers are limited to single-state analyses.[10] For national studies, registry data are often used instead.[6,11,12] While registry data minimize misclassification,[13] they are limited by the voluntary nature of research registries. In addition, registry datasets must be large enough to provide sufficient statistical power to detect rare events, for example, neonatal death, and standardized across all 50 states.[13]

Our objective was to determine low-risk pregnancies, whether planned home births and planned birth center births in the United States have different outcomes, both in terms of processes of care and maternal and fetal/neonatal health. Our a priori hypothesis was aligned with ACNM and the National Academy of Medicine; planned home births are just as safe as planned birth center births for low-risk pregnant individuals.

METHODS

Data Sources

We used 2 large community birth registries[11,12] that contain extensive, standardized information about prenatal, birth, and postpartum care processes and outcomes, and which track both planned and actual places of birth[13] to assess differences in key outcomes between planned home and birth center births. Both contain hundreds of variables spanning prenatal, birth, and postpartum care for midwife-attended, planned community births in the United States. The first registry is the Midwives Alliance of North America Statistics (MANAStats Project) 4.0 dataset, for birth years 2012–2018. The second registry is the American Association of Birth Centers' Perinatal Data Registry (PDR), for birth years 2012–2019.

Data collection protocols and evidence of reliability and validity for both registries are described elsewhere.[11,12] Briefly, midwives use medical records to enter clinical and demographic data for each patient prospectively, beginning with the first prenatal visit and extending through birth, until the final postpartum visit (at 6–8 wk[14]). Both midwives and pregnant individuals provide consent for their data to be used for research. Numerous built-in validity checks help ensure data accuracy. The prospective nature of data collection ensures the completeness of a given practice's data; all new patients are logged in the system after their first visit, well before birth outcomes are known. Data from each practice must be complete, with all logged clients accounted for before that year's births are added to the research dataset.

Our initial plan was to merge the 2 datasets for increased statistical power. However, because the distribution of our main exposure variable (planned place of birth) between the two datasets was highly uneven (MANAStats is 68% home births; PDR is 97% birth center births), and frequencies of key outcomes were uneven between the datasets (secondary to slight differences in the variable definitions), analysis of the combined dataset yielded effect estimates strongly confounded by dataset of origin (Supplemental Table 1, Supplemental Digital Content 1, http://links.lww.com/MLR/C898). There are also different sensitivity analyses needed for the 2 datasets (see below). Finally, it is possible there is some overlap of records if the same midwifery practice contributed to both registries (possible, but not trackable). We, therefore, conducted the planned analysis twice, separately for each of the 2 datasets, and presented both sets of results. This reduces statistical power but increases the internal validity of our results.

Population and Sample

We first excluded all cases in which the pregnant individual started care with a participating community midwife but transferred to another provider during pregnancy. This could occur because of an antenatal complication (eg, cholestasis) but also includes miscarriages, stillbirths before labor, and those pregnant individuals who transferred for nonmedical reasons (eg, community birth not covered by insurance). Preterm births do not appear in the datasets because preterm labor is a contraindication for community birth (<36 or <37 wk, depending on the state).

For the main analysis, we then limited the samples to low-risk pregnancies, excluding multiple gestations, breech presentations identified antenatally, preexisting or gestational diabetes, preeclampsia, individuals with a history of cesarean, and post-date pregnancies (>42 completed weeks).[15] This resulted in 50,043 records for analysis from the PDR. Finally, we excluded from MANAStats those fetuses/neonates ($n = 38$) who died because of a congenital anomaly incompatible with life (variable unavailable in the PDR); the final sample size in MANAStats was 64,819.

Exposure

Our exposure of interest is the planned place of birth at labor onset, home versus birth center.[13] Prior publications with the PDR data have excluded those who are never "admitted" to community birth care during labor.[16] This might happen, for instance, if the amniotic fluid is heavily stained with meconium, or it might happen for a nonurgent reason like the laboring person has decided

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they want an epidural. For our main analysis, these immediate transfers were retained, so that the definition of "planned place of birth at labor onset" was consistent between the two datasets.

Outcomes

Maternal outcomes included intrapartum transfer to a hospital, both any and urgent, cesarean, hemorrhage (>1000 mL), immediate postpartum transfer to a hospital for a maternal indication (any, urgent), and postpartum maternal hospitalization independent of transfer. Neonatal outcomes included immediate neonatal transfer to a hospital (any, urgent), postpartum hospitalization, neonatal intensive care unit (NICU) admission, and intrapartum or neonatal death (during labor or in the first 28 d). We analyzed intrapartum demise and neonatal death both combined and separately. Exact definitions of many outcomes differed slightly between the datasets (Table 1).

TABLE 1. Outcome Variable Definitions for the 2 Datasets, the MANAStats Project, and the American Association of Birth Centers' PDR

Variable name	MANAStats	PDR
Process outcomes		
Intrapartum transfer	Any transfer of care to a hospital after labor onset but before the baby is born	Any transfer of care to a hospital after labor onset but before the baby is born. The main analysis includes individuals who were never admitted to community birth care in labor but rather transferred to a hospital after the midwife's first intrapartum assessment
Cesarean	Surgical abdominal birth; would only occur after intrapartum transfer	Surgical abdominal birth would only occur after intrapartum transfer
Postpartum transfer	Any transfer of care to a hospital during the first 6 h after the baby is born, for a maternal indication. Women who accompany their neonates to the hospital but do not require hospital-level care or resources themselves are not considered postpartum transfers	Risk factor is identified during postpartum, requiring referral to acute care. Not an emergency situation—transport time is not a significant factor. Women who accompany their neonates to the hospital but do not require hospital-level care or resources themselves are not considered postpartum transfers
Neonatal transfer	Any transfer of care to a hospital during the first 6 h after the baby is born, for a neonatal indication. Neonates who accompany their mothers to the hospital but do not require hospital-level care or resources themselves are not considered neonatal transfers	Newborn risk factor is identified, which requires referral to acute care setting. Not an emergency—transport time is not a significant factor. Neonates who accompany their mothers to the hospital but do not require hospital-level care or resources themselves are not considered neonatal transfers
Maternal health outcomes		
Urgent intrapartum transfer	Midwife considered the intrapartum transfer "urgent"	Risk factor is identified in labor which requires transfer to acute care setting. Situation is urgent and rapid transport is required. Basic emergency treatment may be instituted at the birth center (or mother's home)
Hemorrhage	>1000 mL estimated blood loss	Cumulative blood loss of ≥1000 mL or blood loss accompanied by signs/symptoms of hypovolemia within 24 h after the birth process (includes intrapartum loss)
Urgent postpartum transfer	Midwife considered the postpartum transfer "urgent"	Emergency postpartum transfer—Risk factor during postpartum which requires transfer to acute care setting. Situation is urgent and rapid transport time is required. Basic emergency treatment is initiated at the birth center (or mother's home)
Maternal hospitalization	Any maternal hospitalization in the first 6 wk postpartum; does not include postpartum transfers who were in ED only (eg, suturing complex tears without being admitted to an inpatient ward)	Maternal readmission before 6 wk
Neonatal health outcomes		
Urgent neonatal transfer	Midwife considered the neonatal transfer "urgent"	Emergency newborn transfer— Newborn risk factor is identified, which requires transport to acute care setting. Situation is urgent and rapid transport is required. Basic emergency treatment is initiated at the birth center (or mother's home)
Neonatal hospitalization	Any neonatal hospitalization in the first 6 wk; does not include neonatal transfers who were in ED only (eg, for pediatrics assessment of congenital anomalies who were then sent home)	Newborn readmission before 6 wk
NICU admission	Any NICU admission in the first 6 wk	Newborn admission to NICU after newborn transfer or hospital birth
Intrapartum death	Fetus was alive at the onset of labor and died before birth	IUFD after the onset of labor AND after admission to the birth center for intrapartum care (transfers upon initial assessment would not be included)
Neonatal death	Liveborn infant who died during the first 27 complete days	Infant died after birth (in any setting) and before 28 d of age

ED indicates emergency department; IUFD, intrauterine fetal demise; MANAStats, Midwives Alliance of North America Statistics; NICU, neonatal intensive care unit; PDR, Perinatal Data Registry.

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When presenting results, we differentiate between "process of care" outcomes and "health" outcomes. Process of care outcomes are those for which the ideal incidence is not zero—for example, some proportion of cesarean births is necessary to prevent maternal and child mortality.[17] The other process of care outcomes are transfers—intrapartum, postpartum, and neonatal. Clinicians in any care setting expect to transfer care when complications beyond their scope of practice arise. In the U.S. community birth setting specifically, community-to-hospital transfers occur during or immediately after 15%–20% of laborers,[16,18] when the labor would benefit from additional equipment or personnel available in a hospital.

Health outcomes, in contrast, are those events with a preferred zero or near-zero incidence. Maternal health outcomes in our analysis are urgent intrapartum transfers (ideally, the need for transfer is recognized before the situation becomes urgent), hemorrhage, urgent postpartum transfer, and maternal hospitalization. We did not assess maternal deaths in this study because very few maternal deaths occurred in these registries. Neonatal health outcomes included urgent neonatal transfers, neonatal hospitalization, NICU admission, and intrapartum or neonatal death. We were unable to calculate home/birth center comparisons for intrapartum/neonatal death using the PDR data because only one event occurred in the home birth group in the PDR dataset; thus, for death outcomes, our analysis used MANAStats only. In addition, the urgency of intrapartum transfer was not noted for those PDR patients who transferred immediately and were never admitted to community birth care. These records were dropped from the analysis of urgent intrapartum transfer.

Covariables

Maternal demographics included race/ethnicity, marital status, education, and eligibility for public health insurance (all dichotomized for models). Pregnancy-related risk factors included maternal age, pre-gravid body mass index, and parity. The body mass index variable included more missing data than other covariables; thus, "missing" was considered a valid category during analyses, so those records were not eliminated from the models.[19] Attending provider credentials had 3 categories: certified nurse midwife (CNM), certified professional midwife (CPM), and other provider. A few states (eg, New York) recognize a certified midwife credential; these are grouped with CNMs, as are the few individuals who hold both CNM and CPM credentials. "Other provider" is comprised of midwifery students practicing under supervision, physicians, providers with other, non-midwife credentials (eg, naturopathic doctor, women's health nurse practitioner), and licensed midwives/direct-entry midwives who do not hold a CPM credential.

Analyses

Data were analyzed using unconditional logistic regression models, and we present frequencies, as well as adjusted odds ratio (aOR) estimates. Adjusted models included as confounders all covariables listed previously. All neonatal health outcomes models, except those for intrapartum death, were limited to liveborn infants. Maternal hemorrhage models were limited to vaginal births only, and maternal hospitalization models included cesarean as an additional confounder. Both postpartum and neonatal transfer (any and urgent) models were limited to the population at risk (ie, those who did not transfer intrapartum); however, frequencies for these outcomes are presented with the entire sample in the denominator to be consistent with previous publications.[16,18] All analyses were conducted twice, once for each dataset.

We conducted 2 sensitivity analyses to assess the robustness of our analysis assumptions. First, from MANAStats, we were able to differentiate between those women with a history of cesarean, who also had a history of vaginal birth and those who have had only cesareans. Prior work in community birth settings suggests those parturients with a history of cesarean and also at least one vaginal birth have very good outcomes in (indeed, better outcomes than primiparas).[15,20] Our first sensitivity analysis reran the MANAStats models with this group included. Second, we repeated the analysis in the PDR, excluding entirely those individuals who experienced immediate intrapartum transfers and were never 'admitted' to community birth care in labor, in line with how prior publications handled this group.[16]

This analysis using de-identified data from both registries was approved by the IRB (Oregon State University). Analyses were conducted using SPSS version 24.0.0.0 (IBM Corporation) and R version 3.3.2 (R Foundation for Statistical Computing).

RESULTS

Demographics and pregnancy characteristics are shown in Table 2. Consistent with prior research on community birth in the United States,[16,18,21,22] our sample was majority white, with relatively few who qualified for public insurance. Nearly all were married or partnered; roughly one-third were primiparous. There were some key differences between the two datasets, reinforcing our decision to analyze them separately. For example, in MANAStats, planned home births were much more likely to be a woman with a Bachelor's degree (or higher) education, 53% home versus 43% birth center, but in the PDR, people planning birth center births were more likely to have this level of education (44% vs 57%). The PDR had a more racially diverse sample, with 22% of people of color in the PDR versus 14% in MANAStats. Finally, CNMs contributed the majority of PDR data (91%), and CPMs contributed the majority of MANAStats data (67%).

Process of care outcomes by planned place of birth are shown in Table 3. All odds ratios are home compared with a birth center. Results for transfers were consistent between the two datasets; people in the home birth group transferred less often than people in the birth center group. This was true for all 3 types of transfers, but a stronger protective effect was present in the PDR data. In the PDR,

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TABLE 2. Demographic and Pregnancy Risk Factor Variables for Women Planning a Community (Home or Birth Center) Birth at the Onset of Labor

	MANAStats (n = 64,819)		PDR (n = 50,043)	
Variable name	**Planned home births, n (%)**	**Planned birth center births, n (%)**	**Planned home births, n (%)**	**Planned birth center births, n (%)**
Total	44,255 (68.3)	20,564 (31.7)	1704 (3.4)	48,339 (96.6)
Midwife-identified race of mother				
White, non-Hispanic	38,197 (86.3)	17,699 (86.1)	1378 (80.9)	37,806 (78.2)
Black	852 (1.9)	312 (1.5)	107 (6.3)	3267 (6.8)
American Indian/Alaska Native	147 (0.3)	133 (0.6)	12 (0.7)	243 (0.5)
Asian	1017 (2.3)	478 (2.3)	31 (1.8)	885 (1.8)
Hispanic	2791 (6.3)	1199 (5.8)	129 (7.6)	3996 (8.3)
Native Hawaiian/Pacific Islander	—	—	4 (0.2)	126 (0.3)
Mixed	1127 (2.5)	643 (3.1)	26 (1.5)	919 (1.9)
Unknown	124 (0.3)	100 (0.5)	17 (1.0)	1093 (2.3)
Pregnant person is married or partnered	42,300 (95.6)	19,089 (92.8)	1627 (95.5)	45,699 (94.5)
Maternal education: at least a Bachelor's degree	23,296 (53.1)	8604 (42.7)	750 (44.0)	27,706 (57.4)
Public insurance	5639 (12.7)	4332 (21.1)	350 (20.5)	12,803 (26.5)
Mother is age > 35	7146 (16.2)	2121 (10.3)	272 (16.0)	5309 (11.0)
Pre-gravid BMI				
< 18.5	1860 (4.2)	758 (3.7)	49 (2.9)	1508 (3.1)
18.5– < 25	28,202 (63.7)	12,174 (59.2)	832 (48.8)	24,047 (49.7)
25– < 30	8606 (19.4)	4420 (21.5)	281 (16.5)	8952 (18.5)
30– < 35	2992 (6.8)	1732 (8.4)	96 (5.6)	3213 (6.6)
35+	1589 (3.6)	986 (4.8)	48 (2.8)	1480 (3.1)
Unknown	1006 (2.3)	494 (2.4)	398 (23.4)	9139 (18.9)
Parity and history of cesarean				
Primiparous	13,335 (30.1)	8907 (43.3)	402 (23.6)	19,951 (41.3)
Multiparous, no history of cesarean	29,443 (66.5)	11,299 (54.9)	1302 (76.4)	28,288 (58.7)
Multiparous, history of both cesarean and vaginal birth	1477 (3.3)	358 (1.7)	—	—
Provider				
CNM/CM*	6455 (14.6)	3181 (15.5)	1506 (88.4)	44,074 (91.2)
CPM	30,358 (68.6)	12,981 (63.1)	181 (10.6)	3073 (6.4)
Other provider†	7442 (16.8)	4402 (21.4)	17 (1.0)	1192 (2.5)

Data come from 2 sources: the Midwives Alliance of North America Statistics Project (MANAStats, birth years 2012-2018) and the American Association of Birth Centers' Perinatal Data Registry (birth years 2012–2019).

*Includes those dually credentialled with both CNM and CPM or CM and CPM.

†Includes naturopaths, students practicing under supervision, licensed midwives who do not have CNM, CM, or CPM credentials, and physicians.

BMI indicates body mass index; CM, certified midwife; CNM, certified nurse midwife; CPM, certified professional midwife; MANAStats, Midwives Alliance of North America Statistics; PDR, Perinatal Data Registry.

people planning home births had about a 40% reduction in the adjusted odds of transfers: aOR (95% CI) for intrapartum transfer 0.63 (0.52–0.77), postpartum 0.63 (0.39–1.02), and neonatal 0.60 (0.37–0.97). In MANAStats data, the effects were also internally consistent, at about a 15% reduction in risk of transfer: intrapartum 0.87 (0.82–0.92), postpartum 0.86 (0.77–0.96), neonatal 0.80 (0.70–0.92). Here and throughout, narrower confidence intervals in the MANAStats data are a result of a more evenly distributed sample across the 2 birth sites; CIs in the PDR are more likely to cross 1.0 as a result.

Interestingly, the results for cesarean were not consistent between the two datasets: in the PDR data, people planning home births had increased odds of cesarean [1.32 (1.02–1.70)], whereas in the MANAStats data, planned place of birth was not associated with cesarean [0.95 (0.88–1.03)]. Sensitivity analyses did not affect any of these processes of care results (Supplemental Tables 2 and 3, Supplemental Digital Content 1, http://links.lww.com/MLR/C898).

Maternal health outcomes by planned place of birth are shown in Table 4. Urgent intrapartum transfers were less common among planned home births in MANAStats [0.87 (0.78–0.98)] but not the PDR [1.06 (0.56–2.01)]. Neither urgent postpartum transfers nor hemorrhage was associated with planned birthplace in either dataset. Maternal hospitalization in the first 6 weeks was less common among planned home births in MANAStats [0.85 (0.76–0.95)], but not in the PDR [0.97 (0.54–1.74)]. Sensitivity analyses did not substantively alter these results (Supplemental Tables 2 and 3, Supplemental Digital Content 1, http://links.lww.com/MLR/C898).

Fetal and neonatal health outcomes by planned place of birth are shown in Table 5. Urgent neonatal transfers and hospitalization were less common among planned home births in MANAStats [0.81 (0.69–0.96) for transfer and 0.90 (0.82–0.98) for hospitalization] but not the PDR. Conversely, fewer NICU admissions were found among planned home births in the PDR data [0.54 (0.28–1.00)] but not in MANAStats. Sensitivity analyses

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TABLE 3. Comparison of Process of Care Outcomes for Women With Low-Risk Pregnancies Planning a Home Birth at the Onset of Labor Versus Low-Risk Individuals Planning a Birth Center Birth

Variable name	Total sample, n (%)	Planned home births, n (%)	Planned birth center births, n (%)	aOR (95% CI)*
Outcome				
Total sample				
PDR	50,043	1704 (3.4)	48,339 (96.6)	—
MANAStats	62,984	42,778 (67.9)	20,206 (32.1)	—
Intrapartum transfer—all				
PDR†	7647 (15.6)	116 (7.7)	7531 (15.8)	0.63 (0.52–0.77)
MANAStats	7549 (12.0)	4473 (10.5)	3076 (15.2)	0.87 (0.82–0.92)
Cesarean				
PDR	2330 (4.7)	69 (4.1)	2261 (4.7)	1.32 (1.02–1.70)
MANAStats	2814 (4.5)	1694 (4.0)	1120 (5.6)	0.95 (0.88–1.03)
Postpartum transfer—all‡				
PDR	923 (2.2)	17 (1.3)	906 (2.3)	0.63 (0.39–1.02)
MANAStats	1430 (2.3)	900 (2.1)	530 (2.6)	0.86 (0.77–0.96)
Neonatal transfer—all‡ §				
PDR	958 (2.3)	17 (1.3)	941 (2.3)	0.60 (0.37–0.97)
MANAStats	958 (1.5)	583 (1.4)	375 (1.9)	0.80 (0.70–0.92)

Process of care outcomes are those for which the ideal incidence is above zero: from a community birth practice, we expect some proportion of laboring persons to require hospital care or resources during or immediately after the birth. Thus transfers are expected. Similarly, some proportion of laboring women will require cesareans, regardless of the planned place of birth. Data are from 2 large community birth data registries in the United States: the Perinatal Data Registry (2012–2019) and MANAStats (20121–2018). Results are from unconditional logistic regression models. All odds ratios are presented as planned homes compared with planned birth centers; an odds ratio <1 means that the outcome is less common among planned home births, and an odds ratio >1 means the outcome is more common among planned home births.

*Adjusted for provider credential (certified professional midwife, certified nurse midwife/certified midwife, other), maternal demographics (public insurance, maternal education, maternal race/ethnicity, married/partnered), and pregnancy-related risk factors (advanced maternal age, pre-gravid body mass index, parity).

†Women not admitted to community birth care once in labor (ie, immediate intrapartum transfers) were counted as having experienced this outcome. This applies to the PDR data only (see "Methods" section).

‡Models are limited to no intrapartum transfer, but percentages in the first 3 columns were calculated with the entire sample as the denominator, to be consistent with previous publications using these data.

§Models are limited to no known IP death (deaths of unknown timing are retained); denominators for percentages are likewise limited to liveborn infants only.

aOR indicates adjusted odds ratio; IP, intrapartum; MANAStats, Midwives Alliance of North America Statistics; PDR, Perinatal Data Registry.

produced similar results (Supplemental Tables 2 and 3, Supplemental Digital Content 1, http://links.lww.com/MLR/C898).

As discussed in the Methods section, fetal/neonatal death analyses were conducted in MANAStats only. Planned place of birth was not associated with death overall [1.07 (0.68–1.67)], but separating intrapartum and neonatal deaths suggests a possible increase in intrapartum deaths [1.26 (0.67–2.40)] alongside a decrease in neonatal deaths [0.89 (0.47–1.69)] for planned home births. These results were not statistically significant, and the sensitivity analysis subset did not alter results (Supplemental Table 3, Supplemental Digital Content 1, http://links.lww.com/MLR/C898).

DISCUSSION

In this study, we explored whether key maternal and neonatal outcomes differed by planned place of birth for people with low-risk pregnancies in the U.S. community setting, using 2, large, national, validated registries. Because a plan to give birth in either community setting includes transfer to a hospital when complications arise, and because both community settings have similar interventions and skilled attendants available, we hypothesized that outcomes would be similar. Nonetheless, because there are potential differences between home and birth center patient populations, and because birth centers and home birth practices are governed by different sets of practice standards, regulatory guidelines, and levels of health system integration,[23] we recognized that planned home and birth center birth samples might well have different outcomes, as posited by ACOG.[5]

Overall, our findings support the first hypothesis: outcomes for planned home and birth center births in the United States are comparable to each other, for low-risk pregnancies. This finding aligns with previous work conducted in other high-income nations nations.[6,24–26] Notably, our findings do not support ACOG's current position, that birth in an accredited birth center birth is preferable to home birth.[5]

Despite this overall finding of no clinically meaningful differences in health outcomes, we identified some process of care differences that may be important. For instance, we found that transfers from home to hospital tended to occur at lower rates than transfers from birth center to hospital. This may be secondary to differences in identity for people who can access home birth versus birth center birth (Table 2). Because birth center births are more commonly covered by insurance, and more widely accepted as a "safe" option by family members and obstetric collaborators,[5,6,27] people who access home birth in the United States are a highly selected sample. Prior work suggests many people who do choose home birth do so because of a strong desire to avoid hospital-based interventions;[28] this could explain at least some of the lower likelihood of transfer.

An alternative explanation focuses on the system more so than the birthing person. Birth centers in the United States generally have transfer criteria as required

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TABLE 4. Comparison of Maternal Health Outcomes for Women With Low-Risk Pregnancies Planning a Home Birth at the Onset of Labor Versus Low-Risk Individuals Planning a Birth Center Birth

Variable name	Total sample, n (%)	Planned home births, n (%)	Planned birth center births, n (%)	aOR (95% CI)*
Outcome				
Total sample				
PDR	50,043	1704 (3.4)	48,339 (96.6)	—
MANAStats	62,984	42,778 (67.9)	20,206 (32.1)	—
Intrapartum transfer—urgent				
PDR†	352 (0.8)	10 (0.7)	342 (0.8)	1.06 (0.56–2.01)
MANAStats	1320 (2.1)	800 (1.9)	520 (2.6)	0.87 (0.78–0.98)
Hemorrhage‡				
PDR	2779 (5.9)	89 (5.5)	2690 (5.9)	0.97 (0.78–1.21)
MANAStats	3225 (5.4)	2159 (5.3)	1066 (5.6)	0.99 (0.91–1.07)
Postpartum transfer—urgent§				
PDR	340 (0.8)	9 (0.7)	331 (0.8)	0.85 (0.44–1.67)
MANAStats	769 (1.2)	490 (1.1)	279 (1.4)	0.88 (0.76–1.03)
Maternal hospitalization, through 6 wk postpartum‖				
PDR	357 (0.9)	12 (0.8)	345 (0.9)	0.97 (0.54–1.74)
MANAStats	1398 (2.2)	871 (2.0)	527 (2.7)	0.85 (0.76–0.95)

Data are from 2 large community birth data registries in the US: the Perinatal Data Registry (2012–2019) and MANAStats (20121–2018). Results are from unconditional logistic regression models. All odds ratios are presented as planned home compared with planned birth centers; an odds ratio <1 means that the outcome is less common among planned home births, and an odds ratio >1 means the outcome is more common among planned home births.

*Adjusted for provider credential (certified professional midwife, certified nurse midwife/certified midwife, other); maternal demographics (public insurance, maternal education, maternal race/ethnicity, married/partnered); and pregnancy-related risk factors (advanced maternal age, pre-gravid body mass index, parity).

†Drops patients who transferred before being admitted to community birth care, because we don't know whether they were urgent or not. Denominators are now 1671 homes, 45,784 birth centers, and 47,455 total.

‡Models are limited to vaginal births only; denominators for percentages are vaginal births only.

§Models are limited to no intrapartum transfer, but percentages in the first 3 columns are calculated with the entire sample as the denominator, to be consistent with prior publications using these data.

‖Models control, in addition, for cesarean delivery.

aOR indicates adjusted odds ratio; MANAStats, Midwives Alliance of North America Statistics; PDR, Perinatal Data Registry.

by accrediting bodies, insurers, and/or receiving providers and hospitals, regardless of the strength of evidence underpinning such criteria. Independent home birth practices are often more able to engage in true informed shared decision-making with clients, with more flexibility to accommodate client preferences.[23] The greater degree of integration into maternity care systems enjoyed by many birth center providers,[29] including birth center midwives who have local hospital privileges, may also mean that both patients and midwives are less concerned about transferring to the hospital from birth centers. Those who consider transfer from planned home birth might fear loss of continuity of provider, as well as possible mistreatment and judgment upon arrival at the hospital.[30,31] Indeed, in one large national study on experiences of care, many participants reported mistreatment and abuse (staff shouting, ignoring, scolding, threatening, doing invasive procedures without consent) during childbirth; this was especially true for Black and Indigenous people who transferred to a hospital from a planned home birth.[32] To the extent that previous hostile transfer experiences among home birth midwives[30,31] and previous hostile hospital birth experiences among people choosing home birth[6,28,32–34] contribute to reluctance to transfer, we collectively need to work together to improve the experience of transfer for all community birth patients. Transfer from community settings is often necessary;[16,18,35] systems discouraging such transfers likely cause harm.

Notably, despite fewer transfers in our data, people who planned home births had comparable or better outcomes than people who planned birth center births, across nearly all maternal and neonatal outcomes: fewer maternal or neonatal hospitalizations, fewer NICU admissions, fewer or no association with urgent transfers, no association with hemorrhage or fetal/neonatal death. One exception was cesarean; in the PDR data (but not the MANAStats data), people planning home births had an increased risk of cesarean. This could be related to the transfer discussion previously: if people accessing home birth are more likely to desire an intervention-free birth, and/or are more fearful of poor treatment at the hospital, they might delay transferring. This could lead to a substantial proportion of those who do transfer requiring major interventions. Another, and perhaps more likely, interpretation is that midwives who attend births in birth centers have stronger relationships with hospital-based providers or may even have hospital privileges;[29] providers and administrators may be less opposed (and thus more collaborative with) birth center-based midwives than with home birth midwives. Smoother systems of transfer and professional collaboration between the referring and receiving provider may make hospital-based providers more willing to try, for instance, epidural and augmentation rather than cesarean in response to long, nonprogressive labor. Prior evidence indeed suggests a systems-level effect on intervention rates, especially cesarean rates, after intrapartum transfer from the community setting.[29,36,37]

Finally, and importantly, we found no difference in perinatal mortality between planned home and planned birth center births (aOR: 1.08, 95% CI: 0.69–1.68) in this

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TABLE 5. Comparison of Fetal/Neonatal Health Outcomes for Women With Low-Risk Pregnancies Planning a Home Birth at the Onset of Labor Versus Low-Risk Individuals Planning a Birth Center Birth

Variable name	Total sample n (%)	Planned home births n (%)	Planned birth center births n (%)	aOR (95% CI)*
Outcome				
Total sample				
PDR	50,043	1704 (3.4)	48,339 (96.6)	—
MANAStats	62,984	42,778 (67.9)	20,206 (32.1)	—
Neonatal transfer—urgent†‡				
PDR	375 (0.9)	9 (0.7)	366 (0.9)	0.84 (0.43–1.64)
MANAStats	624 (1.0)	382 (0.9)	242 (1.2)	0.81 (0.69–0.96)
Neonatal hospitalization, through 6 wk postpartum‡				
PDR	1093 (2.7)	30 (2.0)	1063 (2.8)	0.77 (0.53–1.11)
MANAStats	2203 (3.5)	1420 (3.3)	783 (4.0)	0.90 (0.82–0.98)
NICU admission‡				
PDR	594 (1.2)	10 (0.6)	584 (1.2)	0.54 (0.28–1.00)
MANAStats	1213 (1.9)	804 (1.9)	409 (2.0)	0.97 (0.86–1.10)
Intrapartum or neonatal death§				
MANAStats	90 (1.43/1000)	60 (1.40/1000)	30 (1.48/1000)	1.07 (0.68–1.67)
Intrapartum death				
MANAStats	48 (0.76/1000)	34 (0.79/1000)	14 (0.69/1000)	1.26 (0.67–2.40)
Neonatal death‖				
MANAStats	42 (0.67/1000)	26 (0.61/1000)	16 (0.79/1000)	0.89 (0.47–1.69)

Data are from 2 large community birth data registries in the United States: the Perinatal Data Registry (2012–2019) and MANAStats (20121–2018). Results are from unconditional logistic regression models. All ORs are presented as planned homes compared with planned birth centers; an odds ratio <1 means that the outcome is less common among planned home births, and an odds ratio >1 means the outcome is more common among planned home births. Multiparous, history of both cesarean and vaginal birth.

*Adjusted for provider credential (certified professional midwife, certified nurse midwife/certified midwife, other), maternal demographics (public insurance, maternal education, maternal race/ethnicity, married/partnered), and pregnancy-related risk factors (advanced maternal age, pre-gravid body mass index, parity).

†Models are limited to no intrapartum transfer, but percentages in the first 3 columns are calculated with the entire sample as the denominator, to be consistent with our previous publications. Because intrapartum transfers are not at risk of these outcomes, these rows were not repeated after dropping immediate intrapartum transfers (ie, those not admitted) in the PDR because the odds ratios would be exactly the same.

‡Models are limited to no known intrapartum death (deaths of unknown timing are retained); denominators for percentages are likewise limited to liveborn infants only.

§Data presented from MANAStats only because only 1 death occurred in the home birth group in the PDR, rendering effect estimates unstable.

‖Models are limited to no known intrapartum death (deaths of unknown timing are not retained); denominators for percentages are likewise limited to liveborn infants only.

aOR indicates adjusted odds ratio; MANAStats, Midwives Alliance of North America Statistics; NICU, neonatal intensive care unit; PDR, Perinatal Data Registry.

low-risk cohort. One of the main critiques of planned home birth levied by obstetricians is the increased risk of death.[5,38,39] This criticism is not supported by these data.

Limitations

Our analysis is not without limitations. First, ideally, we would have been able to merge the 2 datasets, to increase power and simplify the reporting of results. This was not possible, for reasons discussed previously. Second, and related, the entire MANAStats sample contained only 92 perinatal deaths, which is a small number from which to inform policymaking. Nonetheless, given the large overall sample size, we had 90% power to detect a 2% or larger difference in death rates between the two community birth sites, so if there was a clinically meaningful difference, we likely would have found it. Third, these are registry data, which has all the benefits described previously, but which have the potential of selection bias as a limitation. It is possible that midwives who contribute data to these registries are more interested in quality assessment of their own practices and have corresponding better outcomes than midwives who do not. To mitigate this selection bias among midwives who do participate, we have outcomes for all of their cases because both systems require prospective logging of new clients before birth outcomes are known. More than 99% of clients of participating midwives consent to be included in the MANAStats registry.[40] Fourth, these are observational data, and thus it is possible there were additional, unmeasured confounders at play.

Finally, our analysis compares planned home to planned birth center births and concludes there are no meaningful differences in outcomes. We have interpreted this as follows: since we know birth centers are safe, and home births have similar outcomes, home births must also be safe for low-risk pregnancies. However, an alternative explanation is possible—what if hospitals really are the safest place to give birth? Although home births are indeed as safe as birth centers, what if our baseline assumption about birth center safety is incorrect, and although they are "the same," neither is ideal, compared with a hospital? Although this explanation is possible, we do not think it has merit. There exists a vast quantity of recent, high-quality analysis of safety in community settings globally, and it collectively points to planned community birth, with a midwife attendant, being a safe option for low-risk pregnancies, provided transfer to specialist care is readily available if necessary.[6,10,26,41–44] Indeed, neither ACOG nor ACNM questions the safety of birth center birth.[5,7] Our assessment of the state of knowledge on this topic is

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that planned birth center birth is safe for low-risk pregnancies and reduces the rates of obstetric interventions, and so, based on our data, is planned home birth.

CONCLUSIONS

This is, to date, the largest study comparing low-risk planned homes to low-risk planned birth center birth in the United States. We found evidence that outcomes from planned home births are comparable to outcomes from planned birth center births, across numerous outcomes, including maternal or neonatal hospitalization, hemorrhage, NICU admission, and perinatal death. Our findings suggest both planned home and birth center birth offer similar levels of safety in low-risk pregnancies. ACOG's current Committee Opinion, which supports birth center birth but advises against home birth, is not supported by this evidence. Critical next steps include revising such guidance, as well as improving integration and smooth transfers when complications do arise,[6,30,31] to ensure that all pregnant people have equitable access to all birth settings.

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