

Unraveling the Tapestry: Variations in Midwifery and Community Birth Utilization Among Asian Subgroups

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Abstract

Background: This article examines the utilization patterns of community birth (CB) and midwife-attended birth (MAB) among Asian/Pacific Islander (API) populations in the United States. It highlights the presence of significant racial-ethnic disparities and discusses cultural variations that influence these birth choices.

Objectives: To describe variation in the probability of CB and MAB in low-risk pregnancies across API communities and to explore contributors to these variations, including traditional birth practices, cultural beliefs, and acculturation.

Methods: The study employs logistic regression analysis of 2010-2020 birth certificate data to examine the probability of CB and MAB across pan-ethnic racial-ethnic groups and API subgroups. The data include information on place of birth, birth attendant, maternal demographics, and race-ethnicity, providing a comprehensive view of maternity care utilization among diverse populations.

Results: The findings reveal that CB and MAB rates are significantly lower among API groups compared to other pan-ethnic groups. Among API subgroups, there is substantial heterogeneity in the uptake of CB and MAB, with lower rates among Asian Indians and Chinese birthing people and higher rates in Hawaiian, Japanese, and Guamanian populations.

Conclusion: The study underscores the importance of addressing racial-ethnic disparities in maternity care and promoting culturally sensitive approaches. Factors such as traditional birth customs, cultural beliefs, and acculturation significantly influence the choice of maternity care among API communities. Tailored interventions that consider the cultural differences and values of API subgroups are essential to enhancing the adoption of low-intervention care models and reducing healthcare disparities in maternal and infant outcomes.

Key words: Community birth, Midwifery, Racial-ethnic disparities, Asian/Pacific Islander (API) populations, Cultural Differences

Practitioner Points

1. **Addressing Racial-Ethnic Disparities:** Practitioners should recognize and address racial-ethnic disparities in the uptake of community birth (CB) and midwife-attended birth (MAB) among different populations, including within Asian/Pacific Islander (API) communities. Understanding these disparities can help practitioners design and implement culturally tailored interventions to promote equitable access to evidence-based maternity care.

2. Cultural Sensitivity and Awareness: Given the heterogeneity within API subgroups and their diverse traditional birth practices, practitioners should prioritize cultural sensitivity and awareness in their care approaches. This includes understanding and respecting traditional birth customs, dietary recommendations, and beliefs about pregnancy and childbirth, which can significantly influence a person's choice of maternity care.
3. Promotion of Low-Intervention Care Models: Practitioners should advocate for and support access to midwifery care for low-risk API births in the U.S., emphasizing spontaneous labor, freedom of movement, continuous labor support, and reduced routine interventions. Encouraging the adoption of low-intervention care models, especially in community birth settings, can contribute to improved maternal and infant health outcomes and reduce healthcare disparities.

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INTRODUCTION

The midwifery model of care aligns with evidence-based maternity care: spontaneous labor, freedom of movement, continuous labor support, no routine interventions, spontaneous pushing, and no separation of mother and baby.¹⁻³ Community birth (CB) settings offer the most support for a low-intervention midwifery approach. (CB refers to birth at home or in a free-standing birth center.) While a high-tech medical model of hospital birth dominates birth in the U.S.,^{4,5} research has shown that CB and midwife-attended birth (MAB) are associated with a lower likelihood of mistreatment and lower intervention-associated maternal morbidity in U.S. births.^{1,6-9} Midwives attend approximately 10% of American births, and 1-2 percent occur outside a hospital setting.¹⁰⁻¹² Since 2004, CB rates have increased substantially, especially for non-Hispanic white births. Midwives also attend a growing number of births, both inside and outside hospital settings, with excellent outcomes.^{10,13-15} However, racial-ethnic disparities in birth outcomes in the U.S. suggest that more access to evidence-based midwifery approaches in non-white populations could be a useful point of intervention for improving maternity care outcomes.

CB and MAB rates are particularly low in Asian/Pacific Islander (API) populations in the U.S., although pan-ethnic categories like API are diverse and conceal significant internal variation.¹⁶⁻¹⁸ API groups living in the U.S. come from different countries and cultures, with significant variation in traditional birth practices and their adoption of the medical model of childbirth.²⁰⁻⁴¹ Traditional birth customs in many patrilineal Asian countries involve cultural dietary recommendations, behavioral taboos, balancing of bodily energies, and a month-long period of confinement after the birth.^{20,33,34,40,42} In contrast, traditional Pacific Island birth customs tend to emphasize support networks of women and the honor of motherhood in a matrilineal kinship system.^{22,32,36} Asian and

Pacific Island countries also vary in their utilization of pre- and post-natal care and their maternal and infant mortality rates.^{32,35,40} Some highly modern Asian countries, like South Korea, Japan, and Singapore, have high rates of prenatal care and childbirth education and low maternal and infant mortality.¹⁹ Countries like Japan have incorporated a low-intervention midwifery model of care into the hospital setting and have maintained a robust tradition of CB.^{25,28,38} Others, like China and South Korea, have increasingly adopted the medical model over time, especially in urban areas and higher income populations.^{20,27,30,37,41}

Once they are in the U.S., ethnic groups with large immigrant populations, like Asians, often face language barriers that can limit their knowledge about resources like pregnancy and birth support groups and which can cause stress in interactions with care providers.¹⁹ Indian and Vietnamese mothers have reported experiences with racist treatment in American maternity care and Pacific Islanders often experience different treatment depending on their skin tone, with darker-skinned women receiving worse treatment.¹⁹ For these reasons, use of CB and MAB may vary significantly across API subgroups and it is important to disaggregate these groups to better understand their maternity care needs. This paper examines differences in CB and MAB utilization in API births in the U.S. We use birth certificate data from 2010-2020 to analyze primary attendant (midwife versus MD) and place of birth (defining births outside hospitals as “community births”).

METHODS

We use data from the National Center for Health Statistics (NCHS) on all recorded births in the United States from 2010-2020. Since high-risk pregnancies are often ineligible for midwifery care and CB, we isolate the analysis to low-risk pregnancies: at term (37-41 weeks), in mothers with no previous cesarean, carrying a single infant with vertex presentation, and without placenta previa, placenta abruption, premature rupture of membranes, cord prolapse, or maternal diabetes or

hypertension (N=22,212,076). NCHS data include the place of birth (home, hospital, or free-standing birth center), the birth attendant (midwife, physician, or other), and maternal age, education, marital status, parity, and race-ethnicity (self-defined). There are no measures of income in the NCHS data, thus mother's education is the best available measure of socio-economic status. The NCHS data also include measures for payer (private insurance, public insurance, or no insurance), which significantly influences place of birth. While CB costs much less than hospital birth, insurance companies, Medicaid and the VA do not always cover these births and out-of-pocket costs can make CB cost-prohibitive.¹¹

Missing Data Imputation

Some states had extensive missing data, especially before 2016, due to slow adoption of the 2003 revised birth certificate. For example, some states have no data for maternal education and health insurance status (private, public, or no insurance) in some years. Previous research has used listwise deletion of missing cases or has excluded data for states and years with missing data on maternal education.^{43–45,45,46} In contrast, we used multiple imputation to generate multiple, iterative, plausible values for missing data and conserve state-years with missing data. Multiple imputation produces unbiased estimates and is a statistical “best-practice” for conserving cases.⁴⁷ We used PROC MI in SAS to generate five imputations, using OLS regression to model missing values for mother's education and logistic regression to impute missing values for private, public, or no insurance. These models imputed values based on all other estimators in the models that we present below. We then ran logistic regression models across five imputed datasets and used PROC MIANALYZE to pool estimates across the five imputed datasets.⁴⁷

Logistic Regression Models

We performed two sets of logistic regression analysis of CB and MAB. First, using the full sample of low-risk births, we used binary logistic regression to examine differences across pan-

ethnic groups in the probability of CB and MAB (N=22,212,076). Second, we used binary logistic regression to examine differences in the probability of CB and MAB across API subgroups in the subsample of API births (N=1,663,167). Binary logistic regression estimates the probability of a discrete outcome and is appropriate for binary dependent variables like whether birth occurs out-of-hospital or whether the primary birth attendant is a midwife.

RESULTS

In the full sample of low-risk births from 2010-2020, midwives attended 11.32% of all births and 1.79% were CB (Table 1). Childbearing people were an average of 28 years old and had a median education of “some college.” On average, childbearing people were having their second birth and 60.1% were married. Approximately half (49.5%) had private insurance, almost 46% had public insurance (Medicaid, VA, or IHS), and less than 5% were uninsured. Childbearing people could identify as more than one race. Approximately three-quarters self-identified as white (77.2%), 24.4% identified as Hispanic, 15.7% identified as Black, 1.3% identified as American Indian/Alaska Native (AIAN), and 7.5% identified as API. Table 1 breaks down the API subsample by ethnic subgroup.

The first set of binary logistic regression models revealed that the odds of CB and MAB were low for all groups, with significant racial-ethnic differences (Table 2). Non-Hispanic white birthing people (the reference group) are significantly more likely to have a CB and/or to have a midwife as the primary birth attendant than all other racial-ethnic groups. Comparing pan-ethnic groups, API births are the least likely to occur outside a hospital or have a midwife as the primary attendant.

A second set of binary logistic regression models focuses on differences across API subgroups, with Asian Indian as the reference category (Table 3). These models reveal that CB and

MAB vary significantly in the heterogeneous population of Asian and Pacific Islander subgroups. CB is less common among Chinese birthing people than Asian Indians, but more common in all other API subgroups. Among API groups, CB rates are highest for Hawaiian births, followed by Japanese births. For MAB, Indian birthing people are the least likely to have a midwife as their primary birth attendant, compared to all other API subgroups (Table 3). The probability of MAB is highest for Guamanian and Japanese births, followed closely by Filipino, Samoan, other Asian, and Hawaiian births. The results in Table 3 reveal that Asian and Pacific Islander groups are heterogeneous in their uptake of CB and MAB options. We calculated the predicted probability of CB and MAB by racial-ethnic identity to graph these trends (Figures 1 and 2).

We also ran models that controlled for whether the birthing person was born in Asia to consider whether a desire to acculturate in the U.S. might be a source of differences in CB and MAB (not shown). The results suggested that Asian-born mothers have lower odds of CB and MAB than API mothers who were born in the U.S. or another non-Asian country (e.g., Canada or the UK). The direction of the API subgroup effects remained the same as in Table 3, with some changes in magnitude (results available from the first author).

DISCUSSION

The findings suggest that CB and MAB births are more common in some API subgroups than others. Given the racial and ethnic inequality in maternal outcomes, an intervention that focuses on expanding API uptake of CB and MAB in the U.S. may help address these disparities. To develop effective interventions that work towards these goals, one must be aware of cultural differences among API subgroups. Anthropological research has shown, first, that most Asian cultures are patrilineal and share some cultural beliefs about pregnancy and birth as socially isolating conditions. For example, India, Nepal, Bangladesh, and China have traditional taboos about

menstruation, pregnancy, birth, and the postpartum period as polluting.^{26,34,40} Birth customs in most Asian countries also include beliefs about beneficial and harmful foods, use of plants and herbs, massage, and a period of postpartum confinement and rest. Parts of Asia where traditional birthways are common tend to have low uptake of prenatal and maternity care, partly due to beliefs that hospitals are places for sick and dying people and that obstetric interventions are harmful.^{22,40} However, earlier colonization and later development projects have promoted the medical model of hospital birth as the “modern” method of birthing in parts of Asia.³² In South Korea, birth moved from home to hospital over the last few generations.²⁰ In China, most births in urban areas occur in hospitals with overuse of obstetric interventions, especially for higher income mothers.^{27,37,41} In contrast, Japan has integrated a midwifery model into contemporary hospital births and also maintains freestanding birth centers.^{25,28,38}

Pacific Island birthways differ substantially from Asian traditions. Pacific Island cultures have matrilineal kinship systems that emphasize the honor and respect associated with motherhood, the spiritual dimensions of birth, and the use of inner strength to facilitate an unmedicated vaginal birth.^{22,32,36} As a result, Pacific Island cultures have a tradition of homebirth with traditional midwives and social support from other women in the community.^{22,23,36} Previous research has found that Pacific Islanders who gave birth in the U.S. used negative emotional language to describe their experiences with medicalized hospital birth.²² Pacific Island cultures have not embraced the medical model to the same extent as some Asian countries. Recognizing these cultural differences is important, since interventions to expand CB and MAB will likely be better received among groups whose cultures and values are consistent with these models of birth.

Limitations

While the NCHS data are the best available population-level data on place of birth and birth attendant with detailed information about racial-ethnic subgroup, there are known problems with

birth certificate data. State vital statistics offices must register all births and then transmit the birth certificate data to NCHS, and states vary in the timing of their adoption of revised birth certificate forms and their oversight over data collection. In CB, the birth attendant (usually a midwife) collects the information to complete the birth certificate. In hospital births, a nurse or hospital registrar collects the information. Data quality depends on the training of the staff completing the birth certificate, and lean budgets since the late 1990s have reduced standards for the timeliness and quality of data.⁴⁸ Birth certificates are imperfectly correlated with medical record data, where medical records represent the “gold standard.” Agreement between birth certificates and medical records is “almost perfect” for delivery type (vaginal or cesarean), prior obstetric history, and Apgar score. Agreement with medical records is “substantial” for several other variables, including gestational age, but is only moderate for most maternal risk factors and complications of pregnancy, labor, and delivery.⁴⁸ Data quality problems could lead to under-counts of risks and complications. Additionally, we treat all out-of-hospital births as CB, but birth certificate data cannot distinguish between planned and unplanned births outside hospitals.¹¹

Finally, the racial-ethnic identification questions on birth certificates do not distinguish all API subgroups, combining different countries with different cultures, histories, and religious traditions into the “other Asian” category (e.g., Thai, Vietnamese, Cambodian, Bengali, Pakistani, and Afghani) and “other Pacific” category (e.g., Tongan, Fijian, etc.). Additionally, all self-identified ethnic categories combine first, second, and third generation immigrants together.

CONCLUSIONS

In sum, the odds of CB and MAB are significantly lower in API births in the U.S. than in other pan-ethnic groups, but this conceals significant variation among API subgroups. This study used NCHS data to analyze the odds of CB and MAB among seven Asian and four Pacific Islander

subgroups: Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, Other Asian, Hawaiian, Guamanian, Samoan, and Other Pacific Islander. Results from logistic regression models reveal that the odds of CB are highest in Japanese and Hawaiian births and lowest in Chinese and Indian births. The odds of a MAB are also lower in Chinese and Indian births than in all other API groups. We discussed cultural differences in traditional birthways and degree of medicalization as possible sources of these differences. This study documents internal variation in CB and MAB within the pan-ethnic API classification and underscores the importance of addressing racial-ethnic disparities in maternity care and promoting culturally sensitive approaches. Factors such as traditional birth customs, cultural beliefs, and acculturation significantly influence the choice of maternity care among API communities. These insights can inform culturally tailored healthcare interventions that consider the cultural differences and values of API subgroups and promote equitable access to evidence-based low-intervention maternity care models in the U.S.

REFERENCES

1. Goer H, Romano A. *Optimal Care in Childbirth The Case for a Physiologic Approach*. Classic Day Publishing; 2012.
2. Lothian JA. Promoting, Protecting, and Supporting Normal Birth. *J Perinat Educ*. 2002;11(3):viii-x. doi:10.1624/105812402X88777
3. Lothian JA. Healthy Birth Practice #4: Avoid Interventions Unless They Are Medically Necessary. *J Perinat Educ*. 2014;23(4):198-206. doi:10.1891/1058-1243.23.4.198
4. Davis-Floyd RE. *Birth as an American Rite of Passage*. University of California Press; 2003.
5. Simonds W, Rothman BK, Norman BM. *Laboring on: Birth in Transition in the United States*. Taylor & Francis; 2007.
6. Cheyney M, Bovbjerg M, Everson C, Gordon W, Hannibal D, Vedam S. Outcomes of Care for 16,924 Planned Home Births in the United States: The Midwives Alliance of North America Statistics Project, 2004 to 2009. *J Midwifery Womens Health*. 2014;59(1):17-27. doi:10.1111/jmwh.12172
7. MacDorman M, Cheyney M, Caughey AB. Report on birth settings in the US: maternal and neonatal outcomes. *J Pediatr*. 2020;224:179-183. doi:10.1016/j.jpeds.2020.07.024

8. MacDorman MF, Singh GK. Midwifery care, social and medical risk factors, and birth outcomes in the USA. *J Epidemiol Community Health*. 1998;52(5):310-317. doi:10.1136/jech.52.5.310
9. Vedam S, Stoll K, Taiwo TK, et al. The Giving Voice to Mothers study: inequity and mistreatment during pregnancy and childbirth in the United States. *Reprod Health*. 2019;16(1):77. doi:10.1186/s12978-019-0729-2
10. Declercq E. Midwife-Attended Births in the United States, 1990–2012: Results from Revised Birth Certificate Data. *J Midwifery Womens Health*. 2015;60(1):10-15. doi:10.1111/jmwh.12287
11. MacDorman MF, Declercq E. Trends and state variations in out-of-hospital births in the United States, 2004-2017. *Birth*. 2019;46(2):279-288. doi:10.1111/birt.12411
12. MacDorman MF, Barnard-Mayers R, Declercq E. United States community births increased by 20% from 2019 to 2020. *Birth*. 2022;49(3):559-568. doi:10.1111/birt.12627
13. Attanasio L, Kozhimannil KB. Relationship Between Hospital-Level Percentage of Midwife-Attended Births and Obstetric Procedure Utilization. *J Midwifery Womens Health*. 2018;63(1):14-22. doi:10.1111/jmwh.12702
14. Grünebaum A, McCullough L, Klein R, Chervenak FA. US midwife-attended hospital births are increasing while physician-attended hospital births are decreasing: 2003–2018. *Am J Obstet Gynecol*. 2020;223(3):460-461. doi:10.1016/j.ajog.2020.03.031
15. Souter V, Nethery E, Kopas ML, Wurz H, Sitcov K, Caughey AB. Comparison of Midwifery and Obstetric Care in Low-Risk Hospital Births. *Obstet Gynecol*. 2019;134(5):1056. doi:10.1097/AOG.0000000000003521
16. Lee J. Many dimensions of Asian American pan-ethnicity. *Sociol Compass*. 2019;13(12):e12751. doi:10.1111/soc4.12751
17. Okamoto DG. *Redefining Race: Asian American Panethnicity and Shifting Ethnic Boundaries*. Russell Sage Foundation; 2014.
18. Okamoto D, Mora GC. Panethnicity. *Annu Rev Sociol*. 2014;40(1):219-239. doi:10.1146/annurev-soc-071913-043201
19. Nguyen TT, Criss S, Kim M, et al. Racism During Pregnancy and Birthing: Experiences from Asian and Pacific Islander, Black, Latina, and Middle Eastern Women. *J Racial Ethn Health Disparities*. 2023;10(6):3007-3017. doi:10.1007/s40615-022-01475-4
20. Ahn S. Childbirth in Korea. In: Selin H, ed. *Childbirth Across Cultures: Ideas and Practices of Pregnancy, Childbirth and the Postpartum*. Science Across Cultures: the History of Non-Western Science. Springer Netherlands; 2009:77-83. doi:10.1007/978-90-481-2599-9_7
21. Ayers S. Fear of childbirth, postnatal post-traumatic stress disorder and midwifery care. *Midwifery*. 2014;30(2):145-148. doi:10.1016/j.midw.2013.12.001

22. Ayers BL, Purvis RS, Bing WI, et al. Maternal Health Beliefs, Perceptions, and Experiences in a U.S. Marshallese Community. *J Transcult Nurs.* 2020;31(2):144-152. doi:10.1177/1043659619854525
23. Broyles H. Act 32 and Perpetuating Practices of Hawai'i Na Pua o Haumea: How Hawai'i's Midwifery Licensure Law Adversely Impacts Traditional Hawaiian Birthing Practices. *Asian-Pac Law Policy J.* 2021;23:1.
24. Donner H. The place of birth: Childbearing and kinship in Calcutta middle-class families. *Med Anthropol.* 2003;22(4):303-341. doi:10.1080/714966300
25. Fiedler DC. Authoritative Knowledge and Birth Territories in Contemporary Japan. *Med Anthropol Q.* 1996;10(2):195-212. doi:10.1525/maq.1996.10.2.02a00060
26. Goyal D. Perinatal Practices & Traditions Among Asian Indian Women. *MCN Am J Matern Nurs.* 2016;41(2):90. doi:10.1097/NMC.0000000000000222
27. Harris A, Gao Y, Barclay L, et al. Consequences of Birth Policies and Practices in Post-Reform China. *Reprod Health Matters.* 2007;15(30):114-124. doi:10.1016/S0968-8080(07)30315-7
28. Iida M, Horiuchi S, Porter SE. The relationship between women-centred care and women's birth experiences: A comparison between birth centres, clinics, and hospitals in Japan. *Midwifery.* 2012;28(4):458-465. doi:10.1016/j.midw.2011.07.002
29. Kuan CI. "Suffering Twice": The Gender Politics of Cesarean Sections in Taiwan. *Med Anthropol Q.* 2014;28(3):399-418. doi:10.1111/maq.12103
30. Kuan CI. Understanding Technology in Birth Care from the Experiences of Taiwanese Obstetricians. *East Asian Sci Technol Soc Int J.* 2020;14(1):123-136. doi:10.1215/18752160-8234240
31. Liamputtong P, Kitisriworapan S. Authoritative Knowledge, Folk Knowledge, and Antenatal Care in Contemporary Northern Thailand. In: Liamputtong P, ed. *Contemporary Socio-Cultural and Political Perspectives in Thailand.* Springer Netherlands; 2014:465-486. doi:10.1007/978-94-007-7244-1_29
32. Lukere V, Jolly M. *Birthing in the Pacific: Beyond Tradition and Modernity?* University of Hawaii Press; 2001.
33. Naser E. Motherhood and childbirth practices in Asia. In: *Routledge Handbook of Families in Asia.* Routledge; 2015:150-160.
34. Naser E, Mackey S, Arthur D, Klainin-Yobas P, Chen H, Creedy DK. An exploratory study of traditional birthing practices of Chinese, Malay and Indian women in Singapore. *Midwifery.* 2012;28(6):e865-e871. doi:10.1016/j.midw.2011.10.003
35. Nembhard WN, Ayers BL, Collins RT, et al. Adverse Pregnancy and Neonatal Outcomes Among Marshallese Women Living in the United States. *Matern Child Health J.* 2019;23(11):1525-1535. doi:10.1007/s10995-019-02775-8

36. Reed SJ, Callister LC, Kavaefiafi 'Ana, Corbett C, Edmunds D. Honoring Motherhood: The Meaning of Childbirth for Tongan Women. *MCN Am J Matern Nurs.* 2017;42(3):146. doi:10.1097/NMC.0000000000000328
37. Santos G. Birthing Stories and Techno-moral Change across Generations: Coping with Hospital Births and High-tech Medicalization in Rural South China, 1960s–2010s. *Technol Cult.* 2020;61(2):581-616.
38. Shirai C. Historical Dynamism of Childbirth in Japan: Medicalization and its Normative Politics, 1868–2017. *Technol Cult.* 2020;61(2):559-580.
39. White J, Oosterhoff P, Huong NT. Deconstructing 'barriers' to access: Minority ethnic women and medicalised maternal health services in Vietnam. *Glob Public Health.* 2012;7(8):869-881. doi:10.1080/17441692.2012.679743
40. Withers M, Kharazmi N, Lim E. Traditional beliefs and practices in pregnancy, childbirth and postpartum: A review of the evidence from Asian countries. *Midwifery.* 2018;56:158-170. doi:10.1016/j.midw.2017.10.019
41. Zhang J, Santos GD. The Rise in Cesarean Births and the Technocratic Medicalization of Childbirth in Late-Reform China. *Mod China.* Published online February 20, 2024. Accessed February 28, 2024. doi:10.1177/00977004241231474
42. Vo T, Desai M. Immigrant Southeast and East Asian mothers' transnational postpartum cultural practices: A meta-ethnography. *Womens Health.* 2021;17:17455065211060640. doi:10.1177/17455065211060640
43. De Silva DA, Gleason JL. Affordable Care Act (ACA) Implementation and Adolescent Births by Insurance Type: An Interrupted Time Series Analysis of Births between 2009 and 2017 in the United States. *J Pediatr Adolesc Gynecol.* 2022;35(6):685-691. doi:10.1016/j.jpag.2022.07.007
44. Mark NDE, Torrats-Espinosa G. Declining violence and improving birth outcomes in the US: Evidence from birth certificate data. *Soc Sci Med.* 2022;294:114595. doi:10.1016/j.socscimed.2021.114595
45. Rauscher E, Rangel DE. Rising inequality of infant health in the U.S. *SSM - Popul Health.* 2020;12:100698. doi:10.1016/j.ssmph.2020.100698
46. Strully KW, Bozick R, Huang Y, Burgette LF. Employer Verification Mandates and Infant Health. *Popul Res Policy Rev.* 2020;39(6):1143-1184. doi:10.1007/s11113-019-09545-y
47. Rubin DB. *Multiple Imputation for Nonresponse in Surveys.* John Wiley & Sons; 1987.
48. DiGiuseppe DL, Aron DC, Ranbom L, Harper DL, Rosenthal GE. Reliability of Birth Certificate Data: A Multi-Hospital Comparison to Medical Records Information. *Matern Child Health J.* Published online 2002:11.

