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State insurance mandates and racial and ethnic inequities in assisted reproductive technology utilization

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Abstract

Objective: To examine whether the (1) scope of state-mandated insurance coverage for assisted reproductive technology (ART) and (2) proportion of the population eligible for this coverage are associated with reductions in racial/ethnic inequities in ART utilization.

Design: National cross-sectional, ecologic study.

Subjects: We employed estimates from the US Census Bureau of all women 20–44 years of age living in the US in 2018. Data on the number of women who initiated an ART cycle during that year that were reported to the US Centers for Disease Control and Prevention were obtained from the National ART Surveillance System.

Exposure: State mandates were classified according to the scope of required coverage for fertility services: Comprehensive, Limited, and No Mandate.

Main Outcome Measures: Race and ethnic-specific ART utilization rates, defined as the number of women undergoing ≥ 1 ART cycles per 10,000 women, were the primary outcomes. As

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state mandates do not apply to all insurance plans, Comprehensive Mandate utilization rates were recalculated using denominators corrected for the estimated proportions of populations eligible for coverage.

Results: Across all mandate categories, Non-Hispanic (NH) Asian and NH White populations had the highest ART utilization rates, whereas the lowest rates were among Hispanic, NH Black, and NH Other/Multiple Races populations. Compared with the NH Asian reference group, the NH Black population had smaller inequities in the Comprehensive Mandate group than the No Mandate group (rate ratio [RR 0.33 [0.28–0.38] vs. RR 0.23 [0.22–0.24]). Using the Comprehensive Mandate group for each race/ethnicity as the reference, the NH Black and NH Other/Multiple Races populations showed the largest relative differences in utilization between the No Mandate and Comprehensive Mandate groups (RR 0.39 [0.37–0.41] and 0.33 [0.28–0.38], respectively). Within the Comprehensive Mandate group, the disparities in the Hispanic and NH Black populations moved toward the null after correcting for state-mandated insurance eligibility.

Conclusions: Racial/ethnic inequities in ART utilization were reduced in states with comprehensive infertility coverage mandates. Inequities were further attenuated after correcting for mandate eligibility. Mandates alone, however, were not sufficient to eliminate disparities. These findings can inform future strategies aimed at improving ART access under a social justice frame-work.

Abstract

Examinar si el (1) alcance de la cobertura del seguro exigido por el Estado para tecnologia de reproducción asistida (ART) y (2) la proporción de la población elegible para esta cobertura están asociadas con reducciones en la inequidad racial/étnica en la utilización de ART.

Estudio ecológico, transversal nacional.

Empleamos estimaciones del Departamento de Censo de EEUU de todas las mujeres 20-44 años de edad que vivían en EEUU en 2018. Datos del número de mujeres que iniciaron un ciclo de ART durante ese año que fue reportado a los Centros de Control y Prevención de Enfermedades de EEUU fueron obtenidos del Sistema Nacional de Vigilancia de ART.

Los mandatos del Estado fueron clasificados de acuerdo al alcance de cobertura requerida para servicios de fertilidad: Completo, Limitado y sin Mandato.

Las tasas de raza y etnia especifica en la utilización de ART, definidas como el número de mujeres sometidas a ciclos de ART por cada 10,000 mujeres, fueron los principales resultados. Como los mandatos estatales no aplican para todos los planes de seguro, las tasas de utilización del Mandato Completo fueron recalculadas utilizando denominadores corregidos para las proporciones de población estimadas eligibles para cobertura.

En todas las categorías de mandato, las poblaciones No hispanas (NH) asiáticas y NH blancas tuvieron las tasas más altas de utilización de ART, mientras que las tasas más bajas fueron entre poblaciones Hispanas, NH negras, y NH Otras/Múltiples razas. Comparado con el grupo de referencia de NH asiáticas, la población de NH negras tuvo menores inequidades en el grupo de Mandato Completo que el grupo de No Mandato (relación de tasas [RR 0.33 [0.28–0.38] vs. RR 0.23 [0.22–0.24]). Usando el grupo the Mandato Completo para cada raza/etnicidad como la referencia, las poblaciones NH negras y NH otras/múltiple razas mostraron la mayor diferencia relativa en la utilización entre los grupos Sin Mandato y Mandato Completo (RR 0.39 [0.37–0.41]

y 0.33 [0.28–0.38], respectivamente). Dentro del grupo de Mandato Completo, las disparidades en las poblaciones hispanas y NH negras se movieron hacia la nulidad luego de corregir la elegibilidad para el seguro exigido por el Estado.

Las inequidades raciales/étnicas en la utilización de ART fueron reducidas en los estados con cobertura completa de infertilidad. Las inequidades se fueron atenuando luego de corregir el mandato de elegibilidad. Sin embargo, los mandatos por sí solos no fueron suficientes para eliminar las disparidades. Estos hallazgos pueden informar estrategias futuras destinadas a mejorar el acceso a ART bajo un marco de justicia social.

Keywords

Health disparities; state mandates; access to care; assisted reproductive technology

Racial disparities are pervasive in every facet of healthcare and reflect broader social inequities (1, 2). Infertility services maybe particularly susceptible to disparate access because of the high costs of care (3-7), which are not covered services in many health insurance policies. As of 2022, 20 of 50 states of the United States (US) enacted state laws mandating that certain health insurance policies provide coverage for fertility services (8). These mandates may help address economic barriers to fertility services (7, 9, 10).

State-mandated infertility insurance coverage is associated with increased utilization and safety of assisted reproductive technology (ART) treatment through a marked reduction in the multiple pregnancy rate (11). Many previous studies, however, demonstrated that these benefits were not equitably distributed (12-16). An analysis of natality data from 1981 to 1999 found that state-mandated coverage for fertility services was associated with an increase in delivery of firstborns that was generally limited to older, white women (13). In addition, data from the National Survey of Family Growth found no evidence that racial, ethnic, or educational disparities were mitigated by state-mandated coverage for fertility services in effect during 1982–2002 (14). Since these initial publications, additional states have enacted mandates and the scope of coverage for fertility services of many existing mandates has expanded (8). Moreover, many types of health insurance plans (i.e., state and federal public assistance programs, federal and military plans, and private self-insured plans) are excluded from state mandates. The majority of earlier studies did not account for the proportion of each racial/ethnic group enrolled in eligible insurance plans, nor the level of coverage for ART treatment accorded by these mandates.

The primary hypothesis of our study is that the scope of state-mandated insurance coverage for fertility services, as well as the proportion of the population eligible for this coverage, affects a state infertility mandate’s impact on known racial and ethnic inequities in ART utilization. Accordingly, we investigated race/ethnic-specific differences in ART utilization across different levels of state-mandated coverage. Subsequently, we recalculated ART utilization rates on the basis of the estimated proportion of the populations eligible for mandated coverage.

MATERIALS AND METHODS

Study Design, Setting, and Population

This is a national, cross-sectional, ecologic study examining race- and ethnicity-specific ART utilization rates accounting for (1) the level of state-mandated insurance coverage for fertility services in the woman's state of residence and (2) the proportion of the population covered by an eligible policy within each Comprehensive Mandate state. Our research protocol was submitted to the Beth Israel Deaconess Medical Center Committee on Clinical Investigations and it was deemed to not constitute human subjects research, hence no further approval was required (protocol #2022D000169).

We obtained estimated numbers from the US Census Bureau of all reproductive-aged women (defined herein as 20–44 years of age) living in the United States in 2018. We used data from the National ART Surveillance System (NASS) to obtain the number of women who initiated an ART cycle in 2018, as reported by ART clinics to the US Centers for Disease Control and Prevention (CDC) and is required by federal law. ART is defined as all fertility treatments in which either eggs or embryos are handled, including in vitro fertilization (IVF), gamete intrafallopian transfer, and zygote intrafallopian transfer cycles. Women were selected for the study if they initiated one or more ART cycles, excluding long-term oocyte and embryo banking.

Race and ethnicity were classified on the basis of the categories reported by the US Census Bureau: Non-Hispanic (NH) Asian, NH Black, NH White, NH Other/Multiple Races, and Hispanic (any race) (17, 18). The NH Other/Multiple Races group consists of NH American Indian or Alaskan Native, NH Native Hawaiian or Other Pacific Islander, and NH Two or More Races.

Data Sources

More than 98% of all ART cycles performed in the US are captured by NASS (19). These data include patient demo-graphics, reproductive history, infertility diagnoses, and cycle-specific variables and outcomes.

Population estimates from the US Census Bureau from January 1, 2018 to December 31, 2018 were used to approximate the number of reproductive-aged women living in each state. Data on health insurance coverage for this population in 2018 were obtained from the American Community Survey (ACS) (20). The ACS provides state-level information on the proportion of women aged 20–44 in each racial/ethnic group covered by private and public (Medicaid) insurance and the proportion who are uninsured.

The 2018 Medical Expenditure Panel Survey (MEPS) of the Agency for Healthcare Research and Quality provides national estimates of health care use, expenditures, sources of payment, and health insurance coverage for US civilians (21). This survey collects household-level data reported by a single household respondent. A medical provider supplements and verifies payment-related data. MEPS provides state-level estimates of the proportions of private plan enrollees who are enrolled in self- vs. fully-insured health plans (21, 22).

Classification of State-Mandated Insurance Coverage for Fertility Services

There are distinct differences in the scope of state infertility insurance mandates (8), but no universal classification system for state mandates. We, therefore, classified each state mandate into Comprehensive or Limited Mandate categories by assessing which mandate requirements would most impact ART utilization. For classification as a Comprehensive Mandate state, both of the following criteria must be met:

1. *Required* IVF coverage (as opposed to a requirement to *offer* IVF coverage) and
2. ≤ 2 years of infertility or unexplained infertility to be considered eligible for coverage.

Two of the investigators independently reviewed each state mandate to determine if they met Comprehensive Mandate criteria. States with infertility insurance mandates that did not meet both criteria were classified as a Limited Mandate state. States without an infertility insurance mandate in 2018 came under the No Mandate group.

Indexed to their 2018 statutes, 8 states were deemed to have a Comprehensive Mandate: Arkansas, Connecticut, Delaware, Illinois, Maryland, Massachusetts, NewJersey, and Rhode Island and 9 others were classified as having a Limited Mandate: California, Hawaii, Louisiana, Montana, New York, Ohio, Texas, Utah, and West Virginia (Figure 1). The remaining 33 states did not mandate insurance coverage for infertility treatment that year. Detailed characteristics of the mandates are enumerated in Supplemental Table 1 (available online). Notably, 8 of 9 states in the Limited Mandate group did not have required ART coverage and the remaining state in that category required more than 5 years of unexplained infertility to be eligible for coverage. There was no discordance in the classification of the state infertility insurance mandates by the 2 reviewers.

The Delaware mandate came into effect on June 30th, 2018 and hence the state population was not covered by a mandate for a proportion of the study period (8). In our experience, ART utilization quickly escalates in the period following the institution of a robust state infertility mandate; therefore, it was classified under Comprehensive Mandate. A sensitivity analysis was conducted by excluding Delaware from the Comprehensive Mandate group and repeating the data analysis described.

Data Analysis

We used the number of ART patients per 10,000 reproductive-aged women as a proxy measure of ART utilization rate. The numerator, the number of patients in each group who initiated an ART cycle in 2018, was derived from NASS. The US Census Bureau data provided estimates for the denominator, the total number of reproductive-aged women living in each state in 2018. These rates were stratified both by the racial/ethnic group and by state-mandated infertility insurance coverage groups. To address missing patient race and ethnicity data in NASS (35.4% of patients), a multiple imputation procedure on the basis of sequential regression was used to generate 20 imputed data sets, which were subsequently analyzed, and estimates were summarized according to Rubin's rules (23, 24). Statistical analyses were conducted using SAS version 9.4 (SAS Institute) and SUDAAN 11.0.3 (RTI International).

We evaluated differences in ART utilization in 2 ways: 1) utilization rates within each racial/ethnic group were compared across state insurance mandate coverage categories using the Comprehensive Mandate group as the reference and 2) ART utilization rates within each mandate coverage category were compared across racial/ethnic groups. The racial/ethnic group with the highest utilization rate in the Comprehensive Mandate group was selected as the reference. Rate ratios (RR) with 95% confidence intervals (CI) were calculated to examine these associations.

State-mandated coverage for fertility services does not apply to all health insurance plans. Health insurances offered by state or federal public assistance programs, federal or military plans, and private companies who self-insure are excluded from most state mandates (8). In contrast to fully-insured plans in which the employer pays a fixed monthly premium per employee (member) to an insurance company who assumes the risk, self-insured employers function as their own insurers and are directly responsible for paying each claim (25). As state mandates can only benefit individuals insured under certain types of plans, we corrected the denominators in our initial analysis by removing the population ineligible for state-mandated insurance coverage for infertility services. We first estimated the proportion of reproductive-aged women with private insurance (both fully- and self-insured) in each racial/ethnic category for each Comprehensive Mandate state using the ACS data set. We then applied state-level estimates (not race/ethnicity-specific) of the proportions of private enrollees with self-insured plans to obtain estimated proportions of women covered by fully-insured private health plans for each racial/ethnic group using data from the 2018 MEPS. These proportions were applied to each Comprehensive Mandate state's population of reproductive-aged women and summed to define the population eligible to benefit from state-mandated comprehensive insurance coverage for infertility services. The utilization rates were then recalculated with this denominator and the comparisons were repeated.

RESULTS

Among an estimated 53,748,220 reproductive-aged women living in the US in 2018, 52%, 35%, and 13% respectively, lived in a state with No Mandate, Limited Mandate, and Comprehensive Mandate for insurance coverage for ART. A total of 147,803 women underwent at least one ART cycle during 2018 with an overall utilization rate of 27.5 per 10,000 women. Compared with the ART utilization rate in Comprehensive Mandate states (46.2 cycles/10,000 women), utilization rates were approximately 32% lower in Limited Mandate states (31.3 cycles/10,000 women; RR 0.68 [0.67–0.69]) and 56% lower in No Mandate states (20.2 cycles/ 10,000 women; RR 0.44 [0.43–0.44]).

Across state mandate coverage groups, the NH Asian and NH White populations had the highest ART utilization rates, whereas the lowest rates were among the Hispanic, NH Black, and NH Other/Multiple Races populations (Supplemental Figure 1, available online). For comparisons within state mandate categories, the NH Asian population functioned as the reference group because this population had the highest utilization rate (Table 1). The largest racial/ethnic inequities in utilization were observed in the Hispanic population in states with Limited Mandates (RR 0.15 [0.14–0.15]) and in the NH Other/Multiple Races population in states with No Mandates (RR 0.13 [0.12–0.14]), where utilization rates were 85% and 87%

lower than their NH Asian counterparts, respectively. ART utilization was 76%–77% lower in the NH Black population than the reference group in both No Mandate states and Limited Mandate states, compared with 67% lower in Comprehensive Mandate states.

We also examined the association of state-mandated infertility insurance coverage on ART utilization within each racial/ethnic group using the Comprehensive Mandate group as a reference (Table 2). For most racial/ethnic groups, utilization was the highest in Comprehensive Mandate states followed by Limited Mandate and No Mandate states. One exception was the Hispanic population in which there was lower utilization in Limited Mandate states compared with No Mandate states (10.2 vs. 11.1 per 10,000 women, respectively). In addition, there was no difference in utilization rates among NH Other/Multiple Races women when comparing Limited vs. Comprehensive Mandate states (RR 1.09 [0.93–1.27]). The largest differences in ART utilization rates between the No Mandate and the Comprehensive categories were observed for NH Other/Multiple Races (RR 0.33 [0.28–0.38]) and NH Black (RR 0.39 [0.37–0.41]) populations. Utilization among the NH White population was also lower in No Mandate vs. Comprehensive Mandate states (0.41 [0.41–0.42]).

Estimated proportions of each racial/ethnic group with private, fully-insured health insurance plans in Comprehensive Mandate states and the associated corrected utilization rates are shown in Table 3. Population coverage of eligible plans was the lowest in the Hispanic (23.5%) and NH Black (25.7%) populations and the highest in the NH Asian (35.0%) and NH White (34.4%) populations. Accounting for the estimated proportion of populations enrolled in health insurance plans subject to state-mandated coverage for infertility services resulted in higher ART utilization rates across all racial/ethnic groups. Furthermore, the utilization RRs in the Hispanic and NH Black populations relative to the reference group (NH Asian) moved toward the null (Hispanic population uncorrected RR 0.23 [0.22–0.25] vs. corrected RR 0.35 [0.33–0.37]; NH Black population uncorrected RR 0.33 [0.31–0.35] vs. corrected RR 0.45 [0.42–0.47]). In contrast, there was no difference in utilization rates in the NH White or NH Other populations compared with the reference group after this correction (NH White uncorrected RR 0.73 [0.70–0.76] vs. corrected RR 0.75 [0.72–0.77]; NH Other/Multiple Races uncorrected RR 0.22 [0.19–0.26] vs. 0.27 [0.24–0.32]).

As aforementioned, the Delaware infertility mandate came into effect on June 30th, 2018. Accordingly, a sensitivity analysis was performed to determine if results would differ if the state was excluded from the Comprehensive Mandate group. The analyses comparing ART utilization rates (1) across mandate coverage categories, (2) across racial/ethnic groups, and (3) with utilization rates corrected for mandate eligibility were repeated after excluding the 149,354 reproductive age women residing in Delaware from the Comprehensive Mandate group. There were no significant differences in these revised results compared with the initial findings (Supplemental Tables 2, 3, and 4, available online).

DISCUSSION

Our study demonstrates that ART utilization is the highest across almost all racial/ethnic groups in states with mandated insurance coverage for infertility services. Compared with No Mandate states, the magnitude of the association was generally greater in Comprehensive Mandate states compared with Limited Mandate states. Our analysis also suggests that Comprehensive Mandates partially mitigate racial/ethnic disparities in utilization of ART services. Although the NH Black and NH Other/Multiple Races populations generally have the lowest ART utilization rates, they also have the largest relative differences in utilization when comparing populations residing in states with No Mandates to those in Comprehensive Mandate states. These findings indicate that utilization in these populations is disproportionally impacted by the absence of state-mandated insurance coverage for infertility treatment.

Population-level differences in insurance coverage may contribute to persistent inequities in states with infertility mandates. Importantly, a minority of residents in mandated states are covered under an eligible insurance plan (26). The *Employee Retirement Income Security Act* (ERISA), a federal law enacted in 1974, pre-empts states from regulating self-insured companies (25). Moreover, public assistance programs, federal and military plans, as well as the uninsured are also largely exempt from these laws. In our analysis, only 1 in 4 women who identify as Hispanic or NH Black (compared with 1 in 3 among NH Asian and NH White populations) are estimated to be insured by plans that fall under state mandates and are required to include coverage for ART. When we account for the estimated population covered under eligible plans, the relative differences in ART utilization rates for Hispanic and NH Black groups compared with the reference group (NH Asian) are attenuated. Differential insurance coverage rates across racial/ethnic groups that have been described on a broader healthcare level clearly impact eligibility for mandated infertility coverage (27). The *Family Building Federal Employees Health Benefits (FEHB) Act* recently introduced in Congress would mandate infertility treatment coverage for federal employees under the FEHB program (28). Similar new legislation, both at the state and at the federal level, can expand eligibility for ART treatment coverage and may address the racial/ethnic inequities in mandated coverage (26).

Certainly, variables other than health insurance plan eligibility may account for the large differences in ART utilization by race/ethnicity that persist in Comprehensive Mandate states. Deductibles, co-payments, and indirect cycle costs of ART treatment, such as time off work and childcare, can still present significant financial barriers in individuals who are eligible for mandated infertility insurance coverage (29). The national racial wealth gap has only widened over time, with marked inequities in the financial assets and income of NH Black and Hispanic populations compared with the NH White population (30). Hence, these residual costs of ART treatment may disproportionally impact these populations and should be examined in future work.

Racial and ethnic differences in knowledge, awareness, and attitudes relating to reproductive health may also underly these inequities (31-33). For example, a survey study identified that NH Asian women were twice as likely to be concerned about their fertility potential

and were more likely to anticipate requiring fertility treatment in the future (31). These beliefs may translate to the NH Asian population accessing care more readily than the other racial/ethnic groups. There were also racial/ethnic differences in reproductive knowledge, which may impact the ability to accurately and promptly identify fertility issues. Cultural beliefs may drive some of this variability in reproductive health knowledge (32). Further qualitative studies characterizing these racial/ethnic-specific differences would assist in targeting interventions around increasing reproductive health knowledge and awareness in a culturally relevant manner (29).

Prior studies investigating the effects of state mandates on ART utilization by race/ethnicity grouped together all states with mandated ART coverage (5, 14). A national analysis of 2014 ART utilization concluded that although the presence of state infertility insurance mandates may increase utilization across all racial/ethnic groups, they were not sufficient to eliminate disparities in access to treatment (5). Similarly, an analysis of the *National Survey of Family Growth* found no evidence that racial, ethnic, or educational disparities in ART treatment were ameliorated by state mandates (14). Notably, the proportion of each population with health plans covered under the mandate, as well as the scope of mandated coverage, was not considered in these studies. Since these publications, additional states have established mandated infertility coverage and many states with existing mandates expanded the scope of covered services, as well as broadened eligibility for coverage (8).

A notable strength of our study is that it represents an updated analysis with a novel focus on both the scope and population eligibility of state-mandated coverage for infertility services. In addition, our methodology included the imputation of missing race/ethnicity data. Earlier reports on ART utilization by race/ethnicity were limited by the high proportion of missing data (34). Participant race, ethnicity, and language have been shown to impact response rates and data completeness (35-39). As the proportion of missing data can differ among racial/ethnic groups, simply excluding these observations can introduce bias. Refinement in imputation methodology has improved the validity of the approach; however, the significant proportion of missing data is a limitation and continued emphasis on complete data collection remains important.

The analysis is constrained by the lack of individual-level data on the extent of insurance coverage and payment source, including insurance co-payments and deductibles. There is also a growing number of businesses exempted from state mandates that are voluntarily offering fertility benefits as they are shown to improve employee recruitment and retention (40). Individuals with coverage for IVF under plans exempt from the mandate would not be captured in this study. Cultural factors, geographic variables, and social determinants of health, such as employment and income, are difficult to capture in ecological studies and may contribute to these inequities. Future studies may consider employing geographic clustering and proxy measures for social determinants, such as the area deprivation index. As there are no standard categorizations for state infertility insurance mandates, results may not be directly comparable to other publications. A technical limitation of the data set is that women who received ART services from more than one clinic during 2018 would be counted as a unique individual at each clinic and not as a single individual in the data set. Although multiple imputation was used in our analysis to address the notable

proportion of missing race/ethnicity data (35.4%), there remains an exigency for registries and surveillance systems to make continued efforts at collecting accurate and complete data. Finally, the MEPS state-level estimates on the proportion of private enrollees with self- vs. fully-insured plans are not race/ethnicity specific, which may limit their accuracy.

CONCLUSION

In conclusion, our study demonstrates that Comprehensive Mandates for state infertility insurance are associated with higher rates of ART utilization across all racial and ethnic groups. Utilization data also suggest that Comprehensive Mandates may reduce racial and ethnic inequities in access to ART, but they do not eliminate these disparities. Importantly, a smaller proportion of the NH Black, Hispanic and NH Other/Multiple Races populations are eligible for coverage under present mandates. Efforts to better capture and analyze how social determinants of health, cultural factors, and geographic barriers may contribute to these persistent inequities in ART utilization can inform future strategies aimed at improving ART access.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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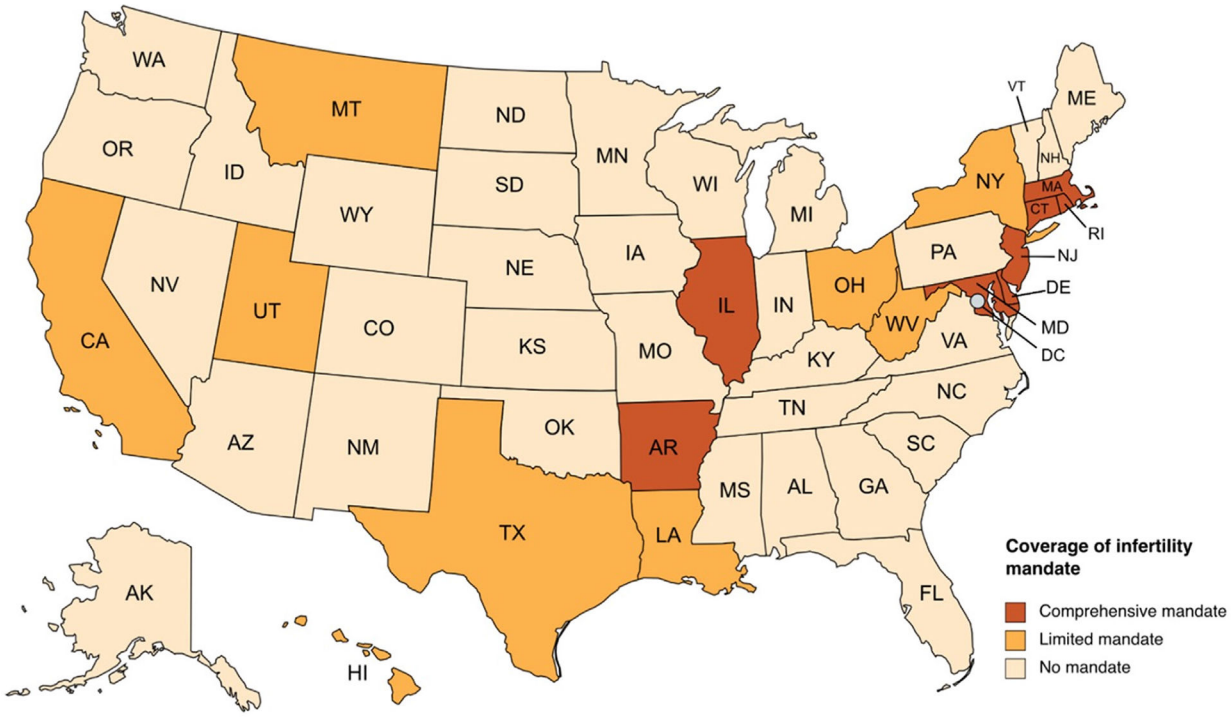

FIGURE 1.

Categorization of 2018 infertility mandates by state. 1. For classification as a Comprehensive Mandate state, all two of the following criteria must be met: (1) *required* IVF coverage and (2) ≤2 years of infertility or unexplained infertility to be considered eligible for coverage. 2. The Delaware mandate, which was included in the Comprehensive group, came into effect on June 30, 2018. 3. States with infertility insurance mandates not meeting all of the mentioned criteria were classified as a Limited Mandate state. 4. States without an infertility insurance mandate in 2018 were classified in the No Mandate group. Classification on the basis of statutes is outlined in Appendix Table 1.

TABLE 1

Comparison of ART utilization by race/ethnicity group *within* each category of state-mandated infertility coverage using the racial/ethnic group with the highest utilization as a reference (Non-Hispanic Asian).

	Comprehensive mandate[a]		Limited mandate		No mandate	
Racial/Ethnic Group	**ART utilization[b]**	**Rate ratio (95% CI)**	**ART utilization[b]**	**Rate ratio (95% CI)**	**ART utilization[b]**	**Rate ratio (95% CI)**
Non-Hispanic Asian	78.4	Ref	69.0	Ref	44.3	Ref
Hispanic[c]	18.3	0.23 (0.22–0.25)	10.2	0.15 (0.14–0.15)	11.1	0.25 (0.24–0.26)
Non-Hispanic Black	25.8	0.33 (0.31–0.35)	16.9	0.24 (0.23–0.25)	10.1	0.23 (0.22–0.24)
Non-Hispanic Other /Multiple Races[d]	17.4	0.22 (0.19–0.26)	19.0	0.27 (0.25–0.30)	5.7	0.13 (0.12–0.14)
Non-Hispanic White	57.3	0.73 (0.70–0.76)	41.9	0.61 (0.59–0.62)	23.7	0.53 (0.52–0.55)

Abbreviations: ART, assisted reproductive technology; CI, confident interval; Ref, reference.

[a] The Delaware infertility mandate, which was included in the Comprehensive group, came into effect on June 30th, 2018.

[b] Utilization rate per 10,000 women 20–44 years of age where each individual is only considered once (first cycle in a specified timeframe).

[c] Hispanic origin, any race.

[d] Non-Hispanic Other/Multiple Races including Non-Hispanic American Indian or Alaska Native, Non-Hispanic Native Hawaiian and Other Pacific Islander, or Non-Hispanic Two or More Races.

TABLE 2

Comparison of ART utilization by state-mandated infertility coverage category *within* each racial/ethnic group using the utilization rate in the Comprehensive Mandate category as a reference.

	Comprehensive mandate[a]		Limited mandate		No mandate	
Racial/Ethnic Group	**ART utilization[b]**	**Rate ratio (95% CI)**	**ART utilization[b]**	**Rate ratio (95% CI)**	**ART utilization[b]**	**Rate ratio (95% CI)**
All races	46.2	Ref	31.3	0.68 (0.67–0.69)	20.2	0.44 (0.43–0.44)
Non-Hispanic Asian	78.4	Ref	69.0	0.89 (0.85–0.92)	44.3	0.57 (0.54–0.59)
Hispanic[c]	18.3	Ref	10.2	0.56 (0.53–0.59)	11.1	0.61 (0.58–0.65)
Non-Hispanic Black	25.8	Ref	16.9	0.66 (0.62–0.69)	10.1	0.39(0.37–0.41)
Non-Hispanic Other /Multiple Races[d]	17.4	Ref	19.0	1.09 (0.93–1.27)	5.7	0.33 (0.28–0.38)
Non-Hispanic White	57.3	Ref	41.9	0.73 (0.72−-0.75)	23.7	0.41 (0.41–0.42)

Abbreviations: ART, assisted reproductive technology; CI, confident interval; Ref, reference.

[a] The Delaware mandate, which was included in the Comprehensive group, came into effect on June 30th, 2018.

[b] Utilization rate per 10,000 women 20–44 years of age where each individual is only considered once (first cycle in a specified timeframe).

[c] Hispanic origin, any race.

[d] Non-Hispanic Other includes Non-Hispanic American Indian or Alaska Native, Non-Hispanic Native Hawaiian and Other Pacific Islander, or Non-Hispanic Two or More Races

TABLE 3

Comparison of ART utilization in Comprehensive Mandate states[a] considering population covered under the state infertility insurance mandate.

Race and ethnicity	Estimated proportion of population with insurance subject to mandate[b]	Entire reproductive-aged female population		Reproductive-aged female population covered by mandate	
		Utilization rate[c]	Rate ratio (95% CI)	Utilization rate[b]	Rate ratio (95% CI)
Non-Hispanic Asian	35.0%	78.4	Ref	223.9	Ref
Hispanic[d]	23.5%	18.3	0.23 (0.22–0.25)	77.8	0.35 (0.33–0.37)
Non-Hispanic Black	25.7%	25.8	0.33 (0.31–0.35)	100.1	0.45 (0.42–0.47)
Non-Hispanic Other /Multiple Races[e]	28.4%	17.4	0.22 (0.19–0.26)	61.2	0.27 (0.24–0.32)
Non-Hispanic White	34.4%	57.3	0.73 (0.70–0.76)	166.6	0.75 (0.72–0.77)

Abbreviations: ART, assisted reproductive technology; CI, confident interval; Ref, reference.

[a]The Delaware mandate, which was included in the Comprehensive group, came into effect on June 30th, 2018.

[b]Insurance coverage estimated from 2018 US Census, American Community Survey, and Medical Expenditure Panel Survey.

[c]Utilization rate per 10,000 women 20–44 years of age where each individual is only considered once (first cycle in a specified timeframe).

[d]Hispanic origin, any race.

[e]Non-Hispanic Other/Multiple Races including Non-Hispanic American Indian or Alaska Native, Non-Hispanic Native Hawaiian and Other Pacific Islander, or Non-Hispanic Two or More Races.