

Legislation, Market Size, and Access to Gender-affirming Genital Surgery in the United States

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Background: The value of gender-affirming genital surgery (GAGS) has been established for certain transgender or gender non-conforming patients. This study aimed to determine the availability of GAGS by state and region in the United States, and to query possible associations of access to care with healthcare legislation and local market size.

Methods: This was a cross-sectional study reporting on the distribution of hospitals and private practices offering GAGS in the United States. A list of prospective gender surgeons was compiled from 18 online databases. All surgeons were individually verified and were excluded if they did not perform phalloplasty, metoidioplasty, or vaginoplasty. Pertinent legislative and transgender or gender non-conforming population data were derived from the Movement Advancement Project and the Williams Institute.

Results: Seventy-one practices in the United States offered GAGS in 2019. Forty-seven percent of states did not have a practice offering GAGS. A large prospective transgender or gender non-conforming market size increased the odds of GAGS availability in a state more than did local healthcare legislation supporting insurance coverage for gender-affirming care in 2019.

Conclusions: Access to gender-affirming genital surgery was highly disparate in 2019. Factors that predicted access to care, including state healthcare legislation and prospective market sizes, may indicate strategies for overcoming disparities. (*Plast Reconstr Surg Glob Open* 2021;9:e3422; doi: [10.1097/GOX.0000000000003422](https://doi.org/10.1097/GOX.0000000000003422); Published online 16 February 2021.)

INTRODUCTION

Medical consensus increasingly points to the suitability of transition-related medical care and gender-affirming surgery for certain transgender or gender non-conforming (TGNC) patients. Surgery can be an important step following hormone therapy and counseling.¹⁻³ Body image satisfaction, quality of life, and social functioning

have been shown to improve for TGNC patients who are prepared for and choose to undergo gender-affirming surgery.⁴⁻¹¹

The number of patients receiving gender-affirming genital surgery (GAGS) has increased in the past 2 decades.¹² Whether the availability of GAGS meets demand remains unknown. If access to surgeons is insufficient nationally, regionally, or by state, subsets of the TGNC population may remain medically disadvantaged.

In this study, GAGSs availability and determinants of this availability were assessed. Although a variety of procedures may be performed for gender-affirmation, we chose to focus on vaginoplasty, metoidioplasty, and phalloplasty because of the unique demand for these services among TGNC patients, the complexity of these procedures, and the history of limited access in the United States.¹³

We hypothesized that federal and state healthcare legislation supporting insurance coverage for gender-affirming

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IRB Statement: This study was approved by the Boston Children's Hospital Committee on Clinical Investigation (Protocol number: IRB-P00034233).

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DOI: [10.1097/GOX.0000000000003422](https://doi.org/10.1097/GOX.0000000000003422)

Disclosure: *The authors have no financial interest to declare in relation to the content of this article.*

Related Digital Media are available in the full-text version of the article on www.PRSGlobalOpen.com.

care would predict the availability of GAGS. We additionally hypothesized that the size of states' TGNC population would serve as an index for local demand and predict the availability of care.

METHODS

Data Collection

Eighteen databases of gender surgeons were discovered between November 2019 and January 2020 through Internet search. All sources were publicly available. Requirements for database inclusion were provision of names and practice locations for providers, as well as a date of publication (Fig. 1). Databases meeting inclusion criteria were lists of surgeons' professional affiliations, such as the World Professional Association for Transgender Health (WPATH), a non-profit professional organization devoted to education around transgender health, as well as those from charitable and community organizations.

An initial list of 1055 gender surgeons was compiled. Of these, 377 were unique. All surgeons were subsequently verified through individual phone calls and detailed web reviews. A GAGS practice was defined by the presence of at least 1 surgeon offering vaginoplasty, metoidioplasty, or phalloplasty. This categorical definition followed from the fact that insurance-based legal discriminations against gender-affirming surgeries often have not distinguished between transfeminine and transmasculine surgeries, but have treated GAGS singularly.^{14,15} Surgeons who performed genital surgeries common to the general population, such as hysterectomy or oophorectomy, were excluded if they did not also perform vaginoplasty, metoidioplasty, or phalloplasty. Surgeons were excluded if they performed only non-genital gender-affirming surgeries, such as chest, neck, or facial reconstruction.¹⁶⁻¹⁸

In 2014, the Department of Health and Human Services reversed a federal policy that had denied Medicare coverage for gender-affirming surgeries.¹⁵ To identify the possible impact of this policy reversal on the availability of GAGS, we conducted a second date-restricted Internet search. As with the 2019–2020 query, inclusion criteria for databases from the date-restricted search (January 2007–January 2014) were the provision of names, practice locations, and date of publication. Seven databases were discovered. Verifications of practice scope were conducted through cross-validation on multiple databases, and in many cases additionally through continued practice into 2019.

Mapping

Current and historical GAGS practices were mapped with QGIS 3.10 software. Inclusion zones of 100-mile radii encircled GAGS practices to identify states, regions, and large cities with access to local care. The availability of care was additionally described by population-to-practice ratios by state and region.

All legislative and demographic data were sourced secondarily. Legislative data were collected from the Movement Advancement Project in December 2019.¹⁹ MAP defines and tallies a standardized set of state healthcare policies dictating insurance coverage for

gender-affirming care. Legislation was dichotomized as favorable or unfavorable based on a median split of 6 healthcare policies. Seven scores were possible. States with a summed score between 0 and 2 (inclusive) were deemed unfavorable to transgender health. Those with a score between 3 and 6 (inclusive) were deemed favorable. (See table, Supplemental Digital Content 1, which displays the "favorability" of state healthcare legislation toward coverage for gender-affirming care.¹⁸ <http://links.lww.com/PRSGO/B594>.) A favorable legislative environment was hypothesized to increase the likelihood of a state having a GAGS practice.

TGNC demographic data, including estimated population sizes by state, were collected from the Williams Institute 2016 report.²⁰ The Williams Institute uses modeling to estimate the size of TGNC populations. Although only a proportion of the TGNC population chooses to pursue GAGS, the size of state TGNC populations was taken as an index of demand. A threshold market size was defined as the minimum TGNC population necessary to support a GAGS practice in a state in 2019, and as a descriptive term, accounted for incomplete market capture. A preliminary approximation of this threshold was estimated by dividing the national TGNC population by the total number of GAGS practices in the United States in 2019. The resultant ratio was hypothesized and tested for significance as a minimum market size to support a single GAGS practice in any individual state. Sensitivity analysis was performed to estimate the effect of error in the initial derivation. The same cross-tabulations and chi-square analyses were performed 4 additional times, assuming that the originally derived market size was underestimated or overestimated by 25% or 50%. The threshold market size was the number of TGNC individuals that most consistently associated with the presence of a GAGS practice in a state in 2019.

STATISTICAL TESTS

Categorical availability of care, defined as the presence of at least 1 GAGS practice in a state, was used as the basis for testing correlations with legislation and market size. We used SPSS (IBM Corp. Released 2016. IBM SPSS Statistics for Windows, version 24.0. Armonk, N.Y.: IBM Corp.) to perform all cross-tabulations, 2-sided hypothesis tests, logistic regression modeling, and tests of interaction.

A binary logistic regression model was fit to assess the significance and independence of the legislation and market size variables as predictors of GAGS availability. To determine whether legislation moderated the relationship between local market size and GAGS availability, an interaction term was created using both the legislation and market size variables. A logistic regression model was fit with this interaction term as a predictor of GAGS availability.

RESULTS

GAGS was offered at 71 practices across the United States in 2019. These practices were distributed across 26 states and the District of Columbia. National disparities in the categorical availability of care were considerable,

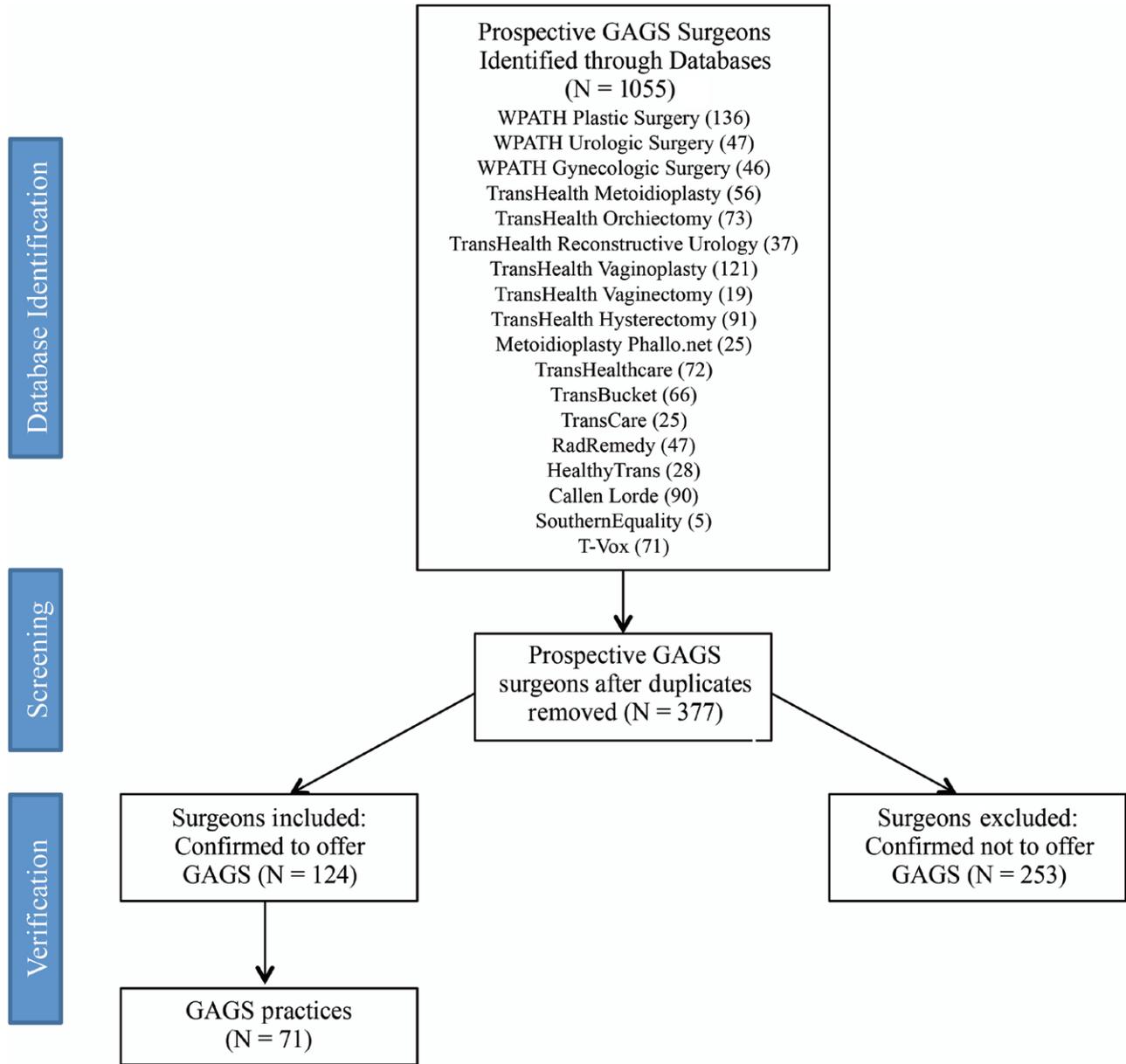


Fig. 1. Data collection and verification of practices offering phalloplasty, metoidioplasty, or vaginoplasty in the United States in 2019.

as displayed graphically in the lower map of [Figure 2](#) and regionally in [Table 1](#). California had 16 GAGS practices, whereas 24 states did not have any. Thirty-five percent of the 113 cities in the United States with populations > 200,000 people did not have a GAGS practice within a 100-mile radius.

States of the Mideast and New England had the smallest (most favorable) ratio of GAGS practices-to-TGNC individuals: 1:10,772 and 1:11,880, respectively. The ratio was the highest (least favorable) in the States of the Southwest and Southeast: 1:37,200 and 1:47,706, respectively ([Table 1](#)).

In 2013, there were 34 GAGS practices distributed across 18 states. By 2019, there had been 209% growth in the number of GAGS practices in the United States, and 44% growth in the number of states with GAGS practices.

This national growth followed a 2014 federal policy reversal, which banned public health insurance discrimination against gender-affirming surgeries.¹⁵

In 2019, state healthcare legislation that supported insurance coverage for gender-affirming care increased the odds of a state having a GAGS practice 4-fold when compared to states with unfavorable legislation (OR = 4.13, 95% C.I. 1.27–13.39; *P* = 0.016). Prospective state market sizes also significantly associated with the availability of care. A GAGS practice was 11-fold more likely to be present in a state where the local TGNC population surpassed 19,678 people (OR = 10.857, 95% C.I. 2.93–40.16; *P* < 0.001). Sensitivity analysis confirmed this market size to correctly predict the presence or absence of a GAGS practice in a state more often than did approximations 25% and 50% above or below this number. Market size

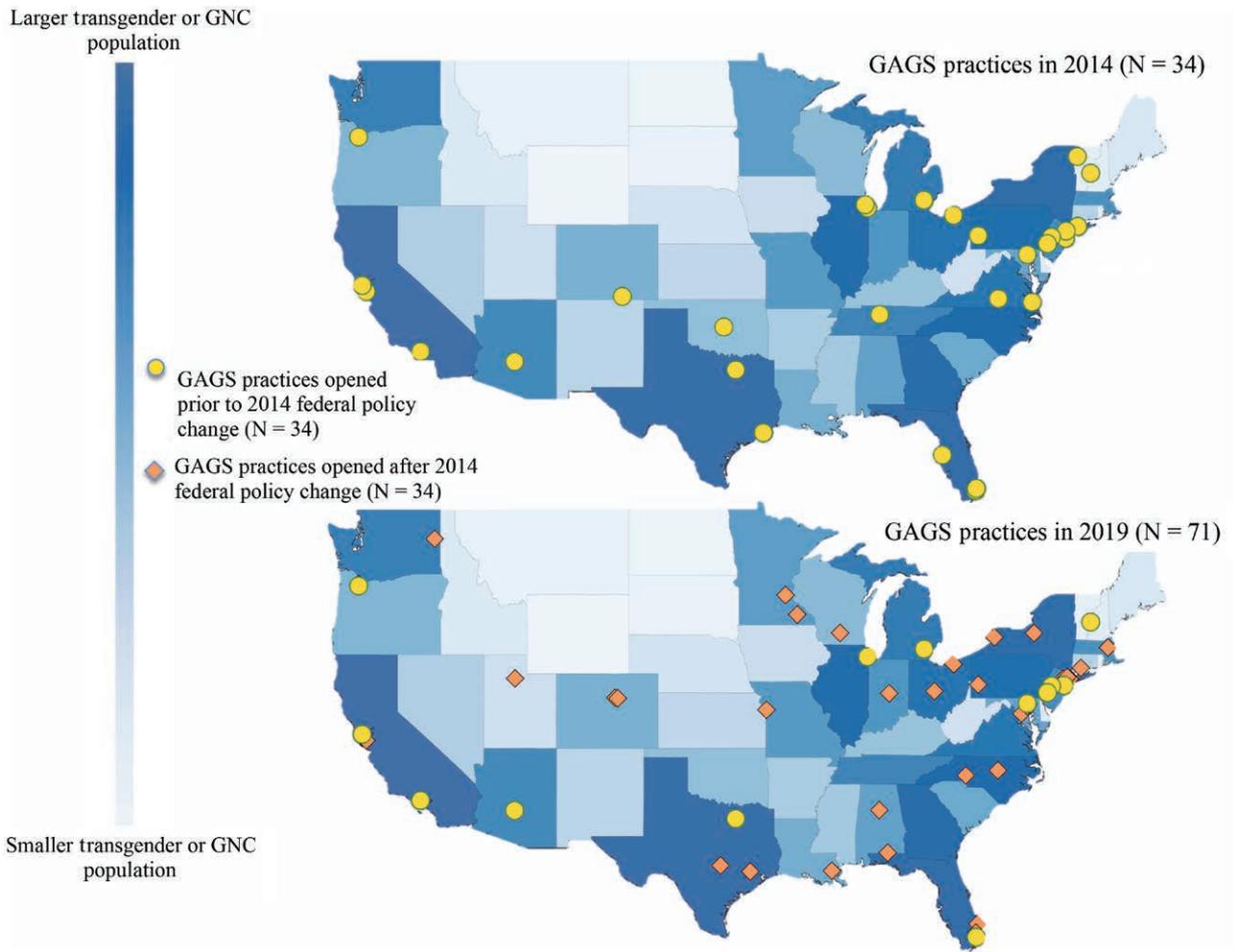


Fig. 2. Practices offering GAGS in the United States before (upper map) and after (lower map) the Department of Health & Human Services 2014 legislation barring insurance coverage exclusions for gender-affirming procedures.

Table 1. Regional Division of the US by GAGS Practice Availability Revealed the Southeast and the Southwest May Be Relatively Underserved

Regional Divisions	States by Region	Ratio of GAGS Practice to TGNC Population
Mideast	Delaware, District of Columbia, Maryland, New Jersey, New York, and Pennsylvania	1: 10,772
New England	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont	1: 11,880
Rocky Mountain	Colorado, Idaho, Montana, Utah, and Wyoming	1: 12,300
Far West	Alaska, California, Hawaii, Nevada, Oregon, and Washington	1: 14,742
Plains	Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota	1: 17,617
Great Lakes	Illinois, Indiana, Michigan, Ohio, and Wisconsin	1: 18,817
Southwest	Arizona, New Mexico, Oklahoma, and Texas	1: 37,200
Southeast	Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia	1: 47,706

did not significantly alter the probability of a state having favorable healthcare legislation ($P = 0.488$).

The logistic regression model including both the legislative and market size variables correctly predicted the availability of care in 76.5% of states. Legislation (OR = 5.64; C.I. 1.28–24.79; $P = 0.02$) and market size (OR = 13.54; C.I. 3.07–59.68; $P = 0.001$) were independently associated with GAGS availability. There was, however, an apparent interaction between the variables. A

large market size appeared to moderate the association between healthcare legislation favorability and GAGS availability, as 100% of states with favorable legislation and a TGNC population above the threshold market size had a GAGS practice (Fig. 3). An interaction variable was modeled to assess the significance and directionality of this effect (Fig. 4).

The interaction proved significant ($P < 0.01$). Unfavorable legislation diminished the likelihood that

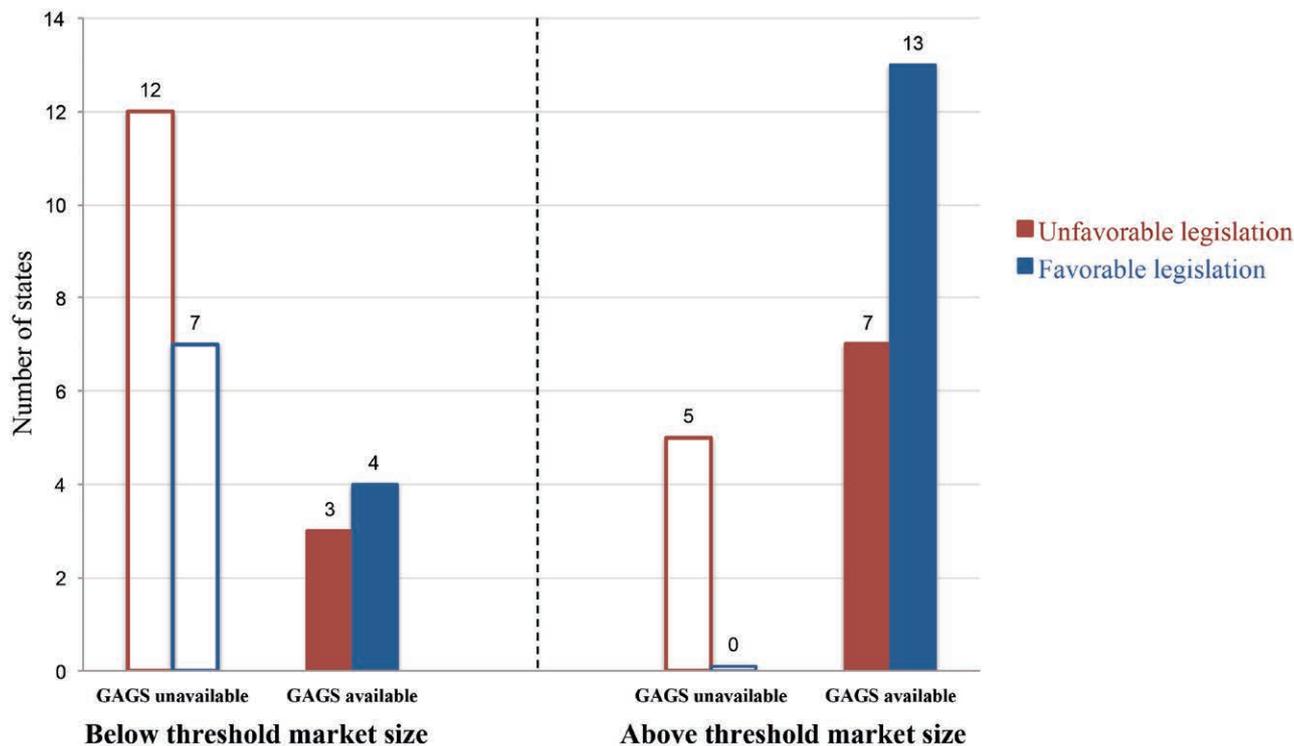


Fig. 3. States lacking access to GAGS (no fill, N = 24) typically had small TGNC populations and healthcare legislation that was unfavorable toward insurance coverage for gender-affirming care. This relationship suggested a possible interaction between the variables (Fig. 4).

a state with a TGNC population above the threshold market size had a GAGS practice. On the other hand, a small TGNC population restricted the beneficial effects of favorable legislation on ensuring local access to care: there were similar proportions of states with GAGS practices in the group with market sizes below the threshold, irrespective of whether healthcare legislation was favorable (Fig. 4).

DISCUSSION

Transgender and gender non-conforming individuals face multiple barriers to accessing healthcare in the United States.²¹ Insurance coverage has been unevenly distributed and often insufficient for this patient population.^{22–29} Despite recent improvements in coverage,^{30–32} stigmatization and inadequate provider-training in parts of the healthcare system continue to deter proper utilization and delivery.^{33–44}

The availability of GAGS, specifically phalloplasty, metoidioplasty, and vaginoplasty, and determinants of their availability were the focus of this study. Historically, access to GAGS has been limited in the United States. Demand is unique among TGNC patients. The procedures are highly complex and require dedicated training.¹³ The rate of GAGS performed in the United States has increased over the last 2 decades, yet regional availability of care has not been known.¹²

We mapped disparities in the availability of GAGS by state and by region, and identified legal and market factors influencing access to care. Because in-depth services and volume data were not available, and

because legal determinants of care availability often have treated GAGS singularly, GAGS practices were defined categorically.^{14,15} We demonstrated that significant disparities existed in access to GAGS across the United States in 2019 (Fig. 2, Table 1). Approximately 325,000 TGNC individuals lived in one of the 24 states without access to phalloplasty, metoidioplasty, or vaginoplasty services.¹⁹

Where GAGS practices were available, access to care was often tenuously maintained. In 2019, 13 states had only 1 GAGS practice. Between 2013 and 2019, 4 states lost their only GAGS practice due to physician retirement or relocation. Sudden practice closures may be difficult to remediate because of the specialized training required for these procedures, typically following surgical residencies.^{45,46}

On a national scale, the apparent impact of supportive legislation on GAGS availability was seen in the doubling of GAGS practices in the United States between 2013 and 2019. This followed a 2014 federal policy revoking insurance exclusions for gender-affirming care.¹⁵

Still, in 2019, local healthcare legislation and prospective market sizes independently predicted disparate access to GAGS by state. States with estimated TGNC populations greater than 19,678 people were nearly 11-fold more likely to have a GAGS practice of some kind. A TGNC population of this size increased the likelihood of GAGS availability in a state more than did healthcare legislation supporting insurance coverage for gender-affirming care. Market size may therefore have been a stronger determinant of access to care in 2019.

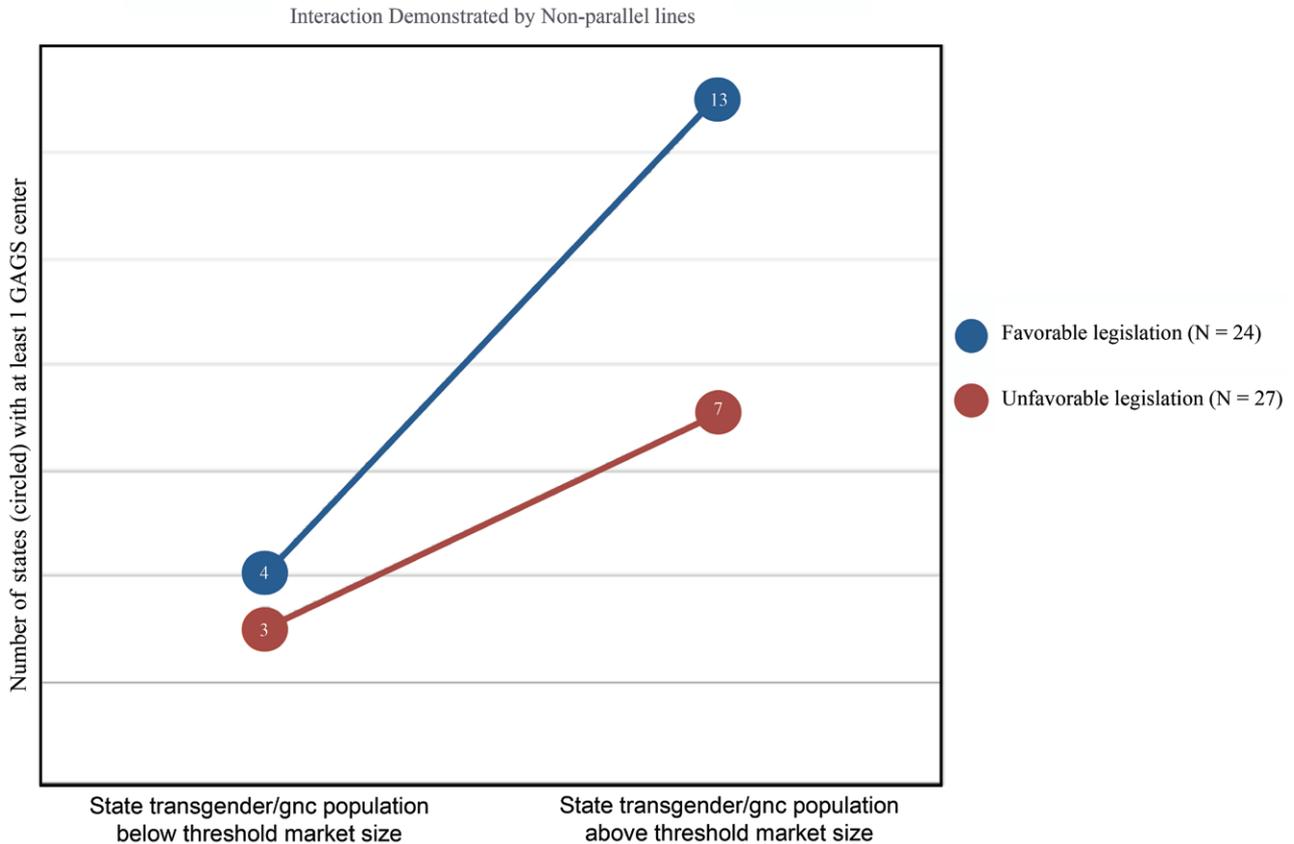


Fig. 4. The positive association between a large TGNC population and the presence of a practice offering GAGS was diminished by unfavorable state healthcare legislation.

Small TGNC populations were likely to face disproportionate burden in accessing a GAGS practice, even if their state healthcare legislation was favorable toward gender-affirming care (Fig. 3). This phenomenon may have created additional hardship for those dwelling in isolated communities who were unable to travel for economic, professional, or social reasons.

Multiple recommendations may be considered on the basis of our findings. Clear geographic disparities existed in the availability of GAGS in 2019. TGNC individuals living in areas where the legal or demographic environment predicted limited access to GAGS may struggle to obtain healthcare that could enable them to function more successfully.^{9,47,48} The solution may be to increase the availability of local care, or to facilitate access to geographic “centers of excellence.”

Increasing the number of GAGS practices nationally might require maintaining providers and surgeons in low-volume environments. Incentives would be necessary to ensure public and private support where demand is low. In contrast, a centers of excellence approach might require improving patient mobility to ensure equitable access to care. Centers of excellence models have been proposed in an increasing number of fields, including surgical oncology,⁴⁹ bariatric surgery,⁵⁰ aortic cardiac surgery,⁵¹ and other specialties.^{52,53}

LIMITATIONS

Every GAGS surgeon included in our mapping was individually verified by phone or web review, resolving an issue of database reliability discussed in previous work.⁵⁴ This bottom-up approach made the research logistically feasible; however, it left open the possibility that the compilation was not exhaustive. The historical query may have overestimated the number of bottom surgeons available at the end of 2013, as some practices may have closed after databases were published. It would have been ideal to have volume and in-depth services data to better characterize access to care; however, this information was not available and is difficult to procure. It is important to understand which data are missing before formulating the next steps in ensuring access to care.

The focus on GAGS, to the exclusion of other important gender-affirming procedures, was chosen because of the unique demand for GAGS in the transgender and GNC population, and for reasons of historical inaccessibility. Variation in practice volume and services among GAGS practices, such as in the types of phalloplasty procedures offered, was not addressed by this study. A workforce study would provide additional information on availability of these services and possible differences in their use across the country, and granularity into possible disparities in the availability of different types of care.

In some cases, the correlation of legislation with the availability of care may be due to cultural–political environments that preceded policy itself. Additional studies looking at longitudinal effects of policies could potentially uncover causative forces. The possible impact of a pre-existing GAGS practice on the development a large TGNC transgender population was beyond the scope of this study and immaterial to the question of a minimum market size necessary to support a GAGS practice. Many TGNC individuals choose not to undergo gender-affirming surgeries. Market size calculations are liable to change as finances, behaviors, and treatment options for gender-affirming care evolve.

Despite the limitations noted, our analysis provides a historical snapshot of access to GAGS in the United States in 2019, and of legislative and market forces predicting this access. As the availability of GAGS remains disparate, further research will be necessary to ensure equitable access to care.

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