

OBSTETRICS & GYNECOLOGY



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- Comments from the reviewers and editors (email to author requesting revisions)
- Response from the author (cover letter submitted with revised manuscript)*

**The corresponding author has opted to make this information publicly available.*

Personal or nonessential information may be redacted at the editor's discretion.

Questions about these materials may be directed to the *Obstetrics & Gynecology* editorial office:

obgyn@greenjournal.org.

Date: 08/19/2022
To: "Anita M Madison" [REDACTED]
From: "The Green Journal" em@greenjournal.org
Subject: Your Submission ONG-22-1219

RE: Manuscript Number ONG-22-1219

Association Between Publicly-funded Contraceptive Services and Abortion Rate in Texas, 2010-2015

Dear Dr. Madison:

Thank you for sending us your work for consideration for publication in Obstetrics & Gynecology. Your manuscript has been reviewed by the Editorial Board and by special expert referees. The Editors would like to invite you to submit a revised version for further consideration.

If you wish to revise your manuscript, please read the following comments submitted by the reviewers and Editors. Each point raised requires a response, by either revising your manuscript or making a clear argument as to why no revision is needed in the cover letter.

To facilitate our review, we prefer that the cover letter you submit with your revised manuscript include each reviewer and Editor comment below, followed by your response. That is, a point-by-point response is required to each of the EDITOR COMMENTS (if applicable), REVIEWER COMMENTS, STATISTICAL EDITOR COMMENTS (if applicable), and EDITORIAL OFFICE COMMENTS below. Your manuscript will be returned to you if a point-by-point response to each of these sections is not included.

The revised manuscript should indicate the position of all changes made. Please use the "track changes" feature in your document (do not use strikethrough or underline formatting).

Your submission will be maintained in active status for 21 days from the date of this letter. If we have not heard from you by Sep 09, 2022, we will assume you wish to withdraw the manuscript from further consideration.

EDITOR COMMENTS:

We found this study to be interesting and would recommend revising using the reviewer comments. The study uses a cross-sectional approach over 2 different timepoints and so the focus should really be associations and not causality. The Authors would need much finer grain chronologic detail to establish a biologically plausible causal path of the time sequence. In addition, the way the Authors have formatted the analysis could be more straightforward. For instance, in Table 1, the variables are arranged in columns where rates of abortion decline are compared. This could be accompanied by another Table where the columns are arranged according to rates of contraceptive clients per 1000 women. Then, the reference on lines 160-164 to its Table (now a new Table 2) would, I think, be more direct. And perhaps the direction sense could also be changed in present Table 2, now Table 3. That is, use the 75-100th %tiles as the referent with the outcome of high abortion rate decline as the outcome of interest. That would lead to ~ 0.30 (CIs 0.12-0.74) adjusted odds of high abortion rate decline among those counties in the 25-75th %-tiles, compared to the counties with in the highest quartile.

REVIEWER COMMENTS:

Reviewer #1: This is an observational study looking at the rates of abortion by county in Texas over time and any association with the availability of contraceptive services. I applaud the authors for exploring this important topic. The paper is well written and clear. I would however, caution the authors to not interpret the association as causation.

Abstract - use of the term "demonstrating" in the conclusion implies causation. Please rephrase.

Introduction - lines 44-49, if available, some idea of the magnitude of these changes for the reader (ie 25% loss of funding, decrease of 40% enrollees, etc)

Methods - line 80 and 92-94 - how are "Catholic hospital" noted?

Discussion - line 199. There is a clear association with increased contraceptive provision and higher rates in abortion declines, however, I would encourage the authors to use language that interprets the finding rather than declaring that increased contraceptive care demonstrates (causes) less abortion care. Perhaps, "we the authors interpret this association as a demonstration of xxx, which is supported in other literature..." Line 222-223 - "the most restricted ability" means more than other states? more than other countries? Or just incredibly restricted? The last paragraph of the paper is strong and summarizes the authors' points well. I would recommend adjusting the last line for clarity.

Reviewer #2:

Comments to the Author

The authors completed a large cross-sectional study to 1) assess county-by-county contraceptive availability over time as a result of a state health funding change and 2) whether that change in availability affected the county-by-county abortion rate in Texas. It is a thoughtful and thorough evaluation of several large data sets, and beautifully tells the story that contraceptive availability, as opposed to abortion restrictions, has a larger impact on abortion rate.

A question I held throughout is what percent of the population relied on public vs private insurance over the time periods assessed. Privately insured patients likely had mitigating factors with regard to contraceptive availability (they could see providers at non-publicly funded clinics/private offices). Furthermore, such individuals would potentially have more means to access abortion (though it would likely be unmeasured by the current study, as they may have increased access to extra-legal self-managed abortion and/or to travel out of state). If the number of patients on private insurance remained similar over time, perhaps these factors would not affect the authors' assessment greatly. If a large number of patients changed from public to private insurance over the time period assessed (which I believe is unlikely), then perhaps this could be a reason for abortion rate differences by county.

Introduction

1. The authors compare the abortion rate change in Texas to the national change. Is this difference of 4% meaningful? Are the authors positing that Texas underwent more drastic policy or other changes that lead to a larger decrease in the abortion rate compared to the nation?

Methods

2. Contraceptive data was collected based on the county where the service was provided, but abortion data was collected based on the county where the patient resided? Is there a possibility this could augment the measured effect?
3. Contraceptive clients were assumed to be women in this study, but cis-men can also receive contraceptive care. Is it assumed that external condom use and vasectomy did not contribute greatly to the contraceptive use in this study, and that the proportion of people using this method didn't vary significantly over time?
4. Line 71 - The authors mentioned that self-managed abortion is not reflected in their data set. I would mention also that this data cannot measure the number of abortions obtained by residents out-of-state (I appreciate this is mentioned later in the discussion).
5. Line 61 - do "other clinics" include independent abortion clinics, where specialized family planning providers may be found?
6. Line 81 - is race/ethnicity data self-reported (sometimes race/ethnicity data is assessed/collected by a 3rd party, like a nurse, and therefore subject to more bias?).
7. Line 88 - some measure of the proportion of Medicaid recipients vs privately insured over the time period assessed would be helpful; if the proportion changed drastically over the assessed time period, and only the Medicaid birth rate was included, this could change the interpretation of the difference in abortion rate.
8. Line 92 - Do any/all of the Catholic hospitals provide obstetric/gynecologic services? This would affect whether their presence is meaningful in terms of contraceptive access.

Discussion

9. Line 187 - Are there data to suggest that clinicians at FQHCs also provide highly effective male contraception less frequently?

Tables and Figures

10. The figure legends do not show enough of the pattern to be clear. Either increase the size of the boxes to reflect more of the pattern or have the figure in color.

Appendix

11. In the "spatial dimensions of access," was there any consideration to pharmacy availability? I would imagine counties with fewer resources have fewer pharmacies that are farther apart, making it difficult if patients rely on a daily/weekly/monthly form of birth control.

12. In the "accommodation of aspatial dimensions of access," I would consider listing racism rather than race.

Reviewer #3: Thank you for the opportunity to review this interesting and timely manuscript examining the association between publicly-funded contraceptive services and abortion rates in Texas. Considering the recent overturning of Roe vs. Wade, among other abortion restrictions occurring across the United States, the importance of contraceptive access cannot be underemphasized. A manuscript that helps to better link contraceptive services to abortion declines would strengthen the remaining protections on contraception in these regions.

However, in its current state, the manuscript cannot be published without major revisions. In summary, the analysis reflects several inappropriate comparisons (e.g., contraceptive access at a single timepoint versus abortion rates between two timepoints, as opposed to comparing changes against changes) and is written with insufficient detail (e.g., log regression modeling) and justification of covariates and their definitions for the study to be reproducible. As is, the conclusions represent an association that is compelling but not adequately supported by the data.

Summary of the study

This is an ecological study evaluating the association between contraceptive services and changes in the abortion rate at the county level following changes to the family planning budget and abortion restrictions in Texas. The study concluded that in the counties with higher abortion rate declines, that there were more publicly funded contraceptive clinics and these counties served more contraceptive clients compared to those counties with lower declines the abortion rate. The study pointed out the importance of greater access to publicly funded contraceptive services.

Abstract:

-Line 17: "We evaluated differences in contraceptive provision between high and low abortion decline counties, adjusting for..." The actual analysis evaluated the contraceptive provision at 2015, not the difference in contraceptive provision. Also, the final model did not adjust for the variables described here.

-Line 18: "racial/ethnic composition" might be a better choice of words here given that you are describing the county

-Line 31: The conclusions appropriately acknowledge that there isn't an assessment of change in measurements of contraceptive services, however this weakens the conclusion by making the study more cross-sectional. In being a cross-sectional comparison, the author cannot state that access to publicly funded contraceptive services could lead to greater abortion rate decline. Further the conclusion overstates the data in saying that the association is "demonstrating the importance of greater access to publicly-funded contraceptive services." For example, the authors are unable to say whether abortion clinic closures may have contributed to lower declines in abortion rates in some counties, which may have confounded the association. Decreasing abortion rates in certain counties may have been a byproduct of something unrelated to contraception altogether.

Introduction

- The introduction appropriately describes major policy changes in Texas that impacted the availability of contraceptive and abortion services. However, the introduction feels disorganized and contains citations/attribution that are inapplicable to the intended study and could be replaced by more specific and compelling background information.

- For example, the authors make a general statement in line 36 that the decline in abortion might be related to the increased use of highly effective contraceptive methods, however specific research in Texas reveals that LARC use actually decreased during this time (https://ajph.aphapublications.org/doi/full/10.2105/AJPH.2014.302515?casa_token=wMCubSXdlbQAAAAA%3Ag0JLkuo1XSquQ1Bp0wH0VfWUYfb6I6cffnDUvP2mT9wWk9D--wx-WE14_7j3QKfQgKMpD024mB5yUg). The authors could have cited other studies that gave specific assessment of change in the abortion rate due to legislative changes. <https://doi.org/10.1016/j.jpubeco.2018.08.009>

- Line 38 and 39 seems less relevant and draw the readers' attention away from a specific discussion of Texas. That highly effective contraceptive use decreases unintended pregnancies does not need to be featured so prominently.

- Line 40: Unclear to what Medicaid could have been expanded too. More context needed

- Of note, the Affordable Care Act and its contraceptive protections were also enacted during the course of this study and so the authors could have discussed and attempted to account for changes related to this legislation which should have made contraception more affordable.

- Line 50: The author stated that the objective is to evaluate if the availability of contraceptive service was associated with change in abortion rate. However, in the actual analysis, the study compared number of clients receiving contraceptive services in 2015 between counties with low vs high declines in abortion rate. I suggest the author restate the objective to be clearer and more consistent with the analysis.

- The comparison between contraception in 2015 with changes of abortion rate between 2010-2015 may not accurately reflect the actual effect of policy changes during the proposed study time. I'd suggest the author to consider comparing changes in contraception between 2010-2015 with changes in abortion rate during the same period.

- Contraceptive services were obtained from publicly funded clinics and counted as such, however, the abortion rates were counted overall across Texas. Abortion rates thus refer to the total number performed in both public and private facilities. It would be more appropriate to compare both exposures and outcomes from the same source.

-Secondary objective not introduced

Methods

-Line 71: Self-managed abortions are not reported to the state, but it's possible that abortions completed by a clinician are not always reported either and so the author could perhaps provide an estimate of proportion expected to be reported.

-Line 72: Understanding that the national rate of abortion and its changes likely ALREADY include TEXAS, we should not be comparing this rate against rates within Texas. Instead we should be looking at abortion rates between Texas versus non-Texas states.

-Line 99: The exposure variable is defined as mean number of clients receiving contraceptive services per 1000 women. This variable is a proportion, not continuous variable. Please justify why the author compared the mean?

-Line 101-110: The way the authors managed the # of contraceptive clients being higher than the population catchment is interesting and warrants reconsideration. Rather than exclude these data, the authors should try to better understand how these data came about. It is possible that numerous individuals drove to nearby counties and inflated the number of individuals receiving services.

-Line 110: Unclear why the author chose to treat a continuous variable as a categorical here in quartiles. Would seem appropriate to use as a continuous variable.

-Line 114-116: This has already been published - association of abortion rates to distance to abortion. (see link above)

Overall: Would have been better to give the reader the actual abortion rates for each time period and THEN examine the change in abortion rates.

Results

-It is worthwhile to report the data at 2010 and 2015 for several variables such as the contraceptive services, abortion rate, distance from the clinic rather than only report the changes, as the changes to the abortion rate could have been influenced by the absolute value rather than the relative value. For example, an individual who has always lived far from an abortion clinic might not have a significant increase in distance.

- Line 132: Unclear where female population data came from.

- Line 141B: Presentation of results obscures meaningful interpretation. The authors should make it more obvious that the change in composition of contraception clinics potentially led to fewer clients served.

- Line 151-154: Possible discrepancy in text versus table, as table shows significant association whereas text does not.

-Figure 1 is confusing. The total number and percent may be added to make it clearer and relevant to the text.

-Figure 2 should also report the total between 2010 and 2015. The total, low and high decline groups should all be in the same graph so they are in the same scale that we can see the comparison. The total number and percent may be added to make it clearer and relevant to the text.

-Table 1: The presentation is confusing in that the author should label the numbers (e.g. mean, proportion) and statistical tests used for each comparison should be given here or in the results text. The total number of contraceptive clients/clinics should be included. Report of race-ethnicity, percent unemployed, poverty, uninsured, without diploma should be presented as frequency (percent) and compared with chi square.

-Table 2: Did the author include contraceptive clients of lower than 50 percentiles in the logistic regression model? If included, please report results, if not included, please justify. How did the author decide to include/exclude adjusting variables in the multivariate model? What does below mean and equal to/greater than mean for population of 'None of the above' mean? What is the result for comparison of overall race-ethnicity between counties with low vs high declined in abortion rate? Much of the above could be better explained in the methods section.

-Did the author rest for association between number of contraceptive clinics and counties with low vs high declined in abortion rate using logistic regression?

Discussion

-Line 171 "The association between high abortion decline counties and increased contraceptive provision was modified only when distance to an open abortion clinic was greater than or equal 50 miles" Did the author test for distance to an open abortion clinic as the effect modifier? Please explain the interpretation from the model.

- Line 199: Based on my interpretation of Table 2, it would seem as if a change in distance to abortion clinics significant impacted high abortion rate decline, which runs counter to the conclusion drawn here.

-Regarding the ecological study design, caution is needed to apply the grouped results to individual level. The authors should address about potential ecological fallacy as one of the study limitations that the women who seek/do not seek for contraceptive services may not be the one who have abortions.

STATISTICAL EDITOR COMMENTS:

lines 25-26, Table 1: Based on the relationship of the means and SDs, the distributions are right-skewed and would not conform to normal distributions. Should format as median (range or IQR) and use as stats test a non-parametric test. If a non-parametric stats test was used, then need to explicitly state in Methods, but the change in format (from mean and SD to median and range or IQR) is still required.

Table 1: Same issue with comparison of publicly funded clinics, FQHCs, etc, where the SD vs mean indicates significant right-skewing of data distributions.

Table 2: Need to indicate in footnote to Table 2 the adjustors included in adjusted model

EDITORIAL OFFICE COMMENTS:

1. If your article is accepted, the journal will publish a copy of this revision letter and your point-by-point responses as supplemental digital content to the published article online. You may opt out by writing separately to the Editorial Office at em@greenjournal.org, and only the revision letter will be posted.

2. When you submit your revised manuscript, please make the following edits to ensure your submission contains the required information that was previously omitted for the initial double-blind peer review:

- * Funding information (ie, grant numbers or industry support statements) should be disclosed on the title page and at the end of the abstract. For industry-sponsored studies, describe on the title page how the funder was or was not involved in the study.
- * Include clinical trial registration numbers, PROSPERO registration numbers, or URLs at the end of the abstract (if applicable).
- * Name the IRB or Ethics Committee institution in the Methods section (if applicable).
- * Add any information about the specific location of the study (ie, city, state, or country), if necessary for context.

3. Obstetrics & Gynecology's Copyright Transfer Agreement (CTA) must be completed by all authors. When you uploaded your manuscript, each coauthor received an email with the subject, "Please verify your authorship for a submission to Obstetrics & Gynecology." Please ask your coauthor(s) to complete this form, and confirm the disclosures listed in their CTA are included on the manuscript's title page. If they did not receive the email, they should check their spam/junk folder. Requests to resend the CTA may be sent to em@greenjournal.org.

4. For studies that report on the topic of race or include it as a variable, authors must provide an explanation in the manuscript of who classified individuals' race, ethnicity, or both, the classifications used, and whether the options were defined by the investigator or the participant. In addition, describe the reasons that race and ethnicity were assessed in the Methods section and/or in table footnotes. Race and ethnicity must have been collected in a formal or validated way. If it was not, it should be omitted. Authors must enumerate all missing data regarding race and ethnicity as in some cases missing data may comprise a high enough proportion that it compromises statistical precision and bias of analyses by race.

Use "Black" and "White" (capitalized) when used to refer to racial categories.

List racial and ethnic categories in tables in alphabetic order. Do not use "Other" as a category; use "None of the above" instead.

Please refer to "Reporting Race and Ethnicity in Obstetrics & Gynecology" at https://edmgr.ovid.com/ong/accounts/Race_and_Ethnicity.pdf.

5. ACOG uses person-first language. Please review your submission to make sure to center the person before anything else. Examples include: "People with disabilities" or "women with disabilities" instead of "disabled people" or "disabled women"; "patients with HIV" or "women with HIV" instead of "HIV-positive patients" or "HIV-positive women"; and "people who are blind" or "women who are blind" instead of "blind people" or "blind women."

6. The journal follows ACOG's Statement of Policy on Inclusive Language (<https://www.acog.org/clinical-information/policy-and-position-statements/statements-of-policy/2022/inclusive-language>). When possible, please avoid using gendered descriptors in your manuscript. Instead of "women" and "females," consider using the following: "individuals;" "patients;" "participants;" "people" (not "persons"); "women and transgender men;" "women and gender-expansive patients;" or "women and all those seeking gynecologic care."

7. Standard obstetric and gynecology data definitions have been developed through the reVITALize initiative, which was convened by the American College of Obstetricians and Gynecologists and the members of the Women's Health Registry Alliance. Obstetrics & Gynecology has adopted the use of the reVITALize definitions. Please access the obstetric data definitions at <https://www.acog.org/practice-management/health-it-and-clinical-informatics/revitalize-obstetrics-data-definitions> and the gynecology data definitions at <https://www.acog.org/practice-management/health-it-and-clinical-informatics/revitalize-gynecology-data-definitions>. If use of the reVITALize definitions is problematic, please discuss this in your point-by-point response to this letter.

8. Make sure your manuscript meets the following word limit. The word limit includes the manuscript body text only (for example, the Introduction through the Discussion in Original Research manuscripts), and excludes the title page, précis, abstract, tables, boxes, and figure legends, reference list, and supplemental digital content. Figures are not included in the word count.

Original Research: 3,000 words

9. Specific rules govern the use of acknowledgments in the journal. Please review the following guidelines and edit your title page as needed:

- * All financial support of the study must be acknowledged.
- * Any and all manuscript preparation assistance, including but not limited to topic development, data collection, analysis, writing, or editorial assistance, must be disclosed in the acknowledgments. Such acknowledgments must identify the entities that provided and paid for this assistance, whether directly or indirectly.
- * All persons who contributed to the work reported in the manuscript, but not sufficiently to be authors, must be acknowledged. Written permission must be obtained from all individuals named in the acknowledgments, as readers may infer their endorsement of the data and conclusions. Please note that your response in the journal's electronic author form verifies that permission has been obtained from all named persons.
- * If all or part of the paper was presented at the Annual Clinical and Scientific Meeting of the American College of Obstetricians and Gynecologists or at any other organizational meeting, that presentation should be noted (include the exact dates and location of the meeting or indicate whether the meeting was held virtually).
- * If your manuscript was uploaded to a preprint server prior to submitting your manuscript to Obstetrics & Gynecology, add the following statement to your title page: "Before submission to Obstetrics & Gynecology, this article was posted to a preprint server at: [URL]."
- * Do not use only authors' initials in the acknowledgement or Financial Disclosure; spell out their names the way they appear in the byline.

Was this presented at a meeting other than the ACOG ACSM? Please disclose on the title page.

10. Be sure that each statement and any data in the abstract are also stated in the body of your manuscript, tables, or figures. Statements and data that appear in the abstract must also appear in the body text for consistency. Make sure there are no inconsistencies between the abstract and the manuscript, and that the abstract has a clear conclusion statement based on the results found in the manuscript.

In addition, the abstract length should follow journal guidelines. Please provide a word count.

Original Research: 300 words

11. Only standard abbreviations and acronyms are allowed. A selected list is available online at <http://edmgr.ovid.com/ong/accounts/abbreviations.pdf>. Abbreviations and acronyms cannot be used in the title or précis. Abbreviations and acronyms must be spelled out the first time they are used in the abstract and again in the body of the manuscript.

12. The journal does not use the virgule symbol (/) in sentences with words, except with ratios. Please rephrase your text to avoid using "and/or," or similar constructions throughout the text. You may retain this symbol if you are using it to express data or a measurement.

13. ACOG avoids using "provider." Please replace "provider" throughout your paper with either a specific term that defines the group to which are referring (for example, "physicians," "nurses," etc.), or use "health care professional" if a specific term is not applicable.

14. In your abstract, manuscript Results sections, and tables, the preferred citation should be in terms of an effect size, such as odds ratio or relative risk or the mean difference of a variable between two groups, expressed with appropriate confidence intervals. When such syntax is used, the P value has only secondary importance and often can be omitted or noted as footnotes in a Table format. Putting the results in the form of an effect size makes the result of the statistical test more clinically relevant and gives better context than citing P values alone.

Please standardize the presentation of your data throughout the manuscript submission. For P values, do not exceed three decimal places (for example, "P = .001").

Express all percentages to one decimal place (for example, 11.1%). Do not use whole numbers for percentages.

15. Please review the journal's Table Checklist to make sure that your tables conform to journal style. The Table Checklist is available at http://edmgr.ovid.com/ong/accounts/table_checklist.pdf.

16. Please review examples of our current reference style at https://edmgr.ovid.com/ong/accounts/ifa_suppl_refstyle.pdf. Include the digital object identifier (DOI) with any journal article references and an accessed date with website references.

Unpublished data, in-press items, personal communications, letters to the editor, theses, package inserts, submissions, meeting presentations, and abstracts may be included in the text but not in the formal reference list. Please cite them on the line in parentheses.

If you cite ACOG documents in your manuscript, be sure the references you are citing are still current and available. Check the Clinical Guidance page at <https://www.acog.org/clinical> (click on "Clinical Guidance" at the top). If the reference is still available on the site and isn't listed as "Withdrawn," it's still a current document. In most cases, if an ACOG document has been withdrawn, it should not be referenced in your manuscript.

Please make sure your references are numbered in order of appearance in the text.

17. Figures

Figures 1-2: Please use solid colors instead of patterns

The manuscript cites a Figure 3, but I don't see one attached.

18. Each supplemental file in your manuscript should be named an "Appendix," numbered, and ordered in the way they are first cited in the text. Do not order and number supplemental tables, figures, and text separately. References cited in appendixes should be added to a separate References list in the appendixes file.

19. Authors whose manuscripts have been accepted for publication have the option to pay an article processing charge and publish open access. With this choice, articles are made freely available online immediately upon publication. An information sheet is available at <http://links.lww.com/LWW-ES/A48>. The cost for publishing an article as open access can be found at <https://wkauthorservices.editage.com/open-access/hybrid.html>.

If your article is accepted, you will receive an email from the Editorial Office asking you to choose a publication route (traditional or open access). Please keep an eye out for that future email and be sure to respond to it promptly.

If you choose to revise your manuscript, please submit your revision through Editorial Manager at <http://ong.editorialmanager.com>. Your manuscript should be uploaded as a Microsoft Word document. Your revision's cover letter should include a point-by-point response to each of the received comments in this letter. Do not omit your responses to the EDITOR COMMENTS (if applicable), the REVIEWER COMMENTS, the STATISTICAL EDITOR COMMENTS (if applicable), or the EDITORIAL OFFICE COMMENTS.

If you submit a revision, we will assume that it has been developed in consultation with your coauthors and that each author has given approval to the final form of the revision.

Again, your manuscript will be maintained in active status for 21 days from the date of this letter. If we have not heard from you by Sep 09, 2022, we will assume you wish to withdraw the manuscript from further consideration.

Sincerely,

Shannon K. Laughlin-Tommaso, MD, MPH
Associate Editor, Gynecology

In compliance with data protection regulations, you may request that we remove your personal registration details at any time. (Use the following URL: <https://www.editorialmanager.com/ong/login.asp?a=r>). Please contact the publication office if you have any questions.

10/10/2022

Re: Submission of manuscript, "Association Between Publicly-funded Contraceptive Services and Abortion Rate in Texas, 2010-2015"

The Editors
Obstetrics & Gynecology
409 12th Street, SW
Washington, DC 20024-2188

Dear Editors:

On behalf of my co-authors, I am pleased to resubmit our manuscript, "Association Between Publicly-funded Contraceptive Services and Abortion Rate in Texas, 2010-2015," for consideration for publication as original research in *Obstetrics & Gynecology*. The manuscript has been solely submitted to *Obstetrics & Gynecology* and not been previously published or submitted to another journal for publication. We evaluated the association between the availability of contraceptive services and change in the abortion rate between 2010 and 2015 in Texas counties before and after the many Texas legislative changes which drastically reduced the state's family planning budget and imposed restrictions on abortion shuttering over half of the state's abortion clinics. We found abortion rates declined more in counties where more contraceptive clients were served and where there was a higher mean number of contraceptive clinics. We also found access to abortion was not independently associated with a high abortion rate decline. This study shows that increasing access to contraception will better serve the goal of decreasing the abortion rate rather than implementing abortion restrictions. Our analysis provides powerful data for health and public policy makers who are sincerely dedicated to helping patients have control over their own reproductive health.

We have addressed each Reviewer and Editor's comments and have provided responses including the position of the changes made. Our responses are listed point-by-point below. We have also included a revised manuscript with the changes tracked. We sincerely appreciate the time that each editor and reviewer took and feel that our manuscript is stronger.

This study was deemed exempt by The University of Texas at Austin Institutional Review Board due to the use of publicly available databases.

The abstract has been presented at the ACOG Annual Clinical & Scientific Meeting in San Diego in May 2022.

I affirm that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained. Each author participated actively in conducting analyses, drafting sections of the manuscript, editing, and approving the final, submitted version. None of the authors has a financial or other conflict of interest. I, Anita Madison, have reviewed and edited the submission to omit any identifying information. I hereby submit this self-blinded manuscript for consideration in *Obstetrics & Gynecology*.

If you have any questions about the manuscript, I will be serving as the corresponding author. We look forward to your comments and critique of the manuscript. Thank you for your consideration.

Sincerely,

Anita Madison, MD

EDITOR COMMENTS:

We found this study to be interesting and would recommend revising using the reviewer comments. The study uses a cross-sectional approach over 2 different timepoints and so the focus should really be associations and not causality. The Authors would need much finer grain chronologic detail to establish a biologically plausible causal path of the time sequence. In addition, the way the Authors have formatted the analysis could be more straightforward. For instance, in Table 1, the variables are arranged in columns where rates of abortion decline are compared. This could be accompanied by another Table where the columns are arranged according to rates of contraceptive clients per 1000 women. Then, the reference on lines 160-164 to its Table (now a new Table 2) would, I think, be more direct. And perhaps the direction sense could also be changed in present Table 2, now Table 3. That is, use the 75-100th %tiles as the referent with the outcome of high abortion rate decline as the outcome of interest. That would lead to ~ 0.30 (CIs 0.12-0.74) adjusted odds of high abortion rate decline among those counties in the 25-75th %-tiles, compared to the counties within the highest quartile.

Response: We have added a new Table 2 in which the columns are arranged similar to the logistic regression model comparing counties that served the highest quartile of contraceptive clients in 2015 to those counties that served 50-74 percentile of contraceptive clients. A new Table 3 has been added with the 75-100 percentile of contraceptive clients served in 2015 serving as the referent group. As suggested by Reviewer 3, we have also added linear regression results that demonstrate how a change in number of contraceptive clients served between 2010 and 2015 is associated with a change in the abortion rate between 2010 and 2015 using county as the unit of analysis. The Methods have been modified to reflect the new Table 2 and updated regression results (Lines 155-169).

REVIEWER COMMENTS:

Reviewer #1: This is an observational study looking at the rates of abortion by county in Texas over time and any association with the availability of contraceptive services. I applaud the authors for exploring this important topic. The paper is well written and clear. I would however, caution the authors to not interpret the association as causation.

Abstract - use of the term "demonstrating" in the conclusion implies causation. Please rephrase.

Response: We changed "demonstrating" to "which may indicate" to not imply causation (Line 36)

Introduction - lines 44-49, if available, some idea of the magnitude of these changes for the reader (ie 25% loss of funding, decrease of 40% enrollees, etc)

Response: We added percentages and dollar amounts to the lines. It now reads "In 2011, the Texas legislature cut its family planning budget from \$111 million to \$38 million and diverted funds from specialized family planning clinics and abortion providers and toward state-funded primary health care centers, causing 25% of family planning clinics to close, reduce hours, or stop providing family planning services. This caused a loss in funding through the Medicaid Women's Health Program, which provided subsidized contraceptive services. This loss of funding and tiered allocation of funding led to a decrease

in long-acting reversible contraceptives (LARCs) being provided in Texas. The replacement state-only funded program had a 15% decrease in enrollees and 41% decrease in contraceptive claims in 2015 compared to 2011.” (Lines 52-60)

Methods - line 80 and 92-94 - how are "Catholic hospital" noted?

Response: We added an explanation about how catholic hospitals were noted. It now reads “Hospital characteristics were retrieved from the American Hospital Association (AHA) Annual Survey Database from 2015 which included the location and Catholic affiliation of each general acute care hospital, according to self-identified Catholic hospital status.” (Lines 125-128)

Discussion - line 199. There is a clear association with increased contraceptive provision and higher rates in abortion declines, however, I would encourage the authors to use language that interprets the finding rather than declaring that increased contraceptive care demonstrates (causes) less abortion care. Perhaps, "we the authors interpret this association as a demonstration of xxx, which is supported in other literature..."

Response: We revised the sentence to read “While our findings suggest that increased contraceptive provision may be associated with a greater decline in the abortion rate, there are limitations to our study.” (Lines 297-298)

Line 222-223 - "the most restricted ability" means more than other states? more than other countries? Or just incredibly restricted? The last paragraph of the paper is strong and summarizes the authors' points well. I would recommend adjusting the last line for clarity.

Response: At that time period, it was the state with the most restrictions to abortion access. We changed the sentence to read “This environment has restricted the ability of Texans to have control over their own reproductive health outcomes.” (Lines 341-343)

Reviewer #2:

Comments to the Author

The authors completed a large cross-sectional study to 1) assess county-by-county contraceptive availability over time as a result of a state health funding change and 2) whether that change in availability affected the county-by-county abortion rate in Texas. It is a thoughtful and thorough evaluation of several large data sets, and beautifully tells the story that contraceptive availability, as opposed to abortion restrictions, has a larger impact on abortion rate.

A question I held throughout is what percent of the population relied on public vs private insurance over the time periods assessed. Privately insured patients likely had mitigating factors with regard to contraceptive availability (they could see providers at non-publicly funded clinics/private offices). Furthermore, such individuals would potentially have more means to access abortion (though it would likely be unmeasured by the current study, as they may have increased access to extra-legal self-managed abortion and/or to travel out of state). If the number of patients on private insurance remained similar over time, perhaps these factors would not affect the authors' assessment greatly. If a large number of patients changed from public to private insurance over the time period assessed (which I believe is unlikely), then perhaps this could be a reason for abortion rate differences by county.

Response: The American Community Survey data for privately and publicly insured only include 54 of the 254 counties. These data show that the percent change in privately insured increased 15.3% between 2010 and 2015. Percent change in publicly insured increased 7.9% over the same time period. The percent uninsured decreased 27.8%. Due to the limited availability of data for privately insured

females in 2010 and 2015, we included it in the conceptual model and reported as data not available. We added “While we attempted to account for all known variables that may affect the association between contraceptive access and abortion rate, comprehensive data for all variables included in our conceptual model were not available (e.g. privately insured female population).” (Lines 310-313)

Introduction

1. The authors compare the abortion rate change in Texas to the national change. Is this difference of 4% meaningful? Are the authors positing that Texas underwent more drastic policy or other changes that lead to a larger decrease in the abortion rate compared to the nation?

Response: In response to Reviewer 3’s comments we compared the abortion rate decline between Texas and non-Texas states and found that for non-Texas states, the abortion rate declined 17.5%. We removed the 19% decline estimate which included all CDC reporting regions including Texas from the Introduction to avoid any confusion. We added a line to the Introduction specifically stating that Texas’ 2013 law was the most restrictive abortion law for that time period and added an appropriate citation. (Lines 63-64)

Methods

2. Contraceptive data was collected based on the county where the service was provided, but abortion data was collected based on the county where the patient resided? Is there a possibility this could augment the measured effect?

Response: Thank you for this point. We have added this as a potential limitation of our study and addressed how we attempted to account for this in our analysis in the Discussion, “Use of data sources that reported the county in which contraceptive clients were served and abortions based on the county in which the patient resided may have led to overestimation of our results. This was true for both time periods, so the trend over time likely still holds. We also tried to account for this by excluding counties that had no contraceptive clinic in both time periods and creating catchment areas that combined the female population and abortion cases for a given region that had a contraceptive clinic (data not shown) and our results were similar” (Lines 313-319)

3. Contraceptive clients were assumed to be women in this study, but cis-men can also receive contraceptive care. Is it assumed that external condom use and vasectomy did not contribute greatly to the contraceptive use in this study, and that the proportion of people using this method didn't vary significantly over time?

Response: According to the literature, there has been a decline in the rate of vasectomies in the United States. <https://pubmed.ncbi.nlm.nih.gov/34390207/> Another study found that in Texas two thirds of publicly funded family planning organizations did not offer vasectomy on-site or pay for referrals with family planning funding; eleven organizations (20%) provided on-site vasectomies, 9 of which frequently. <https://pubmed.ncbi.nlm.nih.gov/28413942/> Also, nationally condom use is showing a slow decline. <https://www.cdc.gov/nchs/data/nhsr/nhsr086.pdf>. We added to Lines 89-90 “We decided to focus on female contraception clients as previous studies has shown a decrease in vasectomy rate and condom use of this time period.”

We also took this opportunity to highlight that use of female/women may not include all people who have the potential to become pregnant and added, “Although we recognize that all people who can get pregnant may not identify as women, we used the term women in this study since our data sources used women/females.” (Lines 95-97)

4. Line 71 - The authors mentioned that self-managed abortion is not reflected in their data set. I would mention also that this data cannot measure the number of abortions obtained by residents out-of-state (I appreciate this is mentioned later in the discussion).

Response: We added a sentence to address abortions that were performed out of state which reads: "Additionally, our dataset did not measure abortions that were performed out-of-state by Texas residents." (Lines 102-3). We also edited lines 298 -300 to read "We were unable to calculate self-managed and out-of-state abortions which may have increased due to more recent abortion restrictions in Texas but were likely negligible during our study period."

5. Line 61 - do "other clinics" include independent abortion clinics, where specialized family planning providers may be found?

Response: Other clinics refer to other independent/private nonprofit organizations that offer contraceptive services to the general public and uses public funds that doesn't fall into the other categories. This information was added to the manuscript at Lines 84-85. As part of its 2011 legislative session, Texas prohibited independent abortion clinics from receiving state family planning funds so these are not included in the "other" category.

6. Line 81 - is race/ethnicity data self-reported (sometimes race/ethnicity data is assessed/collected by a 3rd party, like a nurse, and therefore subject to more bias?).

Response: We clarify that data from the Texas Demographic Center is based on US Census data in which race/ethnicity is self-reported, "Race-ethnicity data were obtained from the Texas Demographic Center, based on US Census data, and were..." (Lines 113-114)

7. Line 88 - some measure of the proportion of Medicaid recipients vs privately insured over the time period assessed would be helpful; if the proportion changed drastically over the assessed time period, and only the Medicaid birth rate was included, this could change the interpretation of the difference in abortion rate.

Response: As noted in our response above The American Community Survey data for privately and publicly insured only include 54 of the 254 counties. These data show that the percent change in privately insured increased 15.3% between 2010 and 2015. Percent change in publicly insured increased 7.9% over the same time period. The percent uninsured decreased 27.8%. Due to the limited availability of data for privately insured females in 2010 and 2015, we included it in the conceptual model and reported as data not available. We added "While we attempted to account for all known variables that may affect the association between contraceptive access and abortion rate, comprehensive data for all variables included in our conceptual model were not available (e.g. privately insured female population)." (Lines 310-313)

8. Line 92 - Do any/all of the Catholic hospitals provide obstetric/gynecologic services? This would affect whether their presence is meaningful in terms of contraceptive access.

Response: The Catholic Health Association of the United States (<https://www.chausa.org/members/directories/catholic-health-care-directory>) reports 54 Catholic hospitals in Texas, excluding long-term care facilities. Of these, 45 (83%) provide obstetric-gynecologic services. Thus, we think it is important to include these data as a potential confounder. We have added this information, "Of all Catholic hospitals in Texas (n=54), 83% (n=45) offered obstetrics-gynecologic services." (Lines 128-129)

Discussion

9. Line 187 - Are there data to suggest that clinicians at FQHCs also provide highly effective male contraception less frequently?

Response: Yes, a study on barriers to vasectomies in Texas showed that FQHCs and public health departments were less likely to offer onsite vasectomies. There was also a lack of trained clinicians and perceived limited demand. FQHCs were more likely to prioritize primary health care services over men's reproductive health services. Additionally, cultural biases were more common in FQHCs leading to clinicians not offering these services to certain demographics.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5657540/#bibr11-1557988317694296>

We edited the text to read, "Clinicians at FQHCs often lack training to provide intrauterine devices, contraceptive implants, and vasectomies and feel family planning is difficult to integrate because of clients' other health needs." and included the appropriate citation. (Lines 282-284)

Tables and Figures

10. The figure legends do not show enough of the pattern to be clear. Either increase the size of the boxes to reflect more of the pattern or have the figure in color.

Response: We changed the figure so that it is now in color.

Appendix

11. In the "spatial dimensions of access," was there any consideration to pharmacy availability? I would imagine counties with fewer resources have fewer pharmacies that are farther apart, making it difficult if patients rely on a daily/weekly/monthly form of birth control.

Response: That is a very good point. No, although we did not consider pharmacy availability, we added it as a factor that may influence access to contraceptive and abortion care but that it was not analyzed. There tends to be no uniformity between the service provided by pharmacies. Also, women can receive prescriptions by mail which would affect the data.

12. In the "accommodation of aspatial dimensions of access," I would consider listing racism rather than race.

Response: We changed Race/ethnicity to structural racism.

Reviewer #3: Thank you for the opportunity to review this interesting and timely manuscript examining the association between publicly-funded contraceptive services and abortion rates in Texas. Considering the recent overturning of Roe vs. Wade, among other abortion restrictions occurring across the United States, the importance of contraceptive access cannot be underemphasized. A manuscript that helps to better link contraceptive services to abortion declines would strengthen the remaining protections on contraception in these regions.

However, in its current state, the manuscript cannot be published without major revisions. In summary, the analysis reflects several inappropriate comparisons (e.g., contraceptive access at a single timepoint versus abortion rates between two timepoints, as opposed to comparing changes against changes) and is written with insufficient detail (e.g., log regression modeling) and justification of covariates and their definitions for the study to be reproducible. As is, the conclusions represent an association that is compelling but not adequately supported by the data.

Response: As detailed below in response to Reviewer 3's subsequent comments elaborating on this overall assessment of the manuscript, we have now included the median and interquartile range for percent change in contraceptive clients and clinics between 2010 and 2015 in Tables 1 and 2. We have also added the results of our log-linear regression analysis which present the association of percent change in abortion rate and percent change in contraceptive clients per 1000 women of reproductive age for the two time periods. We have added more detail to our Methods (Lines 159-180) to explain our regression models and how we decided to include covariates in each model.

Summary of the study

This is an ecological study evaluating the association between contraceptive services and changes in the abortion rate at the county level following changes to the family planning budget and abortion restrictions in Texas. The study concluded that in the counties with higher abortion rate declines, that there were more publicly funded contraceptive clinics and these counties served more contraceptive clients compared to those counties with lower declines the abortion rate. The study pointed out the importance of greater access to publicly funded contraceptive services.

Abstract:

-Line 17: "We evaluated differences in contraceptive provision between high and low abortion decline counties, adjusting for..." The actual analysis evaluated the contraceptive provision at 2015, not the difference in contraceptive provision. Also, the final model did not adjust for the variables described here.

Response: We added to our original analysis and evaluated the association between change in abortion rate and change in contraceptive clients per 1000 women 18-44 years old in both time periods. This information is now included in the results of the abstract (Lines 29-30) so we kept our original wording of "differences in contraceptive provision". We also modified the wording from "adjusting for" to "and evaluated county characteristics (racial/ethnic composition, unemployment, poverty, uninsured, education, distance to an abortion clinic, Medicaid deliveries, and Catholic hospital marketplace dominance) as potential confounders" (Lines 18-21) since not all of these were included in the model. Thank you for highlighting these points.

-Line 18: "racial/ethnic composition" might be a better choice of words here given that you are describing the county

Response: We changed race-ethnicity to racial/ethnic composition. (Lines 18-19)

-Line 31: The conclusions appropriately acknowledge that there isn't an assessment of change in measurements of contraceptive services, however this weakens the conclusion by making the study more cross-sectional. In being a cross-sectional comparison, the author cannot state that access to publicly funded contraceptive services could lead to greater abortion rate decline. Further the conclusion overstates the data in saying that the association is "demonstrating the importance of greater access to publicly-funded contraceptive services." For example, the authors are unable to say whether abortion clinic closures may have contributed to lower declines in abortion rates in some counties, which may have confounded the association. Decreasing abortion rates in certain counties may have been a byproduct of something unrelated to contraception altogether.

Response: We have added bivariate and regression results that evaluate the association between change in contraceptive clients and the abortion rate over time. We have modified our language

throughout the abstract and manuscript to state that our results “suggest” or “which may indicate” instead of “demonstrate” the importance of greater access to publicly-funded contraceptive services (Lines 36, 297, and 337). The point about abortion clinic closures being another important factor in reducing the abortion rate is well taken. We have included the following sentences, “Texas’ 2013 legislation that led to closure of over half of the state’s abortions clinics has been associated with a decline in the state abortion rate. We evaluated the association between median percent change in distance to an open abortion clinic and found no significant association with abortion rate decline county categories likely because the impact of distance is not linear. After adjusting for a change in distance to open abortion clinic between 2010 and 2015 greater than or equal to 50 miles, we found that counties serving the 50-74th quartile of contraceptive clients per 1000 reproductive-aged women in 2015 had similarly reduced odds (aOR 0.43, 95% CI 0.19, 0.96) of having a high abortion rate decline compared to counties serving the top quartile of contraceptive clients as in the unadjusted model.” (Lines 303-310).

Introduction

- The introduction appropriately describes major policy changes in Texas that impacted the availability of contraceptive and abortion services. However, the introduction feels disorganized and contains citations/attribution that are inapplicable to the intended study and could be replaced by more specific and compelling background information.

- For example, the authors make a general statement in line 36 that the decline in abortion might be related to the increased use of highly effective contraceptive methods, however specific research in Texas reveals that LARC use actually decreased during this time (https://ajph.aphapublications.org/doi/full/10.2105/AJPH.2014.302515?casa_token=wMCubSXd1bQAA%3Ag0JLkua1XSquQ1Bp0wHOVfWUYfb6l6cfnDUvP2mT9wWk9D--wx-WE14_7j3QKfQgKMPD024mB5yUg). The authors could have cited other studies that gave specific assessment of change in the abortion rate due to legislative changes. <https://doi.org/10.1016/j.jpubeco.2018.08.009>

Response: We appreciate the reviewer’s comments and have modified the Introduction in Lines 39-69 to more clearly state that 1. The national abortion rate decline has been attributed to increased contraceptive use, 2. That is likely not the case in Texas given the changes to the state family planning program, and 3. Abortion restrictions in Texas have been associated with a decline in the abortion rate. We included the citations recommended by the reviewer and included more compelling data from those citations to organize the Introduction.

- Line 38 and 39 seems less relevant and draw the readers' attention away from a specific discussion of Texas. That highly effective contraceptive use decreases unintended pregnancies does not need to be featured so prominently.

Response: These sentences have been removed and the introductory paragraph has been abbreviated, but still included to set up the juxtaposition between the nation and Texas.

- Line 40: Unclear to what Medicaid could have been expanded too. More context needed

Response: We edited the Introduction for clarity. Line 60 reads: "Additionally, the Texas legislature chose to forgo Medicaid expansion under the Affordable Care Act which mandated contraceptive coverage by insurers."

- Of note, the Affordable Care Act and its contraceptive protections were also enacted during the course of this study and so the authors could have discussed and attempted to account for changes related to this legislation which should have made contraception more affordable.

Response: Line 60 added: "Additionally, the Texas legislature chose to forgo Medicaid expansion under the Affordable Care Act which mandated contraceptive coverage by insurers."

- Line 50: The author stated that the objective is to evaluate if the availability of contraceptive service was associated with change in abortion rate. However, in the actual analysis, the study compared number of clients receiving contraceptive services in 2015 between counties with low vs high declines in abortion rate. I suggest the author restate the objective to be clearer and more consistent with the analysis.

Response: We reworded this sentence to "Our objective was to evaluate the association between contraceptive provision and abortion rate decline in Texas between 2010 and 2015." (Lines 70-71)

- The comparison between contraception in 2015 with changes of abortion rate between 2010-2015 may not accurately reflect the actual effect of policy changes during the proposed study time. I'd suggest the author to consider comparing changes in contraception between 2010-2015 with changes in abortion rate during the same period.

Response: We appreciate this reviewer's comment. In addition to evaluating the contraceptive clients in 2015 and a change in the abortion rate between 2010 and 2015, we included results in Tables 1 and 2 which show the change in contraceptive clients and clinic over the two time periods. We also included linear regression results evaluating the change in abortions and change in clients between 2010 and 2015 in Table 3.

- Contraceptive services were obtained from publicly funded clinics and counted as such, however, the abortion rates were counted overall across Texas. Abortion rates thus refer to the total number performed in both public and private facilities. It would be more appropriate to compare both exposures and outcomes from the same source.

Response: There are no publicly-funded abortion facilities in Texas. Nearly all abortions during this time period happened in independent or Planned Parenthood abortion clinics, neither of which received state or federal funding to cover abortion services. Additionally, because private insurance carriers are prohibited from covering abortion, patients seeking abortion either pay out of pocket or obtain funding assistance from abortion funds. There are no publicly available data on who receives assistance from abortion funds in Texas.

-Secondary objective not introduced

Response: We have edited line 75-78 to read: "Our secondary objective was to evaluate abortion availability and other county-based characteristics as potential confounders in the relationship between contraceptive provision and abortion rate decline."

Methods

-Line 71: Self-managed abortions are not reported to the state, but it's possible that abortions completed by a clinician are not always reported either and so the author could perhaps provide an estimate of proportion expected to be reported.

Response: In Texas, there is mandatory state reporting by abortion facilities and providers. They are mandated to report the number of abortions they perform and certain information about the abortion procedures they perform on the Texas Induced Termination of Pregnancy Reporting (ITOP) form. Per Texas law, anyone performing greater than 50 abortions per year is mandated to report themselves as an abortion provider and complete an ITOP form for each abortion performed, thus the number of abortions that are happening in a private OBGYN offices are negligible.

-Line 72: Understanding that the national rate of abortion and its changes likely ALREADY include TEXAS, we should not be comparing this rate against rates within Texas. Instead we should be looking at abortion rates between Texas versus non-Texas states.

Response: As reported in the original manuscript, the national decline in abortion rate between 2010 and 2015 was 19% calculated from the Centers for Disease Control and Prevention abortion surveillance data reporting regions. When excluding Texas from this national statistic, the national abortion rate decreased by 17.5%. We use this 17.5% cut-off in our new analysis and explain this in the Methods (Lines 1014-108). This did not change our categorization of counties as high or low abortion rate decline county.

-Line 99: The exposure variable is defined as mean number of clients receiving contraceptive services per 1000 women. This variable is a proportion, not continuous variable. Please justify why the author compared the mean?

Response: We changed this to the number of clients instead of using “mean” number for clarity. (Line 136)

-Line 101-110: The way the authors managed the # of contraceptive clients being higher than the population catchment is interesting and warrants reconsideration. Rather than exclude these data, the authors should try to better understand how these data came about. It is possible that numerous individuals drove to nearby counties and inflated the number of individuals receiving services.

Response: We attempted to better understand how these data came about. Prior to our original submission, we contacted the principal research scientist at the Guttmacher Institute who confirmed that contraceptive data represent counties in which clients were served and not where they resided. Given that only two of 157 counties had a greater number of contraceptive clients than the entire catchment population, it is unlikely that the contraceptive data represent multiple visits by the same individual. If that were the case, we would expect many more counties to have a contraceptive client population greater than the female reproductive age population. Since the catchment area analysis provided similar results to an analysis not using catchment areas, we modified our analysis to only include counties that had at least one contraceptive clinic in either year. We chose this approach to 1. Make it easier for the audience to understand and reproduce the analysis and 2. Help alleviate some of the skew present in the dataset using 254 counties. (Lines 139-140)

-Line110: Unclear why the author chose to treat a continuous variable as a categorical here in quartiles. Would seem appropriate to use as a continuous variable.

Response: We clarify in our Methods why we chose to analyze this variable in quartiles, “The

distribution of number of contraceptive clients served per 1000 women 18-44 years old in 2015 was also right-skewed such that below the fiftieth percentile of counties, there were no clients served. Thus, we compared counties that fell within the 50-74 percentile to the top counties (75-100 percentile, referent) of contraceptive clients served per 1000 women 18-44 years.” (Lines 159-163) We also present linear regression analyses maintaining contraceptive clients as a continuous variable.

-Line 114-116: This has already been published - association of abortion rates to distance to abortion. (see link above)

Response: We have removed this sentence from the manuscript. We do evaluate distance to an open abortion clinic as a potential confounder in the relationship between contraceptive clients and abortion rate.

Overall: Would have been better to give the reader the actual abortion rates for each time period and THEN examine the change in abortion rates.

Response: We have added these results to Tables 1 and 2.

Results

-It is worthwhile to report the data at 2010 and 2015 for several variables such as the contraceptive services, abortion rate, distance from the clinic rather than only report the changes, as the changes to the abortion rate could have been influenced by the absolute value rather than the relative value. For example, an individual who has always lived far from an abortion clinic might not have a significant increase in distance.

Response: We have added these results to Tables 1 and 2.

- Line 132: Unclear where female population data came from.

Response: Added to line 90 where female population data came from. It now reads “Using county level population data from the Texas Demographic Center to determine the female population, we calculated the number of contraceptive clients served at each clinic type and number of contraceptive clinics per 1000 women aged 18-44 in 2015.”

- Line 141B: Presentation of results obscures meaningful interpretation. The authors should make it more obvious that the change in composition of contraception clinics potentially led to fewer clients served.

Response: We added lines 201-208 to try to better show the change in composition between the two groups from 2010 and 2015 as described below.

“Low abortion rate decline counties had a decrease in contraceptive clients served for all clinic types (for other (20%), Planned Parenthood (100%), hospital-based (19%), and health department clinics (23%)) except FQHCs which had a 100% increase in contraceptive clients served from 2010 to 2015 (Figure 2). On the other hand, high abortion rate decline counties had a decrease in contraceptive clients served for only other (36%) and Planned parenthood clinics (38%) from 2010 to 2015. There was also an increase in contraceptive clients served among hospital-based (93%), health department (24%), and FQHCs (97%) for high decline counties from 2010 to 2015.”

- Line 151-154: Possible discrepancy in text versus table, as table shows significant association whereas text does not.

Response: When comparing the median distance to an abortion clinic and median percent change in distance to abortion clinic between 2010 and 2015 as recommended by the Statistical editor, this relationship was no longer significant. This is shown in Table 1, but is not included in the text. Nevertheless, given the importance of evaluating increased distance as a potential confounder for reduced abortion rate, this was evaluated in the regression models.

-Figure 1 is confusing. The total number and percent may be added to make it clearer and relevant to the text.

Response: We added percentage to make it clearer.

-Figure 2 should also report the total between 2010 and 2015. The total, low and high decline groups should all be in the same graph so they are in the same scale that we can see the comparison. The total number and percent may be added to make it clearer and relevant to the text.

Response: We attempted to combine the figure to resemble figure 1. However when combined the graph was not easy to compare between the two years for the high decline counties due to the big difference between contraceptive clients between high and low decline. The scale was too big for the high decline counties to the point that visualization and comparison was affected.

-Table 1: The presentation is confusing in that the author should label the numbers (e.g. mean, proportion) and statistical tests used for each comparison should be given here or in the results text. The total number of contraceptive clients/clinics should be included. Report of race-ethnicity, percent unemployed, poverty, uninsured, without diploma should be presented as frequency (percent) and compared with chi square.

Response: We have added information to clarify when we report medians, interquartile ranges, frequencies, and percents. We added a footnote clarifying that the p-value tests for differences in high and low abortion rate decline counties. We have added total number of contraceptive clients and clinics for each year and percent change over the study period. We now report the frequency and percent for race-ethnicity, unemployed, poverty, uninsured, without diploma. We also report the statistical tests used in the Methods (Lines 156-158).

-Table 2: Did the author include contraceptive clients of lower than 50 percentiles in the logistic regression model? If included, please report results, if not included, please justify. How did the author decide to include/exclude adjusting variables in the multivariate model? What does below mean and equal to/greater than mean for population of 'None of the above' mean? What is the result for comparison of overall race-ethnicity between counties with low vs high declined in abortion rate? Much of the above could be better explained in the methods section.

Response: We clarified the reasoning behind our decision to compare the 50-74 percentile to the 75-100 percentile in the Methods (Lines 159-163), "The distribution of number of contraceptive clients served per 1000 women 18-44 years old in 2015 was also right-skewed such that below the fiftieth percentile of counties, there were no clients served. Thus, we compared counties that fell within the 50-74 percentile to the top counties (75-100 percentile, referent) of contraceptive clients served per 1000 women 18-44

years.” We also clarified that we, “We then fit a logistic regression model evaluating the association between top quartiles of contraceptive clients served per 1000 women 18-44 years old in 2015 and the abortion rate decline adjusting for potentially confounding variables that were associated with both variables at a p-value <0.05.” (Lines 166-170)

Additionally, we provided an overall comparison for race-ethnicity between high and low abortion decline counties in Table 1.

-Did the author test for association between number of contraceptive clinics and counties with low vs high declined in abortion rate using logistic regression?

Response: Since number of contraceptive clinics and number of contraceptive clinics per 1000 women 18-44 years old were not significantly associated with low vs. high abortion rate decline county in bivariate analyses, we did not include these in the logistic regression.

Discussion

-Line 171 "The association between high abortion decline counties and increased contraceptive provision was modified only when distance to an open abortion clinic was greater than or equal 50 miles" Did the author test for distance to an open abortion clinic as the effect modifier? Please explain the interpretation from the model.

Response: See next response below

- Line 199: Based on my interpretation of Table 2, it would seem as if a change in distance to abortion clinics significant impacted high abortion rate decline, which runs counter to the conclusion drawn here.

Response: As recommended by Reviewer 3 and the Statistical Editor, we reported the median and interquartile range for distance to an open abortion clinic for both 2010 and 2015 and the median percent change and interquartile range. We conducted Wilcoxon rank tests to evaluate for significant associations between these distance variables and high vs. low decline abortion rate counties and only found a significant difference for 2010. This counters previously published studies that do show an association between categorical change in distance to an open abortion clinic and abortion rate decline. We addressed this in our Discussion (Lines 303-310) by presenting results using a categorical above or equal to 50 mile change vs. less than 50 miles as was used in Fischer 2018 and Grossman 2017 and found a similar relationship to our unadjusted logistic regression results.

-Regarding the ecological study design, caution is needed to apply the grouped results to individual level. The authors should address about potential ecological fallacy as one of the study limitations that the women who seek/do not seek for contraceptive services may not be the one who have abortions.

Response: Added to address ecological fallacy as one of the study limitations. Line 321-325
“Additionally, due to the ecological study design, caution is needed when applying grouped results to the individual level. In our study, we observed that increased contraceptive use was associated with a decline in abortion rate. However, it would be an ecological fallacy to infer that the women who seek contraception are the ones who have abortions.”

STATISTICAL EDITOR COMMENTS:

lines 25-26, Table 1: Based on the relationship of the means and SDs, the distributions are right-skewed

and would not conform to normal distributions. Should format as median (range or IQR) and use as stats test a non-parametric test. If a non-parametric stats test was used, then need to explicitly state in Methods, but the change in format (from mean and SD to median and range or IQR) is still required.

Response: Data are now presented as median and interquartile range. We now report the use of a non-parametric test, Wilcoxon rank sum, in the Methods (Lines 156-158).

Table 1: Same issue with comparison of publicly funded clinics, FQHCs, etc, where the SD vs mean indicates significant right-skewing of data distributions.

Response: Data are now presented as median and interquartile range. We now report the use of a non-parametric test, Wilcoxon rank sum, in the Methods (Lines 156-158).

Table 2: Need to indicate in footnote to Table 2 the adjustors included in adjusted model

Response: A footnote has been added to the new Table 3 stating that the multivariable model includes abortion rate decline county, quartile of contraceptive clients served, race/ethnicity, unemployed, living in poverty, uninsured, without diploma, and Medicaid deliveries variables.

EDITORIAL OFFICE COMMENTS:

Please standardize the presentation of your data throughout the manuscript submission. For P values, do not exceed three decimal places (for example, "P = .001").

Response: We have standardized the presentation of p-values to two decimal places.

Response: We have standardized the presentation of p-values to two decimal places.

Express all percentages to one decimal place (for example, 11.1%). Do not use whole numbers for percentages.

Response: All percentages are now presented to one decimal place.