DOI:10.31557/APJCN.2912.20260714

PROTOCOL

Racial, Socioeconomic and Geographic Disparities in the Selection of Minimally Invasive Approaches Versus Open Abdominal Hysterectomy: A Systematic Review and Meta-Analysis Protocol

Hoda Zendehdel[1], Somayyeh Noei Teymoordash[2], Mahdis Kashian[3], Aram Halimi[4]

[1]Endometriosis Research Center, Iran University of Medical Sciences, Department of Obstetrics and Gynecology, Rasoul Akram Hospital, Tehran, Iran. [2]Firoozgar Clinical Research and Development Center (FCRDC), Department of Obstetrics and Gynecology, School of Medicine, Firoozgar Hospital, Iran University of Medical Sciences, Tehran, Iran. [3]Firoozgar Clinical Research and Development Center (FCRDC), Department of Obstetrics and Gynecology, School of Medicine, Firoozgar Hospital, Iran University of Medical Sciences, Tehran, Iran. [4]Research Center for Social Determinants of Health, Research Institute for Metabolic and Obesity Disorders, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Abstract

Background: Minimally invasive hysterectomy (MIH), including vaginal, laparoscopic, and robotic approaches, is associated with improved perioperative outcomes compared with open abdominal hysterectomy and is now the preferred surgical approach for many benign gynecologic conditions. However, emerging evidence suggests that access to MIH is not equitably distributed, with disparities observed across racial, socioeconomic, and geographic groups. **Objectives:** This systematic review and meta-analysis will aim to evaluate and quantify disparities in the use of minimally invasive versus open abdominal hysterectomy among women undergoing surgery for benign conditions. Specifically, it will estimate pooled associations by race/ethnicity, socioeconomic status, and geographic or hospital-level factors. **Methods:** This protocol follows PRISMA-P guidelines and has been registered in PROSPERO. We will systematically search PubMed, Scopus, and Web of Science (2010–2026) for observational studies reporting hysterectomy route in relation to racial/ethnic, socioeconomic, or geographic variables. Eligible studies will include adult women undergoing hysterectomy for benign indications. Two reviewers will independently screen studies, extract data, and assess risk of bias using JBI tools. Random-effects meta-analyses will be conducted to pool adjusted effect estimates. Heterogeneity will be assessed using I^2 and Cochran's Q. Subgroup and sensitivity analyses will explore clinical eligibility, health system characteristics, and hospital-level factors. **Ethical Considerations:** This systematic review and meta-analysis will rely solely on data obtained from existing published studies, with no direct interaction with human subjects, no collection of personally identifiable information, and no additional intervention beyond the secondary analysis of summarized results. Therefore, official approval from an institutional review board or research ethics committee is typically not necessary.

Keywords: Disparities, minimally invasive hysterectomy, open abdominal hysterectomy.

Asian Pac J Cancer Nursing, 5-9

Submission Date: 04/23/2026 Acceptance Date: 06/05/2026

Introduction

Hysterectomy is among the most common major surgical procedures for women, with an estimated 400,000–450,000 inpatient procedures for benign indications performed annually in the United States [1]. Since the early 2000s, minimally invasive hysterectomy (MIH) has become a standard treatment for benign and some malignant gynecologic conditions [2]. Minimally invasive hysterectomy including vaginal, laparoscopic,

Corresponding Author:
Somayyeh Noei Teymoordash
Firoozgar Clinical Research and Development Center (FCRDC), Department of Obstetrics and Gynecology, School of Medicine, Firoozgar Hospital, Iran University of Medical Sciences, Tehran, Iran.
Email: deniznoei00@gmail.com

and robotic approaches has been performed since the late 1980s. Research consistently shows benefits such as less blood loss, reduced pain, shorter hospital stays, and faster recovery. As a result, its use has now surpassed that of open abdominal hysterectomy [3].

A key gap in research is whether racial differences exist in the use of minimally invasive hysterectomy. As with many medical advances, adoption may favor socially advantaged patients, leaving older surgical techniques increasingly concentrated among racial minorities and disadvantaged groups. This is particularly concerning given that Black women undergo hysterectomy at disproportionately higher rates [4]. In a national TRICARE cohort with universal insurance coverage, African American and Asian women were 27–37% less likely than White women to receive vaginal or laparoscopic hysterectomy rather than abdominal hysterectomy for benign indications, even after adjustment for sociodemographic and clinical factors [5]. Similarly, analyses of state and multi state administrative data have shown that non Hispanic Black women have approximately half the odds of undergoing minimally invasive hysterectomy compared with non Hispanic White women, and are more likely to receive an open abdominal approach even when controlling for indications and comorbidities [3].

Clinical factors such as uterine fibroids, uterine size, and prior abdominopelvic surgery partly, but not fully, explain racial differences in hysterectomy route. Black patients have higher prevalence of fibroids, earlier onset, and more severe disease, resulting in larger uteri at the time of hysterectomy; larger uterine size is known to make minimally invasive hysterectomy more technically challenging. However, within the Veterans Health Administration, Black veterans with fibroids and smaller uteri (postoperative uterine weight <250 g) still had significantly lower adjusted probabilities of receiving minimally invasive hysterectomy compared with White veterans, whereas no racial difference was observed among those with larger uteri, suggesting that uterine size alone does not account for observed disparities. Likewise, in multi state analyses restricted to women without fibroids, obesity, or prior abdominopelvic surgery i.e., those likely eligible for minimally invasive hysterectomy African American, Hispanic, and Asian/Pacific Islander women remained less likely than White women to undergo vaginal or laparoscopic hysterectomy and more likely to receive abdominal hysterectomy [3, 6, 7].

Collectively, existing evidence indicates that racial, socioeconomic, and geographic disparities in the selection of minimally invasive versus open abdominal hysterectomy are prevalent, multifactorial, and incompletely explained by clinical contraindications to minimally invasive surgery. However, prior studies have largely been observational analyses of administrative or single system datasets and have not synthesized the magnitude and consistency of these disparities across diverse populations and settings. To our knowledge, no prior systematic review and meta analysis has comprehensively quantified racial, socioeconomic, and geographic differences in the selection of minimally invasive versus open abdominal hysterectomy across benign gynecologic indications.

Objectives

The objective of this systematic review and meta analysis will be to evaluate and quantify racial, socioeconomic, and geographic disparities in the use of minimally invasive approaches compared with open abdominal hysterectomy among women undergoing hysterectomy for benign conditions. Specifically, we will aim to: [1] estimate pooled measures of association between race/ethnicity and receipt of minimally invasive versus abdominal hysterectomy; [2] assess disparities by socioeconomic indicators, including insurance status and other measures of socioeconomic position; and [3] examine variation in disparities across geographic regions, health systems, and hospital characteristics. By applying a PRISMA guided approach to synthesize existing evidence, this study will clarify the extent of inequities in hysterectomy route selection and to inform targeted interventions at patient, provider, institutional, and policy levels.

PICO

The PICO framework for this systematic review and meta-analysis is as follows:

• P (Population): Adult women (≥18 years) undergoing hysterectomy for benign conditions (e.g., fibroids, abnormal uterine bleeding, endometriosis, pelvic organ prolapse, or benign adnexal disease).

• I (Intervention/Exposure of interest): Receipt of a minimally invasive hysterectomy (MIH), including vaginal, laparoscopic, or robotic-assisted approaches.

• C (Comparison): Receipt of an open abdominal hysterectomy. The comparisons are explicitly drawn across:

• Racial/ethnic groups

• Socioeconomic groups

• Geographic and hospital characteristics

• O (Outcome): The primary outcome is the likelihood of receiving minimally invasive versus open abdominal hysterectomy across racial, socioeconomic, and geographic groups. Secondary outcomes (where available) include perioperative outcomes such as complication rates, length of stay, and readmissions.

Methods

Protocol and registration

This systematic review protocol has been developed according to the Preferred Reporting Items for Systematic Reviews and Meta Analyses Protocols (PRISMA P) guidelines [8]. The review question and eligibility criteria were informed by prior observational studies demonstrating racial and socioeconomic differences in minimally invasive hysterectomy utilization across claims and registry datasets. This protocol was registered in PROSPERO (International Prospective Register of Systematic Reviews) prior to commencing the review [9].

Eligibility criteria

We will include observational studies (cohort, cross sectional, and case control designs) and, where relevant, secondary analyses of randomized or quasi experimental data that report on hysterectomy route for benign gynecologic indications and evaluate associations with race/ethnicity, socioeconomic indicators, and/or geographic or hospital characteristics. Eligible populations will be adult women (≥18 years) undergoing hysterectomy for benign conditions, such as fibroids, abnormal uterine bleeding, endometriosis, pelvic organ prolapse, or benign adnexal disease. Studies focused primarily on gynecologic malignancies will be excluded, although mixed cohorts will be included if benign indications can be disaggregated or if the majority of cases are benign.

The primary exposure variables of interest are:

1. Race/ethnicity (e.g., non Hispanic White, non Hispanic Black/African American, Hispanic, Asian/Pacific Islander, other racial/ethnic groups) as defined in each study. We will harmonize racial/ethnic categories where possible and report definitions as provided in each study.

2. Socioeconomic indicators, including insurance type, income proxies, and other measures of socioeconomic status.

3. Geographic and health system characteristics, such as region, state, urban versus rural location, hospital size, teaching status, hospital hysterectomy volume, and hospital level minimally invasive hysterectomy proportion.

The primary outcome will be hysterectomy route categorized as minimally invasive (vaginal, laparoscopic, robotic assisted) versus open abdominal hysterectomy, consistent with prior claims based studies. Where possible, we will also extract data on specific minimally invasive routes (vaginal, laparoscopic, robotic), inpatient versus outpatient setting, and perioperative outcomes (e.g., complications, length of stay) to allow secondary analyses of how disparities in route selection translate into differences in clinical outcomes.

We will include studies that provide effect estimates (e.g., odds ratios, risk ratios, prevalence ratios) or raw data from which such measures can be calculated, comparing the likelihood of minimally invasive versus abdominal hysterectomy across racial/ethnic, socioeconomic, or geographic groups. Only full text articles published in peer reviewed journals in English will be considered. We will exclude studies limited to pregnant/postpartum hysterectomy, emergency hysterectomy, or malignancy only cohorts.

Information sources and search strategy

We will systematically search three electronic databases: PubMed, Scopus, and Web of Science, from 2010 to the most recent date, using a combination of controlled vocabulary and free text terms related to hysterectomy, minimally invasive surgery, laparoscopic, vaginal, robotic, race, ethnicity, disparities, socioeconomic status, insurance, geography, and hospital characteristics. The search strategy for PubMed is listed below.

PubMed

((“Hysterectomy”[MeSH] OR “Hysterectomy”[Title/Abstract] OR “abdominal hysterectomy”[Title/Abstract]) AND (“minimally invasive hysterectomy”[Title/Abstract] OR “MIH”[Title/Abstract] OR “laparoscopic hysterectomy”[Title/Abstract] OR “robotic hysterectomy”[Title/Abstract] OR “vaginal hysterectomy”[Title/Abstract]) AND (“disparity”[Title/Abstract] OR “disparities”[Title/Abstract] OR “racial”[Title/Abstract] OR “ethnicity”[Title/Abstract] OR “socioeconomic”[Title/Abstract] OR “insurance”[Title/Abstract] OR “geographic”[Title/Abstract] OR “Black”[Title/Abstract] OR “African American”[Title/Abstract] OR “Hispanic”[Title/Abstract])) AND (2010:2026[pdat])

Study selection

Two reviewers (H.Z. and A.H.) will independently screen titles and abstracts for potential eligibility, followed by full text assessment of shortlisted articles against predefined inclusion and exclusion criteria. Disagreements will be resolved through discussion. The study selection process will be documented in a PRISMA flow diagram, including numbers of records identified, screened, excluded (with reasons), and included in qualitative and quantitative syntheses.

Data extraction

Data will be extracted independently by two reviewers using a standardized, pilot tested data extraction form based on common reporting elements in existing hysterectomy disparities studies. Extracted variables will include:

• Study characteristics: authors, year, country, data source, study design, study period, and setting (inpatient, outpatient, or both).

• Population characteristics: inclusion criteria, hysterectomy indications (benign vs. mixed), sample size, age distribution, and key clinical factors such as fibroid diagnosis, uterine size/weight (if available), endometriosis, prior abdominopelvic surgery, and comorbidity indices.

• Exposure variables: detailed race/ethnicity categories; socioeconomic indicators (insurance type, income proxies); and geographic/hospital variables (region, hospital size, teaching status, hospital hysterectomy volume, proportion of minimally invasive hysterectomies; designation as safety net or high Black serving hospital).

• Outcomes: counts and proportions of minimally invasive versus abdominal hysterectomy overall and stratified by exposure categories; perioperative outcomes where reported (complication rates, length of stay, readmissions).

• Effect estimates: crude and adjusted relative measures (odds ratios) with 95% confidence intervals for associations between race/ethnicity, socioeconomic indicators, or geographic/hospital characteristics and receipt of minimally invasive versus abdominal hysterectomy, including the covariates used in adjustment models.

Where studies have examined effect modification

by clinical factors such as uterine weight or fibroid status, stratified estimates (e.g., by uterine weight <250 g vs. ≥250 g or presence vs. absence of fibroids) will be extracted to explore whether disparities differ among women likely eligible for minimally invasive surgery.

Risk of bias and quality assessment

Risk of bias for individual observational studies will be assessed independently by two reviewers (H.Z. and A.H.) using a validated tool such as the JBI guideline [10, 11], with domains adapted to the context of administrative claims and registry based hysterectomy research. Particular attention will be paid to:

• Selection bias, including representativeness of the cohort and exclusion of key populations (e.g., malignancy, emergency surgery).

• Measurement of exposures and outcomes, including accuracy of race/ethnicity coding, classification of hysterectomy route (ICD 9/ICD 10 and CPT codes), and ascertainment of indications and comorbidities.

• Control of confounding, especially adjustment for age, clinical indications, comorbidities, uterine size (if available), and hospital and surgeon characteristics.

• Handling of missing data (e.g., missing race/ethnicity or uterine weight) and use of methods such as reweighting estimating equations or sensitivity analyses.

Discrepancies in risk of bias ratings will be resolved by consensus. Study quality will be considered in sensitivity analyses and in interpreting heterogeneity across studies.

Data synthesis and statistical analysis

We will first provide a qualitative synthesis of study findings, summarizing patterns of racial, socioeconomic, and geographic disparities in hysterectomy route and key contextual factors (e.g., universal vs. fragmented insurance systems; integrated vs. multi hospital settings).

For quantitative synthesis, we will pool adjusted relative measures of association (odds ratios, risk ratios, or prevalence ratios) comparing minimally invasive versus abdominal hysterectomy between:

• Racial/ethnic groups (e.g., Black vs. White, Hispanic vs. White, Asian/Pacific Islander vs. White).

• Socioeconomic groups.

• Geographic/hospital categories (e.g., high vs. low MIH hospitals, high vs. low volume centers, high Black serving vs. low Black serving hospitals).

Odds ratios will be the primary pooled measure. Random effects models will be used to account for anticipated heterogeneity in populations, data sources, and adjustment sets. Statistical heterogeneity will be quantified using the I^2 statistic and Cochran's Q test.

Planned subgroup and sensitivity analyses will include:

• Restricting to women likely eligible for minimally invasive hysterectomy (e.g., studies excluding fibroids, obesity, or prior surgery, or strata with small uterine weight) to assess residual disparities not attributable to clinical contraindications.

• Stratification by health system type (e.g., universal military insurance, integrated veterans' system, state all payer databases) to explore the impact of insurance structure on disparities.

• Analyses by hospital minimally invasive hysterectomy proportion and volume to examine how institutional practice patterns and capacity modify disparities.

Publication bias will be assessed using funnel plots and statistical tests such as Egger's test, where sufficient numbers of studies are available [12].

Study Quality

The Study quality will be considered in sensitivity analyses and in interpreting heterogeneity across studies, and the overall certainty of evidence for key outcomes will be assessed using the GRADE approach [13].

Ethical considerations

This systematic review and meta-analysis will rely solely on data obtained from existing published studies, with no direct interaction with human subjects, no collection of personally identifiable information, and no additional intervention beyond the secondary analysis of summarized results. Therefore, official approval from an institutional review board or research ethics committee is typically not necessary.

Acknowledgments

Statement of Transparency and Principles

• The authors declare no conflict of interest.

References

1. Mehta A, Xu T, Hutfless S, Makary MA, Sinno AK, Tanner EJ, Stone RL, Wang K, Fader AN. Patient, surgeon, and hospital disparities associated with benign hysterectomy approach and perioperative complications. American Journal of Obstetrics and Gynecology. 2017 05;216(5):497.e1-497.e10. https://doi.org/10.1016/j.ajog.2016.12.020
2. Sugrue R, Foley O, Elias K, Growdon W, Sisodia R, Berkowitz R, Horowitz N. Outcomes of minimally invasive versus open abdominal hysterectomy in patients with gestational trophoblastic disease. Gynecologic Oncology. 2021 02;160(2):445-449. https://doi.org/10.1016/j.ygyno.2020.11.022
3. Traylor J, Simon M, Tsai S, Feinglass J. Patient and Hospital Characteristics Associated with Minimally Invasive Hysterectomy: Evidence from 143 Illinois Hospitals, 2016 to 2018. Journal of Minimally Invasive Gynecology. 2020 09;27(6):1337-1343. https://doi.org/10.1016/j.jmig.2020.02.013
4. Robinson WR, Cheng MM, Howard AG, Carpenter WR, Brewster WR, Doll KM. For U.S. Black women, shift of hysterectomy to outpatient settings may have lagged behind White women: a claims-based analysis, 2011–2013. BMC Health Services Research. 2017 Dec;17(1):526. https://doi.org/10.1186/s12913-017-2471-1
5. Ranjit A, Sharma M, Romano A, Jiang W, Staat B, Koehlmoos T, Haider AH, et al. Does Universal Insurance Mitigate Racial Differences in Minimally Invasive Hysterectomy?. Journal of Minimally Invasive Gynecology. 2017 07;24(5):790-796. https://doi.org/10.1016/j.jmig.2017.03.016
6. Carey CM, Katon JG, Bossick AS, Gray KE, Doll KM, Christy AY, Callegari LS. Uterine Weight as a Modifier

of Black/White Racial Disparities in Minimally Invasive Hysterectomy Among Veterans with Fibroids in the Veterans Health Administration. Health Equity. 2022 Dec 01;6(1):909-916. https://doi.org/10.1089/heq.2022.0130
7. Pollack LM, Olsen MA, Gehlert SJ, Chang S, Lowder JL. Racial/Ethnic Disparities/Differences in Hysterectomy Route in Women Likely Eligible for Minimally Invasive Surgery. Journal of Minimally Invasive Gynecology. 2020 07;27(5):1167-1177.e2. https://doi.org/10.1016/j.jmig.2019.09.003
8. Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. Systematic Reviews. 2015 Dec;4(1):1. https://doi.org/10.1186/2046-4053-4-1
9. Zendehdel. H, Teymoordash. SN, Halimi. A, Kashian. M. Racial, socioeconomic and geographic disparities in the selection of minimally invasive approaches versus open abdominal hysterectomy: A systematic review and meta-analysis protocol. PROSPERO. 2026. https://www.crd.york.ac.uk/PROSPERO/view/CRD420261398809.
10. Barker TH, Hasanoff S, Aromataris E, Stone JC, Leonardi-Bee J, Sears K, Habibi N, et al. The revised JBI critical appraisal tool for the assessment of risk of bias for cohort studies. JBI Evidence Synthesis. 2025 03;23(3):441-453. https://doi.org/10.11124/JBIES-24-00103
11. Barker TH, Hasanoff S, Aromataris E, Stone JC, Leonardi-Bee J, Sears K, Klugar M, et al. The revised JBI critical appraisal tool for the assessment of risk of bias for analytical cross-sectional studies. JBI Evidence Synthesis. 2026 03;24(3):401-408. https://doi.org/10.11124/JBIES-24-00523
12. Hayashino Y, Noguchi Y, Fukui T. Systematic Evaluation and Comparison of Statistical Tests for Publication Bias. Journal of Epidemiology. 2005;15(6):235-243. https://doi.org/10.2188/jea.15.235
13. Guyatt GH, Oxman AD, Vist GE, Kunz R, Falck-Ytter Y, Alonso-Coello P, Schünemann HJ. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. BMJ. 2008 04 26;336(7650):924-926. https://doi.org/10.1136/bmj.39489.470347.AD