

Asian-White disparities in obstetric anal sphincter injury: a systematic review and meta-analysis



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OBJECTIVE: Obstetrical anal sphincter injury describes a severe injury to the perineum and perianal muscles after birth. Obstetrical anal sphincter injury occurs in approximately 4.4% of vaginal births in the United States; however, racial and ethnic inequities in the incidence of obstetrical anal sphincter injury have been shown in several high-income countries. Specifically, an increased risk of obstetrical anal sphincter injury in individuals who identify as Asian vs those who identify as White has been documented among residents of the United States, Australia, Canada, Western Europe, and the Scandinavian countries. The high rates of obstetrical anal sphincter injury among the Asian diaspora in these countries are higher than obstetrical anal sphincter injury rates reported among Asian populations residing in Asia. A systematic review and meta-analysis of studies in high-income, non-Asian countries was conducted to further evaluate this relationship.

DATA SOURCES: MEDLINE, Ovid, Embase, EmCare, and the Cochrane databases were searched from inception to March 2023 for original research studies.

STUDY ELIGIBILITY CRITERIA: Observational studies using keywords and controlled vocabulary terms related to race, ethnicity and obstetrical anal sphincter injury. All observational studies, including cross-sectional, case-control, and cohort were included. 2 reviewers followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines and the Meta-analysis of Observational Studies in Epidemiology recommendations.

METHODS: Meta-analysis was performed using RevMan (version 5.4; Cochrane Collaboration, London, United Kingdom) for dichotomous data using the random effects model and the odds ratios as effect measures with 95% confidence intervals. Subgroup analysis was performed among Asian subgroups. The risk of bias was assessed using the Joanna Briggs Institute Critical Appraisal tools. Meta-regression was used to determine sources of between-study heterogeneity.

RESULTS: A total of 27 studies conducted in 7 countries met the inclusion criteria encompassing 2,337,803 individuals. The pooled incidence of obstetrical anal sphincter injury was higher among Asian individuals than White individuals (pooled odds ratio, 1.64; 95% confidence interval, 1.48–1.80). Subgroup analyses showed that obstetrical anal sphincter injury rates were highest among South Asians and among population-based vs hospital-based studies. Meta-regression showed that moderate heterogeneity remained even after accounting for differences in studies by types of Asian subgroups included, study year, mode of delivery included, and study setting.

CONCLUSION: Obstetrical anal sphincter injury is more frequent among Asian versus white birthing individuals in multiple high-income, non-Asian countries. Qualitative and quantitative research to elucidate underlying causal mechanisms responsible for this relationship are warranted.

Key words: Asian race, Asian-White disparities, ethnic disparities, fourth-degree perineal lacerations, obstetrical anal sphincter injury, obstetrical trauma, racial disparities, severe perineal lacerations, third-degree perineal lacerations

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This study was registered on the International Prospective Register of Systematic Reviews (registration number: CRD42022379141) on December 7, 2022.

Study findings were presented at the Racialized Maternal Health Conference, held virtually, November 18, 2022, and the Canadian National Perinatal Research Meeting, Montebello, Quebec, May 23–26, 2023.

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AJOG Global Reports at a Glance

Why was this study conducted?

Obstetrical anal sphincter injury (OASI) can have devastating effects on one's well-being. Understanding the differential burden of obstetrical trauma in specific racial and ethnic groups is of global health importance.

Key findings

The meta-analysis of included studies showed a 1.6-fold increase in OASI among Asian vs White individuals (odds ratio, 1.64; 95% confidence interval, 1.48–1.80). Few studies have explored underlying causal mechanisms responsible for this relationship.

What does this add to what is known?

This systematic review shows a substantial disparity in the rates of obstetrical trauma experienced by Asian vs White birthing individuals in multiple high-income, non-Asian countries. The disproportionate burden of obstetrical trauma among Asian individuals should be underscored in guidelines on OASI prevention.

Introduction

Racial and ethnic inequities are pervasive in maternal health and are a major source of health disparities in many settings. For example, maternal mortality rates persistently highlight racial disparities in high-income countries, such as the United States and the United Kingdom.^{1,2} Studies of composite severe maternal morbidity across racial groups in Europe, Australia, and North America have shown similar trends.^{1,2} However, the relationship between race and ethnicity and specific causes of maternal morbidity, such as obstetrical trauma, is not well understood.

Obstetrical trauma is defined as severe injury to the perineum, pelvic organs, and supporting myofascial pelvic structures after birth. Obstetrical trauma contributes to short-term morbidity and long-term life-changing complications, such as mental health morbidity, sexual dysfunction, pain, and an increase in pelvic floor disorders, including anal incontinence.^{3–8} One such trauma is obstetrical anal sphincter injury (OASI), which is defined as a severe laceration of the perineum and perianal muscles (sphincters) during birth. A third-degree laceration refers to the laceration of the anal sphincters, whereas a fourth-degree tear includes a laceration of the anal mucosa.³ The 1998–2010 Nationwide Inpatient Sample in the United States reported a 4.4%

incidence rate of OASI among all vaginal births.⁹ Evidence is accumulating to support an association between Asian race and OASI in high-income countries, such as Australia, Canada, Norway, and the United States.^{10–17} In contrast, the rates of OASI among Asian individuals residing in Asia do not parallel these high rates.^{10,18,19} Although many of these studies have observed higher rates of obstetrical trauma among racial and ethnic minorities, these analyses have been limited by poorly defined or inconsistent racial categories, small sample sizes, and a lack of generalizability.^{10,11,13–17}

Obstetrical trauma is an area of increasing global health importance, yet its differential burden in specific racial and ethnic groups remains understudied. This is of particular concern, as a temporal increase in the rate of OASI has been shown in several high-income countries in recent years.^{20–26} In addition, the Asian population in the United States has increased by 70% between 2000 and 2020.²⁷ Despite this increase, Asian Americans remain largely understudied in health research; only 0.17% of the National Institutes of Health funding between 1992 and 2018 was allocated to this population.²⁷ Correspondingly, OASI in the Asian diaspora remains understudied.

We conducted a systematic review and meta-analysis to evaluate and

synthesize published studies on the association between Asian race and OASI and to investigate potential heterogeneity in these associations among different Asian racial and ethnic subgroups. We hypothesized that OASI occurs more frequently in Asian vs White individuals in high-income, non-Asian countries.

Methods**Study design**

This systematic review has been registered on the International Prospective Register of Systematic Reviews (registration number: CRD42022379141). This study was conducted and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Guidelines and the Meta-analysis Of Observational Studies in Epidemiology recommendations.²⁸ Further details of the study methods have been previously published.²⁹ The studies included individuals with a vaginal delivery of a live or stillborn infant in non-Asian, high-income countries, which was slightly refined from the originally proposed population (which did not specify a restriction to non-Asian, high-income countries).²⁹

Identification of studies

We searched MEDLINE, Ovid, Embase, EmCare, and the Cochrane databases from inception to March 2023 for observational studies using key words and controlled vocabulary terms related to race, ethnicity, and OASI with the help of an information scientist ([Supplementary Table 1](#)). Additional articles were included through hand searching of references of included articles. All observational studies, including cross-sectional, case-control, and cohort were included. Case reports, case series, literature reviews, conference abstracts, gray literature, and descriptive studies with no comparison to the White population group were excluded from the review. No restriction based on language was applied. Studies that did not provide sufficient information to calculate effect size were excluded.

Studies with all criteria satisfying the population, exposure, comparator, and

outcome framework were included in the review (Supplementary Table 2). Asian individuals were categorized using the United Nations (UN) geographic classification.³⁰ Studies that aggregated individuals of Asian origins with other groups were not included. Because of the absence of standard definitions, misuses of the terms “ethnicity,” “race,” and “ancestry” have been reported.^{14,31–34} Here, we understand the term “race” to reflect sociopolitical inequalities, which are often based on “perceived physical differences,” such as skin and eye color.^{17,31,34} Ethnicity is defined by cultural factors, including language and nationality.³⁴

Study selection

Studies were included if they compared OASI in Asian individuals with OASI in White individuals. The White population served as the comparison group as they are the dominant ethnic group in non-Asian, high-income countries and remain unaffected by the institutional racism that underlies racial inequities in health. Studies that aggregated White individuals with other racial groups were excluded.

The outcome of interest was OASI (third- or fourth-degree perineal laceration). Third-degree lacerations involve a partial or complete disruption of the internal and/or external anal sphincter. Fourth-degree lacerations involve the disruption of the anal mucosa in addition to laceration of the external and internal anal sphincter.^{35–38}

Of note, 2 reviewers (M.P. and G.M.M.) independently screened titles and abstracts of the articles retrieved from the search for study eligibility. Disagreements were resolved through discussions with both reviewers. If disagreements persisted, conflicts were raised with the wider study team until a consensus was reached. Articles deemed potentially eligible were carried forward for full-text screening by the 2 reviewers, independently, using Covidence (<https://www.covidence.org/>) to select the final articles using the predefined inclusion and exclusion criteria.

Data extraction

Moreover, 2 reviewers (M.P. and G.M.M.) extracted study characteristics, including the last name of the first author, year of publication, country, study design, sample size, overall incidence of OASI, race and ethnicity groups included, Asian subgroups examined, method used to specify race and ethnicity, method used to identify OASI, and confounders included in adjusted models. The number of events, number of Asian and White individuals, unadjusted and adjusted odds ratios (ORs), and 95% confidence intervals (CIs) from each study were also included.

Quality assessment

2 reviewers (M.P. and G.M.M.) independently assessed the methodological quality of studies using the Joanna Briggs Institute Critical Appraisal tools,³⁹ which evaluate the risk of bias using a checklist of 10 or 11 items. These items were answered with “yes,” “no,” “maybe” or “not applicable.” A numerical score was calculated (yes = 1 and no, unclear, or not applicable = 0). A total score >7 was considered indicative of low risk of bias, whereas scores between 4 and 7 were classified as medium risk. Scores between 1 and 3 were categorized as high risk of bias. Reviewers resolved any disagreement in bias assessment by discussion.

Statistical analyses

Meta-analysis was performed using RevMan (version 5.4; Cochrane Collaboration, London, United Kingdom) for dichotomous data using the random effects model and the ORs with 95% CIs as the measures of effect. We calculated unadjusted ORs for all studies reporting raw data using the Mantel-Haenszel method. In addition, separate random-effects models were used to pool the reported adjusted ORs for all studies reporting adjusted estimates using the inverse variance method. We assessed the heterogeneity of studies using the I^2 statistic. Heterogeneity was considered significant when the I^2 was >50%, following Cochrane Collaboration

recommendations.⁴⁰ Case-control studies were taken out of crude measures of dichotomous analyses as incidence cannot be derived from case-control data.

We performed random-effects meta-regression using the restricted maximum likelihood method in SAS (version 9.4; SAS Institute, Cary, NC) to assess the effects of differences in study characteristics on between-study heterogeneity.⁴¹ In particular, for each study, we obtained the proportion of Asians in the source population, study design (hospital based vs population based), and subgroup of Asian individuals studied (eg, Chinese, Indian, Japanese, and unspecified “Asian”).

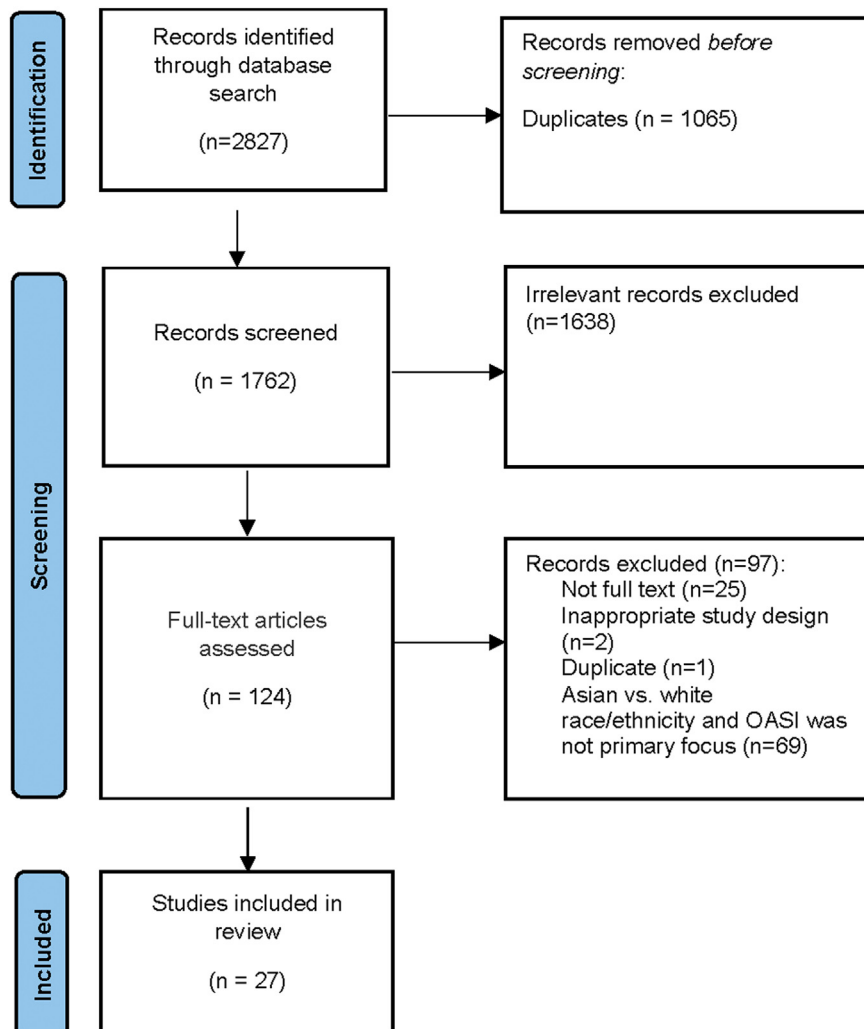
Subgroup analyses were performed using studies that compare OASI in specific Asian subgroups, such as South Asian (Indian), Filipino, Chinese, and Japanese individuals, compared with White individuals. An additional subgroup analysis based on study setting (hospital-based vs population-based studies) was also performed. In addition, we sought to explore reasons for these disparities among the included studies that evaluated any potential causal mechanism. Publication bias was assessed by visual inspection of funnel plots and formally tested using the Begg rank correlation test and Egger regression asymmetry.^{42,43}

Results

We identified 2827 articles in the literature search and removed 1065 duplicates (Figure 1). We screened the titles and abstracts of the remaining 1762 articles for eligibility. We conducted a full-text review of 124 articles and found a total of 27 articles that fulfilled the eligibility criteria. The overall quality of studies was moderate, as the risk of bias scores ranged from 5 to 8 (Supplementary Tables 3 and 4 and Supplementary Figures 1 and 2).

Among the 27 studies, a total of 22 studies provided sufficient data to be included in the dichotomous analysis, which included 2,337,803 individuals; 463,973 identified as Asian and 1,873,830 identified as White. Moreover, 17 of 27 studies reported the

FIGURE 1
Identification of studies included in the systematic review



OASI, obstetrical anal sphincter injury.

Park. Asian-White disparities in obstetrical anal sphincter injury. *Am J Obstet Gynecol Glob Rep* 2023.

adjusted ORs of OASI among Asian vs White individuals and were included in the second meta-analysis using the inverse variance method. Among these 17 studies, relative estimates of OASI were reported for specific subgroups of Asian individuals in 7 studies.

Description of included studies

The 27 included studies were conducted between 1989 and 2022 in Australia (n=1), Canada (n=2), the United States (n=15), and Western Europe (n=9) (Table 1). Study designs consisted of prospective cohort studies (n=3), retrospective cohort studies (n=22), and

case-control studies (n=2). 9 of 27 studies reported subgroup analyses of Asian individuals. There were 16 hospital-based studies and 11 population-based studies.

Furthermore, 5 of 27 studies included in our review attempted to identify factors that could explain the observed association between Asian race and OASI. Factors believed to contribute to these disparities were perineal length, body mass index (BMI), fetal-maternal size disproportion, obesity, and primary language. Despite these efforts, the causal mechanisms remain unclear and are likely multifactorial.

Association of Asian vs White race with obstetrical anal sphincter injury

Nearly all studies reported higher rates of OASI among Asian individuals than among White individuals (n=23/27), with an up to 3-fold higher rate of OASI in the Asian group. The pooled incidence of OASI among the 22 studies that reported risk of OASI in Asian vs White individuals using dichotomous data demonstrated higher risk in Asian individuals: 6.48% among Asian individuals vs 4.49% among White individuals. The meta-analysis of dichotomous estimates showed a 1.64-fold increase in OASI among Asian individuals vs White individuals (95% CI, 1.48–1.80) (Figure 2) with a very high level of between-study heterogeneity ($I^2=94%$).

The higher rate of OASI in Asian individuals than in White individuals was similar in the synthesis of adjusted estimates using the inverse variance method (pooled OR, 1.75; 95% CI, 1.51–2.01) (Figure 3). The studies included in this meta-analysis included confounders, such as maternal age and prepregnancy BMI, parity, operative vaginal delivery, position of the fetal head at delivery, and infant birthweight. Despite adjustment for confounders, heterogeneity between studies remained high ($I^2=96%$).

Subgroup analyses

The pooled estimates were not significantly different between the subgroup analysis of hospital-based studies (OR, 1.48; 95% CI, 1.22–1.78) and population-based studies (OR, 1.74; 95% CI, 1.52–1.98) (Supplementary Figures 3 and 4). However, lower heterogeneity and more precise estimates were observed in studies using population-based data. In the meta-analysis of adjusted estimates of OASI among Asian vs White individuals in hospital-based studies (OR, 1.67; 95% CI, 1.39–2.00) and population-based studies (OR, 1.88; 95% CI, 1.49–2.37), lower heterogeneity in the hospital-based data was observed (Supplementary Figure 5).

Of note, 7 studies included data on subgroups of Asian individuals (ie, South Asian [n=2], Filipino [n=8], Chinese [n=8], and Japanese [n=5]). The

TABLE 1
Characteristics of included studies

Author, year	Study design	Country	Study period	Number of total participants ^a	Hospital based or population based	Asian groups explored	Variables included in adjusted analyses	Race and ethnicity measurement	Method of OASI ascertainment
Green and Soohoo, ⁷⁶ 1989	Retrospective cohort study	United States	1985–1987	4172	Hospital based	Filipino Chinese	N/A	Self-identified ethnicity	Computerized data from hospital databases
Combs et al, ⁷⁷ 1990	Retrospective cohort study	United States	January 1975–July 1988	2832	Hospital based	Chinese Filipino Japanese	Midline Episiotomy Nulliparity Second-stage arrest Occipitoposterior position Low or mid station Use of forceps instead of vacuum Use of local anesthesia	Computerized data from hospital database	Computerized data from hospital database
Handa et al, ³ 2001	Retrospective cohort study	United States	1992–1997	2,101,843	Population based	Filipino Indian Other Asians	Parity Maternal age Maternal race Insurance status Obstetrical characteristics Obstetrical interventions	Health planning and development, which link California birth certificates to maternal and newborn discharge records	Diagnostic and procedure codes from database
Goldberg et al, ¹² 2003	Retrospective cohort study	United States	1983–2000	34,048	Hospital based	Asian	Childbirth Race Maternal age Spontaneous vaginal delivery Forceps Small or large for gestational age Episiotomy Insurance	Self-identified and nurse-assessed race	International Classification of Diseases, Ninth Revision, diagnosis codes documented in hospital electronic medical database
Hopkins et al, ¹⁵ 2005	Retrospective cohort study	United States	1976–2001	17,216	Population based	Japanese Filipino	Maternal age Maternal prepregnancy weight Birthweight Gestational age Operative delivery (forceps or vacuum) Epidural anesthesia Prolonged second stage of labor Occiput-posterior position Accoucheur role (faculty or resident) Health insurance status (private or Medicaid)	Self-identified ethnicity, collected from the University of California, San Francisco database	University of California, San Francisco perinatal database
Guendelman et al, ¹³ 2006	Retrospective cohort study	United States (California)	1996–1998	1,426,854	Population based	Asian	Social characteristics (age, parity, income, and education) Month of prenatal care initiation Hospital quality of care at delivery	Use of data from the California OSHPD, linked with birth certificates	Data from the OSHPD
Dua et al, ⁴⁷ 2009	Prospective cohort study	England	2005–2007	984	Hospital based	Asian	N/A	“National Statistics Classification”	The midwives at the Royal Blackburn Hospital attend regular mandatory training workshops on examination and identification of obstetrical anal sphincter injury after delivery. The tears were graded according to the classification described by Sultan

(continued)

TABLE 1
Characteristics of included studies (continued)

Author, year	Study design	Country	Study period	Number of total participants ^a	Hospital based or population based	Asian groups explored	Variables included in adjusted analyses	Race and ethnicity measurement	Method of OASI ascertainment
Schwartz et al, ⁵⁰ 2009	Retrospective cohort study	United States	2001–2006	3085	Hospital based	Chinese Asian non-Chinese	Previous term vaginal delivery Maternal age at delivery Operative vaginal delivery Newborn birth weight Prepregnancy BMI Ratio of newborn birthweight	Self-identified ethnicity and country of origin	Computerized outpatient center database
Baghurst and Antoniou, ⁷⁸ 2012	Retrospective cohort study	Australia	2002–2008	65,889	Population based	Asian	N/A	Pregnancy Outcome Statistics Unit in South Australia Health	Pregnancy Outcome Statistics Unit in South Australia Health
Tsai et al, ⁴⁶ 2012	Prospective cohort study	United States (Hawaii)	2009–2011	200	Hospital based	Filipino Japanese Chinese	N/A	Race of the subject's parents and grandparents collected from hospital database—no information on whether self-identified or not	Data from medical center database
Gurul-Urganci et al, ²¹ 2013	Retrospective cohort study	United Kingdom (England)	2000–2012	1,035,253	Population based	Asian	Maternal demographic factors Socioeconomic deprivation of the mother's area of residence	Database	Procedure codes, inputted into database
de Silva et al, ⁴⁵ 2014	Retrospective cohort study	United States (Hawaii)	2002–2003	1842	Hospital based	Filipino Chinese Asian	Episiotomy Operative vaginal delivery	Self-identified race	Electronic medical records
Sentell et al, ⁷¹ 2014	Retrospective cohort study	United States (Hawaii)	2008–2012	75,725	Population based	Filipino Japanese Chinese	Age group Payer Rural vs urban hospital location Multiple pregnancy High-risk pregnancy	Self-identified race, collected from hospital database	Data from inpatient data source
Vathanan et al, ⁷⁹ 2014	Retrospective cohort study	United Kingdom (England)	2006–2009	12,612	Hospital based	Asian Oriental	Mode of delivery (ventouse or forceps) Episiotomy Birthweight Age of the mother Parity	Hospital database	Hospital database
Aiken et al, ⁸⁰ 2015	Retrospective cohort study	United Kingdom	Unclear	4831	Hospital based	Asian Chinese	Time in the second stage of labor Birthweight Maternal age Maternal BMI Place of delivery Shoulder dystocia Use of epidural analgesia	Computerized database	Hospital electronic medical records
Grobman et al, ⁵² 2015	Retrospective cohort study	United States	2008–2011	115,502	Population based	Asian	Patient characteristics	Hospital chart	Computerized databases
Kapaya et al, ⁸¹ 2015	Case-control study	England	2003–2012	2572	Hospital based	Asian	Age Parity Primiparity BMI Gestational age Labor Induction of labor Episiotomy Birthweight	Maternity record database	Maternity record database

(continued)

TABLE 1

Characteristics of included studies (continued)

Author, year	Study design	Country	Study period	Number of total participants ^a	Hospital based or population based	Asian groups explored	Variables included in adjusted analyses	Race and ethnicity measurement	Method of OASI ascertainment
Yeaton-Massey et al, ⁴⁹ 2015	Prospective cohort study	United States	2008–2010	344	Hospital based	Asian	N/A	Self-identified race and ethnicity	Electronic medical record
Durnea et al, ⁶² 2018	Retrospective cohort study	United Kingdom	1999–2014	45,557	Hospital based	Asian (subcontinent) Asian (Southeastern)	BMI Age Ethnicity Smoking Parity Pregnancy duration Episiotomies Instrumental delivery Birthweight	Electronic medical records	Electronic medical records
Ramm et al, ⁶³ 2018	Retrospective cohort study	United States	2013–2014	22,822	Population based	Asian	Demographic Health Delivery	Self-identification	Electronic medical records
Jardine et al, ⁶⁴ 2019	Retrospective cohort study	England	2013–2014	192,057	Population based	Asian	Primiparity Previous elective cesarean delivery Previous emergency cesarean delivery Mode of delivery Episiotomy Prolonged labor Shoulder dystocia Birthweight Age Deprivation	Maternity record	Procedure codes
Williams et al, ⁶⁵ 2019	Retrospective cohort study	United States	2010–2014	1179	Hospital based	Asian	Baby's weight and head circumference Mother's age Episiotomy Insurance status Gestational age Operative delivery BMI Occiput-posterior delivery	Self-identified race and ethnicity	Electronic medical record
Yamasato et al, ⁷² 2019	Retrospective cohort study	United States (Hawaii)	2008–2015	25,594	Hospital based	Asian	Birthweight Episiotomy Fetal head position Operative vaginal delivery Parity Shoulder dystocia	Self-identified race	Procedure codes from hospital database
Albar et al, ⁶⁶ 2021	Retrospective cohort study	Canada	2014–2017	11,012	Hospital based	Asian	N/A	Self-identified ethnicity	Electronic medical records
Jardine et al, ⁶⁷ 2021	Retrospective cohort study	United Kingdom (England)	2015–2017	1,237,213	Population based	South Asian	N/A	Self-reported	2 datasets, linked together for the purpose of the National Maternity and Perinatal Audit in England: administrative data for the hospital admission resulting in the birth episode from (Hospital Episode Statistics) records and maternity data from maternity information systems

(continued)

TABLE 1
Characteristics of included studies (continued)

Author, year	Study design	Country	Study period	Number of total participants ^a	Hospital based or population based	Asian groups explored	Variables included in adjusted analyses	Race and ethnicity measurement	Method of OASI ascertainment
Schrot-Sanyan et al, ⁵¹ 2021	Case-control study	Paris, France	2001–2016	334	Hospital based	Asian	Age Previous vaginal delivery Delivery mode Prophylactic episiotomy Birthweight	Ethnicity extracted from hospital records—no information on whether self-identified or not	Procedure codes from hospital database
Zeng et al, ⁸⁷ 2021	Retrospective cohort study	Canada	2015–2017	237,293	Population based	Asian	N/A	Self-identified race	Provincial perinatal database registry

BMI, body mass index; N/A, not applicable; OASI, obstetrical anal sphincter injury; OSHPD, California Office of Statewide Health Planning and Development.

^a The number of patients includes all patients included in the study and is not restricted to the Asian and White populations.

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pooled ORs among the South Asian, Chinese, and Southeast Asian or Filipino subgroups showed similar relative estimates of OASI (South Asian: OR, 1.80; 95% CI, 1.15–2.80; Chinese: OR, 1.57; 95% CI, 1.16–2.12; Southeast Asian: OR, 1.52; 95% CI, 1.26–1.82), whereas the pooled OR for OASI among Japanese vs White individuals showed no association (OR, 1.00; 95% CI, 0.63–1.57) (Supplementary Figure 6).

Heterogeneity could not be explained by fitting meta-regression models accounting for the proportions of Asian individuals in the source population of each study, differences in study design, or subgroups of Asian individuals studied (Table 2). When considering all the covariates, we found a decreasing disparity between OASI rates in Asian and White groups as the proportion of Asians in the source population increased (coefficient=−0.017; P=.002), although significant residual homogeneity was present in the adjusted model (I²=89%). The results of the Begg test (P=.65) and Egger test (P=.96) confirmed that there was no evidence of publication bias (Figure 4 and Supplementary Figure 7).

Discussion

This systematic review and meta-analysis found that Asian individuals have a higher risk of OASI than White individuals in high-income, non-Asian countries, and this association was found among studies that reported both crude and adjusted estimates. Previous studies have shown that Asian race and ethnicity are not associated with high rates of OASI among individuals residing in Asia. Thus, 85% of studies included in our systematic review have demonstrated higher rates of OASI among Asian individuals residing in several non-Asian countries. This suggests that social factors, such as racism, or yet unidentified factors relating to obstetrical practices in different countries are contributing to these disparities in OASI rates.

The observed rates of OASI were the highest in the South Asian group; however, these findings should be

interpreted with caution, given that only 2 studies were included. In contrast, no difference was observed in OASI rates between Japanese and White individuals. This was the sole subgroup that did not report higher risk among Asian vs White individuals. This finding may be due to the fact that 3 of 5 included studies were conducted in Hawaii. Studies conducted in Hawaii may reflect that patients or healthcare systems in this region maintain unique factors that alter the risk of OASI. For example, Hawaii has the highest population of Asians among all states in the United States.⁴⁴

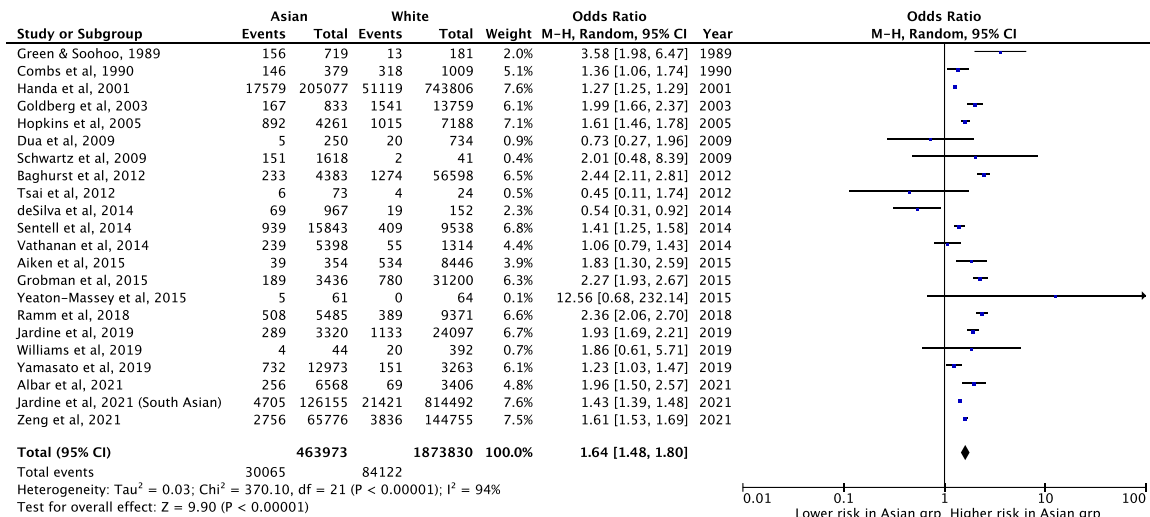
De Silva et al⁴⁵ and Tsai et al⁴⁶ were among the 3 studies that included Japanese subgroup analyses and reported a lower risk of OASI among Asian vs White populations in the dichotomous analysis. Both were single-center studies conducted in Honolulu, Hawaii, and little to no South Asians were included in either study, which may directly influence the prevalence of OASI in the Asian group. The only other study in the meta-analysis of dichotomous data that found a lower rate of OASI in the Asian vs White group was Dua et al,⁴⁷ potentially because of the higher rate of primiparous individuals in the White group and the lack of adjustment for parity.

A systematic review¹⁸ conducted in 2012 found that rates of OASI among Asian individuals residing in Asian countries were similar to those observed in non-Asian populations. In contrast, those who were identified as Asian had up to 4-fold higher rates of OASI than White individuals in non-Asian countries. Our updated review includes additional studies since 2012, and we conducted a meta-analysis to quantify our results.

Some studies have explored the effect of differences in obstetrical care on the association between race and OASI. Sentell et al⁴⁸ uniquely analyzed racial disparities in obstetrical trauma among spontaneous vaginal deliveries and operative vaginal deliveries (forceps or vacuum). The examined Asian racial and ethnic groups consisted of Filipino, Japanese, and Chinese. The study

FIGURE 2

Obstetrical anal sphincter injury among Asian vs White individuals (dichotomous data)



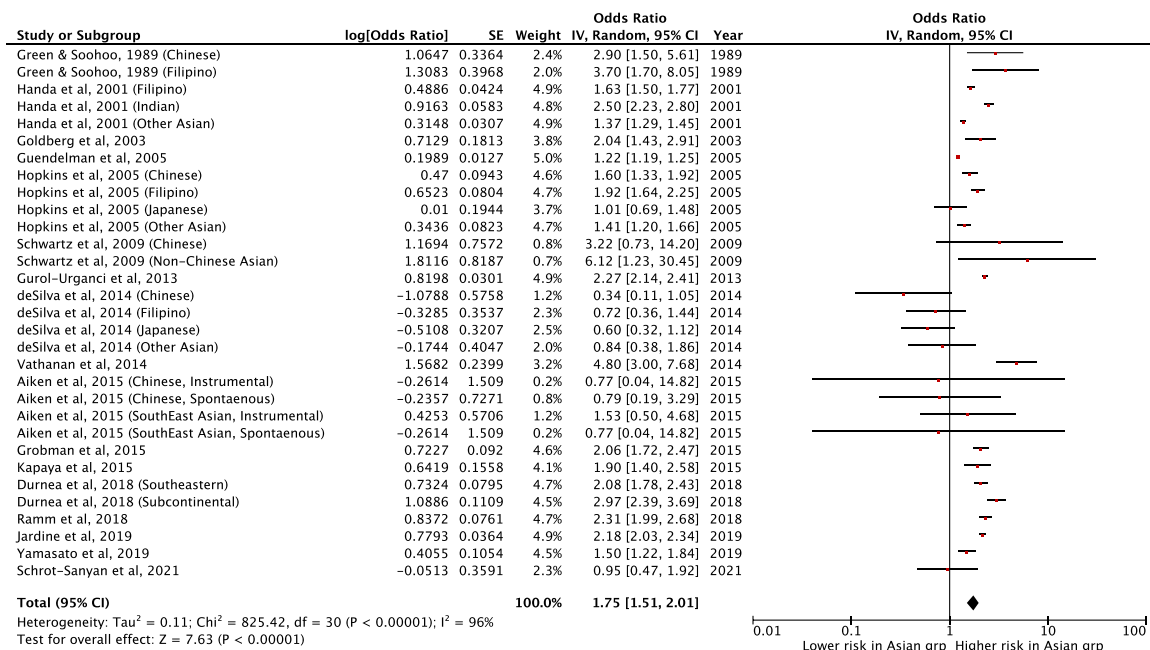
Meta-analysis was performed using the random-effects dichotomous method.

CI, confidence interval.

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FIGURE 3

Obstetrical anal sphincter injury among Asian vs White individuals (adjusted data)



Meta-analysis was performed using the random-effects inverse variance method.

CI, confidence interval;

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TABLE 2
Results from the meta-regression

Covariate	Estimate	SE	P value	95% confidence interval		I ²
				Lower	Upper	
Overall model	0.548	0.084	<.001	0.384	0.713	96
Proportion of Asian individuals among source population	−0.012	0.004	.004	−0.020	−0.004	89
Study design						91
Hospital based	0.202	0.169	.231	−0.129	0.533	
Population based	0 (reference)	—	—	—	—	
Asian subgroup						90
Chinese	−0.360	0.242	.188	−0.792	0.155	
Filipino or Southeast Asian	−0.035	0.181	.846	−0.390	0.320	
Japanese	−0.777	0.311	.013	−1.387	−0.167	
South Asian	0.290	0.326	.373	−0.348	0.928	
All Asians	0 (reference)	—	—	—	—	

SE, standard error Park. Asian-White disparities in obstetrical anal sphincter injury. *Am J Obstet Gynecol Glob Rep* 2023.

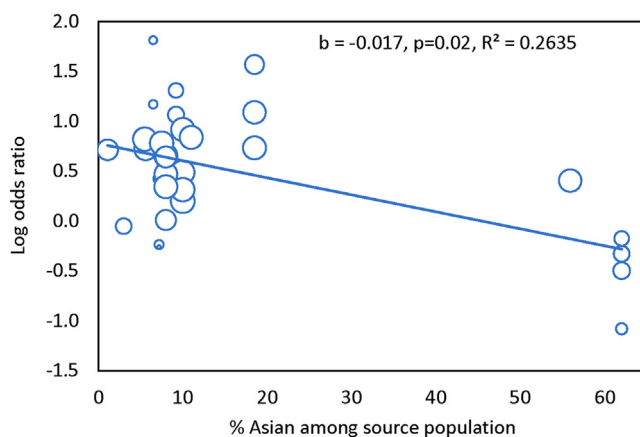
reported that both Japanese and Chinese individuals demonstrated high rates of obstetrical trauma compared with those who identify as White.⁴⁸ The authors noted that these findings persisted, even though Japanese and Chinese populations were not limited in healthcare access or overall health profiles.⁸

Causal mechanisms to explain the association between Asian race and obstetrical anal sphincter injury

Tsai et al⁴⁶ and Yeaton-Massey et al⁴⁹ explored the perineal length and its effect on perineal lacerations and reported that the mean perineal body length did not differ by race. The authors also found no direct relationship

between perineal length and perineal laceration. Schwartz et al⁵⁰ discussed BMI and fetal-maternal size disproportion among Chinese individuals and found that neither variable was found to directly affect the likelihood of OASI. Despite this, Chinese ethnicity remained an independent risk factor for OASI during vaginal delivery.⁵⁰ Yamasato et al⁵² explored obesity as a causal mechanism and revealed that a BMI of ≥ 50 kg/m² resulted in lower OASI prevalence. The authors also reported increased rates of OASI among Asian individuals; however, when adjusting for maternal age, race, and parity, no difference in BMI groups was found. Schrot-Sanyan et al⁵¹ examined language as a causal mechanism between race and obstetrical trauma. The authors concluded that non-English speakers were at an increased risk, along with those of African origin and those who underwent occipitoposterior delivery and prolonged labor duration.

There are several potential factors that may elucidate the increased risk of OASI among Asian vs White individuals. First, differences were observed in commonly provided obstetrical care among Asian vs White patients. For example, episiotomy has been reported

FIGURE 4
Meta-regression assessment of heterogeneity

Linear meta-regression between log odds and proportion of Asian individuals in each source population was performed (intercept: 0.774; slope: -0.017 ; $P = .002$).

Park. Asian-White disparities in obstetrical anal sphincter injury. *Am J Obstet Gynecol Glob Rep* 2023.

to be performed more often in Asian individuals than in White individuals.⁵² Causal mechanisms for this remain unknown; patient characteristics, such as parity, were not found to explain this distinction.⁵²

In addition, there is a notable lack of representation within healthcare workers and physician bias toward the patients and practices of different backgrounds.⁴¹ Lack of diversity among clinicians has been found to play a role in creating disadvantageous care experiences for Asian and other Black, Indigenous, people of color (BIPOC) individuals as healthcare professionals are often not representative of the larger patient population. It is important to train healthcare professionals on the importance of practicing greater cultural humility⁵⁴ and structural competence⁵⁵ to provide culturally competent care. Several studies reported that their participants emphasized the importance of employing healthcare providers who were of the same ethnicity, knowledgeable, respectful of their cultural practices, and open to learning.^{56–59}

These discrepancies caused by lack of representation are further exacerbated by language barriers and the lack of support that many BIPOC individuals face when giving birth.^{56,60–63} For example, confusion distinguishing the words “breathe” and “push” because of language barriers during birth has been reported.⁶³ In a study by Seo et al,⁶² the authors examined childbirth experiences of Korean immigrant women in the United States. It was reported that “even though most participants had interpreting services (eg, telephone interpreters, Korean nurses, or family members), these services were not available at all times, which was especially problematic during active labor and delivery.”⁶² In addition, feeling lost in the new healthcare environment, limited childbirth choices, and experiences of cultural insensitivity were reported. For recent migrants accessing a healthcare system that they are unfamiliar with, inadequate knowledge and socioeconomic barriers can magnify vulnerability.^{53,61}

Sørbye et al¹⁰ was excluded from our meta-analyses because of the discordant definition of ethnicity compared with the definition outlined in the inclusion criteria. The authors defined individuals’ ethnic origin and their birthplace as well as their parents’ birthplace.¹⁰ However, the study remained notable as it formally analyzed the migrants’ length of residence.¹⁰ The study concluded that individuals from Asia were at higher risk of OASI than those who originated from Norway. In addition, those with a shorter duration of residence in Norway and a foreign-born partner were found to experience higher risk. These results further suggest that migrant status and social factors may lead to inadequate healthcare, which, in turn, contributes to health inequities.¹⁰ The authors concluded that for equitable care to be achieved, accessibility of health systems and patient-provider relations must be improved.¹⁰

Several recent works have highlighted that it is racism, not race and ethnicity, that is directly affecting patients’ health outcomes.^{64,65} Obstetrical violence is gender based and encompasses institutional violence and violence against birthing individuals.⁶⁶ Medical racism refers to the way a patient’s race affects the course of one’s treatment through mechanisms, such as medical professionals’ misconceptions.⁶⁶ It is the intersection of both that leads to obstetrical racism, manifested in the form of stigma and lack of access to quality care.⁶⁶ Obstetrical racism can further intersect with migrant status to exacerbate these inequities.

Strengths and limitations

Studies included in this review represent several countries and regions, and the overall sample size exceeded 2,338,293 individuals, which increased the generalizability of our findings. We applied a strict definition of Asian origin that used the UN geographic classification system³⁰ and applied other rigorous standards, such as excluding studies that defined groups by country of birth instead of race and ethnicity. Our ability to perform subgroup analyses by

specific Asian subgroups (eg, Chinese, Japanese, and Indian) revealed heterogeneity in the relationship between specific Asian race and ethnicity and OASI. In addition, our review included representation from 3 continents and was able to confirm pervasive inequities across high-income, non-Asian settings. The enduring gap in understanding the factors contributing to these inequities was revealed, as was the need for future studies to explore causal mechanisms underlying the increased incidence of OASI among Asian individuals. Lastly, this work highlights the crucial need for a more accurate collection of race and ethnicity data (eg, the use of self-reporting) to advance health equity. Our findings may inform obstetrical healthcare practice guidelines on issues related to equitable and accessible care for diverse populations.

The main limitation of this review is the residual heterogeneity in racial categories because of the challenge of measuring race and ethnicity despite our efforts to minimize this variation. Most ascertainment of racial and ethnic identifiers is largely lacking in completeness and accuracy.⁶⁷ This was particularly seen in multiethnic individuals, as they were faced with limited categories to represent their identities.⁶⁷ Furthermore, challenges in the measurement of Asian-White disparities result from dichotomous Asian vs White categorizations that cannot capture the complexity with which race and ethnicity affect maternal outcomes. As the exposure of “race” is inherently unclear, classifying people into heterogeneous groups (eg, “Asian”) is problematic.⁶⁸ This assumes uniform effects within Asian subpopulations and dismisses specific subgroup disparities.²⁷ This was seen in our meta-analyses within subgroups, as heterogeneity in the pooled OR decreased significantly once subgroups were analyzed individually. In addition, to define people with Asian origins, we applied a UN classification system named “standard country or area codes for statistical use (M49).”³⁰ Despite being comprehensive, this classification scheme has limitations because there are several

transcontinental countries, such as Kazakhstan, which can be identified as both Asian and European depending on historical, geographic, and cultural contexts.^{69,70} Thus, the geographic classification used by the UN may differ from the self-identification of race and ethnicity of study participants or the classification set by the individual articles included in this study. This risks inaccuracies and misrepresentations in studies that pooled Asian race and ethnicity.

In addition, there is a potential additional overlap in population groups among some included studies. For example, Sentell et al⁷¹ examined the discharge data from all Hawaii child-birth hospitalizations from 2008 to 2012, whereas Yamasato et al⁷² examined a single center in Honolulu, Hawaii, between 2008 and 2015.

Lastly, the high heterogeneity in our meta-analyses is a significant limitation and could be influenced by several factors. First, despite efforts to create refined racial categories, residual variability in the classification and identification of race and ethnicity among studies likely remains. Second, variability between specific social and environmental factors in different regions may further increase the heterogeneity of pooled data. Thus, the level of heterogeneity reflects the limitations that exist in the currently available race-based data. It is also important to note that the heterogeneity does not change the uniform interpretation that Asians are at higher risk of OASI, despite the variation in magnitude.

Research and clinical implications

Qualitative and quantitative research to address this knowledge gap is warranted to gain a holistic understanding of birth outcomes within various population groups. This is because birth should not be seen as a strictly medical phenomenon; it is also both a social and cultural phenomenon.⁶⁰ Future studies must consider the intersection of various social factors, such as obstetrical racism, migrant status, and language barriers.

Researchers must carefully consider when race is an appropriate variable in research, keeping in mind its sociocultural mechanisms.⁶⁷ Efforts to improve the quality of racial and ethnic coding must be made, to ensure equitable and accurate identification of information.⁶⁷ An updated and transparent classification tool for self-identified race, ethnicity, and ancestry must be pursued by researchers and demographic data collection.^{34,67}

The evidence of racial disparities synthesized in this review reinforces the crucial need for practical solutions to this public health issue.⁶² Ante- and postpartum care strategies that are safe for all birthing individuals must be strongly advocated for and implemented through evidence-based care and prioritizing lived birthing experiences.⁷³ Health institutions must enforce cultural sensitivity and anti-racism training and ensure diversity within staff to allow for humanized care.^{60,74}

Health professionals must acknowledge and take the initiative to understand the diversity that exists in perinatal care-seeking populations to provide adequate person-centered care.^{60,75} It is of utmost importance for clinicians to actively listen and learn about the needs of BIPOC patients while recognizing the complexity of obstetrical care and OASI.⁷⁴ Given the effects that medical racism exerts on health outcomes, it is essential that obstetrical healthcare teams understand the importance of culturally competent, trauma-informed care and be willing to implement such practices in their work.

Conclusion

Asian individuals giving birth in high-income, non-Asian countries have higher rates of OASI than White individuals. Few studies have explored underlying causal mechanisms responsible for this relationship, leaving the causes of these disparities to be determined. This review highlights disparities that exist in current obstetrical healthcare systems. Although the causal mechanisms are unclear, multiple countries and contexts are failing to address the health needs of diverse groups. Findings from this review should be

considered when developing obstetrical trauma-related research and guidelines.

CRediT authorship contribution statement

Meejin Park: Data curation, Formal analysis, Visualization, Writing – original draft, Writing – review & editing. **Susitha Wanigaratne:** Investigation, Methodology, Validation, Writing – review & editing. **Rohan D’Souza:** Investigation, Methodology, Validation, Writing – review & editing. **Roxana Geoffrion:** Investigation, Methodology, Validation, Writing – review & editing. **Sarah Williams:** Investigation, Methodology, Writing – review & editing. **Giulia M. Muraca:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Project administration, Resources, Supervision, Writing – review & editing. ■

Supplementary materials

Supplementary material associated with this article can be found in the online version at [doi:10.1016/j.xagr.2023.100296](https://doi.org/10.1016/j.xagr.2023.100296).

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