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The Burden of and Trends in Pelvic Inflammatory Disease in the United States, 2006–2016

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Abstract

Background—Pelvic inflammatory disease (PID) is an infection of the upper genital tract that has important reproductive consequences to women. We describe the burden of and trends in PID among reproductive-aged women in the United States during 2006–2016.

Methods.—We used data from 2 nationally representative probability surveys collecting self-reported PID history (National Health and Nutrition Examination Survey, National Survey of Family Growth); 5 datasets containing *International Classification of Diseases, Ninth/Tenth Revision* codes indicating diagnosed PID (Healthcare Utilization Project; National Hospital Ambulatory Medical Care Survey, emergency department component; National Ambulatory Medical Care Survey; National Disease Therapeutic Index; MarketScan); and data from a network of sexually transmitted infection (STI) clinics (Sexually Transmitted Disease Surveillance Network). Trends during 2006–2016 were estimated overall, by age group and, if available, race/ethnicity, region, and prior STIs.

Results.—An estimated 2 million reproductive-aged women self-reported a history of PID. Three of 4 nationally representative data sources showed overall declines in a self-reported PID

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Supplementary Data
Supplementary materials are available at *The Journal of Infectious Diseases* online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

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history, and PID emergency department and physician office visits, with small increases observed in nearly all data sources starting around 2015.

Conclusions.—The burden of PID in the United States is high. Despite declines in burden over time, there is evidence of an increase in recent years.

Keywords

pelvic inflammatory disease; burden; trends

Pelvic inflammatory disease (PID) is an inflammatory process of the upper genital tract in females and can lead to important reproductive sequelae, including tubal factor infertility, ectopic pregnancy, and chronic pelvic pain [1, 2]. PID typically results from untreated bacterial infections ascending from the vagina or cervix to the uterus and fallopian tubes [1]. The etiology of PID varies, with *Chlamydia trachomatis* (CT), *Neisseria gonorrhoeae* (GC), *Trichomonas vaginalis* (TV), *Mycoplasma genitalium* (MG), and other bacterial vaginosis–associated bacteria (BVAB) isolated from the lower genital tract of women diagnosed with acute PID [3–13].

PID surveillance is difficult. First, the diagnosis of acute PID by clinical criteria is imprecise [14]. Furthermore, many women with PID are asymptomatic and never diagnosed [15]. Historically, the gold standard for diagnosing PID has been laparoscopy, but it is infrequently used, given its cost, invasiveness, and unavailability in low-resource settings [16, 17]. There is currently no single laboratory test available to diagnose PID, leaving providers with the arduous task of establishing the diagnosis based on history and physical examination while simultaneously evaluating for alternative pelvic and nonpelvic causes [16, 18].

Given that PID itself is not a reportable condition in most jurisdictions in the United States (US), surveillance data are typically lacking on the state and local level. As such, public health officials often rely on other data sources for PID surveillance, including administrative claims and self-reported data from surveys. There are multiple data sources available to monitor PID nationally; the most recent comprehensive review of these data is nearly 2 decades old [19]. The purpose of this analysis was to provide a comprehensive review of multiple national and sentinel data sources to describe the burden of and trends in PID among reproductive-aged women in the US.

METHODS

Study Design, Population, and Summary of Data Sources

We performed a comprehensive review of 6 national and 2 sentinel data sources, each with its own sampling design, study population, and methodology. Although the age of women included and the years of available data differed by data source, they all generally included women aged 15–44 years and encompassed the timeframe during 2006–2016.

The data sources included were 2 nationally representative probability surveys (National Health and Nutrition Examination Survey [NHANES], National Survey of Family Growth

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[NSFG]); 2 nationally representative emergency department (ED) visit datasets (Healthcare Utilization Project Nationwide Emergency Department Sample [HCUP NEDS], National Hospital Ambulatory Medical Care Survey, emergency department component [NHAMCS-ED]); 2 nationally representative physician office visit datasets (National Ambulatory Medical Care Survey [NAMCS], National Disease Therapeutic Index [NDTI]); and data from 2 sentinel surveillance sources of the commercially insured and sexually transmitted disease (STD) clinic attending populations (MarketScan, STD Surveillance Network [SSuN]). A data source summary and more detailed information are provided in Supplementary Table 1 and the Supplementary Methods. The *International Classification of Diseases, Clinical Modification, Ninth Revision* and *Tenth Revision* (*ICD-9-CM*, *ICD-10-CM*) codes used are provided in Supplementary Table 2.

Burden of PID in the United States

To assess the burden of PID in the US, we used data from the 2013–2016 NHANES cycles and the 2015–2017 NSFG cycle to estimate the prevalence of a self-reported history of PID and 95% confidence intervals (CIs) for sexually experienced females aged 18–44 years overall and by age group. Data from NAMCS were also used to assess the number of physician office visits due to PID. Given that NAMCS sample sizes were too small to generate annual estimates, we instead calculated a period estimate of the number of PID physician office visits during 2006–2015 (and 95% CIs), as well as the average annual number of visits among females aged 15–44 years.

Trends in PID in the United States

To assess trends in PID in the United States, we first estimated the prevalence of a self-reported history of PID and 95% CIs using data from the 2006–2010, 2011–2013, 2013–2015, and 2015–2017 cycles of NSFG. Trends were evaluated overall, by age group, and race/ethnicity among sexually experienced females aged 18–44 years. Using data from 2006–2016 HCUP NEDS, trends in the number of PID ED visits and 95% CIs were assessed overall, by age group, and region among females aged 15–44 years. Due to small sample sizes in NHAMCS-ED data, we combined every 2 years of data to increase estimate stability. The overall trend in the number of PID ED visits (and 95% CIs) was evaluated among females aged 15–44 years during 2006–2015. We next evaluated the number of initial, nonpostoperative PID office visits among females aged 15–44 years using 2006–2016 NDTI data. Then, using 2006–2016 MarketScan data, trends in the rate of PID diagnoses per 100 000 commercially insured women and 95% CIs were calculated overall, by age group, and region. Last, using data for females aged 15–44 years attending SSuN STD clinics, trends in the number of female STD clinic attendees as well as the proportion of those women who were diagnosed with PID (and 95% CIs) were evaluated during 2010–2016 overall and by age group.

Characteristics of Women With PID in the United States

To describe the epidemiology of PID in the US, NHANES data during 2013–2016 were used to calculate the prevalence of a self-reported history of PID, prevalence ratios (PRs), and 95% CIs by race/ethnicity and select sexual risk behaviors (age of sexual debut, having had a prior sexually transmitted infection [STI], and number of lifetime vaginal sex partners).

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Using 2010–2016 SSuN STD clinic data, CT and GC positivity was also assessed among cases tested for either infection within 14 days before or after their PID diagnosis.

Data Analysis and Statistical Methods

Data were analyzed using SAS version 9.4 (SAS Institute, Cary, North Carolina). Analyses for all nationally representative data sources were performed using SAS-callable SUDAAN procedures and were weighted to account for the complex sampling design of each. To analyze trends, we estimated the total percentage change, annual percentage change (APC), and average annual percentage change (AAPC) in PID during 2006–2016 (unless otherwise indicated). The total percentage change was calculated as the difference in estimates between the first year/cycle and last year/cycle, divided by the first year/cycle. The APC and AAPC were estimated overall and by each covariate using Joinpoint software, version 4.6.0.0 (National Cancer Institute, Bethesda, Maryland).

RESULTS

Burden of PID in the United States

Among sexually experienced women aged 18–44 years in 2013–2016 NHANES and 2015–2017 NSFG, the prevalence of a self-reported history of PID was 4.1% (95% CI, 3.2%–5.1%) and 3.6% (95% CI, 2.9%–4.5%), respectively (Table 1). This suggests that 2.1–2.4 million reproductive-aged US women have received a PID diagnosis in their lifetime. Prevalence increased with age in both data sources. In NAMCS, the total number of PID physician office visits among females aged 15–44 years during 2006–2015 was 1 292 000 (95% CI, 764 000–1 818 000), equating to an average annual number of 129 000 visits (95% CI, 76 000–182 000) (Table 1).

Trends in PID in the United States

Prevalence of Self-Reported History of PID—During 2006–2017 in NSFG, the prevalence of a self-reported PID history decreased from 4.9% (95% CI, 4.3%–5.5%) to 3.6% (95% CI, 2.9%–4.5%), for a total decrease of 26.5% and an APC of −0.04% (95% CI, −.07% to −.01%; Table 1). Decreases were primarily driven by declines among non-Hispanic white (APC, −0.07% [95% CI, −.10% to −.04%]) and Hispanic (APC, −0.04% [95% CI, −.07% to −.003%]) women (Figure 1). There was a small increase in the 2015–2017 cycle; the largest absolute increase was among non-Hispanic black women, from 3.8% (95% CI, 2.6%–5.5%) in 2013–2015 to 6.3% (95% CI, 3.9%–10.1%) in 2015–2017 (Figure 1).

ED Visits Due to PID

Using 2006–2016 HCUP NEDS data, the number of PID ED visits decreased from 173 000 (95% CI, 162 000–184 000) to 120 000 (95% CI, 112 000–129 000; total: −30.5%; APC, −4.2% [95% CI, −5.7% to −2.7%]; Table 1). Decreases were observed in all age groups and regions. While the number of ED visits during 2006–2016 was consistently highest in females aged 15–24 years and those living in the South, these groups also had the largest declines (Table 1, Figure 2A). Despite overall declines, there was a similar increase in 2016

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in HCUP NEDS compared to the last cycle of NSFG, occurring in all age groups and regions (Table 1, Figure 2A).

Using 2006–2015 NHAMCS-ED data, there was also a decrease in the number of PID ED visits, from 321 000 (95% CI, 233 000–409 000) in 2006–2007 to 196 000 in 2014–2015 (95% CI, 100 000–292 000) (Table 1). Though a 38.9% total decrease, the trend was not statistically significant (APC, −0.03% [95% CI, −.20% to .14%]). The increase that was observed in recent years of NSFG and HCUP NEDS was not found in NHAMCS-ED.

Physician Office Visits Due to PID

NDTI 2006–2016 data showed that the number of initial, nonpostoperative physician office visits for PID decreased by 15.1% among females aged 15–44 years, from 106 000 to 90 000 visits (APC, −5.6% [95% CI, −9.8% to −1.2%]; Table 1). Despite overall declines, similar to NSFG and HCUP NEDS, an increase in PID physician office visits was observed in NDTI in recent years, from a low of 51 000 in 2014 to 90 000 in 2016.

Rate of PID Diagnoses in the Commercially Insured Population

Using 2006–2016 MarketScan data, the rate of PID diagnoses decreased from 255.0 (95% CI, 249.9–260.1) to 245.4 (95% CI, 241.7–249.2) per 100 000 commercially insured women aged 15–44 years (total: −3.7%; AAPC, −1.3% [95% CI, −4.2% to 1.7%]; Table 1). The rate of PID diagnoses during 2006–2016 was consistently highest in commercially insured women aged 25–34 years and those living in the South; women aged 25–34 years (total: −19.4%; APC, −3.8% [95% CI, −5.2% to −2.4%]) and those living in the Midwest (total: −13.7%; APC, −2.5% [95% CI, −4.0% to −1.0%]) experienced the largest declines (Table 1, Figure 2B). There were also statistically significant decreases in females aged 15–24 years (total: −12.0%; APC, −2.0% [95% CI, −3.1% to −1.0%]) and women living in the South (total: −10.4%; APC, −1.9% [95% CI, −2.6% to −1.3%]) (Table 1, Figure 2B). There was a similar increase to NSFG, HCUP NEDS, and NDTI starting in 2014–2015 in MarketScan; increases were observed overall, and in all age groups and regions (Table 1, Figure 2B).

Proportion of STD Clinic Attendees Diagnosed With PID

Using data from participating SSuN STD clinics, the number of female STD clinic attendees declined by 56.6%, from 52 088 in 2010 to 22 631 in 2016. Despite this decline, the proportion of female STD clinic attendees diagnosed with PID stayed low and stable (~1%). Females aged 35–44 years had the highest burden of PID compared to other age groups in 2016 (35–44 years: 1.6% [95% CI, .7%–2.6%] vs 25–34 years: 0.9% [95% CI, .5%–1.3%] and 15–24 years: 0.8% [95% CI, .3%–1.3%]).

Characteristics of Women With PID in the United States

Prevalence of self-reported PID was significantly lower among non-Hispanic white (PR, 0.6 [95% CI, .4–.9]) and Hispanic (PR, 0.5 [95% CI, .3–.8]) women compared to non-Hispanic black women in NHANES 2013–2016 (Figure 3A). Prevalences among those with an early sexual debut and more lifetime sex partners were >3 times that of women with a later sexual debut and fewer lifetime sex partners (<16 years vs ≥16 years: PR, 3.1 [95% CI, 2.0–4.9];

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≥10 partners vs 1 partner: PR, 3.6 [95% CI, 1.5–6.4]). The prevalence of PID was more than doubled in women reporting a prior STI diagnosis (PR, 2.7 [95% CI, 1.7–4.3]).

Using 2010–2016 SSuN data, the majority of female STD clinic attendees diagnosed with PID were tested for CT or GC within 14 days before or after their PID diagnosis; that proportion increased, from 92.6% to 98.7% for CT and from 95.4% to 99.0% for GC. Of those tested, 10%–17% were positive for CT and 3%–8% were positive for GC (Figure 3B).

DISCUSSION

Based on data from multiple national and sentinel sources, PID impacts an estimated >2 million US women in their lifetime. All data sources with available trend data showed overall declines in PID burden during 2006–2016; however, nearly all also showed increases in recent years. Differences in PID burden exist by age group, race/ethnicity, and region, with the highest burden in non-Hispanic black women and women living in the South. Although discordancy existed between data sources on the age group with the highest burden, it is important to note that some were measuring lifetime risk (eg, NSFG) while others were measuring incident cases (eg, HCUP NEDS), a point highlighting the complexities in triangulating results from multiple data sources to monitor PID.

There are several possible reasons for these findings. Decreasing trends could be due to decreases in CT/GC-related complications. Among reproductive-aged women, rates of reported CT have increased since 2000, while rates of reported GC have increased substantially in more recent years [20, 21]. These increases have been concurrent with increases in CT/GC screening [22, 23]. It is possible that incidence may not have changed, but increased screening has led to earlier detection and treatment of these infections and as a result, prevention of PID. A variation in how PID is diagnosed that could possibly explain the observed trends is unlikely, as Centers for Disease Control and Prevention–recommended diagnostic criteria were unchanged over the duration of these datasets [14]. What led to the increase in recent years is currently unknown but might reflect the normal fluctuation in trend. Alternatively, while STD screening can reduce PID as noted, the 20.2% increase in reported cases of gonorrhea during 2014–2016 among reproductive-aged women could also reflect greater disease burden and result in more cases of PID [21, 24–26]. The recent increase in the rate of gonorrhea among women diagnosed with PID in STD clinics within the SSuN dataset supports this hypothesis. Given that rates of reported GC have continued to increase through 2018, more years of data are needed to determine if the increasing PID trend will continue [27].

The highest PID burden was observed in non-Hispanic black women and those living in the South, correlating with the previously demonstrated higher STI burden in these populations [21, 28–36]. There are structural barriers known to contribute to racial inequities in STIs, such as access to sexual healthcare, which is impacted by other factors, such as healthcare coverage and healthcare-seeking behaviors [37]. However, even among women who do get diagnosed with PID, most test negative for CT or GC, as shown in the SSuN dataset and a recent PID treatment trial [38]. Additional microbiologic considerations might also explain these racial and regional disparities. The microbiologic etiology of PID frequently

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includes BVAB, and TV and MG might also be involved in PID pathogenesis [1, 8–13]. Studies show that non-Hispanic black women are more likely to be infected with MG or have a BVAB-dominated microbiome compared to non-Hispanic white women or those of European descent, both of which can predispose to reproductive health issues [13, 39–42]. As the proportion of the population that is of non-Hispanic black descent is higher in the South compared to other regions, nonchlamydial and nongonococcal PID might account for some of the regional disparity as well [43]. Given the complex web of interrelated factors, it is unclear which of these factors is the main driver of these findings.

This study has a number of limitations. First, estimates were based on available national and sentinel data sources, each with its own limitations that could lead to misclassification (eg, NHANES and NSFG data are based on self-report) and potentially bias estimates (eg, MarketScan data are representative of only commercially insured women, but many women at risk for STIs are uninsured) [44]. Many data sources required the combination of multiple years of data to obtain stable estimates due to small sample sizes, and there was limited ability to track patients over time to avoid misclassification of PID in women who ultimately were diagnosed with another medical condition. We were also unable to stratify by important covariates in several data sources. Given the changes in healthcare coverage during the study period due to the introduction of the Affordable Care Act, it would have been informative to stratify by states that expanded Medicaid vs those who did not, as changes in US healthcare may have had an impact on the location of PID diagnosis (ED vs physician office) and STI screening coverage. In addition, though race/ethnicity data were available in several data sources, small sample sizes prohibited analyses beyond stratifications of non-Hispanic white, non-Hispanic black, and Hispanic. Furthermore, the data sources reviewed were not able to be stratified by gender identity. Understanding the burden of PID among transgender men and gender-nonbinary individuals may be important.

Many data sources reviewed were based on case identification via *ICD* diagnostic codes, which are known to have low positive predictive value for identifying PID [45]. In addition, the transition to *ICD-10-CM* codes began on 1 October 2015. As means of evaluating the impact of the transition on PID trends, the 2015 HCUP NEDS data from the first three-quarters of the year were compared to the fourth quarter, and no discernable differences were found. Although further research is needed to understand the full impact of the *ICD-10-CM* transition, we saw similar trends using data sources that did not use *ICD-9/ICD-10* codes. Last, available data only monitor trends in diagnosed PID. Given that a sizeable proportion of PID is believed to be subclinical, these results should be viewed as only the tip of the metaphorical “PID iceberg.” Despite these limitations, it is unlikely that they would have led to a systematic bias across all data sources, a point that is bolstered by the consistency of burden and trend results between multiple data sources.

This study also had numerous strengths. First, this study was a comprehensive review of 8 available national and selected sentinel data sources over an 11-year period. Second, the statistical methods used for trend analyses allowed us to identify the most efficient model to describe trends, account for inflection points, and estimate the annual percentage changes in individual trend segments. Most notable, however, was the consistency of results between such a wide variety of data sources. These analyses included the triangulation of many data

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sources, each with different methods, populations, definitions of PID, and years of available data. Despite these differences, nearly all showed overall declines in PID during the entire study period with increases in recent years, supporting the credibility of our findings.

In summary, this review of multiple national and sentinel data sources demonstrates that the burden of PID in the United States is substantial. While these results describe PID trends, more research is needed to evaluate the reasons for these observed trends. Understanding the drivers of observed trends in PID can help to inform future prevention opportunities in the United States.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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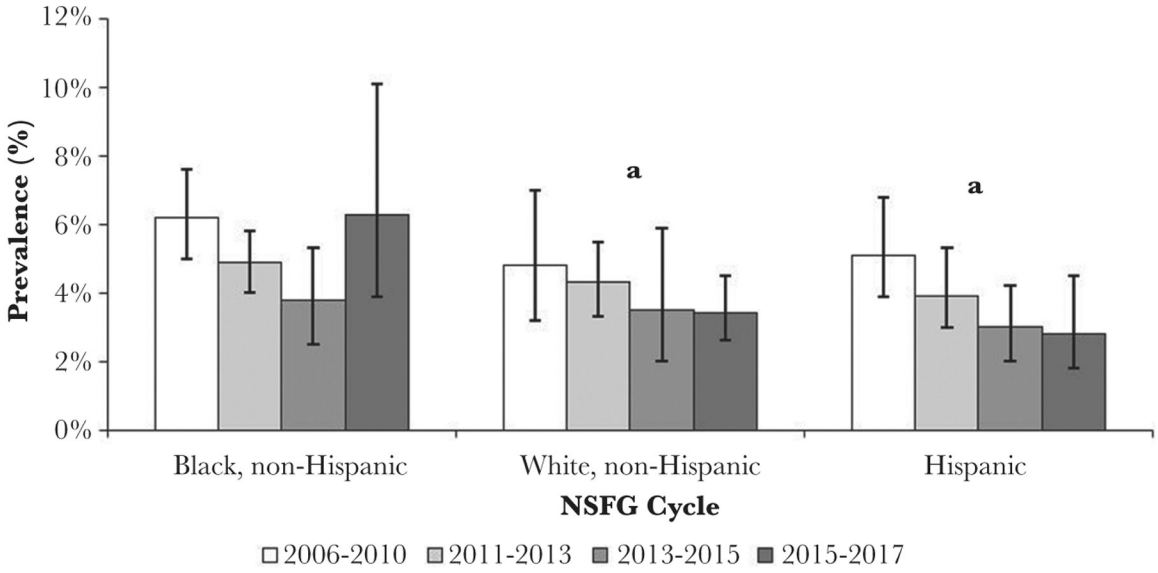

Figure 1.

Burden and trends in the prevalence of self-reported lifetime pelvic inflammatory disease by race/ethnicity, National Survey of Family Growth (NSFG), 2006–2017. [a]Test for trend using log-linear model, $P < .05$.

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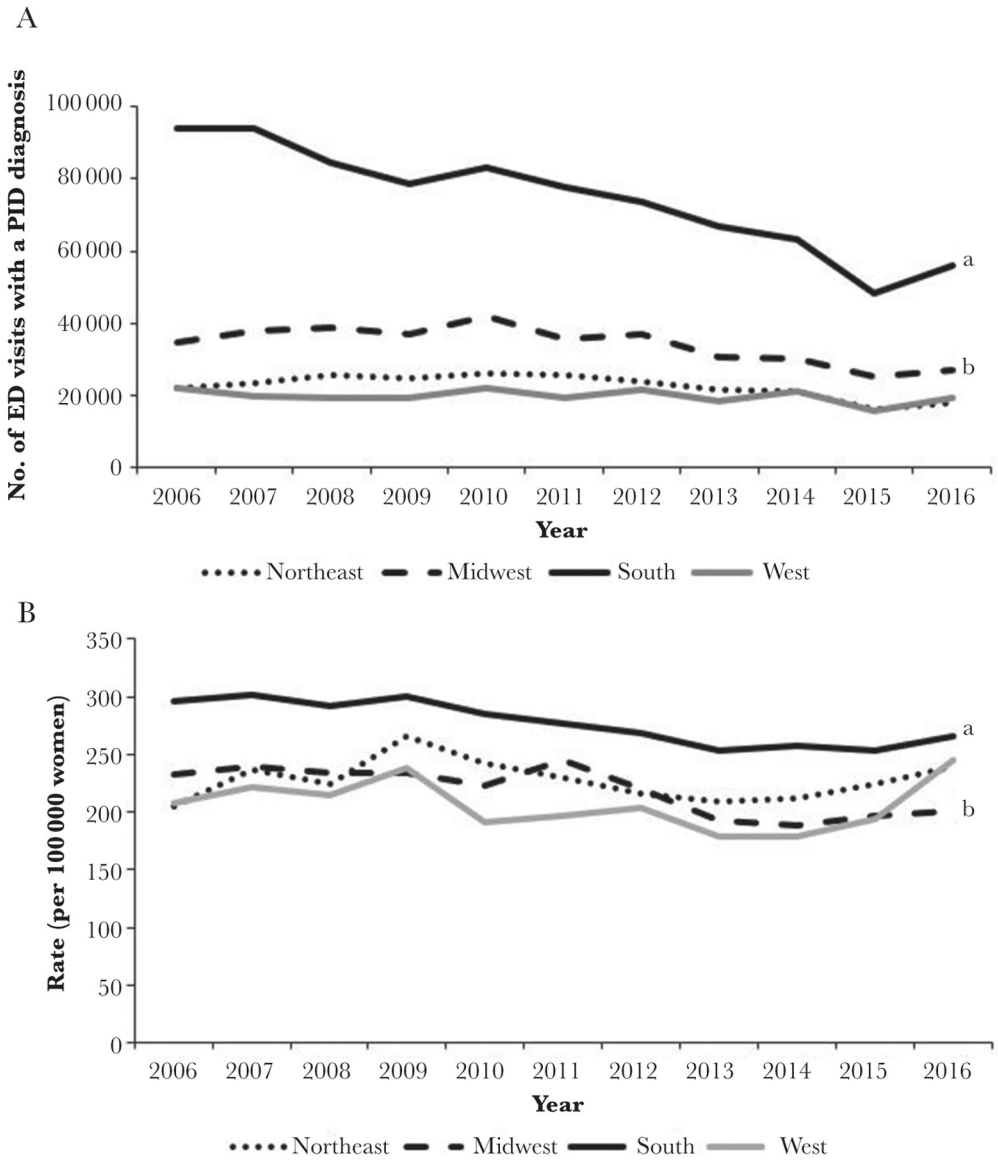

Figure 2.

A, Trends in the number of emergency department (ED) visits with a pelvic inflammatory disease (PID) diagnosis by region, Healthcare Utilization Project Nationwide Emergency Department Sample, 2006–2016. Test for trend using log-linear model: [a]$P < .0001$; [b]$P < .01$. *B*, Trends in the rate of PID diagnoses in commercially insured women by region, MarketScan, 2006–2016. Test for trend using log-linear model: [a]$P = .0001$; [b]$P = .005$.

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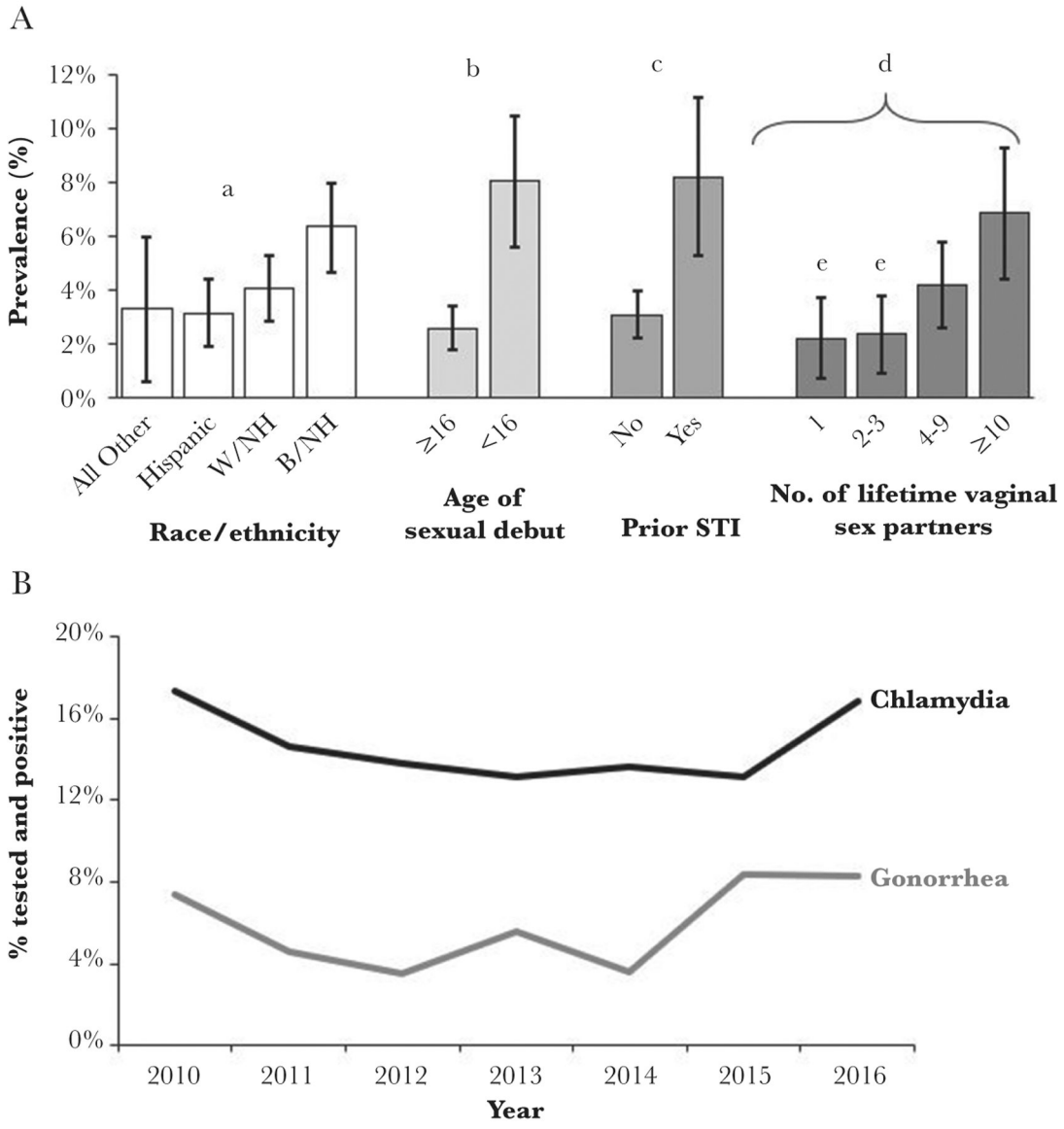

Figure 3.

A, Prevalence of a self-reported history of pelvic inflammatory disease (PID) by race/ethnicity and sexual risk behaviors, National Health and Nutrition Examination Survey, 2013–2016. Bars represent 95% confidence intervals. [a]$P = .002$. [b]$P = .009$. [c]$P < .0001$. [d]≥10 lifetime partners vs 1 lifetime partner, $P = .0005$. [e]Relative standard error >30% but <40%. *B*, Proportion of female sexually transmitted disease (STD) clinic attendees with a PID diagnosis tested and positive for chlamydia and/or gonorrhea, Sexually Transmitted Disease Surveillance Network, 2010–2016. Abbreviations: B/NH, black, non-Hispanic; STI, sexually transmitted infection; W/NH, white, non-Hispanic.

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Table 1.

Burden of and Trends in Pelvic Inflammatory Disease in the United States, 2006–2016

Data Source	Characteristic	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	% Change 2006–2016	APC (95% CI)	AAPC (95% CI)
Nationally representative population-based surveys															
Measure: prevalence of self-reported history of PID (95% CI)															
NHANES[a]	Total	…	…	…	…	…	…	…		4.1 (3.2–5.1)			…	…	…
	Age group, Y														
	15–24	…	…	…	…	…	…	…		2.8 (1.2–4.3)			…	…	…
	25–34	…	…	…	…	…	…	…		3.6 (2.3–5.0)			…	…	…
	35–44	…	…	…	…	…	…	…		5.4 (3.4–7.5)			…	…	…
NSFG[b]	Total			4.9 (4.3–5.5)			4.1 (3.4–5.0)		3.4 (2.7–4.3)		3.6 (2.9–4.5)		−26.5	−0.04 (−.07 to −.01)	…
	Age group, Y														
	15–24			3.8 (2.9–5.0)			2.9 (2.0–4.2)		1.9 (1.1–3.2)		2.5 (1.5–4.2)		−34.2	−0.06 (−.16 to.03)	…
	25–34			5.0 (4.2–6.1)			4.0 (2.8–5.6)		3.5 (2.5–4.9)		3.6 (2.7–4.8)		−28.0	−0.04 (−.07 to −.01)	…
	35–44			5.4 (4.4–6.6)			5.1 (3.7–7.1)		4.3 (3.1–6.0)		4.4 (3.1–6.1)		−18.5	−0.02 (−.05 to .01)	…
Nationally representative ED visit data															
Measure: No.[c] of ED visits with a PID diagnosis (95% CI)															
HCUP NEDS	Total	173 000 (162 000–184 000)	175 000 (163 000–187 000)	168 000 (156 000–180 000)	159 000 (149 000–170 000)	173 000 (158 000–188 000)	158 000 (148 000–168 000)	156 000 (142 000–169 000)	138 000 (129 000–147 000)	136 000 (125 000–146 000)	105 000 (97 000–113 000)	120 000 (112 000–129 000)	−30.5	−4.2 (−5.7 to −2.7)	…
	Age group, Y														
	15–24	91 000 (85 000–97 000)	91 000 (85 000–98 000)	87 000 (81 000–94 000)	81 000 (76 000–87 000)	88 000 (80 000–96 000)	79 000 (74 000–85 000)	76 000 (68 000–83 000)	65 000 (60 000–69 000)	60 000 (55 000–65 000)	49 000 (45 000–52 000)	50 000 (46 000–53 000)	−45.1	−3.2 (−7.1 to .9) −9.7 (−13.6 to-5.7)	−6.5[d] (−8.7 to −4.2)

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Data Source	Characteristic	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	% Change 2006–2016	APC (95% CI)	AAPC (95% CI)
	25–34	58 000 (54 000–61 000)	59 000 (55 000–63 000)	57 000 (53 000–61 000)	56 000 (52 000–60 000)	61 000 (56 000–67 000)	57 000 (53 000–61 000)	57 000 (52 0000–62 000)	52 000 (49 000–56 000)	53 000 (49 000–57 000)	41 000 (37 000–44 000)	48 000 (44 000–51 000)	−17.3	−3.4 (−4.9 to −1.9)	…
	35–44	25 000 (23 000–26 000)	25 000 (23 000–26 000)	24 000 (22 000–25 000)	23 000 (21 000–24 000)	24 000 (22 000–26 000)	22 000 (20 000–24 000)	23 000 (21 000–25 000)	21 000 (19 000–22 000)	22 000 (21 000–24 000)	16 000 (15 000–17 000)	23 000 (21 000–24 000)	−7.2	−1.3 (−3.2 to .7)	…
NHAMCS-ED[e]	Total	321 000 (233 000–409 000)		324 000 (228 000–420 000)		464 000 (341 000–588 000)		268 000 (176 000–360 000)		196 000 (100 000–292 000)			−38.9	−0.03 (−.20 to .14)	…
Nationally representative physician office visits NAMCS measure: No.[c] of physician office visits with PID diagnosis (2006–2015 period estimate, 95% CI) NDTI measure: No.[c] of initial, non postoperative physician office visits with a PID diagnosis															
NAMCS[f]	Total	1 292 000 (764 000–1 818 000)											…	…	…
NDTI[g]	Total	106 000	146 000	104 000	100 000	113 000	90 000	106 000	88 000	51 000	68 000	90 000	−15.1	−5.6 (−9.8 to −1.2)	…
Sentinel surveillance data MarketScan measure: Rate of PID diagnoses in commercially insured women (95% CI) SSuN measure: Proportion of female STD clinic attendees with a PID diagnosis (95% CI)															
MarketScan[h]	Total	255.0 (249.9–260.1)	267.5 (264.0–271.0)	259.6 (256.1–263.1)	269.3 (266.0–272.7)	244.4 (241.4–247.3)	244.9 (242.1–247.7)	233.9 (231.2–236.6)	214.0 (211.1–216.8)	217.5 (214.7–220.2)	227.3 (223.7–230.8)	245.4 (241.7–249.2)	−3.7	−3.0 (−4.6 to −1.3) 5.7 (−4.2 to 1.7)	−1.3[h] (−4.2 to 1.7)
	Age group, Y														
	15–24	264.7 (255.4–273.9)	271.2 (265.0–277.5)	267.4 (261.1–273.7)	265.1 (259.2–270.9)	236.3 (231.0–241.5)	258.8 (253.8–263.8)	250.5 (245.7–255.3)	224.9 (219.9–229.9)	224.1 (219.3–228.9)	231.2 (225.0–237.4)	232.9 (226.4–239.3)	−12.0	−2.0 (−3.1 to-1.0)	…
	25–34	320.0 (309.7–330.2)	328.4 (321.5–335.4)	311.8 (305.0–318.5)	327.9 (321.4–334.3)	293.3 (287.5–299.0)	278.4 (273.1–283.7)	260.3 (255.3–265.3)	234.4 (229.2–239.7)	234.8 (229.8–239.8)	245.9 (239.5–252.4)	257.8 (251.2–264.3)	−19.4	−3.8 (−5.2 to-2.4)	…
	35–44	193.6 (186.4–200.8)	212.5 (207.4–217.7)	207.4 (202.3–212.6)	221.6 (216.6–226.6)	208.4 (203.8–212.9)	201.5 (197.2–205.8)	193.2 (189.0–197.4)	184.1 (179.6–188.6)	194.3 (189.8–198.7)	205.0 (199.2–210.8)	244.8 (238.4–251.3)	26.4	−1.6 (−3.6 to .4) 12.4	1.0[h] (−2.3 to 4.5)

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Data Source	Characteristic	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	% Change 2006–2016	APC (95% CI)	AAPC (95% CI)
														(−7.5 to 36.7)	
SSuN[i]	Total	…	…	…	…	1.3 (1.0–1.7)	1.4 (1.0–1.8)	1.6 (1.0–2.1)	1.6 (1.0–2.2)	1.6 (1.0–2.2)	1.2 (.6–1.8)	1.0 (.5–1.4)	−26.5	4.8 (−.5 to 10.4) −23.1 (−40.3 to −1.1)	−5.5[i] (−9.3 to −1.5)
	Age group, Y														
	15–24	…	…	…	…	1.1 (.8–1.4)	1.2 (.9–1.6)	1.4 (.9–1.9)	1.4 (.9–1.9)	1.4 (.8–2.0)	0.9 (.4–1.4)	0.8 (.3–1.3)	−24.6	5.9 (.7–11.4) −26.6 (−45.5 to −1.0)	−6.3[i] (−10.6 to −1.7)
	25–34	…	…	…	…	1.3 (1.0–1.7)	1.3 (.9–1.7)	1.4 (.9–1.9)	1.5 (.8–2.2)	1.3 (.8–1.9)	1.4 (.6–2.1)	0.9 (.5–1.3)	−31.8	−22.9 (−58.1 to 41.7)	…
	35–44	…	…	…	…	1.5 (.8–2.1)	1.7 (.8–2.5)	1.9 (1.0–2.8)	1.5 (.7–2.2)	1.8 (.9–2.8)	1.6 (.6–2.5)	1.6 (.7–2.6)	9.7	0.9 (−4.3 to 6.5)	…

Any empty cells are due to 1 of 3 factors: (1) unavailability of data for that year, (2) no trend analyses were possible, or (3) the AAPC was not necessary to calculate as there was no inflection in trend.

Abbreviations: AAPC, average annual percentage change; APC, annual percentage change; CI, confidence interval; ED, emergency department; HCUP NEDS, Healthcare Utilization Project Nationwide Emergency Department Sample; NAMCS, National Ambulatory Medical Care Survey; NDTI, National Disease Therapeutic Index; NHAMCS-ED, National Hospital Ambulatory Medical Care Survey, emergency department component; NHANES, National Health and Nutrition Examination Survey; NSFG, National Survey of Family Growth; PID, pelvic inflammatory disease; SSuN, STD Surveillance Network; STD, sexually transmitted disease.

[a] PID data collection began in the 2013–2014 cycle, not yet enough cycles of PID data collection to perform trend analyses; 2013–2014 and 2015–2016 NHANES cycles are combined to increase the stability of the estimates.

[b] Trends evaluated by NSFG cycles 2006–2010, 2011–2013, 2013–2015, and 2015–2017.

[c] Numbers rounded to the nearest thousand; trend analyses based on nonrounded numbers.

[d] AAPC presented due to inflection in trend in 2011 in 15- to 24-year-olds.

[e] Sample size too small to stratify by age group; annual data combined into 2-year cycles to increase the stability of the estimates.

[f] Sample size too small to stratify by age group; average annual estimate for the 10-year period between 2006 and 2015 calculated by combining all years of visits and dividing the weight by the number of years (n = 10).

[g] No ability to stratify by age group due to proprietary nature of data; no standard error provided with proprietary data, assumed constant variance in Joinpoint software for trend analyses.

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[h] MarketScan: Rate of PID diagnoses calculated as the number of females aged 15–44 years with a claim indicating an acute PID diagnosis divided by the total number of women covered by the commercial insurance plans contributing to MarketScan each year; AAPC presented due to inflection in trend in 2014, both overall and in females aged 35–44 years.

[i] Data not available prior to 2010. Overall annual PID prevalence was calculated as the number of females in each age group diagnosed with PID in a year in a jurisdiction divided by the total number of females in each of the age groups in that jurisdiction that year. Using the year and jurisdiction-specific estimates, the overall annual PID prevalence was calculated using an inverse-variance weighted random-effects model. AAPC presented due to inflection in trend in 2015, both overall and in females aged 15–24 years.

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