

# MULTI-CULTURAL SURVEILLANCE FOR ECTOPIC PREGNANCY: CALIFORNIA 1991–2000

**Background:** National surveillance for ectopic pregnancy (EP), the primary cause of maternal death in the first trimester, began in 1970. EP rates peaked during the late 1980s and have been highest for African Americans. However, limited reports on EP rates exist for other racial/ethnic groups.

**Objectives:** To report state-level, multicultural trends in EP rates from 1991 to 2000.

**Methods:** Secondary data analysis of the California hospital discharge database collected by the Office of Statewide Health Planning and Development by using codes 633.0–633.9, from the International Classification of Diseases, Ninth Revision. EP rates are reported per 1000 pregnancies.

**Results:** From 1991 to 2000, 62,839 EP were reported in California. Mean EP rate was 11.2/1000, decreased from 15/1000 to 9.3/1000, and varied significantly by race/ethnicity and age. EP rates were highest among African Americans (25/1000) and lowest among Hispanics (7.7/1000); African Americans had higher odds of having EP relative to non-Hispanic Whites (odds ratio [OR] 2.14, 95% confidence interval [CI] 2.09–2.19). Women 35–44 years of age had the highest EP rates (17.6/1000) and higher odds of having EP compared to other age groups (OR 2.45, 95% CI 2.39–2.50). The highest rate of EP was found among African Americans 35–44 years of age (43.1/1000).

**Conclusions:** The study showed declining EP rates in California for all groups but highlights disparities in EP rates and the attenuated rate of decline for African Americans, which places them at highest risk of death in the first trimester. This study demonstrates the usefulness of analyzing state-level data that may differ from aggregated national data when studying culturally diverse populations. (*Ethn Dis.* 2005;15 [suppl 5]:S5-20–S5-24)

**Key Words:** Multi-Cultural, Ectopic Pregnancy, Health Disparities, Women's Health

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## INTRODUCTION

In 1970, the Center for Disease Control initiated its national surveillance for ectopic pregnancy (EP), the primary cause of maternal death in the first trimester.<sup>1</sup> This surveillance showed that EP rates reached their peak in the 1980s, leveled off by 1992, and have declined steadily since.<sup>2,3</sup> Similar trends have been noted in other industrialized nations.<sup>4,5</sup> Paradoxically, during the 20-year period that saw rates of EP rise to epidemic proportions in the 1980s, morbidity and mortality from EP declined. This inverse relationship was attributed to improved radiologic and serologic diagnostic procedures that allowed early detection and timely use of medical intervention with intramuscular methotrexate and less invasive laparoscopic surgery.<sup>6,7</sup>

Since nearly half of EPs are due to sexually transmitted diseases, especially inflammation and scarring of fallopian tubes with *Chlamydia trachomatis*, some epidemiologists suggest that EP may be a proxy indicator of sexually transmitted disease that has a higher incidence among minorities.<sup>8–10</sup> Other independent risk factors include previous EP, previous pelvic surgery, smoking, endometriosis, and use of contraceptive devices.<sup>11–14</sup> Most of these risk factors are disparately higher among African Americans, which correlates with the CDC surveillance findings that African-American women have consistently had higher EP rates and higher mortality from EP when compared to non-Hispanic Whites.<sup>1–3</sup>

Despite the drop in national EP rates, we do not know which populations experience the benefits of these changes, since epidemiologic surveillance for EP at the national level has traditionally aggregated rates into three categories: Whites, African Americans, and others. This categorization has several implications. The Hispanic and Asian populations have the fastest rate of growth and the highest rate of immigration, which has powered significant demographic shifts and increased diversity nationally, particularly in the most populous states and urban areas. Aggregating health-related data for diverse minority populations as “others,” especially when this group includes Hispanics, who represent the largest minority group, may mean that the conclusions reached in the analysis of these data do not accurately portray the incidence of phenomena such as EP. In addition, reporting these data as part of national trends may not accurately reflect the epidemiology of disease in highly populous and diverse states such as California.

Despite a declining trend in the rate of EP in industrialized nations, the rate of EP in developing nations has risen. The common denominator among these nations is poverty, higher rates of sexually transmitted diseases, and diminished access to care, especially in Africa.<sup>15</sup> These three characteristics are germane to African Americans. Moreover, other than for African Americans, little information about EP exists for racial/ethnic minority groups, particularly Hispanics and Asians, and to date no multicultural studies of EP rates have been reported. The purpose of this study was to evaluate state-level multicultural trends in ectopic pregnancy rates in California during the 10-year period from 1991 to 2000.

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**METHODS**

This study was a secondary database analysis of the public California Hospital Discharge Database for the years 1991–2000. The database maintains comprehensive records of most hospital inpatient discharges from acute-care hospitals.<sup>16</sup> Ectopic pregnancies were identified by using hospital discharge data from the California Office of Statewide Health Planning and Development. The diagnosis of ectopic pregnancy was based on hospital diagnosis codes 633.0–633.9 from the International Classification of Diseases, Ninth Revision (ICD-9). EP rates were calculated by dividing the number of EP by the total number of reported pregnancies (sum of live births, legal induced abortions, and EPs) and rates are reported per 1000 reported pregnancies. Data for live births were obtained from the California Department of Health Services (Public Use File year 1991–2000). Data are reported by race/ethnicity (non-Hispanic White, African American, Hispanic, and Asian/other), age (<14, 15–24, 25–34, 35–44, and ≥45 years), and time trends (assessed by grouping estimates of EP into one-year intervals). We used the odds ratio (OR) and the 95% confidence intervals (CI) for the EP rate to calculate the odds of having EP in an index group relative to that of the reference group. Reference groups were non-Hispanic Whites, age 25–34, and EP rate in 1991. We used chi-squared test and logistic regression analysis in STATA software (version 8.0, StataCorp, College Station, Texas) to analyze the data.

**RESULTS**

From 1991 to 2000, 62,839 ectopic pregnancies were reported in California, representing ≈15% of all EP reported nationally by the Centers for Disease Control and Prevention. The number of EP declined 47.3% from 9,309 to 4,994

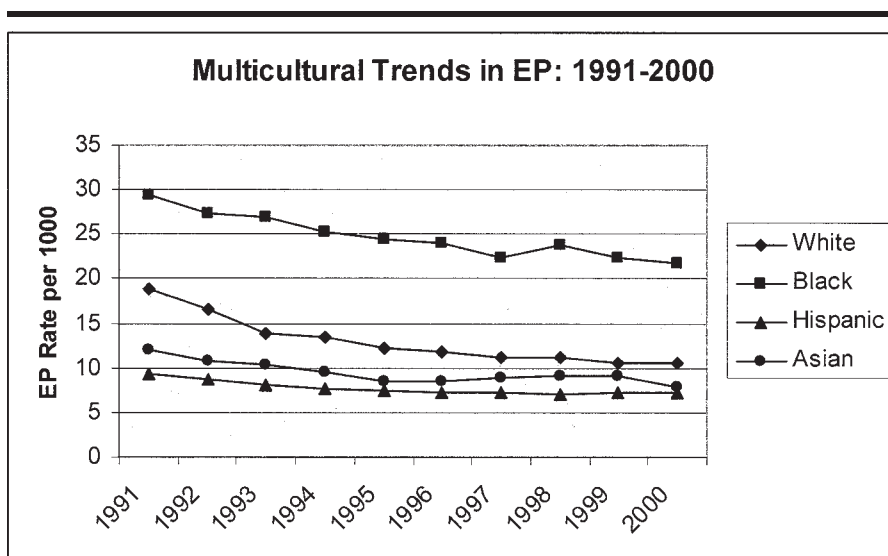
**Table 1. Number of ectopic pregnancies (EP), abortions, live births, and EP rate by year, California, 1991–2000**

Year	EP	Abortions	Live Births	EP Rate
1991	9309	425	610,701	15.0
1992	8171	426	602,269	13.4
1993	7087	431	585,761	11.9
1994	6463	345	568,263	11.2
1995	5879	361	552,393	10.5
1996	5532	314	539,785	10.1
1997	5217	396	525,455	9.8
1998	5183	457	522,882	9.8
1999	5004	394	519,102	9.5
2000	4994	409	532,610	9.3
<b>Total</b>	<b>62,839</b>	<b>3958</b>	<b>5,559,221</b>	<b>11.2</b>

( $P<.0001$ ), and the rate of EP declined correspondingly from 15/1000 to 9.3/1000 ( $P<.001$ ) during this period (Table 1). Stratification of these data reveals a decline in the rate of EP for the four race/ethnicity groups studied (Figure 1). However, the decline in EP rate over time was notably smaller for African Americans when compared to the non-Hispanic White reference group. The rate of EP for African-American women declined 24% from 1991 to 2000 (29.5/1000 to 21.6/1000), whereas the decline in EP rate among non-Hispanic White women was 47% (18.9/1000 to 10.3/1000). Hispanics had the least decline in EP

rates at 20% (9.4/1000 to 7.2/1000) and had the lowest EP rate each year of the study period (7.7/1000) (Figure 1).

The highest EP rate was found among African Americans (25/1000 reported pregnancies), which was 2.2 times the EP rate for all racial/ethnic groups (11.2/1000). Hispanics had the lowest rate of EP followed by the Asian/other group (Table 2). Compared to the non-Hispanic White reference group, African Americans had more than twice the odds of having an ectopic pregnancy (OR 2.14, 95% CI 2.09–2.19,  $P<.0001$ ) (Table 2). Hispanics and the Asian/others group had significantly lower odds of having EP when com-



**Fig 1. Trends in ectopic pregnancy rates by race/ethnicity, California, 1991–2000**

**Table 2. Rate of ectopic pregnancy (EP), odds ratio (OR), and 95% confidence interval (CI) by race/ethnicity and age group, California, 1991–2000**

AVariable	Total Reported EP	Live Births	Rate/1000	OR	95% CI	P value
<b>Total</b>	62,839	5,613,267	11.2			
<b>Race/Ethnicity</b>						
White	26,802	2,005,044	13.3	Reference	–	–
African American	10,134	404,099	25.0	2.14	2.09–2.19	.0001
Asian/Other	6014	637,630	9.5	.57	.55–.58	.0001
Hispanic	19,873	2,579,637	7.7	.57	.56–.58	.0001
<b>Age group (y)</b>						
≤14	78	13,979	5.6	.47	.38–.60	.0001
15–24	14,517	2,005,589	7.2	Reference	–	–
25–34	34,677	2,828,824	12.2	1.69	1.66–1.72	.0001
35–44	13,426	756,774	17.6	2.45	2.39–2.50	.0001
≥45	126	8101	15.7	2.02	1.69–2.42	.0001

pared to the non-Hispanic White reference group (OR 0.57, 95% CI 0.56–0.58,  $P < .0001$ ).

EP rate varied significantly by age and was highest among women age 35–44 years (17.6/1000) (Table 2). Women in this age group also had more than twice the odds of having EP compared to the 15- to 25-year-old reference group (OR 2.45, 95%, CI 2.39–2.50,  $P < .0001$ ). African-American women in this age group had the highest EP rate of all women studied (43.1/1000 reported

pregnancies) (Table 3). Notable findings were that non-Hispanic White adolescents <14 years of age had higher EP rates compared to other racial/ethnic groups in the same age category and that Hispanic adolescents in this age group had more than two times the number of live births than all other racial/ethnic groups combined. The Asian/other group had higher EP rates than Hispanics though lower rates than non-Hispanic Whites and African Americans.

## DISCUSSION

EP rates declined in California during this period for non-Hispanic Whites, African Americans, Hispanics, and the Asian/other racial/ethnic groups. These findings are in keeping with observations of declining EP rates nationally. However, to our knowledge this study is the first to highlight the magnitude of disparity in the rate of EP for African Americans at the state level. It also highlights a disparity in the rate of decline of this condition in California among African Americans when compared to non-Hispanic Whites.

Other studies in well-defined geographic areas of the United States confirm our findings that African Americans are at greatest risk of developing EP and hence at increased risk for infertility and death in the first trimester of pregnancy.<sup>17–19</sup> A disparity in EP rates continues to exist for African Americans despite improved diagnostic and treatment methods. This finding may mean that disparities in the incidence of sexually transmitted diseases and previous EP, the two major risk factors for EP, continue to exist for them as well. The EP rate among African Americans in 2000 was not only more than a decade behind that of the non-Hispanic White reference group, but the EP rate of African-American women in the 35- to 44-

**Table 3. Rate of ectopic pregnancy (EP) by race/ethnicity and age group, California, 1991–2000**

Race/Ethnicity	Age (y)	EP (n)	Live Births	Rate/1000
<b>White</b>	≤14	24	1638	14.4
	15–24	5424	514,127	10.4
	25–34	15085	1,109,647	13.4
	35–44	6214	353,261	17.3
	≥45	56	3618	15.2
<b>Black</b>	≤14	14	2023	6.8
	15–24	2694	178,288	14.9
	25–34	5565	172,115	31.3
	35–44	1853	41,022	43.1
	≥45	8	290	26.8
<b>Hispanic</b>	≤14	32	9086	3.5
	15–24	5433	1,165,478	4.6
	25–34	10704	1,148,143	9.2
	35–44	3673	232,693	15.5
	≥45	31	2,118	14.4
<b>Asian/Other</b>	≤14	8	980	8.1
	15–24	966	132,703	7.2
	25–34	3323	370,104	8.9
	35–44	1686	120,058	13.8
	≥45	31	1836	16.6

year-old age group rivals those of women in developing African nations.<sup>20</sup> The common denominator here may be health communication barriers, a less-informed population, differing health beliefs, and less access to healthcare.

Racial disparities in EP for minorities in general, and for urban-dwelling African Americans in particular, have been reported during the past quarter of a century. Though our findings confirm those of other studies that African Americans are at greatest risk for EP, they differ in the reported EP rates for Hispanics.<sup>19</sup> Cultural differences between Hispanic subgroups such as Puerto Ricans and Mexicans may be responsible for differences in reported EP rates. Urban-dwelling Puerto Ricans in New York have similar health disparities as African Americans, whereas Mexicans, who make up most of the Hispanic population in California, often have health outcomes that differ significantly from African Americans.

Cultural health practices have been reported as the likely reason that Hispanics experience lower rates of infant mortality than African Americans, despite sharing similar socioeconomic and ecologic realities. This fact may also explain why Hispanics had the lowest EP rates. However, noting only a lower EP rate for Hispanics may be misleading. Of 156 cases of EP treated at our institution between 1995 and 1997, 79 were Hispanic and 77 were African American. Despite the lower rate of EP in Hispanics in comparison to African Americans, in this study 78% of both groups presented as ruptured EP, which is the primary risk factor for death in the first trimester.<sup>21</sup> A lack of awareness of EP and limited access to healthcare may have played a role in the late presentation for EP. This finding highlights the need for cross-cultural epidemiologic studies that are conducted in more well-defined geographic regions (as opposed to aggregating rates as national numbers) and that take into consideration not only socioeconomic

factors but factors related to maternal health awareness.

Although ours is the first multicultural report on EP rates, it is limited by the fact that data for Hispanics do not take into consideration differences in cultures and national origins (Central American, Mexican, Mexican-American) despite similar ethnicities and by the fact that Asians are aggregated with other population groups such as Pacific Islanders and Native Americans who are culturally very different. Nevertheless, EP rates may serve not only as an epidemiologic marker for sexually transmitted disease but as a marker of the reproductive health of women within different population groups as well.

The use of aggregated national data may not give an accurate portrayal of EP rates, especially for rapidly growing and culturally diverse populations. This study highlights the importance of using well-defined geographic data sets to analyze clinical and epidemiologic phenomena and to describe them at the level of multiple racial/ethnic groups.

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