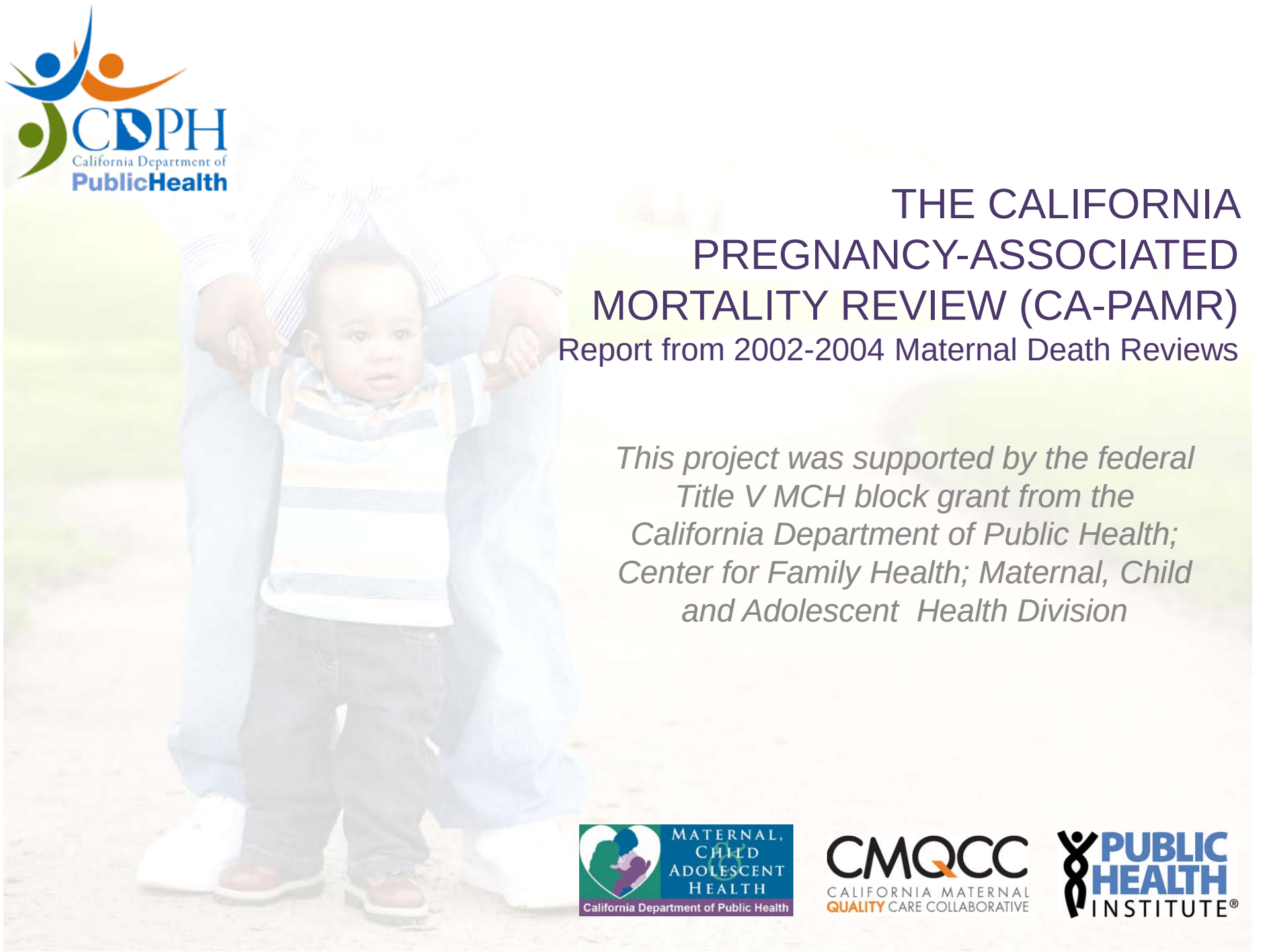


THE CALIFORNIA PREGNANCY-ASSOCIATED MORTALITY REVIEW (CA-PAMR)

Report from 2002-2004 Maternal Death Reviews

This project was supported by the federal Title V MCH block grant from the California Department of Public Health; Center for Family Health; Maternal, Child and Adolescent Health Division

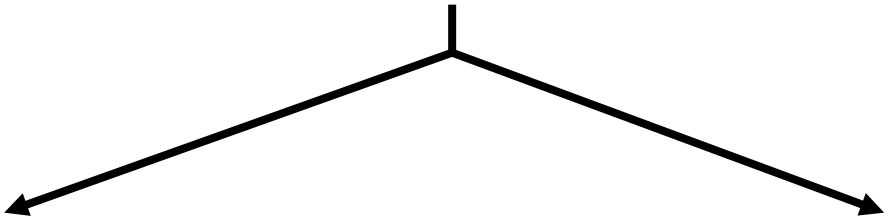
Key Definitions used in CA-PAMR for the Review of Maternal Deaths in California, 2002-2004

Maternal Mortality Rate

Number of women who die from pregnancy-related causes within 42 days postpartum/the number of live births in that year) x 100,000

Pregnancy-Associated Deaths

Death of a woman within one year postpartum from any cause



Pregnancy-Related Deaths

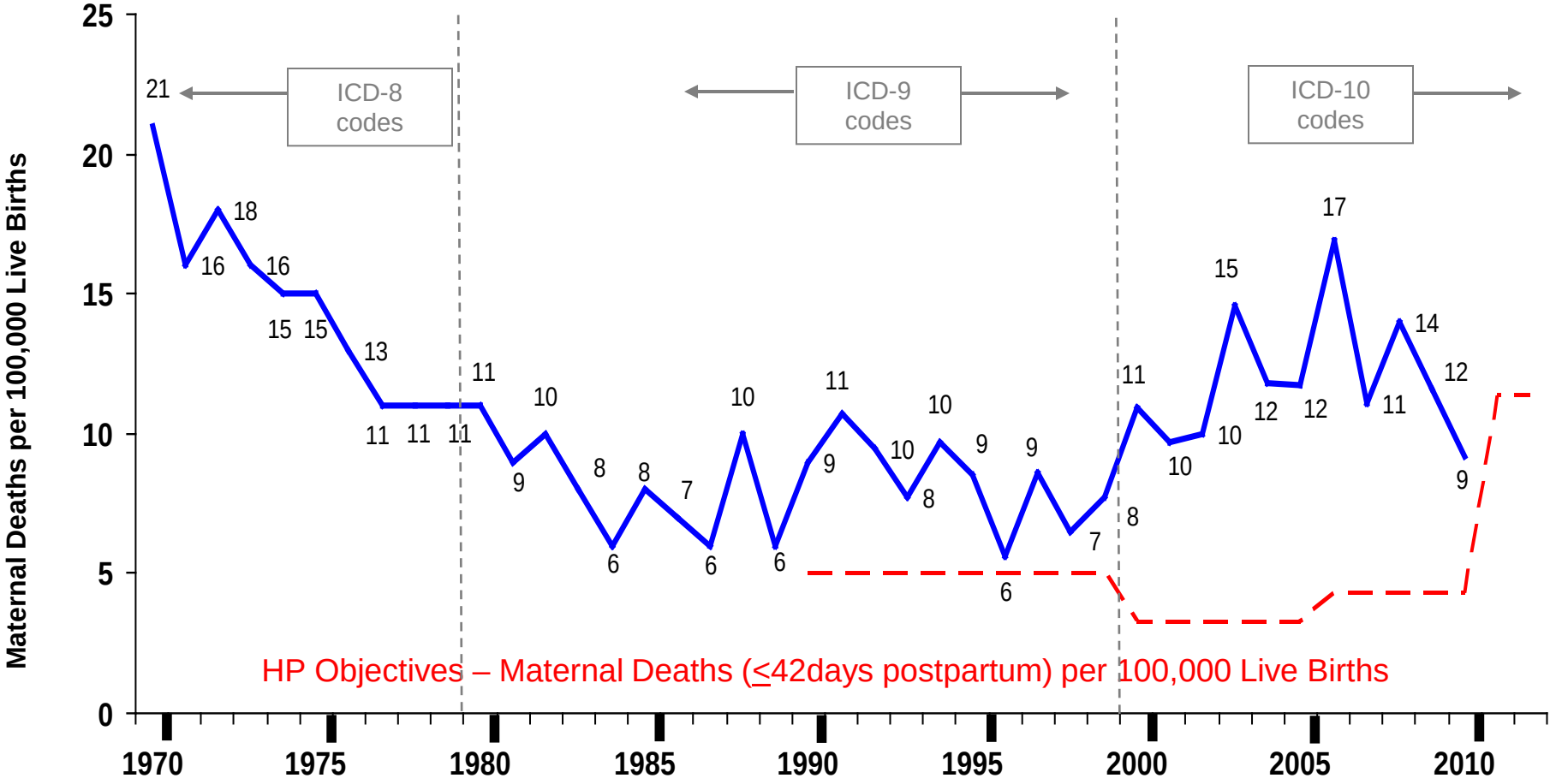
Death of a woman within one year postpartum related to pregnancy or aggravated by the pregnancy or its management

Not-Pregnancy-Related Deaths

Death of a woman within one year postpartum unrelated to pregnancy or its management

SOURCE: The California Pregnancy-Associated Mortality Review, April 2012. © California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division.

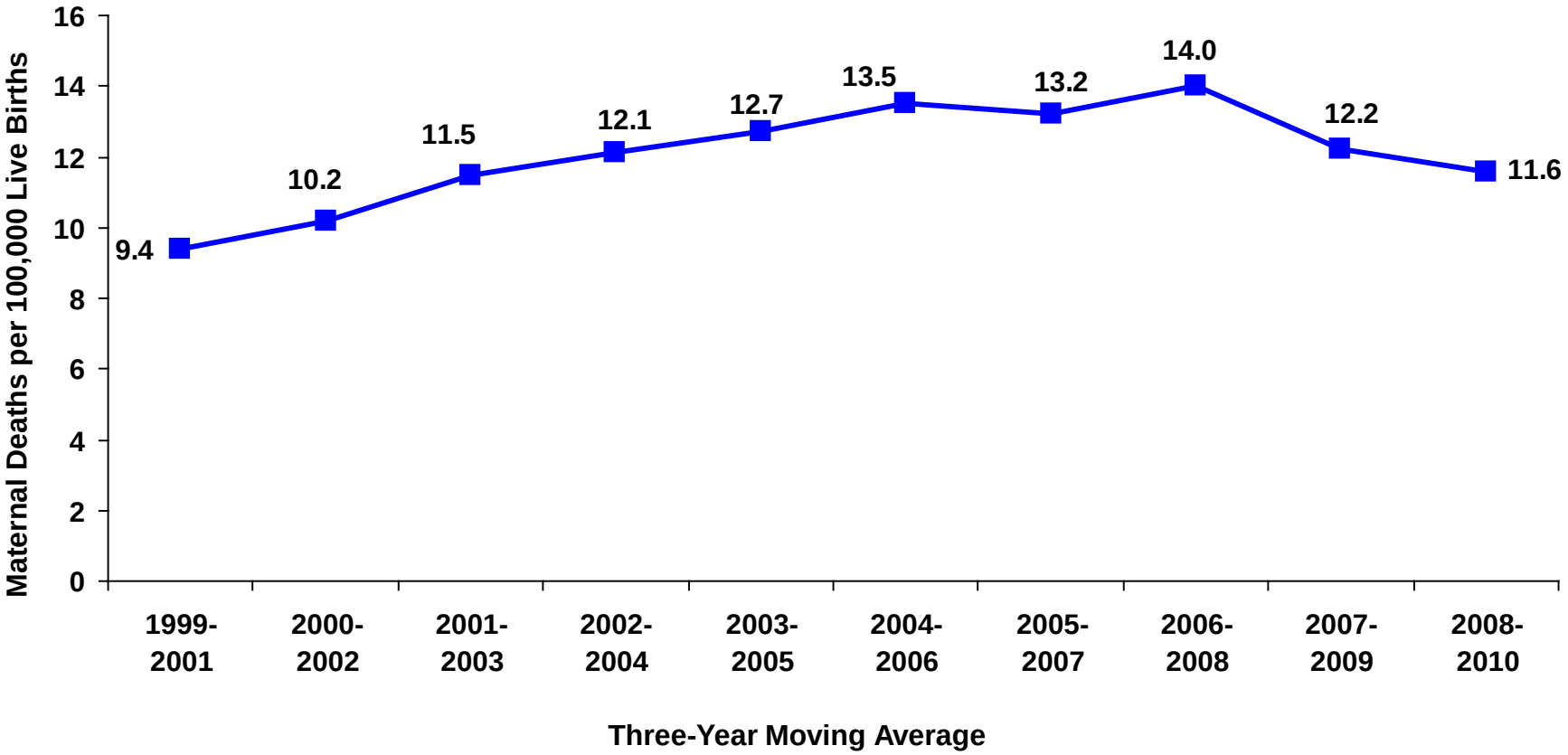
Maternal Mortality Rate, California Residents; 1970-2010



INTERPRETATION: Maternal mortality in California is increasing and is as high as it was in the 1970's. Changes in the coding of maternal deaths on death certificates may account for some (i.e., 30%) of the increase (Hoyert, 2007). Healthy People Objectives: HP2000: 5.0 deaths per 100,000 live births; HP2010: 3.3 deaths, later revised to 4.3 deaths per 100,000 live births, and; HP2020: 11.4 deaths per 100,000 live births.

SOURCE: The California Pregnancy-Associated Mortality Review, December 2012. © California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division.

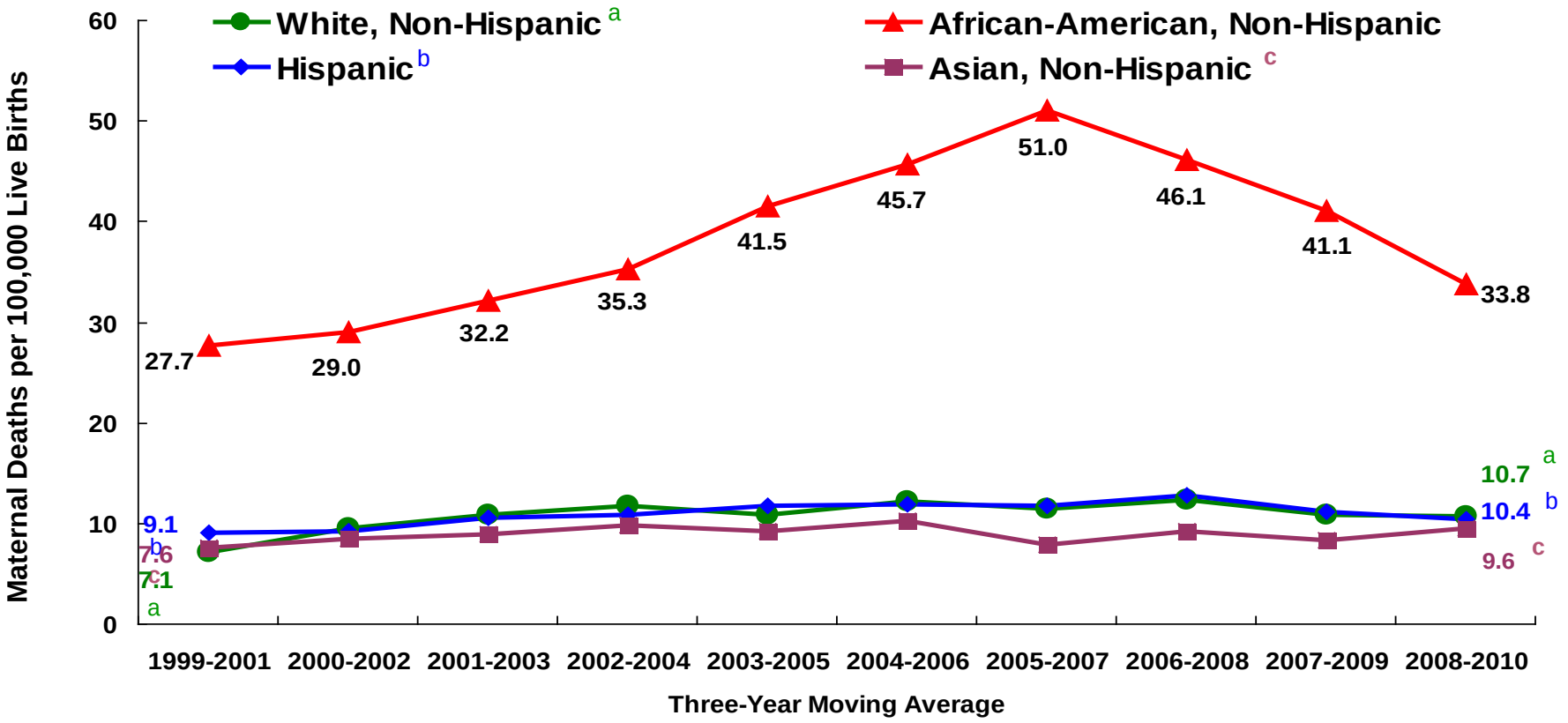
Maternal Mortality Rate, Moving Average, California Residents; 1999-2010



INTERPRETATION: A statistically significant upward trend in maternal mortality rates in California is seen, from 1999-2001 to 2008-2010, even after annual fluctuations are smoothed.

SOURCE: The California Pregnancy-Associated Mortality Review, December 2012. © California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division.

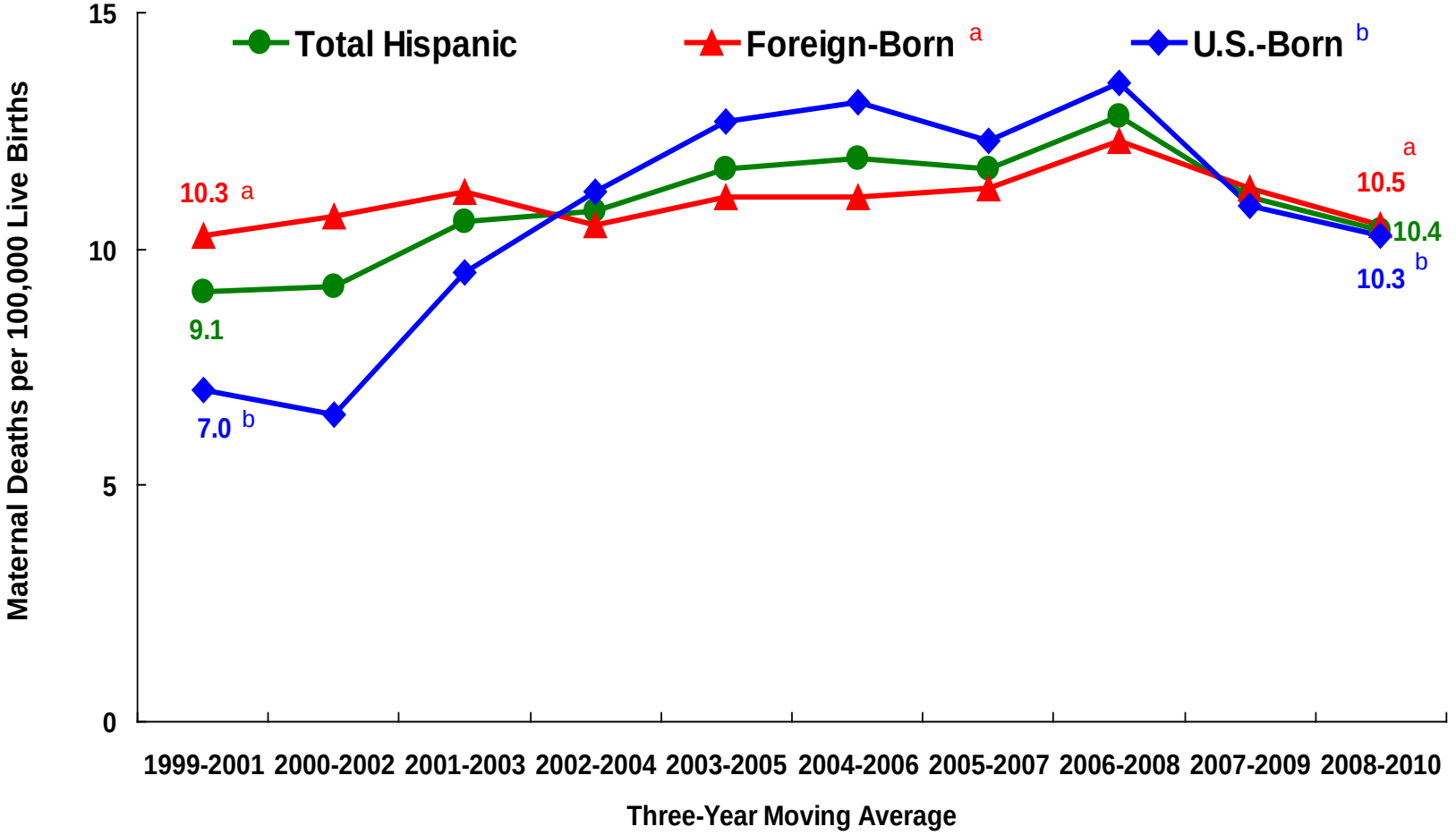
Maternal Mortality Rates by Race/Ethnicity, California Residents; 1999-2010



INTERPRETATION: There is a persistent racial/ethnic disparity in maternal mortality in California.

SOURCE: The California Pregnancy-Associated Mortality Review, December 2012. © California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division.

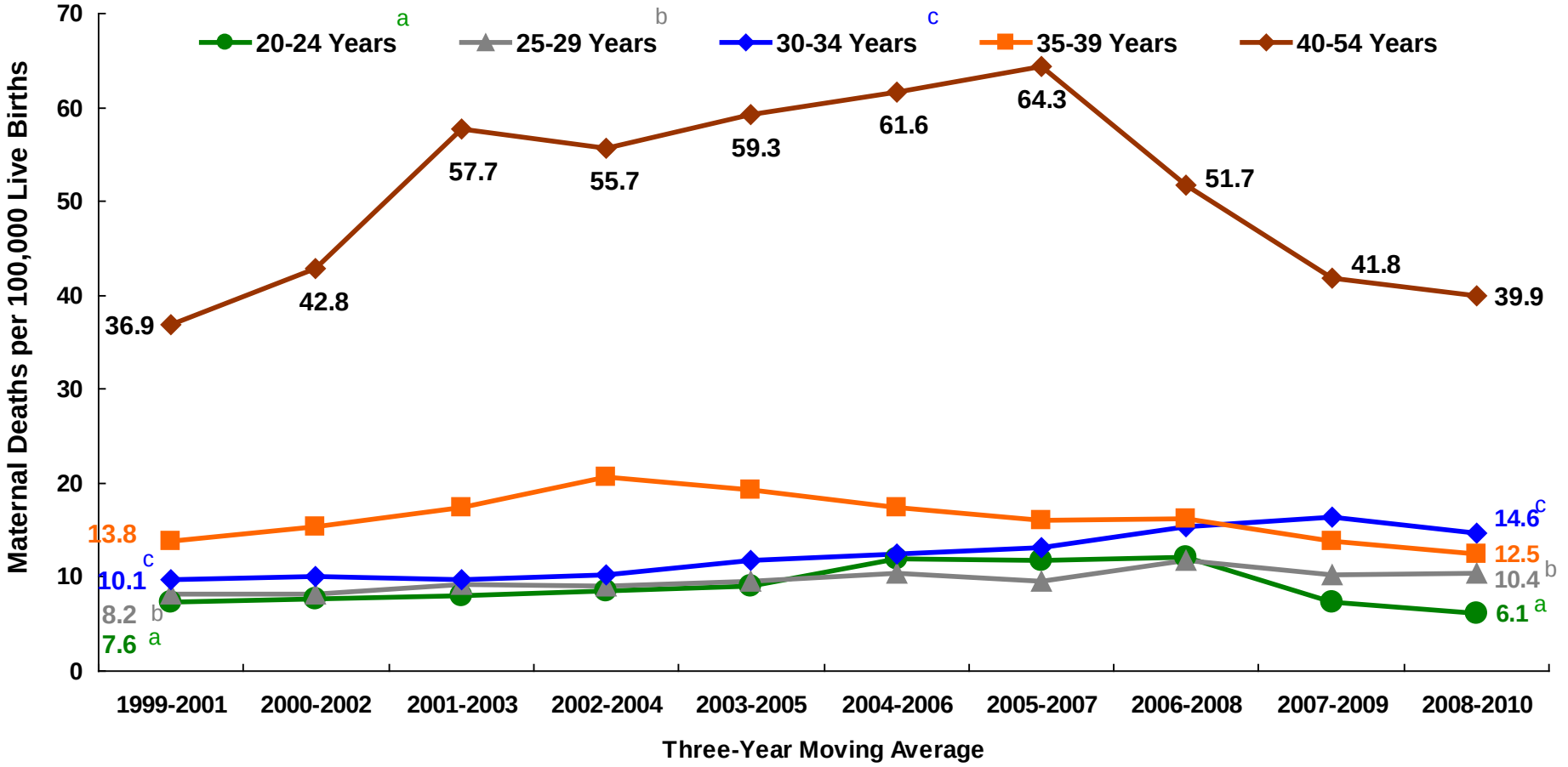
Maternal Mortality Rates for U.S.- and Foreign-born Hispanic California Residents; 1999-2010



INTERPRETATION: Maternal mortality for U.S.-born Hispanics increased by 47% from 1999-2001 to 2008-2010. Over 50% of births in California are to Hispanic women.

SOURCE: The California Pregnancy-Associated Mortality Review, December 2012. © California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division.

Maternal Mortality Rates by Age Group, California Residents; 1999-2010



INTERPRETATION: Women over 40 years of age are at higher risk for mortality and have a three-to-four higher risk of death compared to younger women.

SOURCE: The California Pregnancy-Associated Mortality Review, December 2012. © California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division.

Key Steps of CA-PAMR Methodology

STEP 1: Hospital discharge data linked to birth, death certificates

Identifies women who died within one year postpartum from any cause (*Pregnancy-Associated Cohort*)

STEP 2: Additional data gathered for each death

Coroner reports, autopsy results, and additional information from the death certificate (e.g., multiple causes of death, recent surgeries, etc) are obtained

STEP 3: Cases selected for CA-PAMR Committee review

Documented (ICD-10 obstetric ("O") code) and suspected pregnancy-related deaths are prioritized for review

STEP 4: Medical records abstracted and summarized

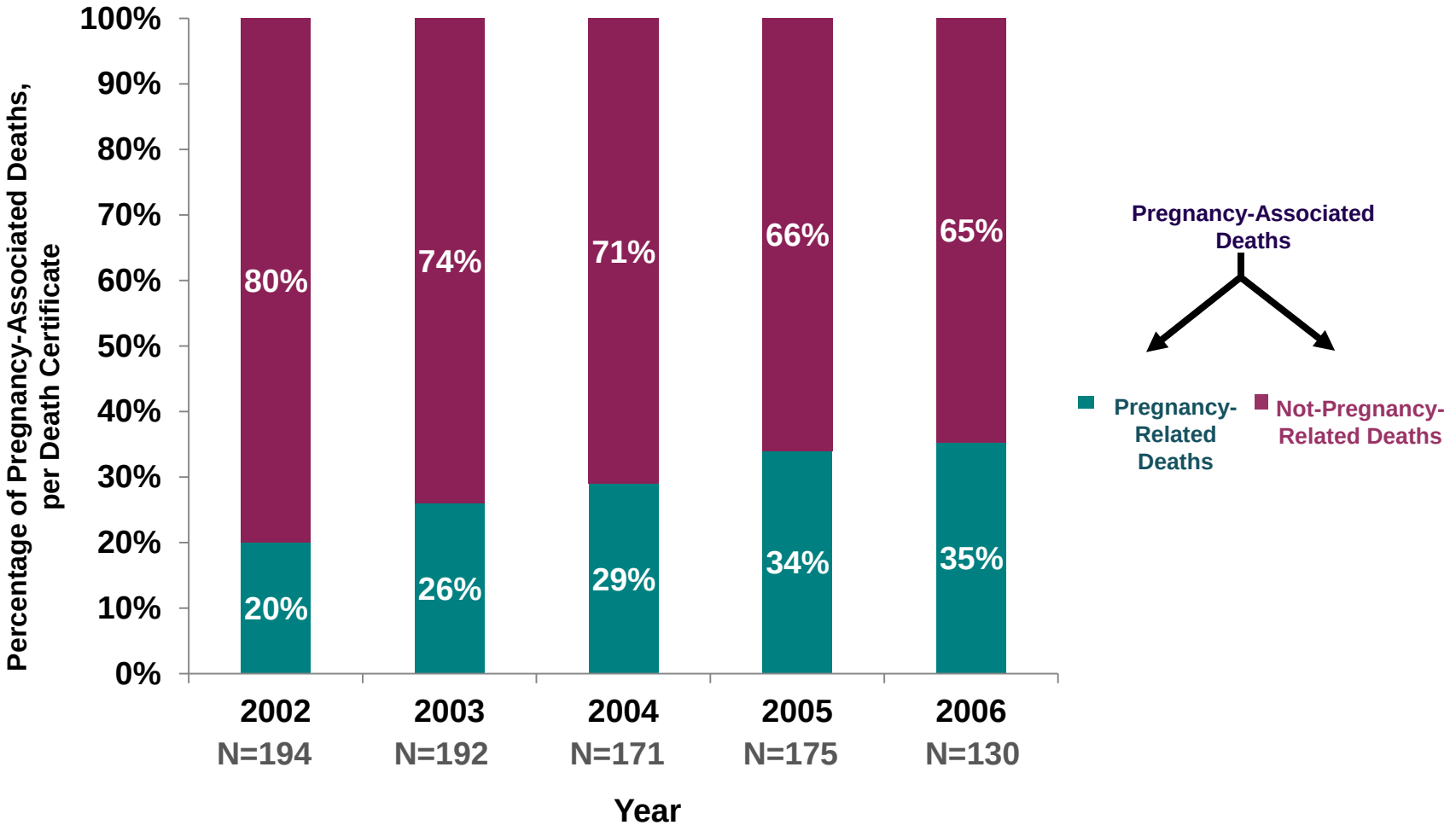
All available labor and delivery, prenatal, hospitalization, transport, and outpatient and emergency department records are obtained and summarized

STEP 5: Cases reviewed by CA-PAMR Committee

Committee determines whether the death was pregnancy-related, the cause of death, contributing factors and quality improvement opportunities

SOURCE: The California Pregnancy-Associated Mortality Review, April 2012. © California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division.

Pregnancy-Associated Deaths, per Death Certificate, California; 2002-2006



INTERPRETATION: Overall pregnancy-associated deaths (deaths within one year postpartum from any cause) remained fairly consistent from 2002 to 2006, but the proportion of pregnancy-related deaths increased from 20% in 2002 to 35% in 2006.

SOURCE: The California Pregnancy-Associated Mortality Review, April 2012. © California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division.

Leading Causes of Pregnancy-Associated Death based on Death Certificates, 2002-2004; N=555 (before CA-PAMR review)

Pregnancy-Related (n=139)

- Preeclampsia/eclampsia (16%)
- Obstetric hemorrhage (15%)
- Amniotic fluid embolism (8%)
- Cardiomyopathy (3%)
- Sepsis/infections (1%)
- Venous embolism (1%)
- Other complications (43%)
  of labor, delivery and pregnancy, excluding above

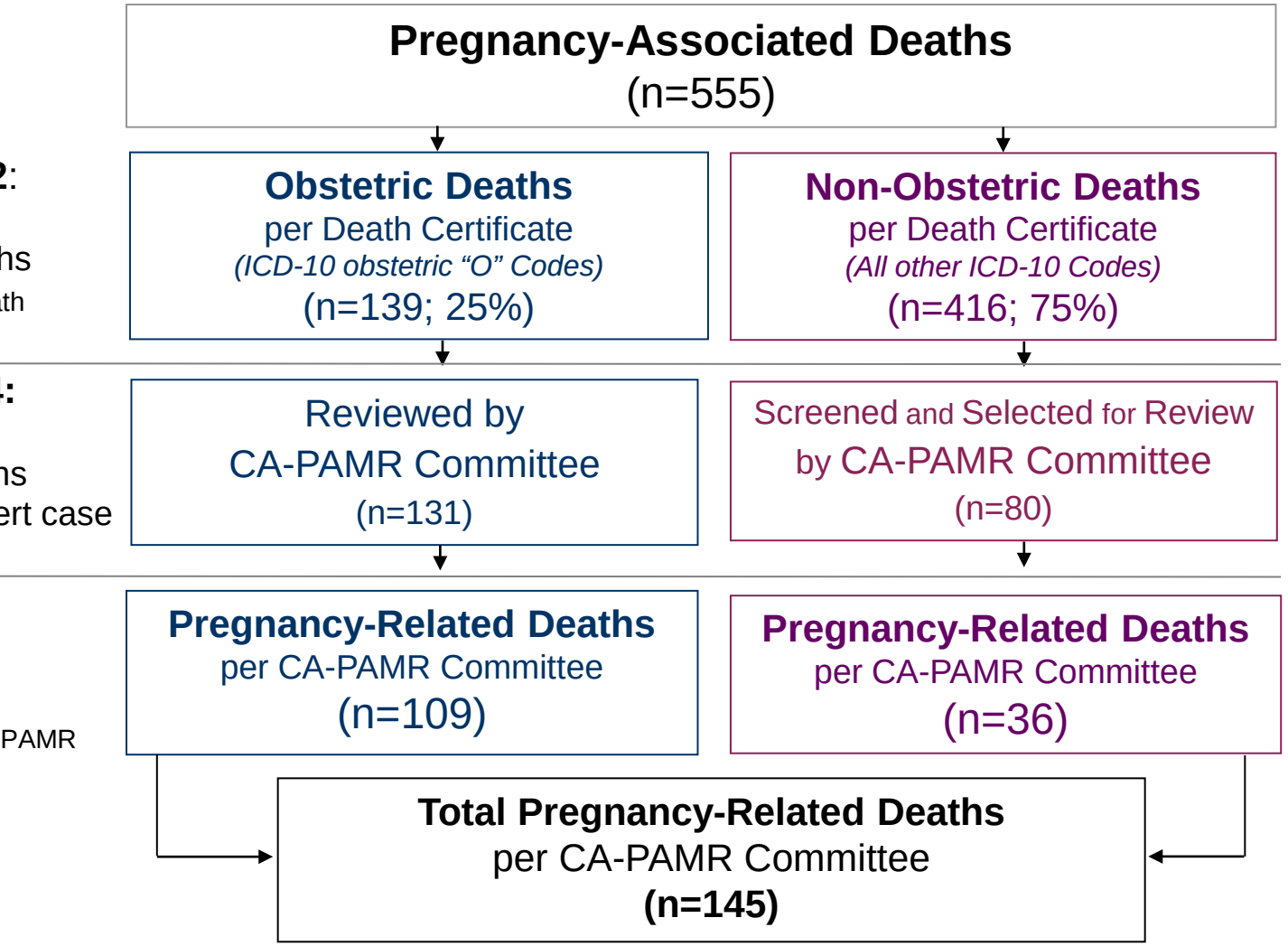
Not-Pregnancy-Related (n=416)

- Motor vehicle crash injuries (21%)
- Cardiovascular disease (18%)
- Violent injuries (homicide and suicide) (16%)
- Cancer or its complications (13%)
- Other unintentional injuries (12%)
  (i.e., drug overdose, non-motor vehicle accidents)
- All Other causes (21%)

INTERPRETATION: Twenty-five percent (n=139) of pregnancy-associated deaths in 2002-2004 (n=555) were classified as pregnancy-related deaths before CA-PAMR case review. The leading causes of pregnancy-related deaths and not-pregnancy-related deaths in California (shown above) were similar to the causes of death for all women of reproductive age in the U.S. in 2002 to 2004.

SOURCE: The California Pregnancy-Associated Mortality Review, April 2012.

Case Ascertainment of Pregnancy-Related Deaths from Enhanced Surveillance and Case Review; 2002-2004



INTERPRETATION: The number of pregnancy-related deaths increased to 145 after the CA-PAMR Committee reviewed all available prenatal, labor and delivery records and Coroner and autopsy reports.

SOURCE: The California Pregnancy-Associated Mortality Review, April 2012. © California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division.

CA-PAMR Pregnancy-Related Causes of Death, 2002-2004 (N=145) (after CA-PAMR review)

Cause of Pregnancy-Related Deaths	N (%)
Cardiovascular disease	29 (20)
Cardiomyopathy	*19 (13)*
Other cardiovascular	*10 (7)*
Preeclampsia/eclampsia	25 (17)
Obstetric hemorrhage	16 (11)
Amniotic fluid embolism	15 (10)
Deep vein thrombosis/pulmonary embolism	15 (10)
Other	14 (10)
Sepsis	10 (7)
Cerebral Vascular Accident	9 (6)
Anesthesia complications	4 (3)
Acute fatty liver	3 (2)
Drug abuse complications	3 (2)
Cancer *(diagnosis or treatment delayed by pregnancy)*	2 (1)
TOTAL	**145**

INTERPRETATION: Cardiovascular disease became the leading cause of pregnancy-related death in California, in 2002 to 2004 after case review by the CA-PAMR Committee.

SOURCE: The California Pregnancy-Associated Mortality Review, April 2012.

CA-PAMR Pregnancy-Related Deaths and CA Birth Cohort, Selected Demographic Characteristics, California; 2002-2004

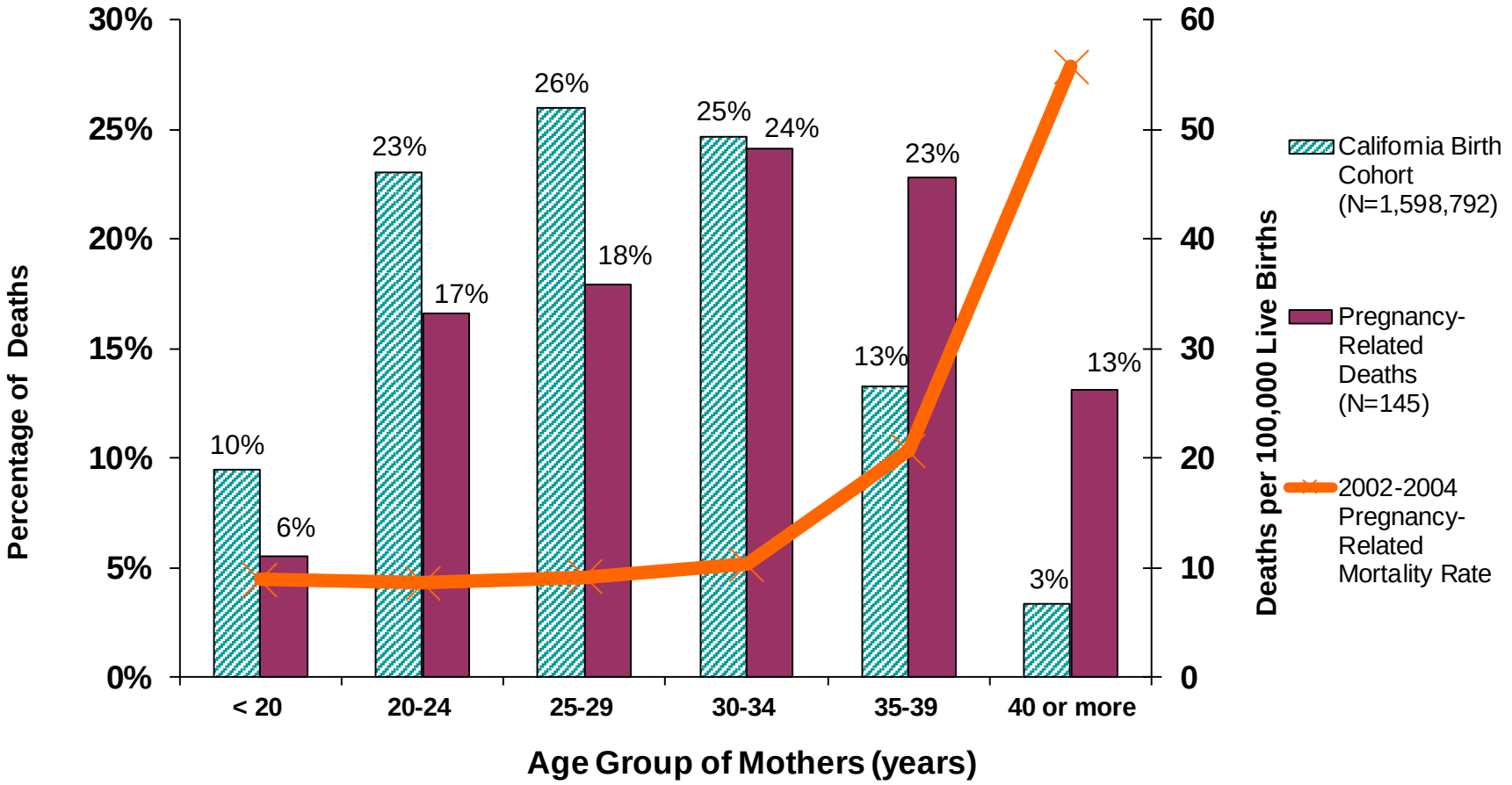
	CA Birth Cohort (N=1,598,792) N (%)	Pregnancy- Related Deaths (N=145) N (%)†
Payer Source		
Medi-Cal / other govt.	736,088 (46)	83 (57)
Private or self-pay	855,570 (54)	59 (41)
Marital Status		
Married/living as married	357,692 (69)	88 (61)
Unmarried	163,669 (31)	53 (37)*
Education		
Less than high school	444,138 (28)	44 (30)
High school/12th grade	444,373 (28)	44 (30)
Beyond high school	670,636 (42)	45 (31)*

† Percentages may not equal 100, because missing or unknown data are not presented.
* p<.05

INTERPRETATION: Women with pregnancy-related deaths were less likely to be married or have graduated high school, and were more likely to have delivery services paid by California's public insurance Medi-Cal.

SOURCE: The California Pregnancy-Associated Mortality Review, April 2012.

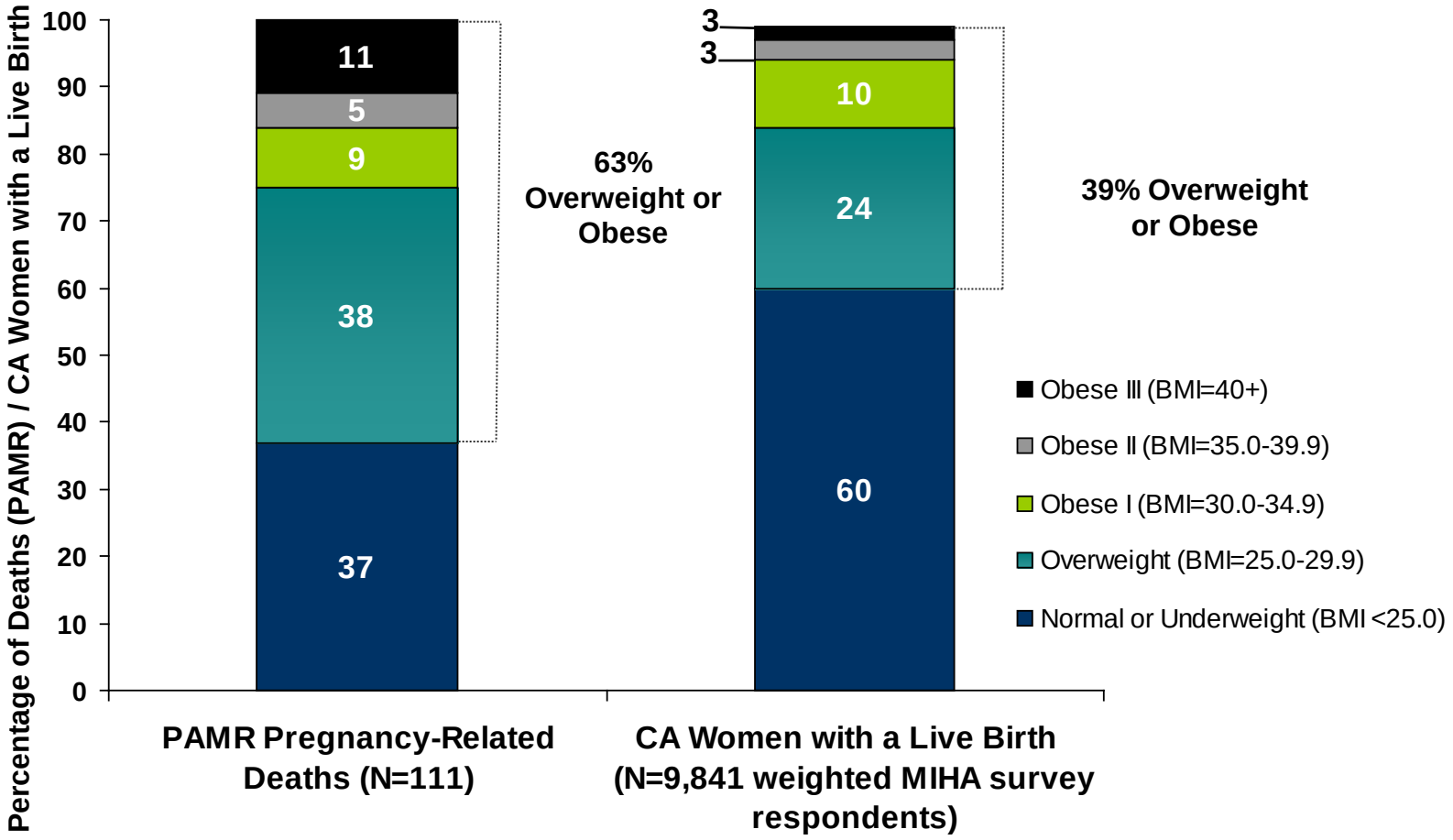
CA-PAMR Pregnancy-Related Deaths and CA Birth Cohort, Age of Mother at Death, California; 2002-2004



INTERPRETATION: Mortality rates for women ages 40 years and older are three-to-five time higher than mortality rates for younger women. However, while the greatest relative risk of dying is at the uppermost maternal age group, the highest number of pregnancy-related deaths (n=68) occur in the 30-39 year old age group.

SOURCE: The California Pregnancy-Associated Mortality Review, April 2012. © California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division.

CA-PAMR Pregnancy-Related Deaths and CA Births, Pre-pregnancy BMI Status; 2002-2004

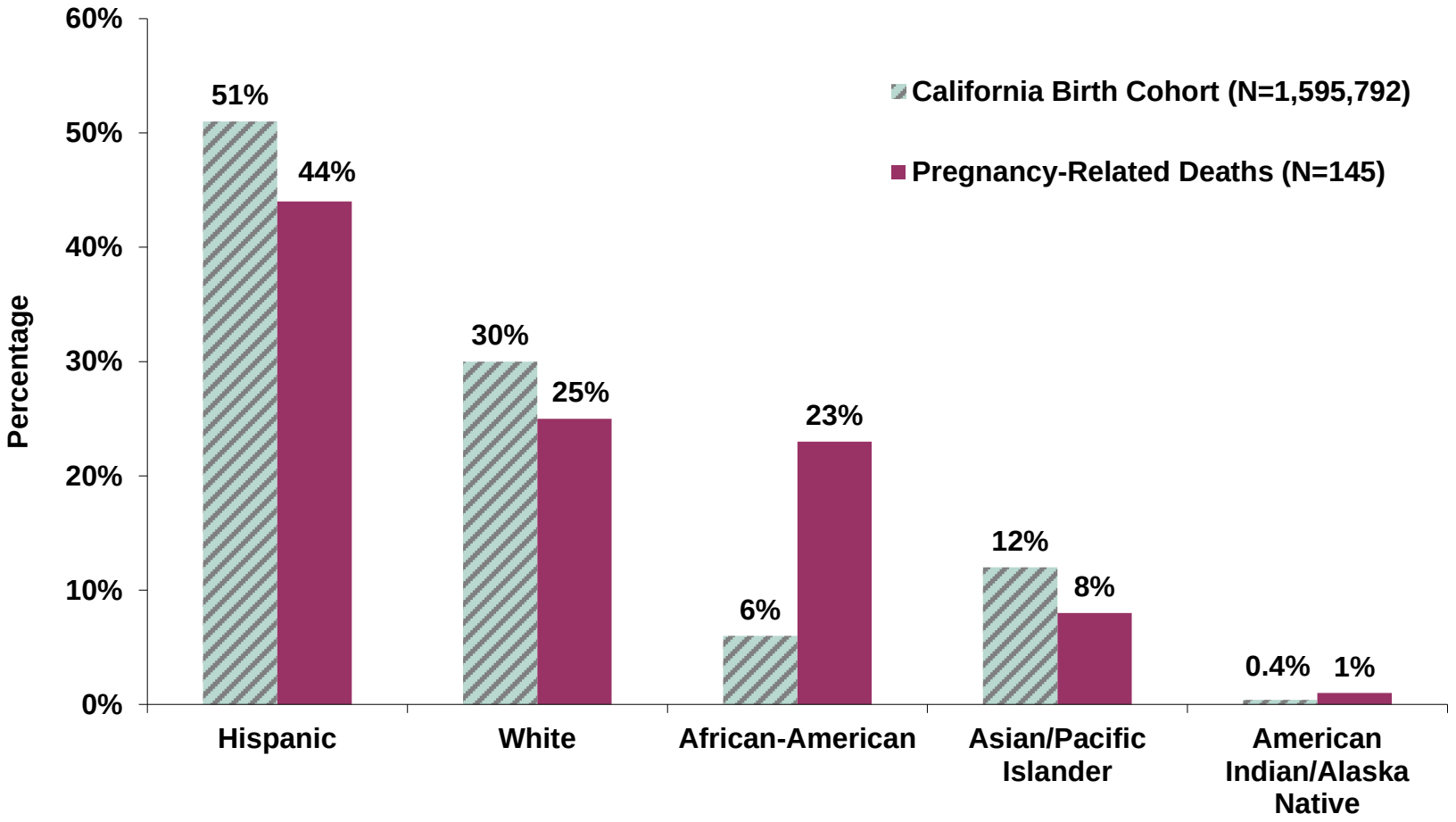


INTERPRETATION: 63% of women with pregnancy-related deaths were obese or overweight pre-pregnancy, compared to 39% of the larger childbearing population (per MIHA*) in California in 2002-2004.

SOURCE: The California Pregnancy-Associated Mortality Review, April 2012. © California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division.

* MIHA is the Maternal Infant Health Assessment weighted survey of recently postpartum California women that is administered by the MCAH Program. More information about MIHA is available at: http://www.cdph.ca.gov/data/surveys/Pages/MaternalandInfantHealthAssessment(MIHA)survey.aspx

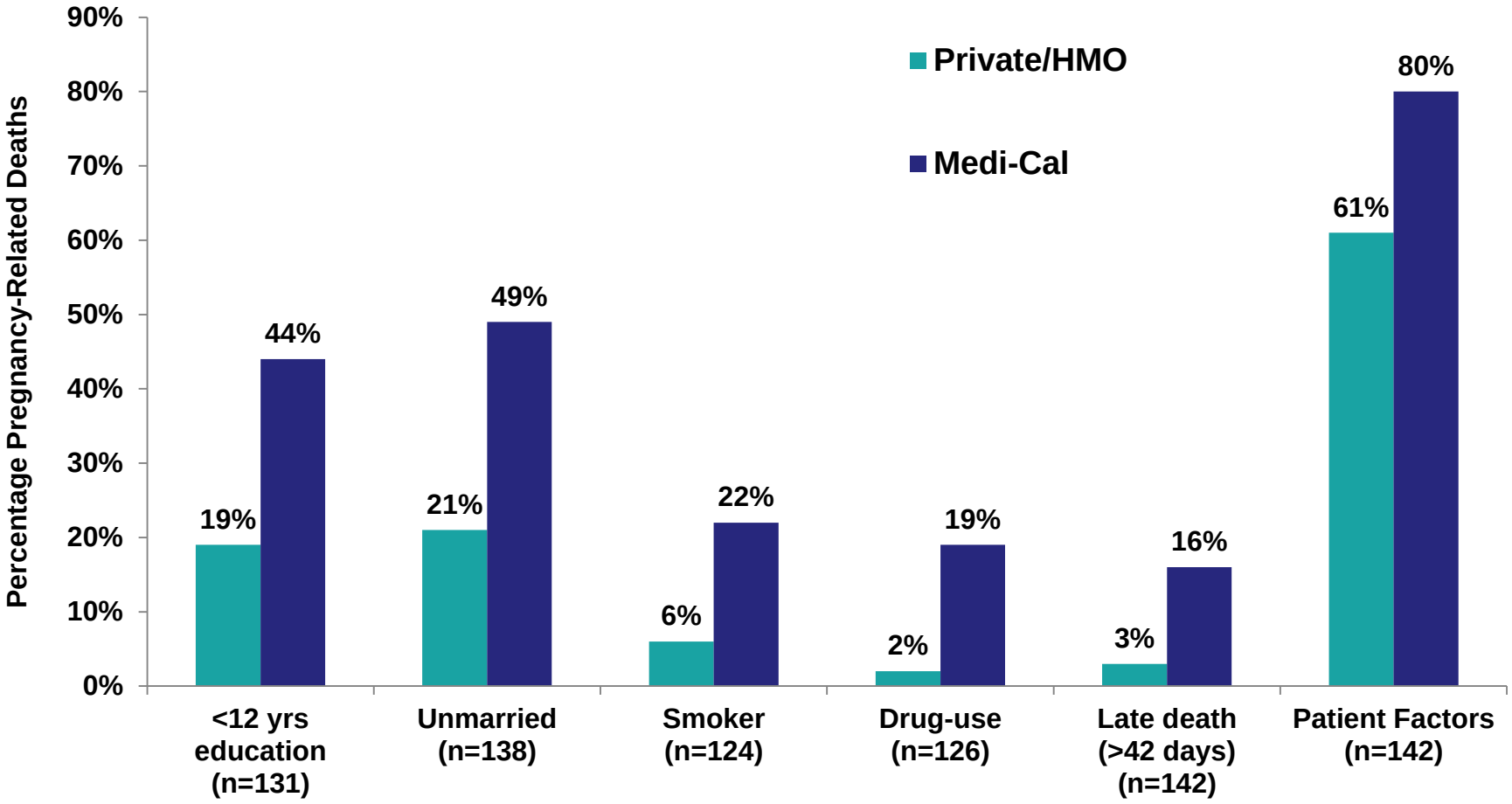
CA-PAMR Pregnancy-Related Deaths and CA Birth Cohort, Race/Ethnicity, 2002-2004



INTERPRETATION: African-American women account for 6% of all California births (and fetal deaths), but constituted 23% of the 2002-2004 pregnancy-related deaths.

SOURCE: The California Pregnancy-Associated Mortality Review, April 2012. © California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division. The California Birth Cohort is derived from vital statistics data comprised of all live births plus fetal deaths (≥20 weeks gestation) in a given year.

CA-PAMR Disparities in Payer Source, 2002-2004



INTERPRETATION: Medi-Cal was the payer source for 46% of women who gave birth in California in 2002-2004, but for 57% of the pregnancy-related deaths (data not shown), indicating that women who died were poorer. Women who died and whose delivery services were paid for by Medi-Cal also had more risk factors, such as lower educational attainment and higher reported substance use.

SOURCE: The California Pregnancy-Associated Mortality Review, April 2012. © California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division.

CA-PAMR Pregnancy-Related Deaths, Chance to Alter Outcome by Grouped Cause of Death; 2002-2004 (N=143)

Clinical Cause of Death	Chance to Alter Outcome (%)			
	Strong/Good	Some	None	Total N (%)
Obstetric hemorrhage	69	25	6	16 (11)
Deep vein thrombosis/ pulmonary embolism	53	40	7	15 (10)
Sepsis/infection	50	40	10	10 (7)
Preeclampsia/eclampsia*	50	50	0	24 (17)
Cardiomyopathy and other cardiovascular causes*	25	61	14	28 (19)
Cerebral vascular accident	22	0	78	9 (6)
Amniotic fluid embolism	0	87	13	15 (10)
All other causes of death	46	46	8	26 (18)
Total (%)	**40**	**48**	**13**	**143***

* Two deaths lacked sufficient records to make determination (one from each cause of death).

INTERPRETATION: The CA-PAMR Committee judged that there was a strong-to-good chance to have altered the fatal outcome in 40% of the pregnancy-related deaths in California in 2002 to 2004. Some pregnancy-related deaths may have had a better chance of being prevented, for example deaths from obstetric hemorrhage, compared to others, such as amniotic fluid embolism.

SOURCE: The California Pregnancy-Associated Mortality Review, April 2012.