THE CALIFORNIA PREGNANCY-ASSOCIATED MORTALITY REVIEW

Report from 2002 to 2007

Maternal Death Reviews

This project was supported by the Federal title V Maternal Child Health block grant funds received from the California Department of Public Health; Center for Family Health; Maternal, Child, and Adolescent Health Division

CDPH California Department of PublicHealth

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CMQCC CALIFORNIA MATERNAL QUALITY CARE COLLABORATIVE

The California Pregnancy-Associated Mortality Review (CA-PAMR)

- Initiated in 2006 in response to rising maternal mortality rates and persistent racial/ethnic disparities
- Goals:
  - Identify pregnancy-related deaths, their causes, risk factors and prevention opportunities
  - Recommend improvements in maternity care, public health programs and surveillance
- Recent report covers in-depth review of maternal deaths from obstetric causes during 2002-2007
- Currently PAMR is
  - Reviewing maternal suicides
  - Planning for future targeted review of obstetric deaths

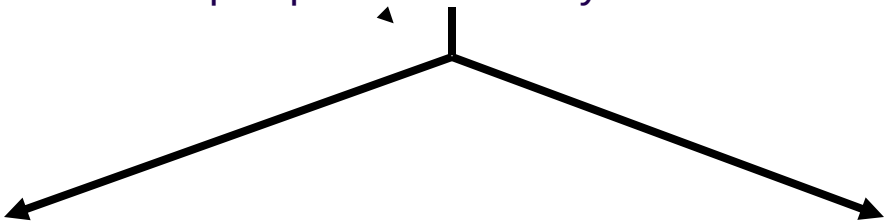
Key Definitions

Maternal Mortality Rate

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

Pregnancy-Associated Deaths

Death of a woman while pregnant or within one year postpartum from any cause



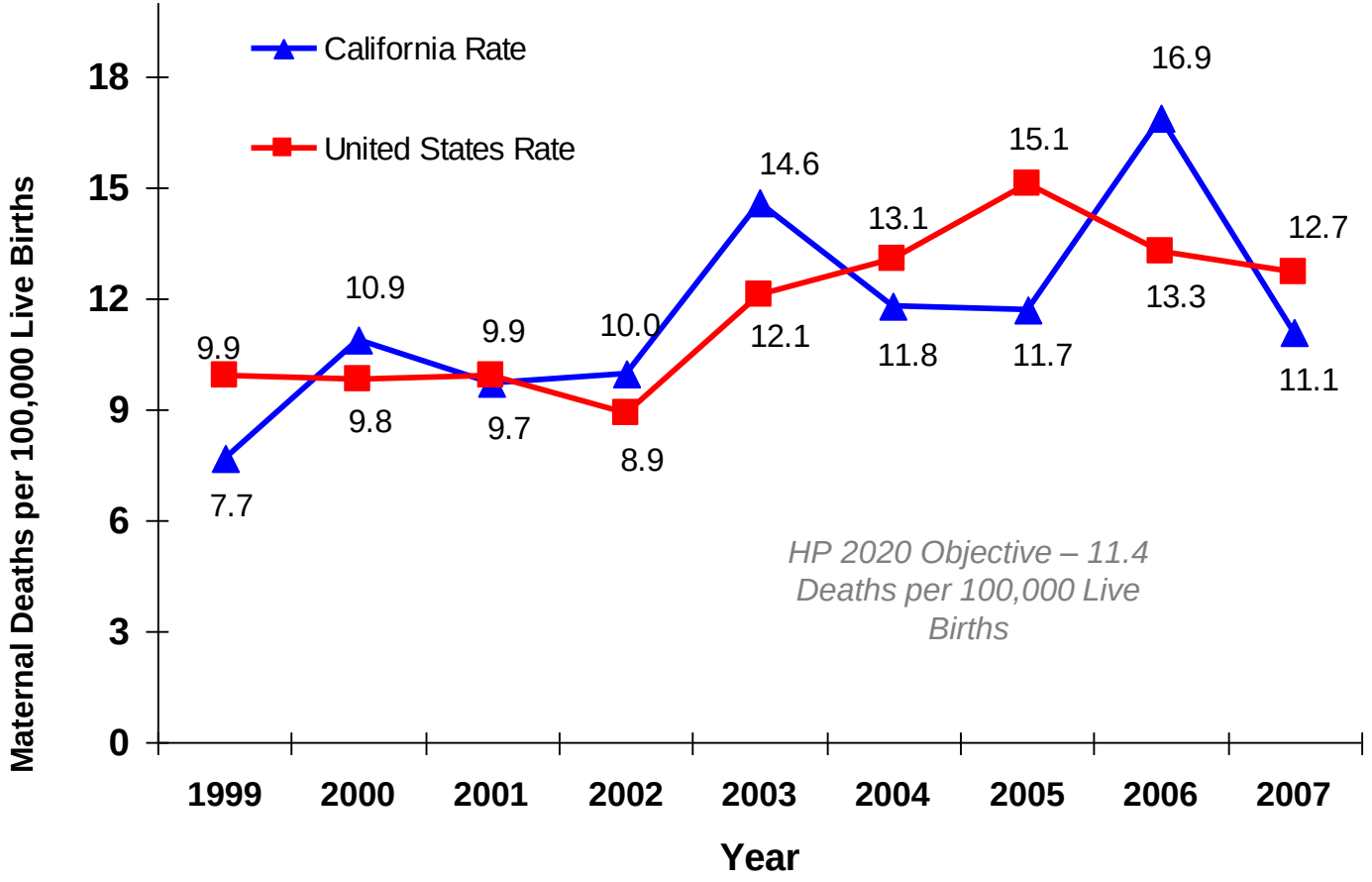
Pregnancy-Related Deaths

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

Not-Pregnancy-Related Deaths

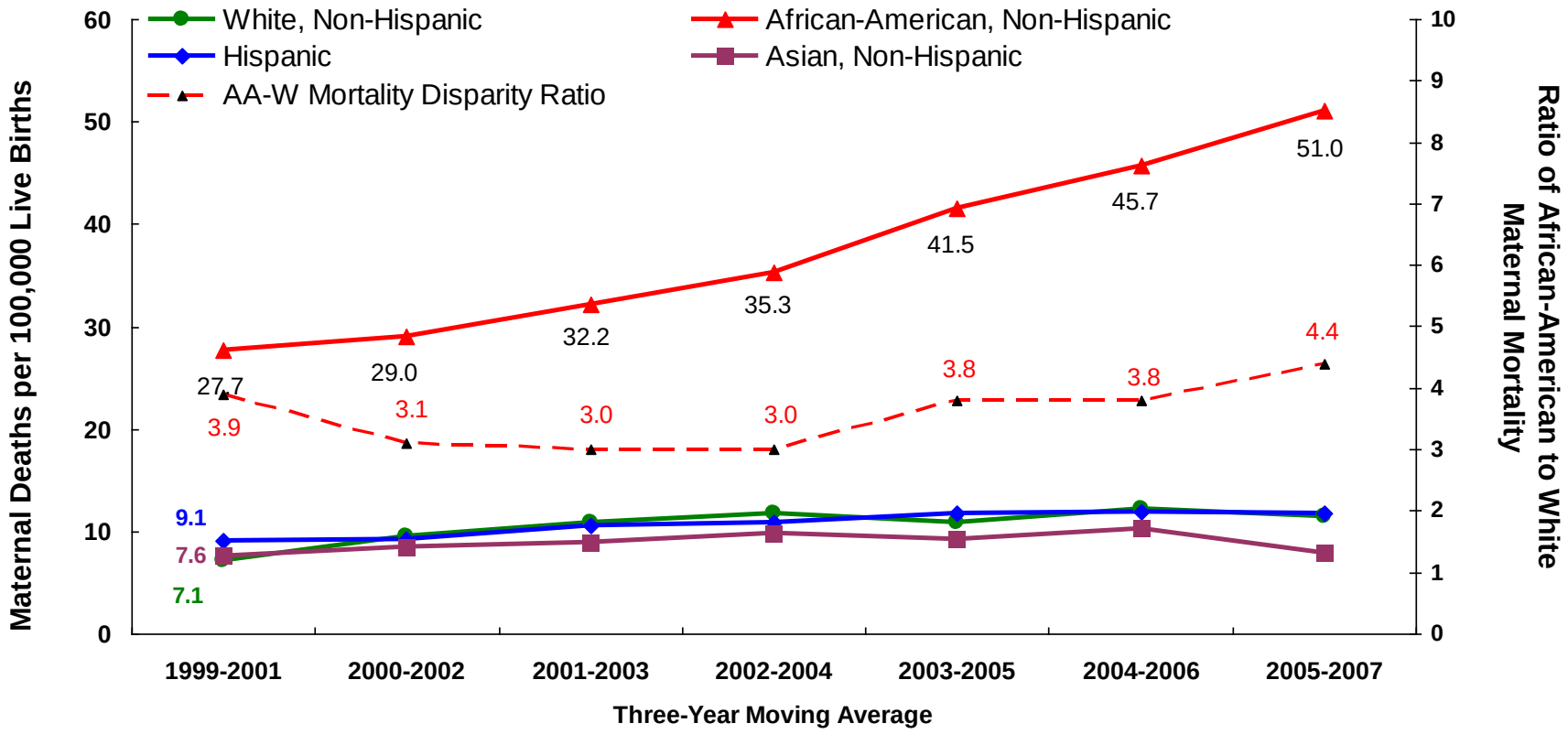
Death of a woman within one year postpartum unrelated to pregnancy or its management

Maternal Mortality Rates, California Residents and the United States; 1999-2007



SOURCE: State of California, Department of Public Health, California Birth and Death Statistical Master Files, 1999-2007. Maternal mortality for California (deaths ≤ 42 days postpartum) was calculated using ICD-10 cause of death classification (codes A34, O00-O95,O98-O99). United States data and HP2020 Objective use the same codes. U.S. maternal mortality data is published by the National Center for Health Statistics (NCHS). Produced by California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division, May, 2015.

Maternal Mortality Rates by Race/Ethnicity, California Residents; 1999-2007



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Why Did Maternal Mortality Rise through 2006?

- Increasing maternal age, obesity, and chronic conditions
  - Within California childbearing population during 2002-2007, maternal age, obesity, and hypertension and diabetes all increased.
  - Among pregnancy-related deaths, rates of diabetes and hypertension were two and four times higher, respectively, than delivering women.
  - The PAMR Committee determined that when diabetes and hypertension were present, they were a contributing factor in 72% and 74% of the deaths.

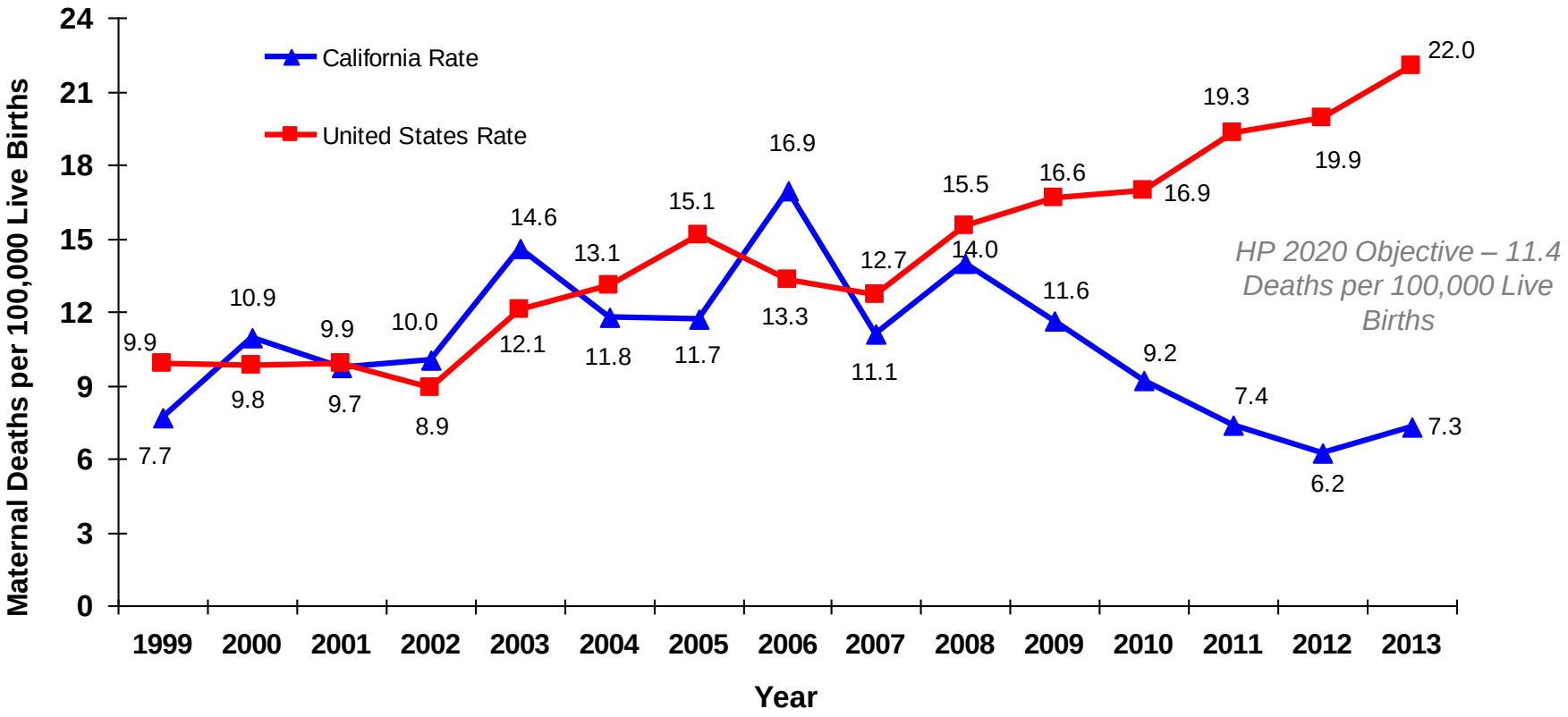
- Factors related to the quality of health care, both inpatient and outpatient, were likely to have been involved
  - Numerous factors were identified as needing improvement.
  - 81% of pregnancy-related deaths had at least one healthcare provider factor identified.
  - 44% had at least one facility issues identified.

Why Did Maternal Mortality Rise through 2006?

- Social factors, (i.e., lower socioeconomic status, low levels of social support or coping skills, chronic exposure to social stressors such as racism), or differential access to health care may have played an important role.
  - CA-PAMR found women who died were more likely to be African-American, lack a partner, have Medi-Cal insurance, less education, and use alcohol, tobacco or illegal drugs during pregnancy.
  - Nearly 10% were homeless or incarcerated while pregnant, and 12% had a mental health diagnosis noted.

- Better data collection may account for increased rates: ICD-10 codes (1999), pregnancy check box added (2003) to the death certificate
  - Better data collection accounted for up to 45% of increased mortality rates in California
  - However, data collection methods can't explain 55% of the increase
  - Deaths before 2003 were likely under-ascertained

Maternal Mortality Rates, California Residents and the United States; 1999-2013



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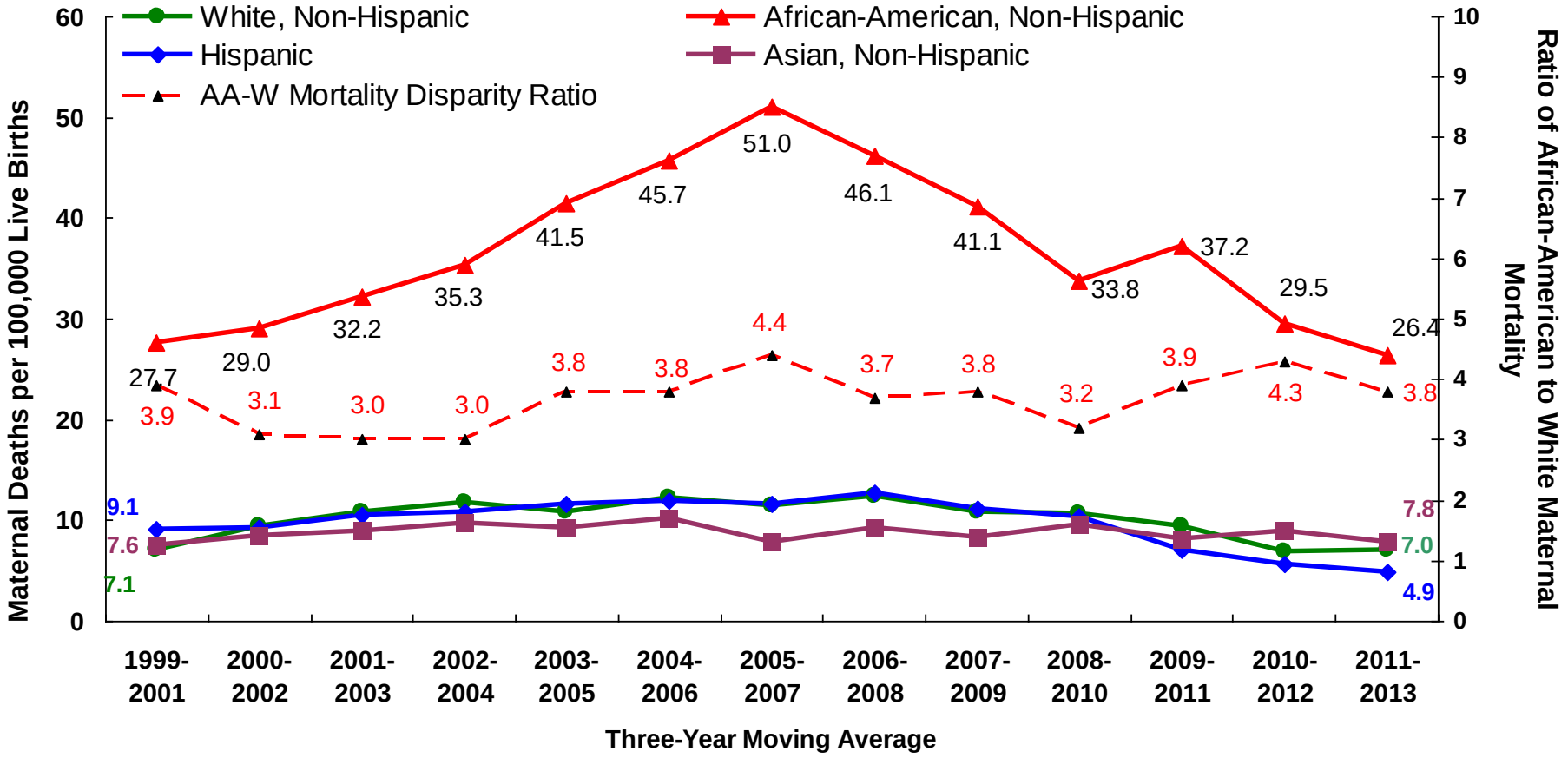
Maternal Mortality Rates by Race/Ethnicity, California Residents; 1999-2013



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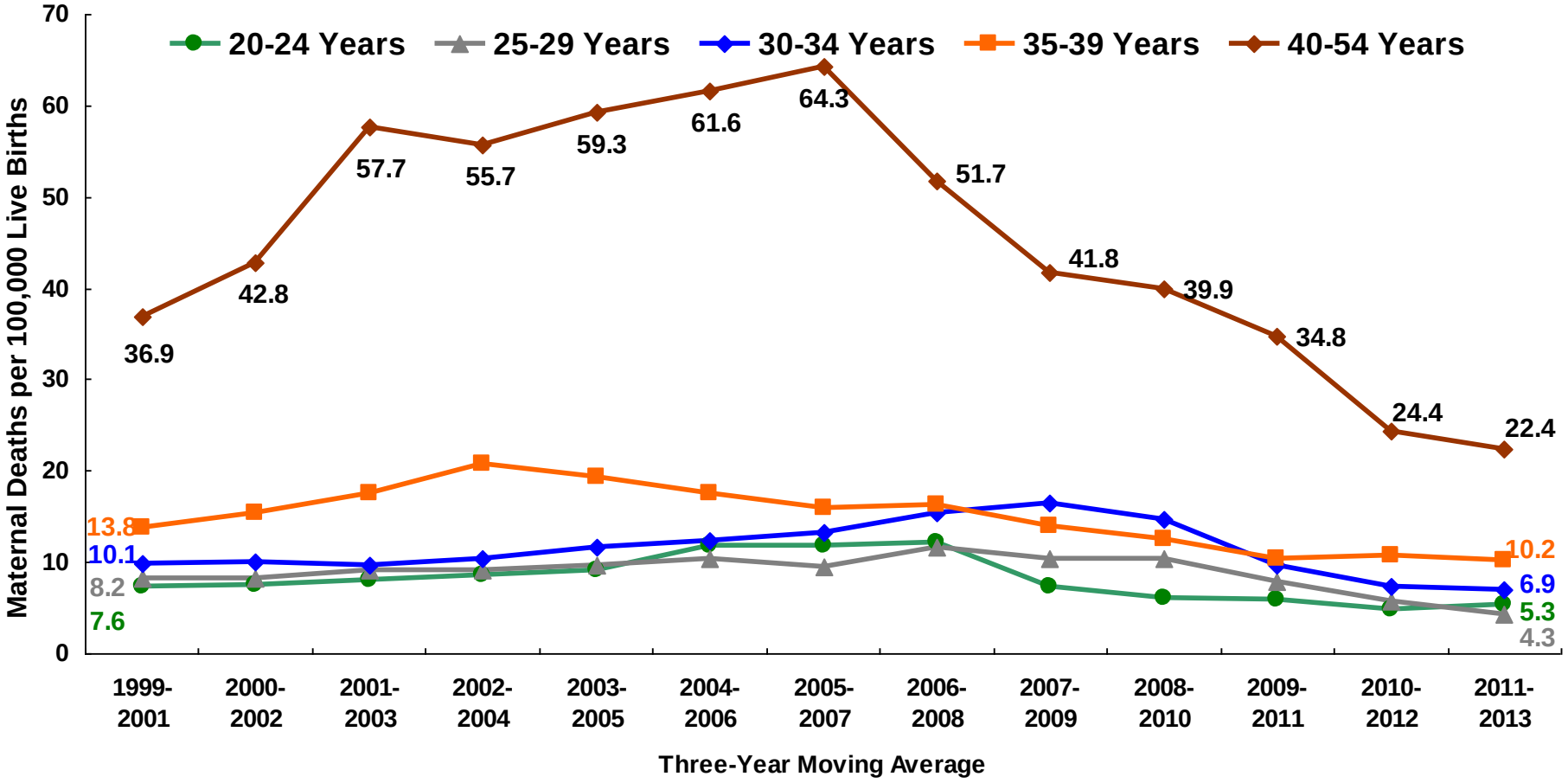
Maternal Mortality Rates by Age Group, California Residents; 1999-2013



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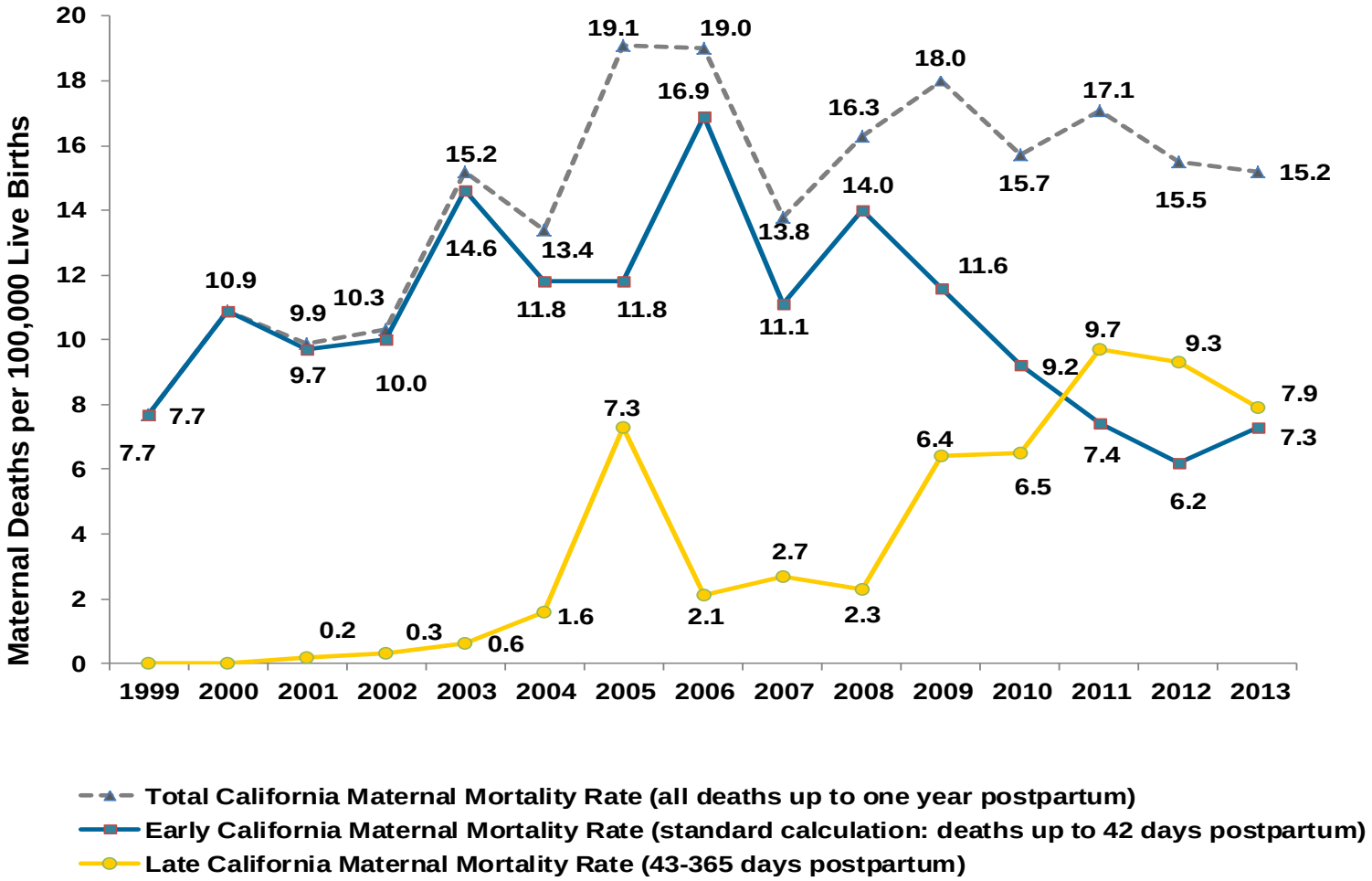
Decline in California Maternal Mortality Rates

- 47% statistically significant decline from 2008 to 2013
  - Sustained when some known reporting errors were accounted for
- California is bucking the trend compared to nation and other states, where rates are still on the rise
- Decline likely reflects the collective impact of many activities
  - CDPH investment in maternal health programs, including PAMR
  - Strong engagement of California maternity care providers by CMQCC and other health and medical organizations
  - California Toolkits and hospital learning collaboratives improve care
  - Heightened attention and activity by:
    - Federal public health partners: CDC Division of Reproductive Health, HRSA Maternal and Child Health Bureau
    - Medical professional organizations: ACOG, The Joint Commission, SMFM, AWHONN

Maternal Mortality Rates (<42 days, 43-365 days, total) California Residents; 1999-2013



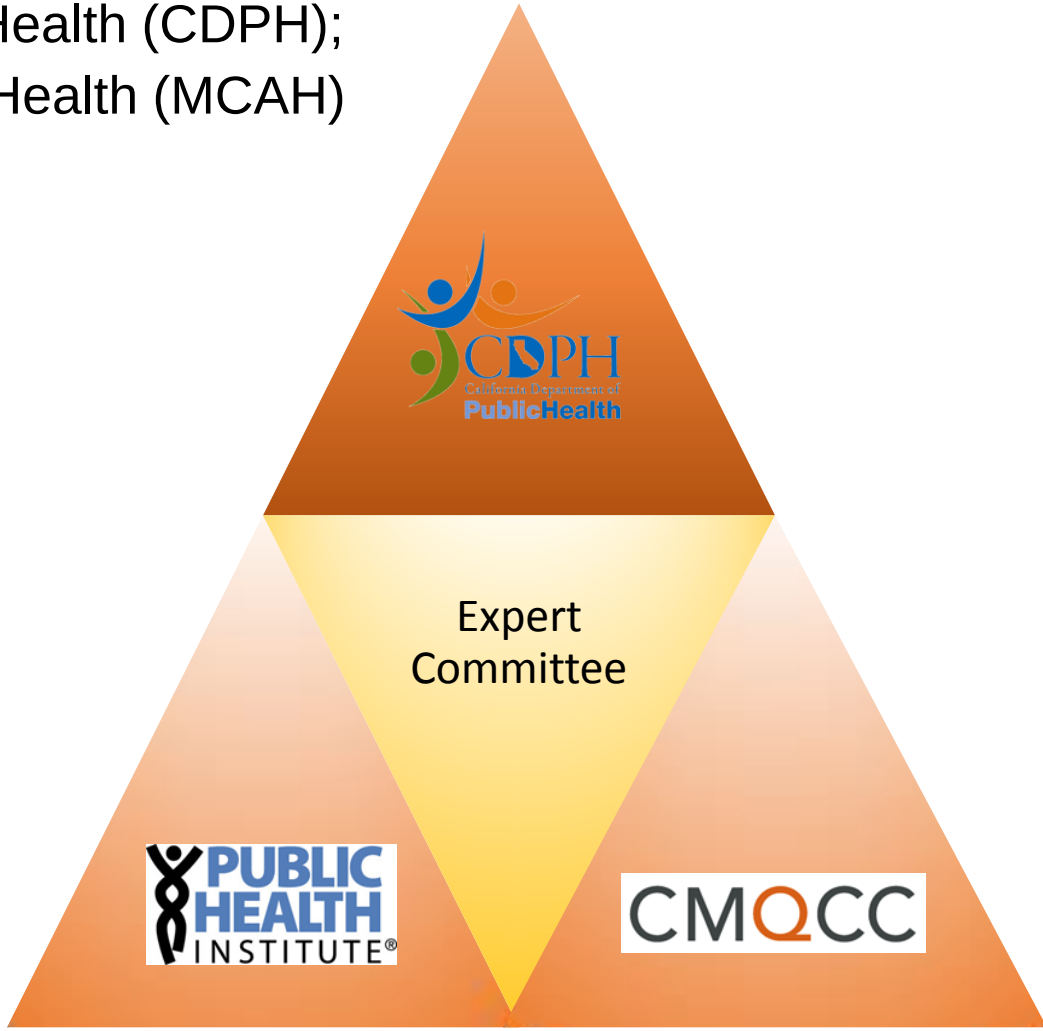
SOURCE: State of California, Department of Public Health, California Birth and Death Statistical Master Files, 1999-2013. Maternal mortality for California 'early' mortality rate (deaths ≤ 42 days postpartum) was calculated using ICD-10 cause of death classification (codes A34, O00-O95,O98-O99). 'Late' mortality rate (43-365 days postpartum) was calculated with ICD-10 code O96. The total rate is the combination of all ICD-10 codes listed. Produced by California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division, May, 2016.

Decline in California Maternal Mortality Rates

- Overall, when both early (<42 days postpartum) and late (43-365 days postpartum) maternal deaths are included, the combined mortality rate (0-365 days postpartum) during 2008 and 2013 decreased by 20% (p=NS).
- The rise in ‘late’ deaths (43-365 days postpartum) is concerning and needs to be better understood.
- This may reflect:
  - Better care at the time of labor and delivery and improved response to obstetric emergencies
  - More late postpartum deaths among older women, or women with chronic disease
  - Decreased access to health care or a change in the quality of care among women whose Medi-Cal benefits for pregnancy end after 60 days postpartum.

CA-PAMR Project Team

- California Department of Public Health (CDPH); Maternal, Child and Adolescent Health (MCAH)
  - Project home, funder
  - Public health authority
  - Vital records, epidemiology
- Public Health Institute (PHI)
  - Medical records
  - Data management and analysis
- California Maternity Quality Care Collaborative (CMQCC)
  - Quality improvement
  - Committee support
  - Engage maternity care providers
- Multidisciplinary Expert Review Committee



CA-PAMR Committee

Current Members

Elliott Main, MD, Chair

Deirdre Anglin, MD, MPH
Conrad Chao, MD
Maurice Druzin, MD
Michael Fassett, MD
Elyse Foster, MD
Kristi Gabel, RNC, MSN, CNS
Dodi Gauthier, MEd, RNC
Kimberly Gregory, MD, MPH
Afshan Hameed, MD, FACOG, FACC
Thomas Kelly, MD
Nathana Lurvey, MD
Natalie Martina, BSN, MSN, CNM
Barbara Murphy, MSN, RN
Larry Newman, MD, FACOG
Ed Riley, MD
Marla Marek Seacrist, PhD RNC
Larry Shields, MD
Lucy Van Otterloo, PhD, RN, CNS

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

Labor and delivery, prenatal, hospitalization, transport, outpatient and emergency department records are obtained and summarized

↓

STEP 5: Cases reviewed by CA-PAMR Committee

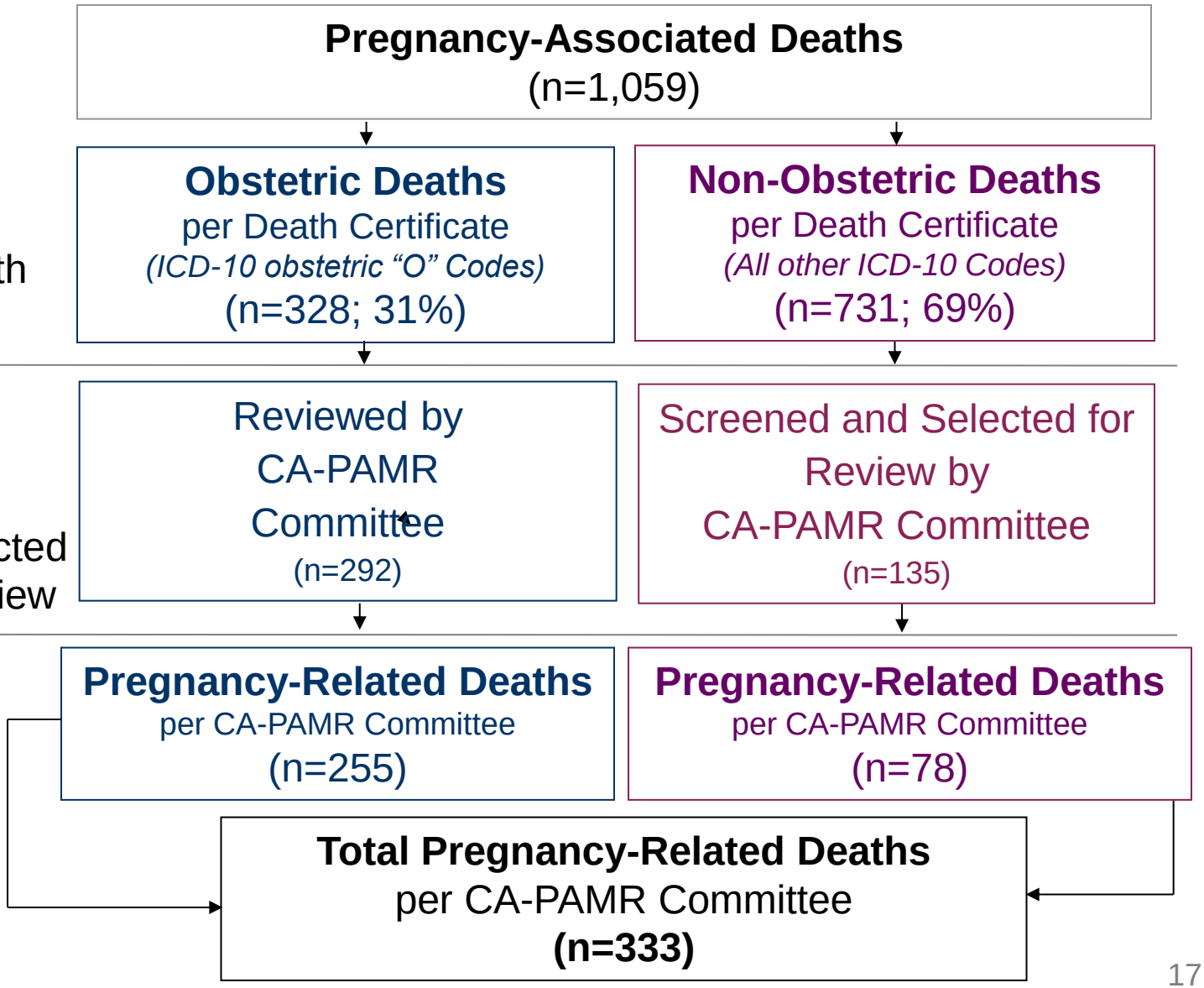
Committee determines whether the death was pregnancy-related, the cause of death, contributing factors and quality improvement opportunities

Case Ascertainment of Pregnancy-Related Deaths from Enhanced Surveillance and Case Review; 2002-2007

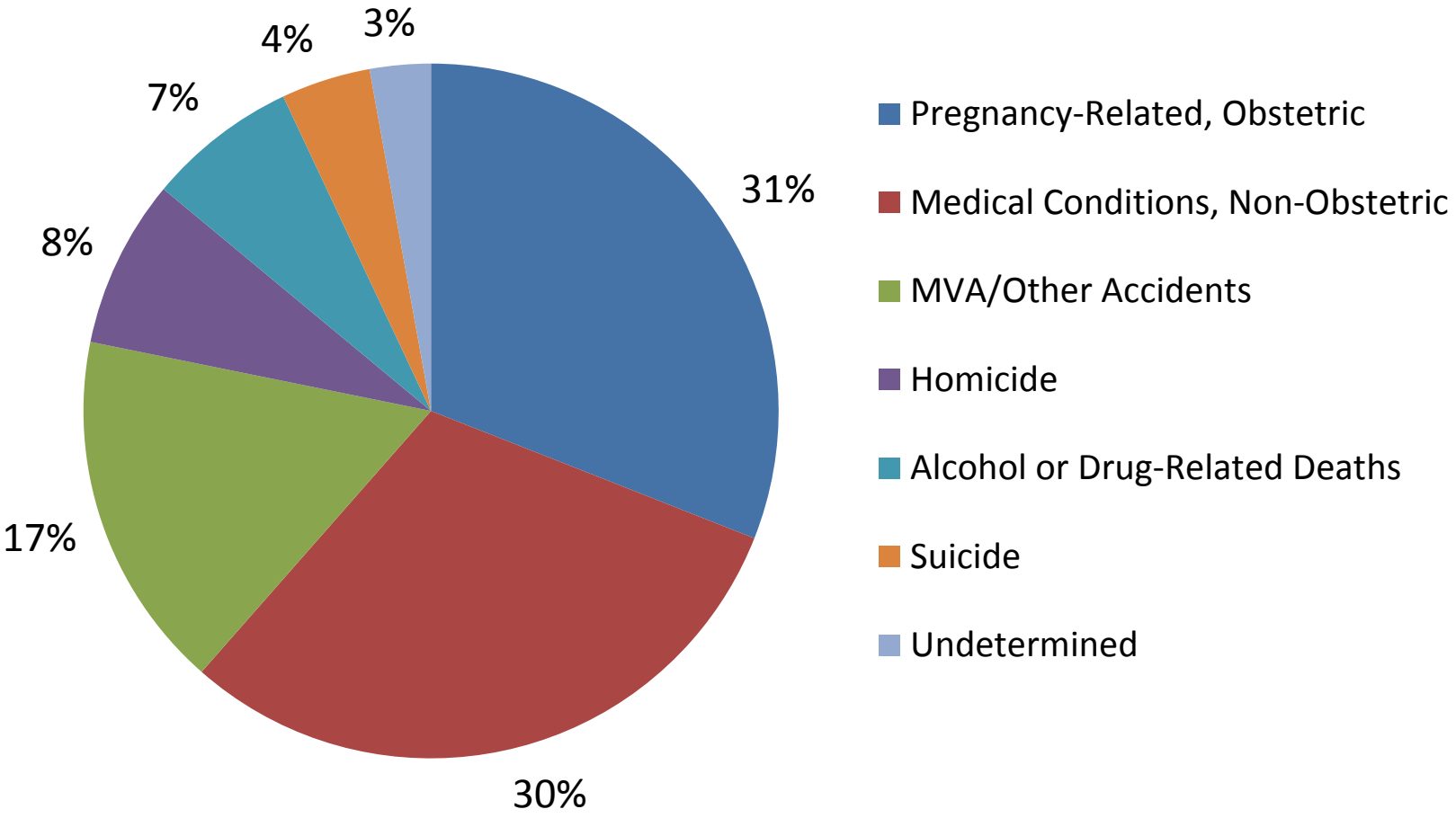
Steps 1 and 2: 1,059 Pregnancy-associated deaths identified, per Death Certificate

Steps 3 and 4: 427 Pregnancy-associated deaths screened and selected for expert case review

Step 5: 333 Pregnancy-related deaths identified, per CA-PAMR Committee



Causes of Pregnancy-Associated Deaths, from the Death Certificate*, California Residents, 2002-2007 (N=1,059)



*prior to case review

Source: *The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews.* Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2018

Leading Causes of Pregnancy-Associated Death based on California Death Certificates, 2002-2007 (N=1,059) *(Before CA-PAMR review)*

Obstetric Codes	(n=328)	Non-Obstetric Codes	(n=731)
• Preeclampsia/eclampsia	(12.5%)	• Motor vehicle / Other accidents	(25%)
• Hemorrhage	(9%)	• Other medical conditions	(20%)
• Amniotic fluid embolism	(6%)	• Cancer or its complications	(13%)
• Cardiovascular disease	(5%)	• Homicides	(11%)
• Sepsis/infection	(1.5%)	• Cardiovascular disease	(10%)
• Other unspecified complications of labor, delivery and pregnancy	(66%)	• Alcohol and other drugs	(10%)
		• Suicides	(6%)
		• Undetermined / Other	(5%)

Source: *The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews.* Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2018

CA-PAMR Expert Case Review

- **In-depth, multidisciplinary, expert medical record review to:**
  - Classify death as pregnancy-related or not
  - Determine cause of death and degree of preventability
  - Determine risk level at time of prenatal care and at labor and delivery
  - Assess patient, facility and health care provider factors contributing to death
  - Identify opportunities for quality improvements in maternity care

Clinical Causes of Pregnancy-Related Deaths, per CA-PAMR Committee 2002-2007 (N=333)

Clinical Cause of Pregnancy-Related Deaths	N (%)
Cardiovascular disease	87 (26)
Cardiomyopathy	*51 (15)*
Other cardiovascular	*36 (11)*
Preeclampsia/eclampsia	54 (16)
Obstetric hemorrhage	33 (10)
Venous thromboembolism	29 (9)
Sepsis	27 (8)
Cerebrovascular accident	26 (8)
Amniotic fluid embolism	24 (7)
Anesthesia complications	6 (2)
Cancer *(diagnosis or treatment delayed by pregnancy)*	5 (1.5)
Acute fatty liver	4 (1)
Drug abuse complications	4 (1)
All Other Causes	34 (10)
TOTAL	**333**

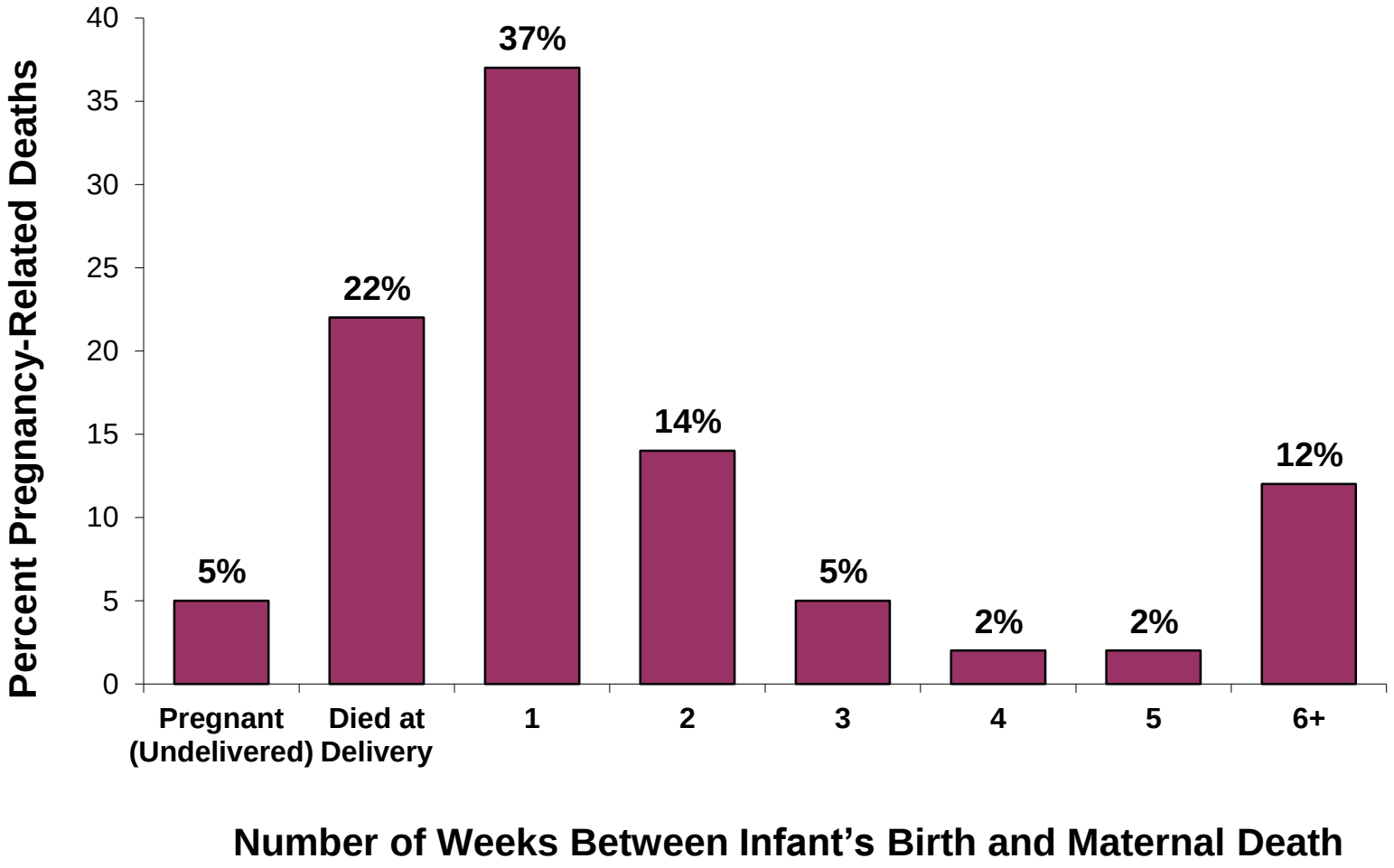
Source: *The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews.* Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2018

Misclassification of the CA-PAMR Pregnancy-Related Top Causes of Death, 2002-2007 (N=333)

Cause of Death after CA-PAMR Review	Total Pregnancy-Related Deaths N (%)	Original ICD-10 Code on Death Certificate	
		ICD-10 Obstetric "O" Codes N (%)	ICD-10 Obstetric Non-"O" Codes N (%)
Cardiovascular Disease	87 (26%)	53 (21%)	34 (44%)
Cardiomyopathy	*51 (15%)*	*25 (10%)*	*26 (33%)*
Other cardiovascular	*36 (11%)*	*28 (11%)*	*8 (10%)*
Preeclampsia/eclampsia	54 (16%)	48 (19%)	6 (8%)
Obstetric hemorrhage	33 (10%)	33 (13%)	0
Venous thromboembolism	29 (9%)	22 (9%)	7 (9%)
Sepsis	27 (8%)	25 (10%)	2 (3%)
Cerebrovascular accident	26 (8%)	15 (6%)	11 (14%)
Other	77 (23%)	59 (23%)	18 (23%)
TOTAL	333	255	78

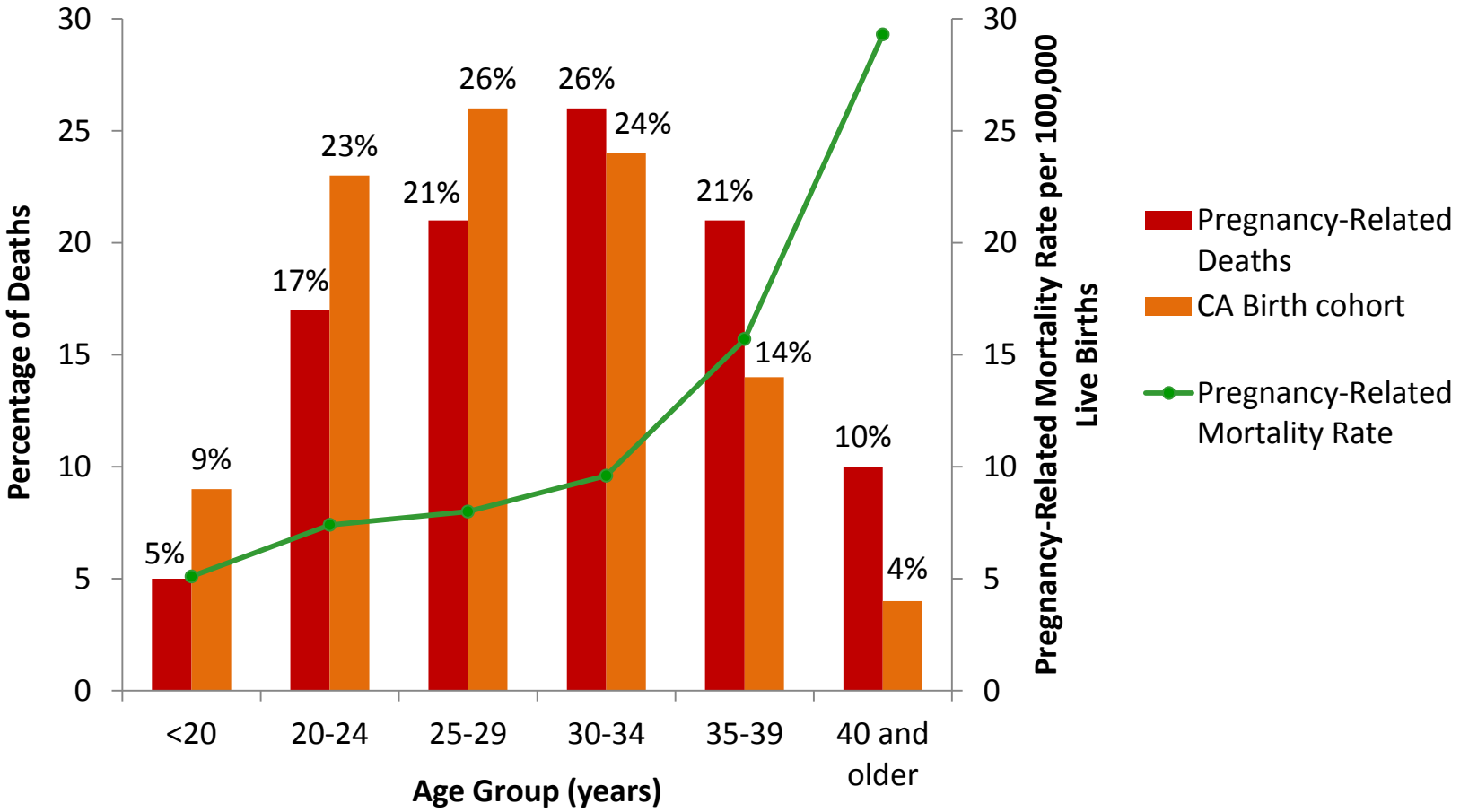
Source: *The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews.* Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2018

CA-PAMR Pregnancy-Related Deaths, Timing of Deaths 2002-2007 (N=333)



Source: *The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews.* Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2018

Age Distribution among California Birth Cohort and Pregnancy-Related Deaths, California; 2002-2007



Source: *The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews.* Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2018

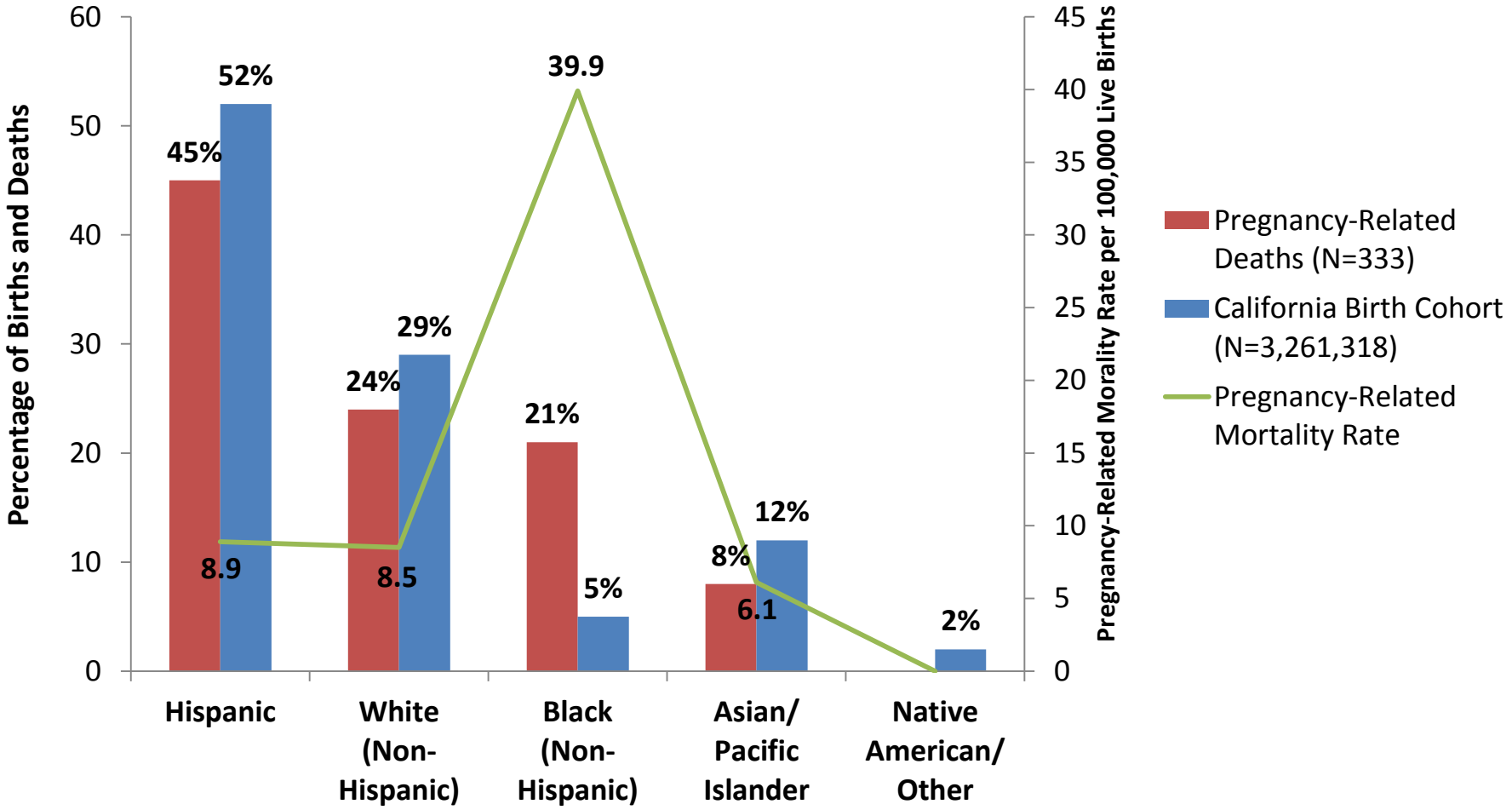
Pregnancy-Related Deaths and California Birth Cohort, Selected Demographic Characteristics, California; 2002-2007

	Pregnancy- Related Deaths (N=333) N (%)	CA Birth Cohort (N=3,310,485) N (%)
Payer Source		
Medi-Cal / other government	193 (58)*	1,564,874 (47)
Private HMO/PPO	124 (37)	1,622,765 (49)
Other/Unknown/Uninsured	16 (5)	122,846 (4)
Education		
Less than high school	94 (28)*	345,929 (10)
High school/12th grade	106 (32)*	1,465,010 (44)
Some secondary	113 (34)*	1,407,259 (43)
Unknown	20 (6)*	92,287 (3)

*p<.05

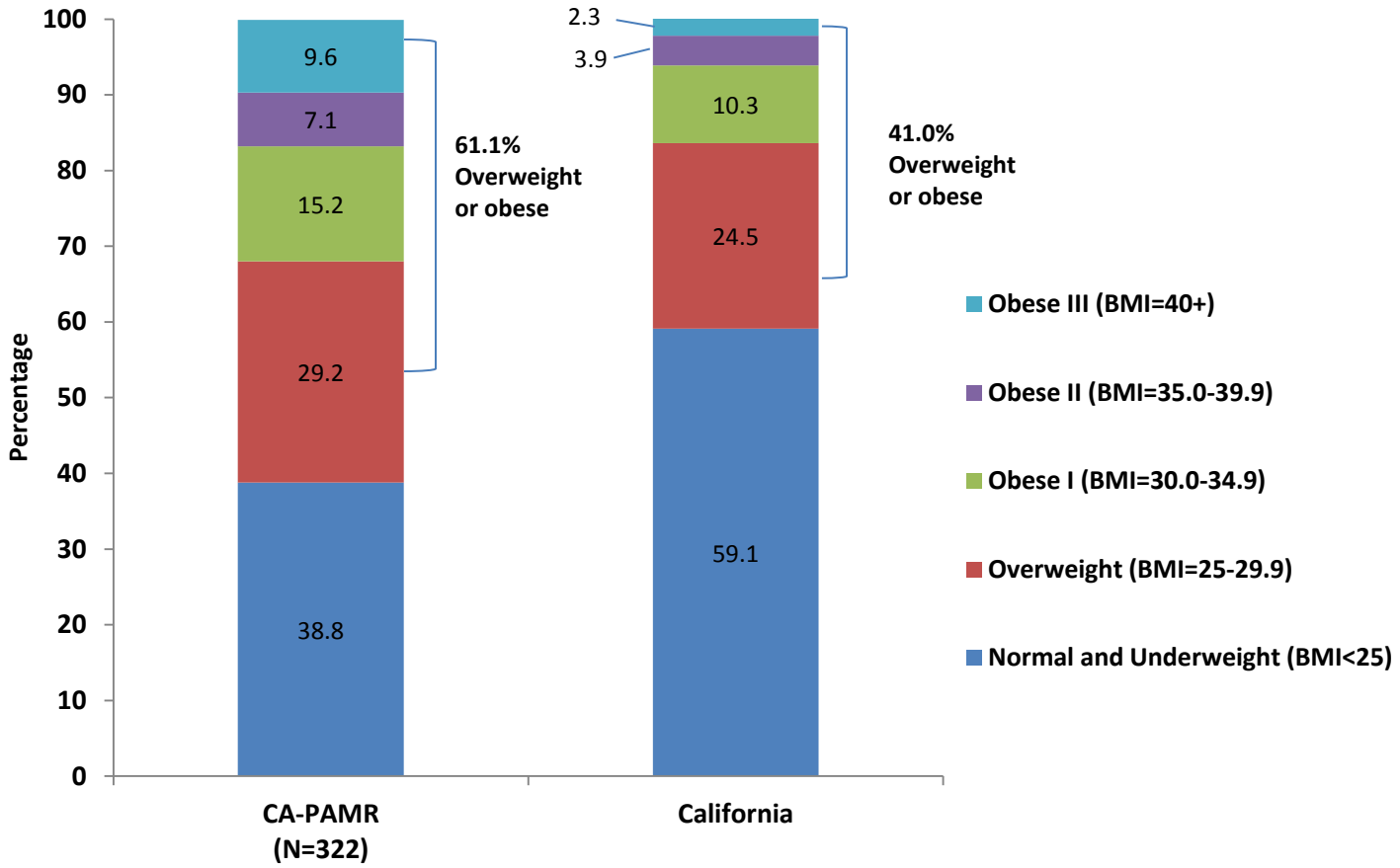
Source: *The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews.* Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2018

Racial/Ethnic Distribution of Pregnancy-Related Deaths, CA-PAMR and California Birth Cohort, 2002-2007



Source: *The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews.* Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2018

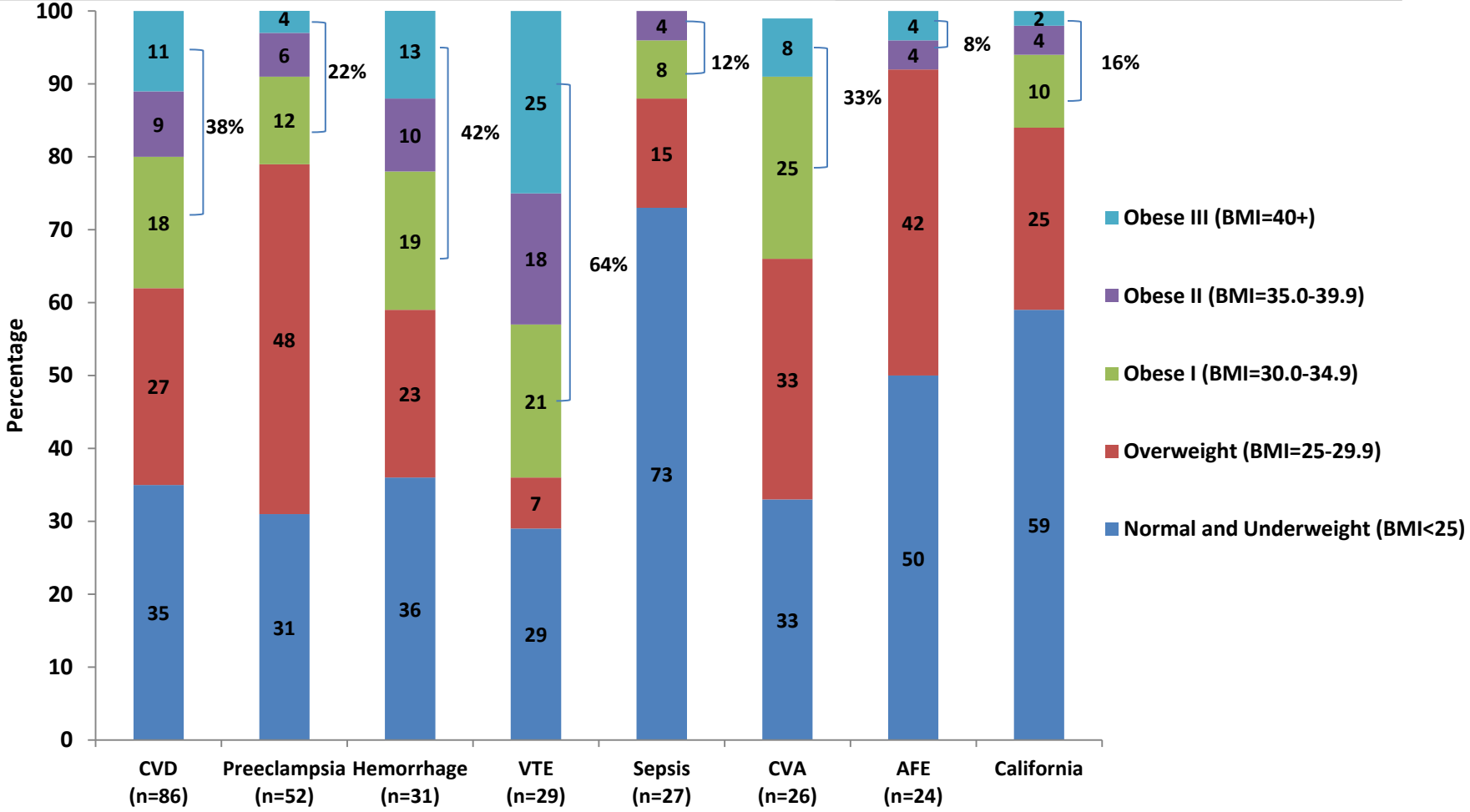
Maternal Pre-Pregnancy BMI Status of CA-PAMR Pregnancy-Related Deaths and California Births; 2002-2007



Source: *The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews.* Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2018

- CA-PAMR Pregnancy-Related: Weight and height data were obtained from prenatal records, hospital labor and delivery records or outpatient visits. If pre-pregnancy weight was not recorded, the weight from the first prenatal visit up to 10 weeks gestation was used. Women with no BMI data available were excluded from this analysis.
- MIHA: California Maternal Infant Health Assessment (MIHA), a statewide, representative survey of postpartum women who gave birth in California in 2002-2007. MIHA is akin to the CDC's Pregnancy Risk Assessment Monitoring System.

Maternal Pre-Pregnancy BMI Status CA-PAMR Pregnancy-Related Deaths and California Births; 2002-2007



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- CA-PAMR Pregnancy-related deaths: Weight and height data were obtained from prenatal records, hospital labor and delivery records or outpatient visits. If pre-pregnancy weight was not recorded, the weight from the first prenatal visit up to 10 weeks gestation was used. Women with no BMI data available were excluded from this analysis.
- California: California Maternal Infant Health Assessment (MIHA), a statewide, representative survey of postpartum women who gave birth in California in 2002-2007. MIHA is akin to the CDC's Pregnancy Risk Assessment Monitoring System.

CA-PAMR Pregnancy-Related Deaths, Level of Risk at Entry to Prenatal and Intrapartum Care; 2002-2007

	Low-Risk	Not-Low-Risk Top Reasons (not mutually exclusive)
Risk Level at Entry to **Prenatal Care**	78 (24%)	247 (76%) ▸ Obesity ▸ Significant medical condition ▸ Prior high-risk obstetric history ▸ Hypertension ▸ Age ≥ 40 years ▸ Grand multiparity (5 or more prior births)
Risk Level at Entry to **Intrapartum Care**	27 (9%)	284 (91%) ▸ Hypertension/preeclampsia ▸ Other reason, unspecified ▸ Significant medical condition ▸ Heart disease ▸ Prenatal risks above that would not change (obesity, age, parity, prior high-risk obstetric history)

Source: *The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews.* Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2018

Pregnancy-Related Mortality Rates by Race/Ethnicity among Leading Four Causes of Death, CA-PAMR, 2002-2007

	Cardiovascular Disease		Preeclampsia / Eclampsia		Obstetric Hemorrhage		Venous Thromboembolism	
Race / Ethnicity	**N**	**Rate (95% CI)**	**N**	**Rate (95% CI)**	**N**	**Rate (95% CI)**	**N**	**Rate (95% CI)**
Hispanic	**30**	1.8 (1.1, 2.4)	**33**	2.0 (1.3, 2.6)	**20**	1.2 (0.7, 1.7)	**14**	0.8 (0.4, 1.3)
Foreign-Born	**15**	1.4 (0.7, 2.1)	**24**	2.3 (1.4, 3.2)	**11**	1.0 (0.4, 1.7)	**6**	0.6 (0.1, 1.1)
U.S.-Born	**15**	2.4 (1.2, 3.5)	**9**	1.4 (0.5, 2.3)	**9**	1.4 (0.5, 2.3)	**8**	1.3 (0.4, 2.1)
White	**22**	2.3 (1.3,3.3)	**13**	1.4 (0.6, 2.1)	**7**	0.7 (0.2, 1.3)	**7**	0.7 (0.2, 1.3)
African-American	**31**	17.4* (11.3, 23.6)	**6**	3.4 (0.7, 6.1)	**4**	--	**7**	3.9 (1.0, 6.9)
Other	**4**	--	**2**	--	**2**	--	**1**	--
Total N / Rate	**87**	2.6 (2.1, 3.2)	**54**	1.6 (1.2, 2.1)	**33**	1.0 (0.7, 1.3)	**29**	0.9 (0.6, 1.2)

*p<.05

Source: *The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews.* Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2018

Mode of Delivery among Pregnancy-Related Deaths, CA-PAMR, 2002-2007

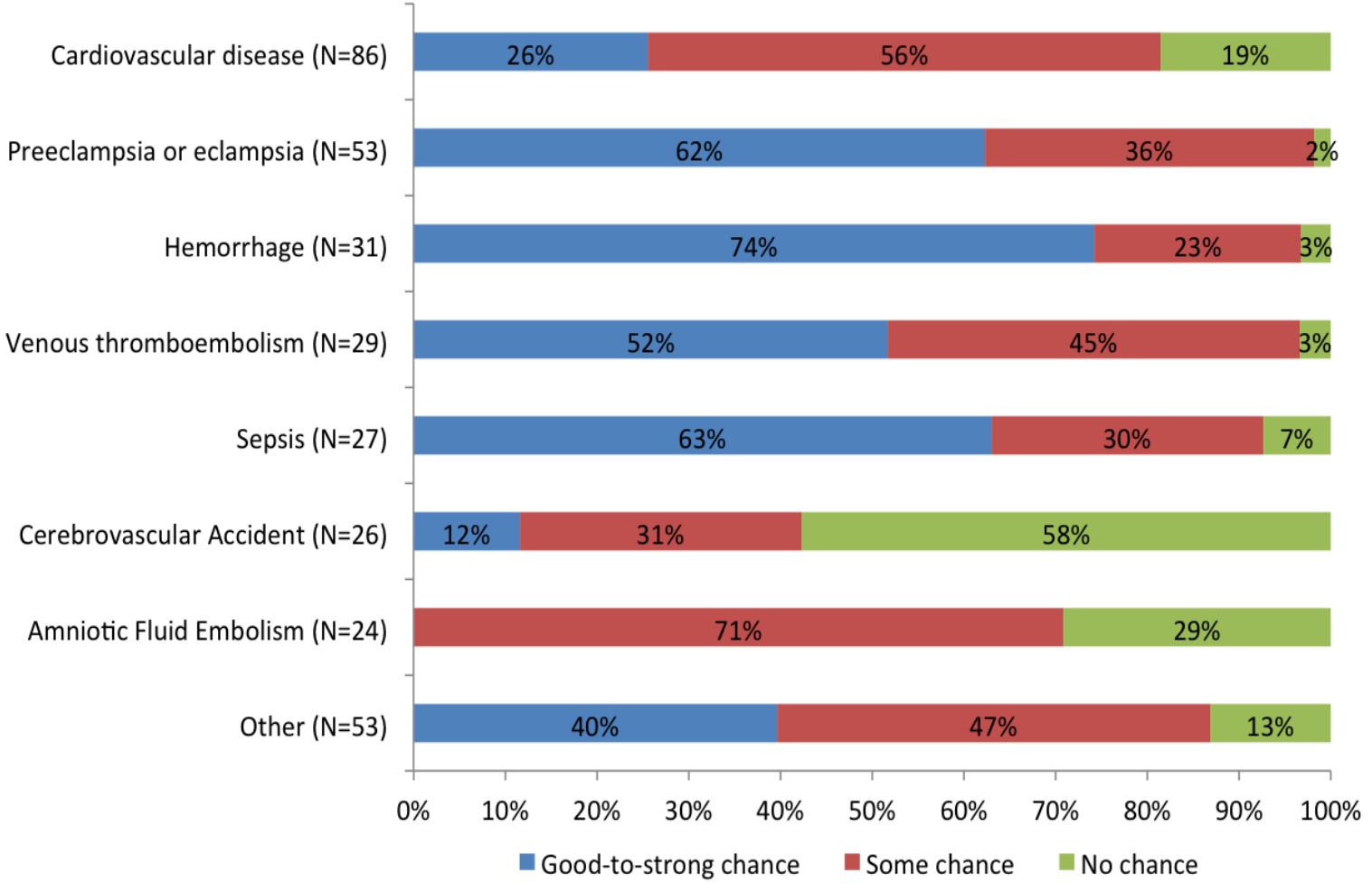
Deaths Before Delivery **18**

Total Delivered **315**

Cesarean Type	Unplanned in Labor	Planned or Scheduled	Crash or Emergent	Perimortem/ Undergoing CPR	Total
Primary	51	5	46	30	132
Repeat	20	24	22	6	72
Total	**71**	**29**	**68**	**36**	**204**
Vaginal Type	**Spontaneous**	**Assisted** (forceps/ vacuum)	**Vaginal Birth after Cesarean (VBAC)**		
Total	**93**	**15**	**3**		**111**

Source: *The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews.* Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2018

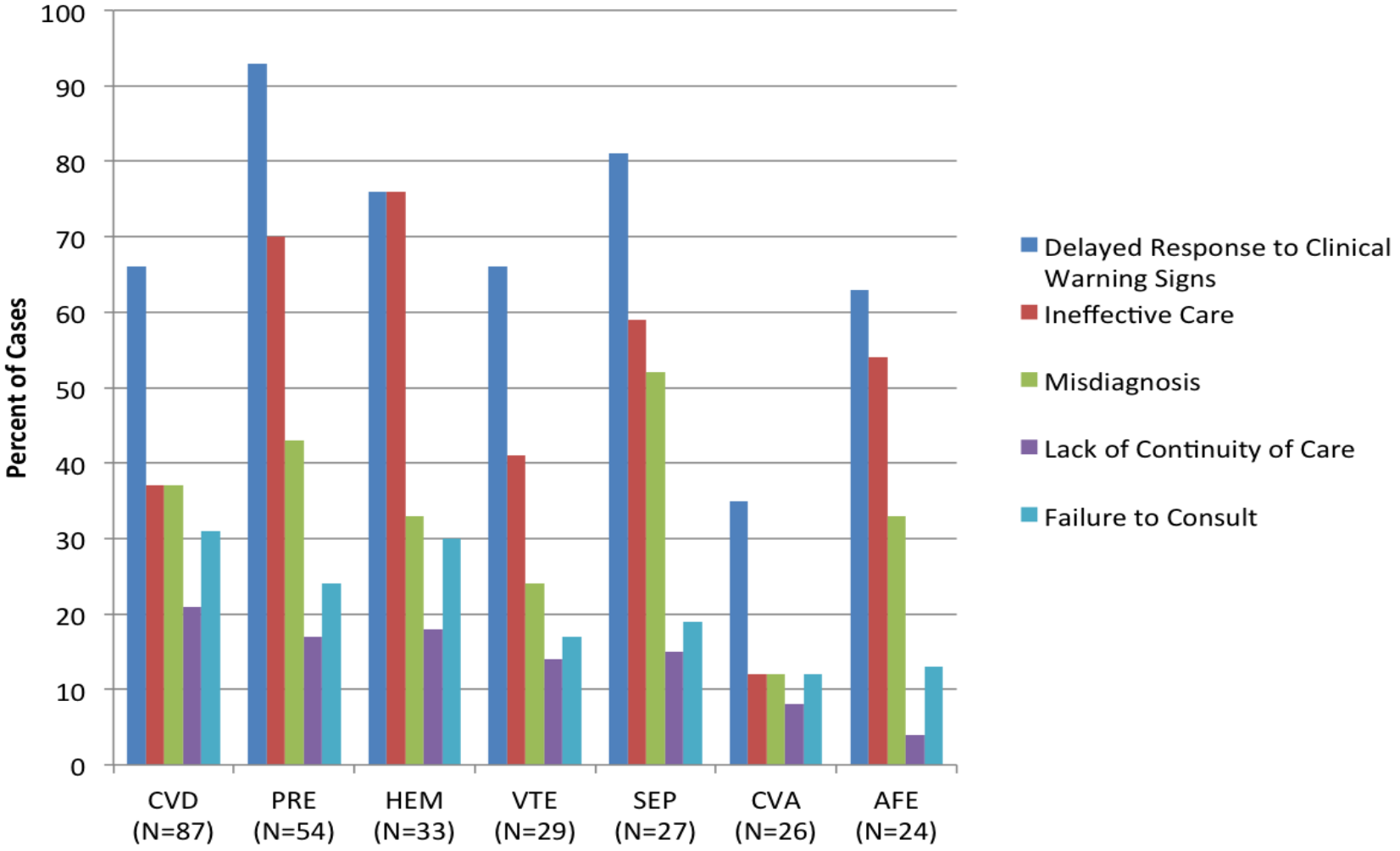
CA-PAMR Pregnancy-Related Deaths, Chance to Alter Outcome by Cause of Death; 2002-2007 (N=329)



Note: The CA-PAMR committee was unable to determine the preventability in two hemorrhage deaths, one cardiovascular and one preeclampsia/eclampsia death.

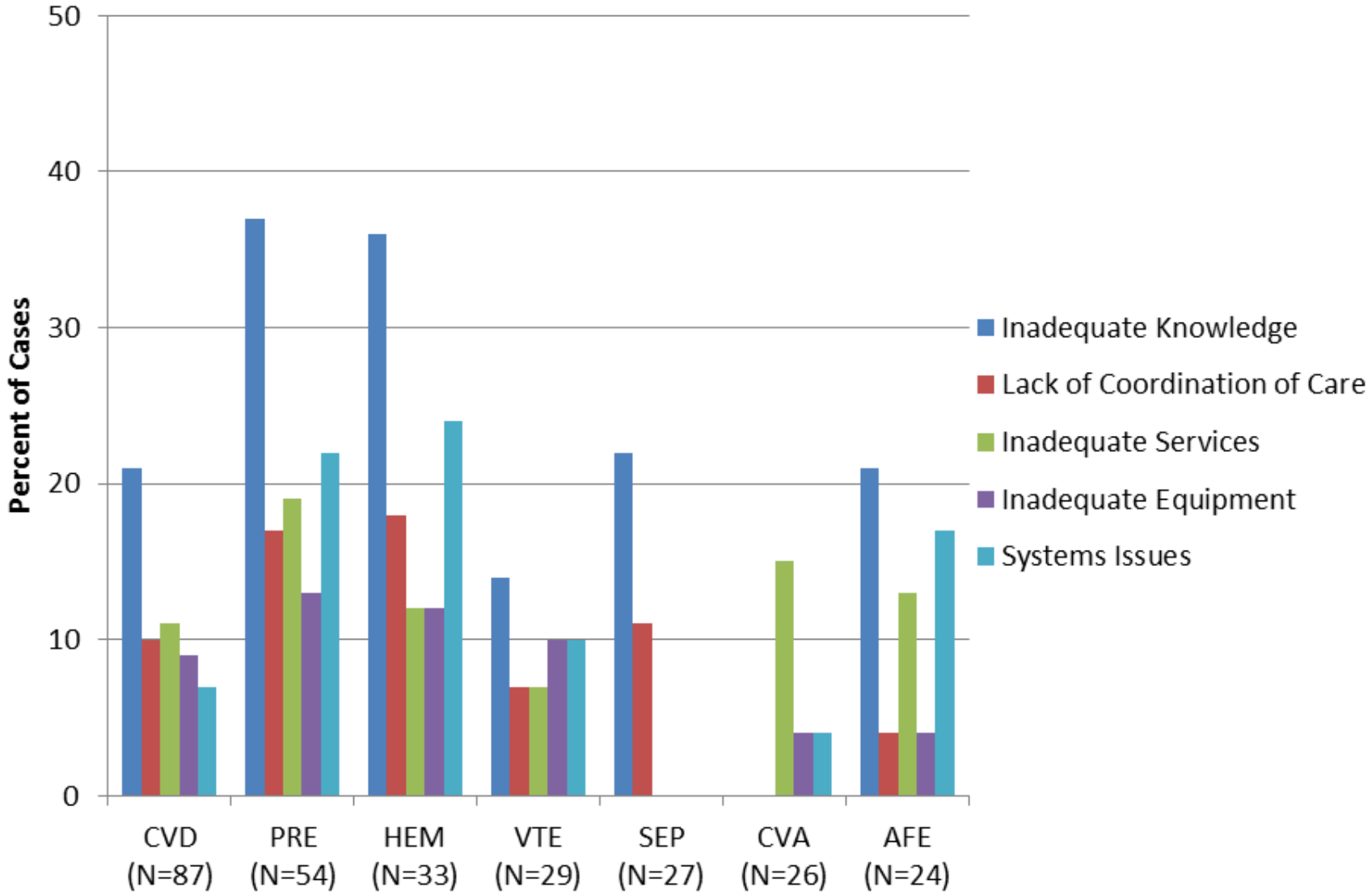
Source: *The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews.* Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2018

Health Care Provider Factors Contributing to Pregnancy-Related Death, CA-PAMR, 2002-2007



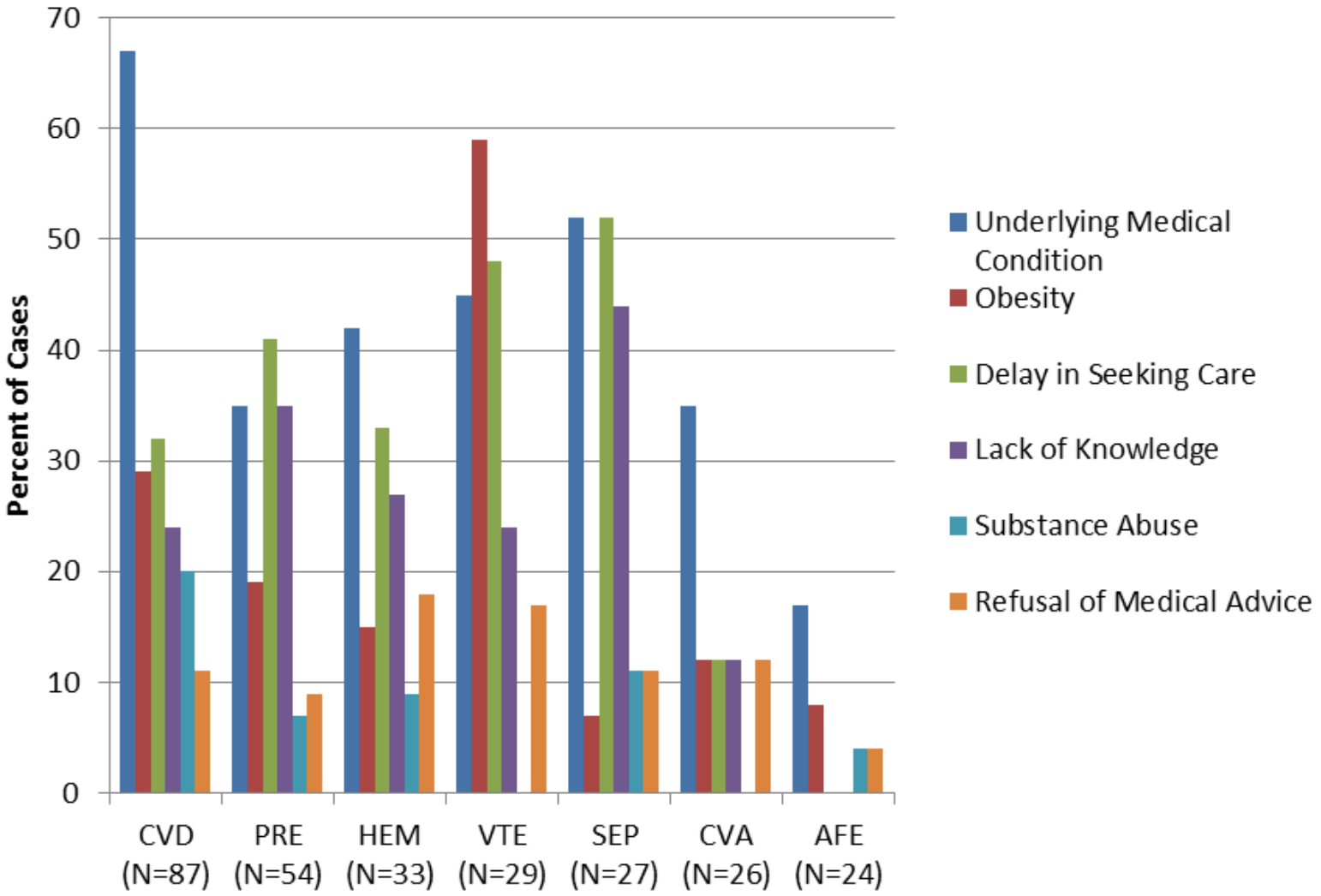
Source: *The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews.* Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2018

Facility Factors Contributing to Pregnancy-Related Death, CA-PAMR, 2002-2007



Source: *The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews.* Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2018

Patient Factors Contributing to Pregnancy-Related Death, CA-PAMR, 2002-2007



Source: *The California Pregnancy-Associated Mortality Review. Report from 2002-2007 Maternal Death Reviews.* Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2018

Opportunities for Quality Improvement

COMMON Themes

Emphasize the Need for Improvements in:

- Timely diagnosis and standardized, evidence-based management of specific clinical conditions
- Recognition and response to clinical triggers (i.e., warning signs) in clinical status
- Coordination of care issues
- Optimal resuscitation of pregnant women, and earlier consideration of cesarean birth during resuscitation
- Access to care, including timely referrals to, and the availability of, medical consultants or subspecialist care
- Maximizing the health of women before and during pregnancy, and postpartum

HEMORRHAGE

Improvement in care opportunities included

- Facility and clinician readiness through practice standardization, better organization of equipment to treat hemorrhage, and planning for care of high risk patients.

- Hemorrhage recognition through better appreciation of blood loss, risk factors, and early clinical signs of deterioration.

- Reducing delays in giving blood, seeking consultations, transferring patients to a higher level of care, and moving on to other treatments if the patient was not responding to current treatment.

Opportunities for Quality Improvement

PREECLAMPSIA

Improvement in care opportunities included

- Birth facilities need standardized policies and protocols for managing severe hypertension, and for blood pressure measurement and monitoring
- Women who were clearly high risk were cared for at hospitals that appeared to lack resources or protocols for managing serious complications
  - Need to access appropriate specialists, personnel, equipment for resuscitation, or medications in a timely manner
- Improve communication between nurses and physicians about a patient's worsening condition. Use of consistent and accurate terminology to convey signs and symptoms of preeclampsia

Patient education

- Patient knowledge of signs and symptoms of preeclampsia

Opportunities for Quality Improvement

CARDIOVASCULAR DISEASE

Improvement in care opportunities included

- Better identification of high-risk factors and signs/symptoms of CVD, including shortness of breath, tachycardia, crackles, wheezing, shoulder pain
- Ensuring that patients at high risk for morbidity from CVD are cared for in facilities with specialists equipped to handle severe conditions
- More rapid, aggressive treatment plan including appropriate medications and better evaluation of patient status

Patient education

- Early warning signs and when to seek care
- Importance of follow-up care post discharge

Opportunities for Quality Improvement

VENOUS THROMBOEMBOLISM

Improvement in care opportunities included

- Implementation of preventative measures including the standardized use of prophylaxis
- Improve methods of recognizing the signs and symptoms of VTE and overall communication strategies among clinicians

Patient education

- Patient knowledge of signs and symptoms
- Consistent and thorough discharge education must be employed with all pregnant and postpartum women and their families.

California Toolkits to Transform Maternity Care

Toolkits Released

- Obstetric Hemorrhage (2010, 2015 updated)
- Preeclampsia (2014)
- Cardiovascular Disease in Pregnancy and Postpartum (2017)
- Available to freely download at: www.cmqcc.org

Toolkits Forthcoming

(2018)

- Venous Thromboembolism in Pregnancy and Postpartum

The Toolkit series were developed by CMQCC with funding provided by California Department of Public Health, federal Title V MCH block grant funds

Summary of Major Findings from CA-PAMR Review of 2002 to 2007 Deaths

- 41% of the pregnancy-related deaths had a good-to-strong chance of preventability.
- Cardiovascular disease was the leading cause of pregnancy-related death.
- Racial disparities persist. African-American women continue to die at three-to-four times the rate of women of other racial/ethnicities groups.
- Multiple patient, facility, and health care provider factors contributed to the pregnancy-related deaths.

Major Recommendations and Implications from In-Depth Maternal Mortality Review (1)

- Quality improvements are needed in provider and hospital facility care
- Better communication and coordination is needed within and across hospital departments where pregnant and postpartum women seek care.
- Clinicians caring for African-American women need a heightened sense of awareness of the risk factors among this population.

Major Recommendations and Implications from In-Depth Maternal Mortality Review (2)

- Care needs to be optimized for women entering pregnancy with chronic health conditions, including obesity.
- Social and economic factors need to be taken into account when evaluating effective care and in anticipating the health needs of pregnant and postpartum women.
- Improvements and investments in public health data collection and maternal mortality case review enhance California's ability to monitor maternal mortality and develop evidence-based recommendations to prevent its occurrence.

Next Steps and Future Actions

- Continue California Pregnancy-Associated Mortality Review.
  - Conclude the current review of maternal suicides from 2002 to 2012.
  - Plan for targeted review of obstetric deaths.
- Develop capacity to improve timeliness of mortality reviews.
- Develop capacity to better assign causes of death for years not receiving full case review of obstetric deaths.
- Recommend that California adopt the standard format of the pregnancy check box on the California death certificate.
- Examine shift in deaths occurring 43-365 days postpartum in order to identify prevention opportunities.