

The Challenge of Maternal Mortality & Its Meaning for Normal Birth

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Normal Labour and Birth Research Conference Ann
Arbor, Michigan

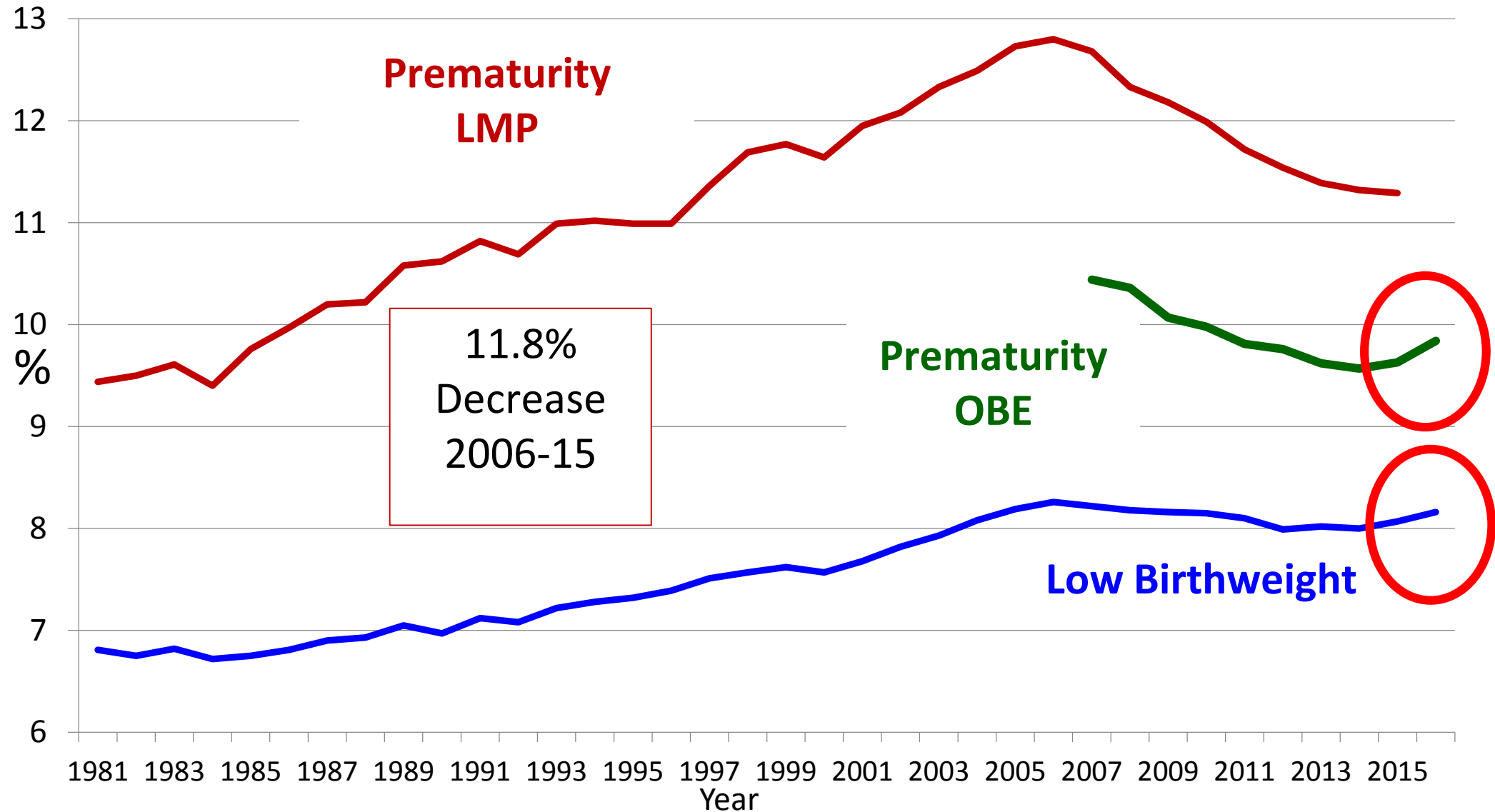
June 27, 2018

Context

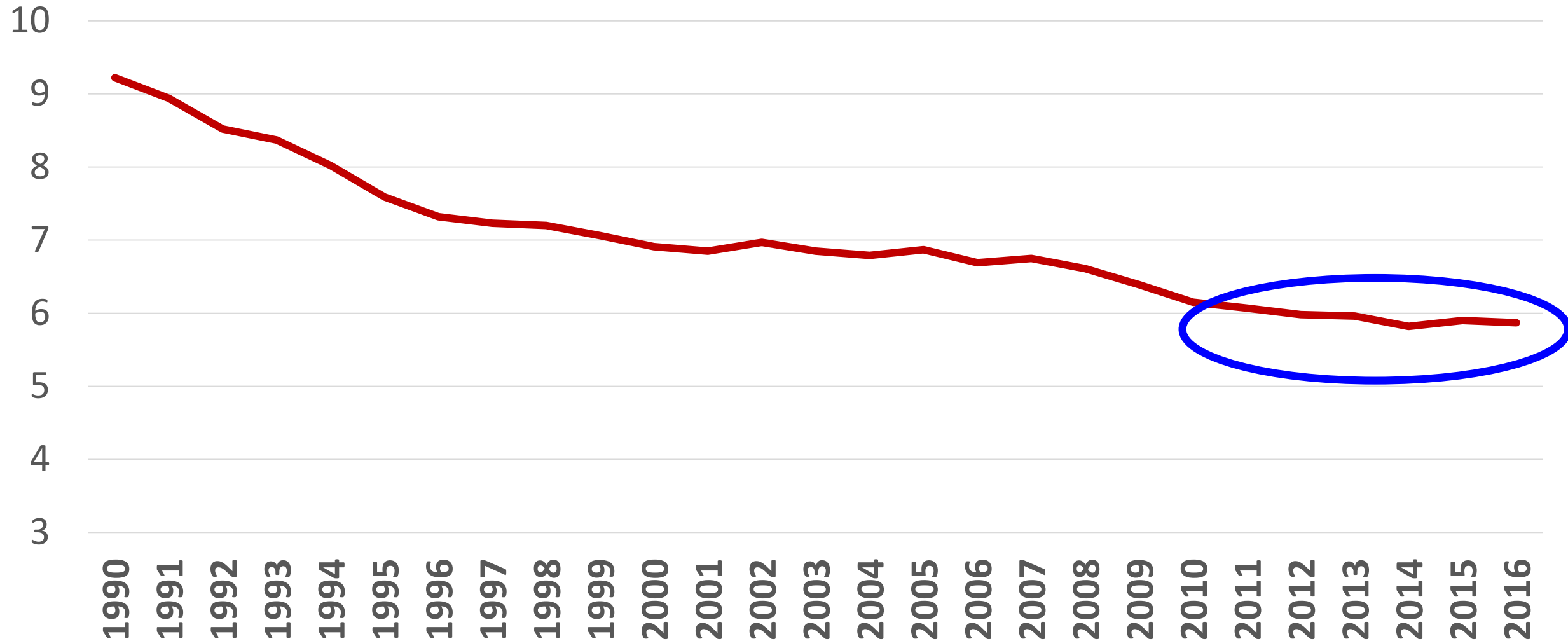
- Key process measure
- Status of key health outcomes

Changes in process that lead to improved outcomes are more easily defensible, but that's not the case in the U.S.

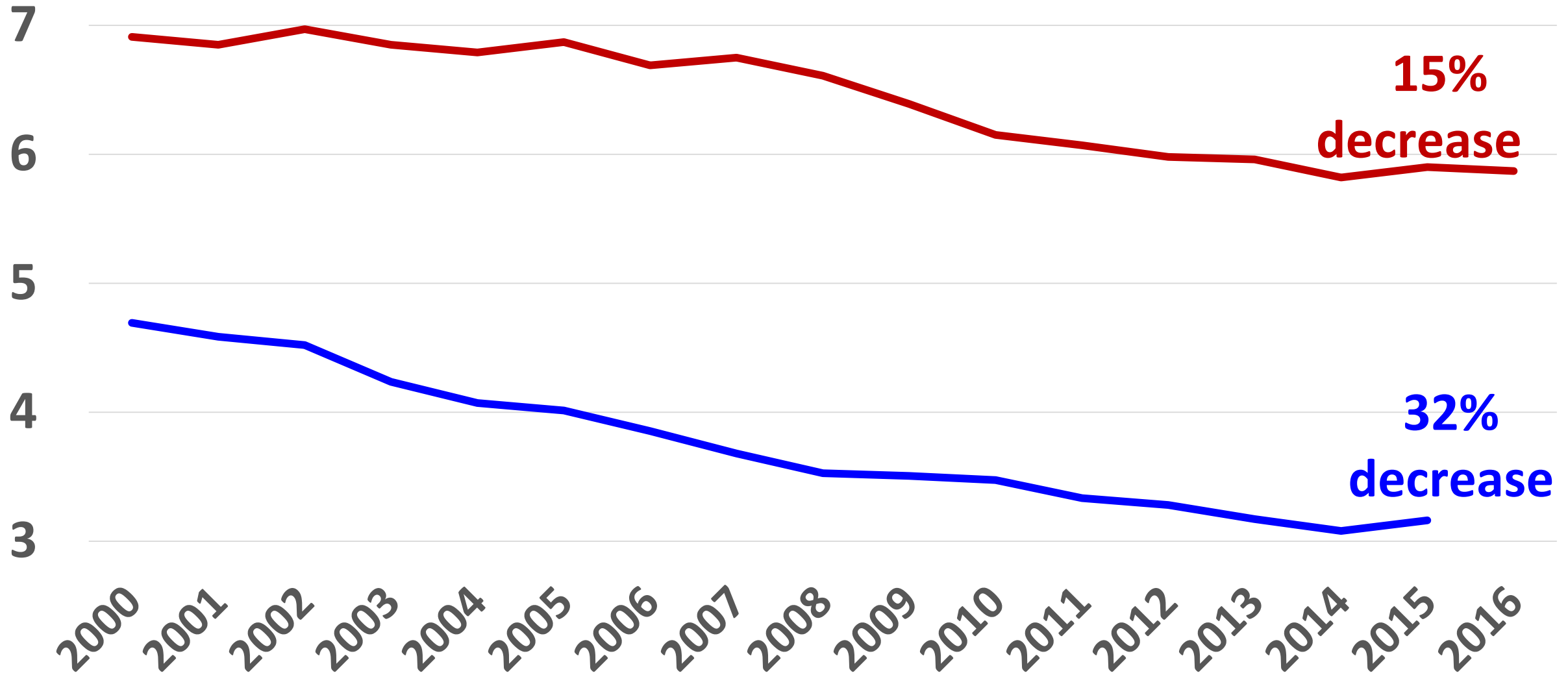
Prematurity and Low Birthweight, U.S., 1981-2016



Infant Mortality (per 1,000 births), U.S. 1990-2016



Infant Mortality (per 1,000 births), U.S. & OECD 2000-2016



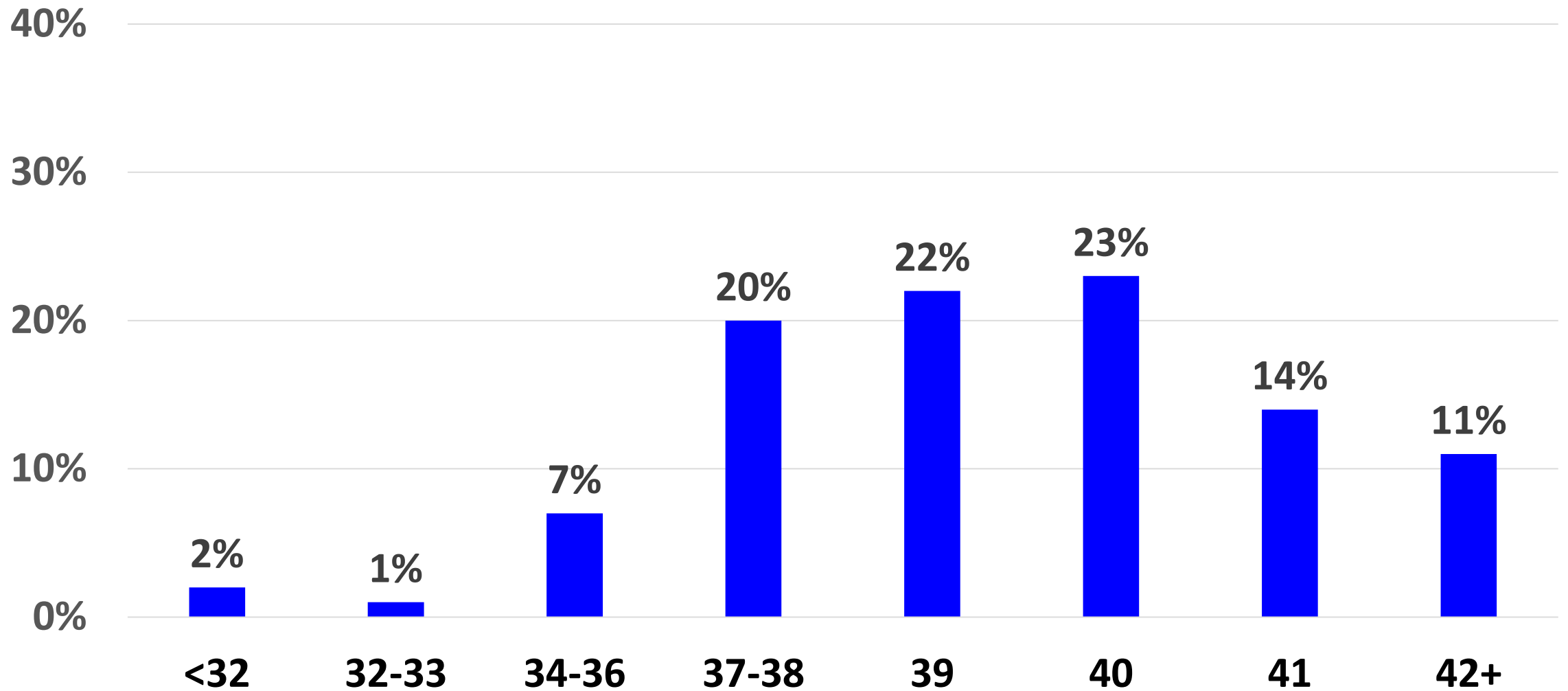
BirthByTheNumbers.org

* Countries with 100,000+ births): Australia, Belgium, Canada, Czech Republic, France, Germany, Greece, Israel, Italy, Japan, Netherlands, S. Korea, Spain, Sweden, UK

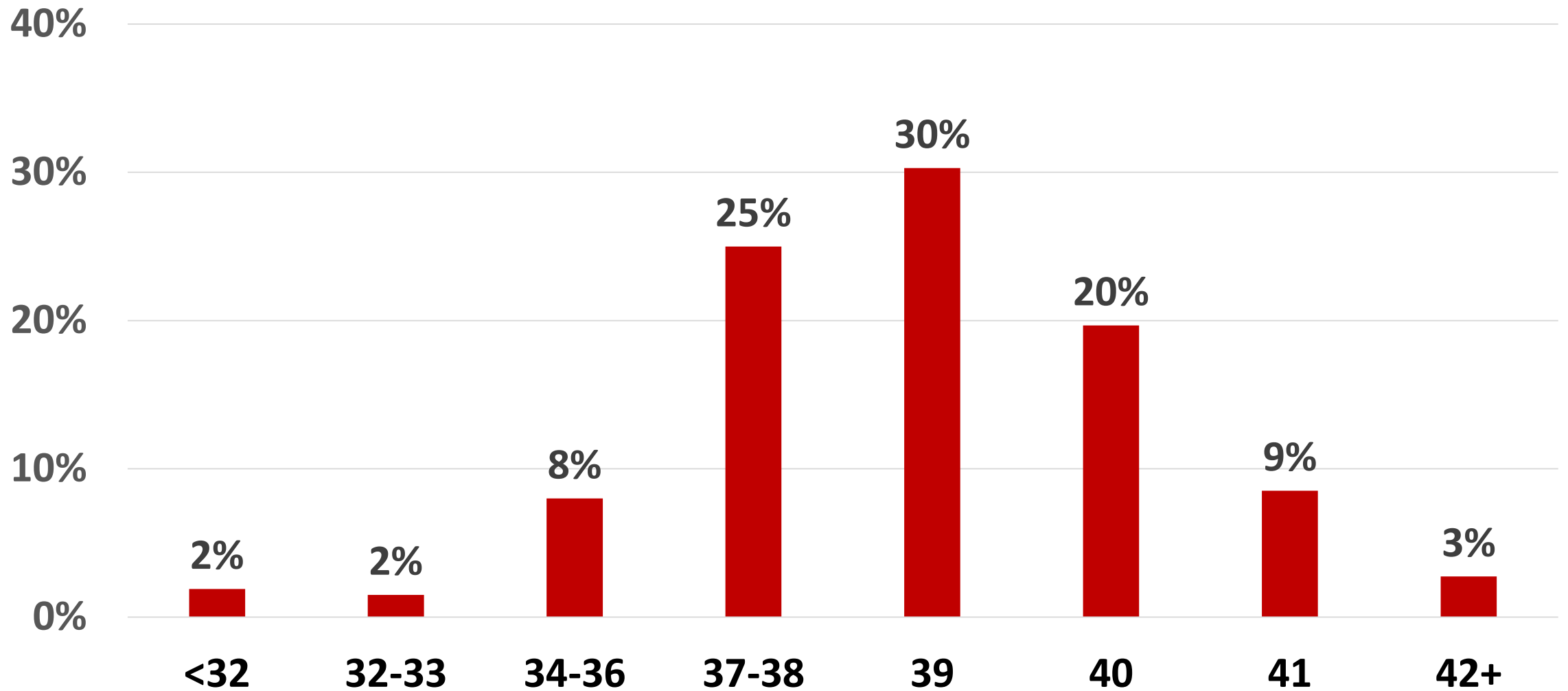
*How can we best capture the
change in process in the U.S.?*

Gestational Age

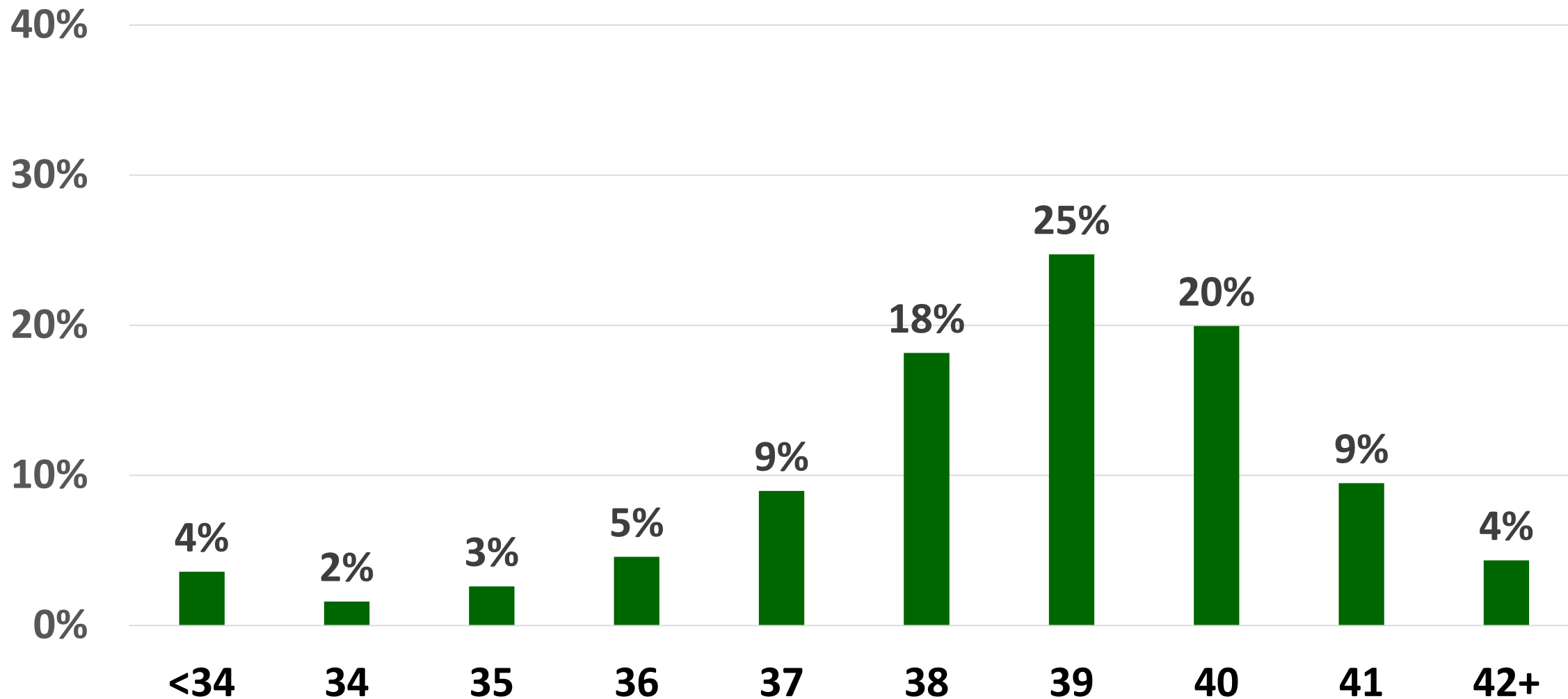
Gestational Age, U. S., All Births, 1990



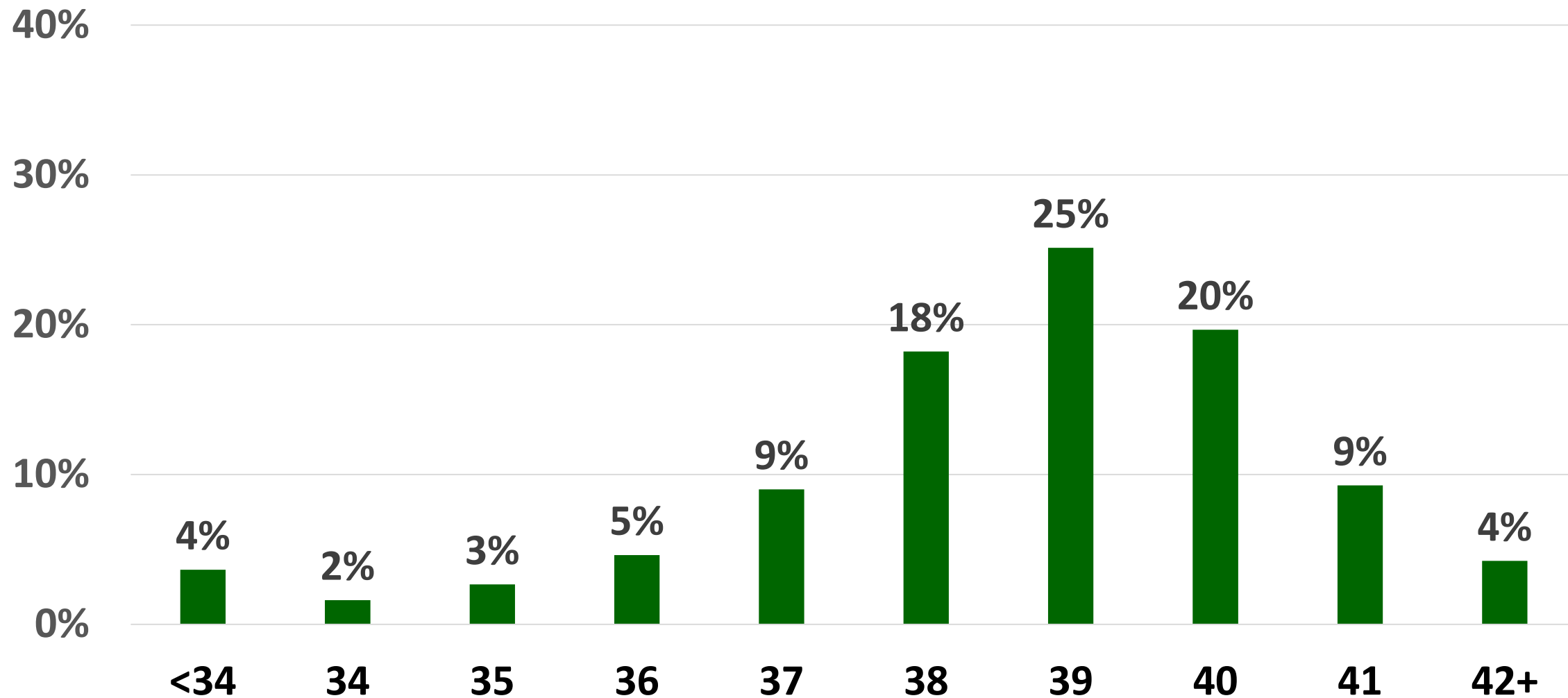
Gestational Age, U. S., All Births, 2016



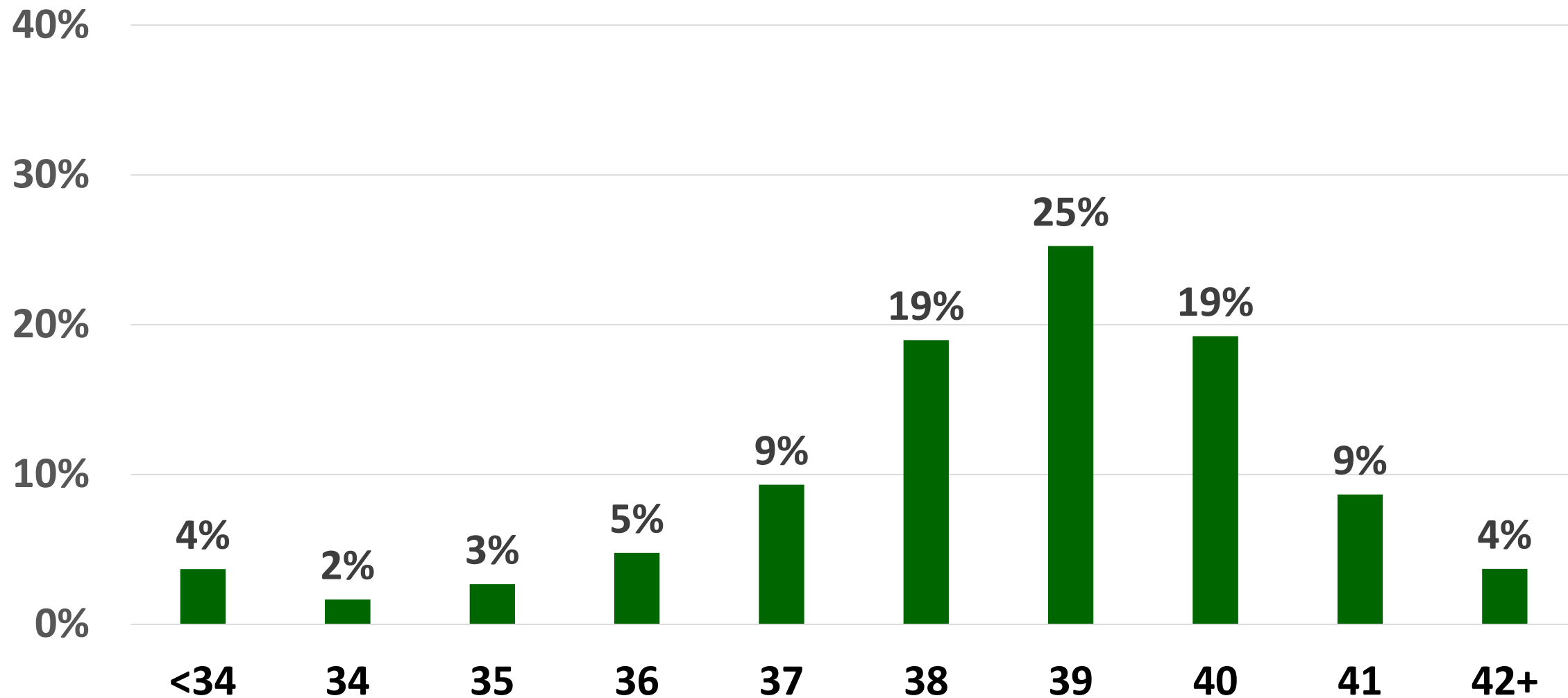
Gestational Age, U. S., LMP, 2003



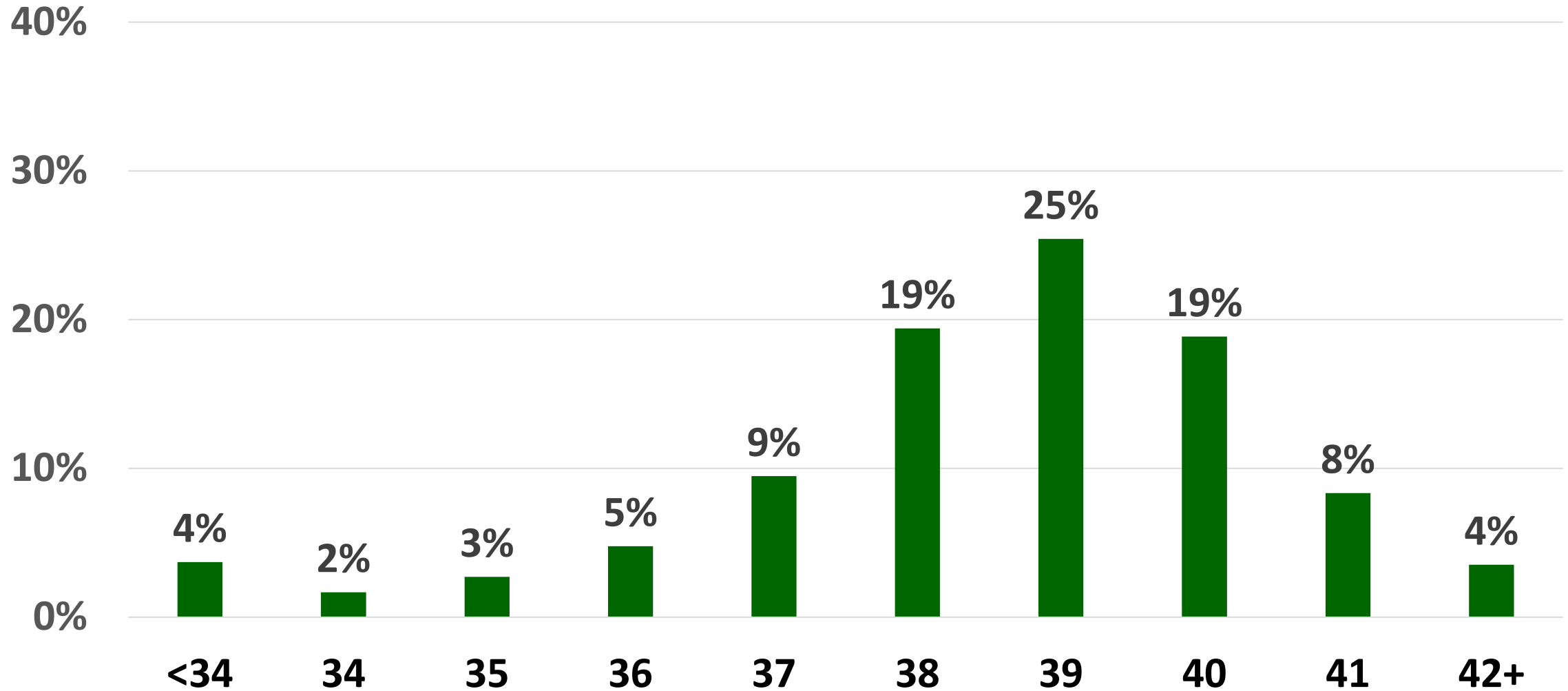
Gestational Age, U. S., LMP, 2004



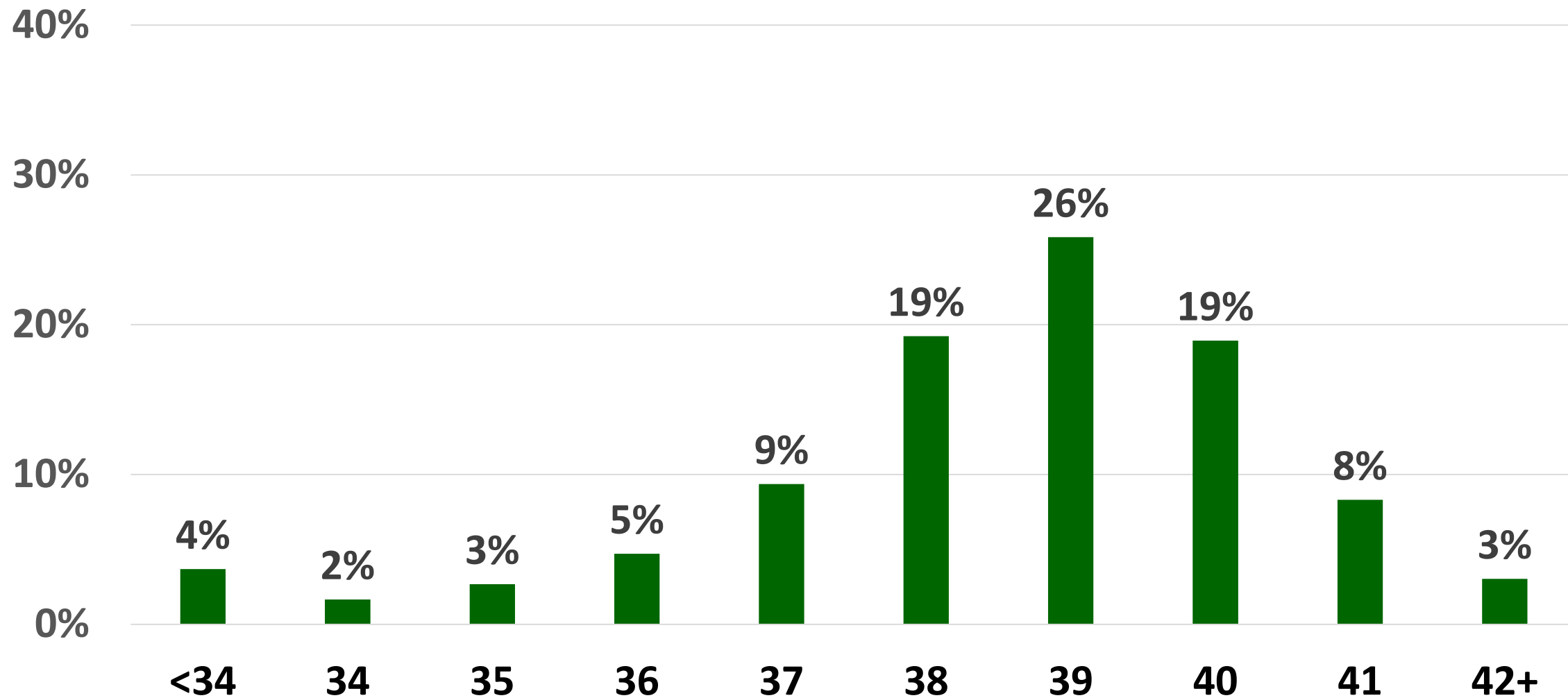
Gestational Age, U. S., LMP, 2005



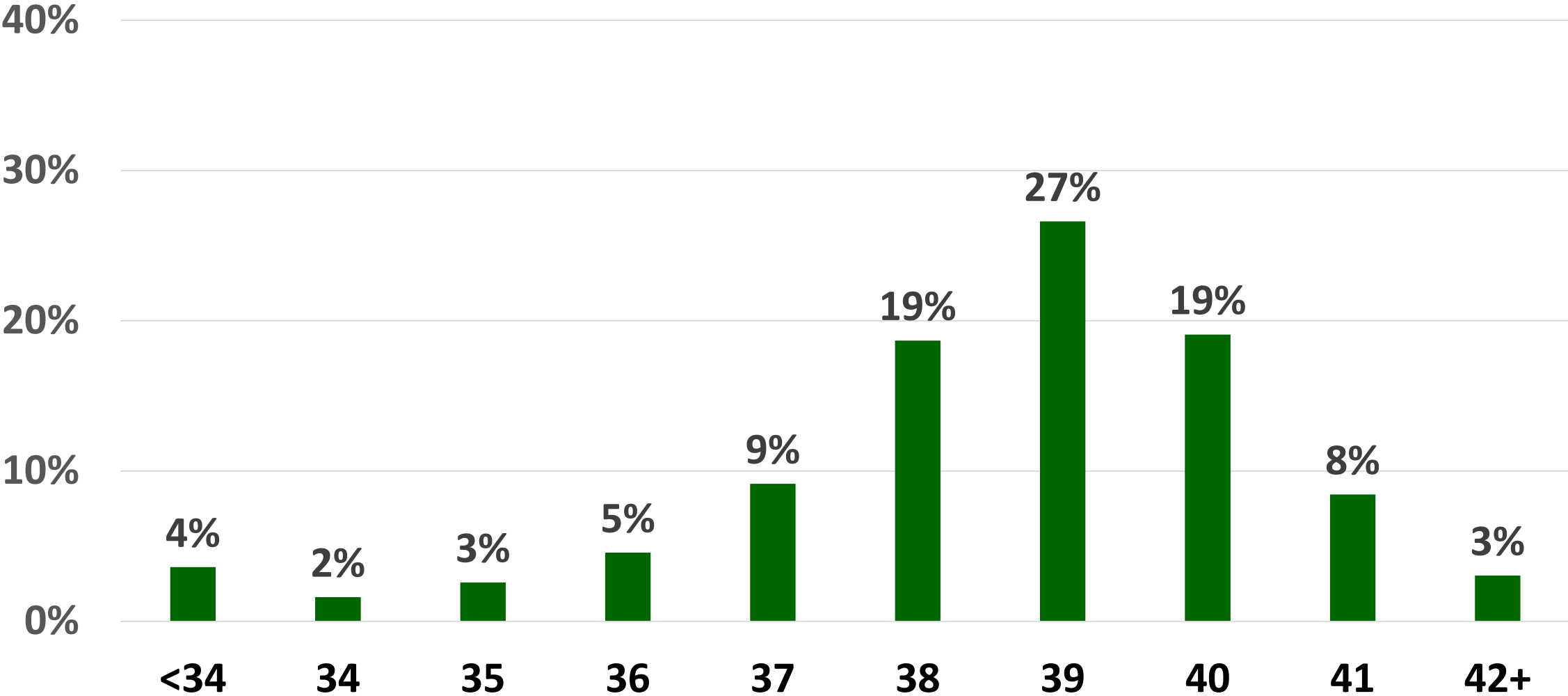
Gestational Age, U. S., LMP, 2006



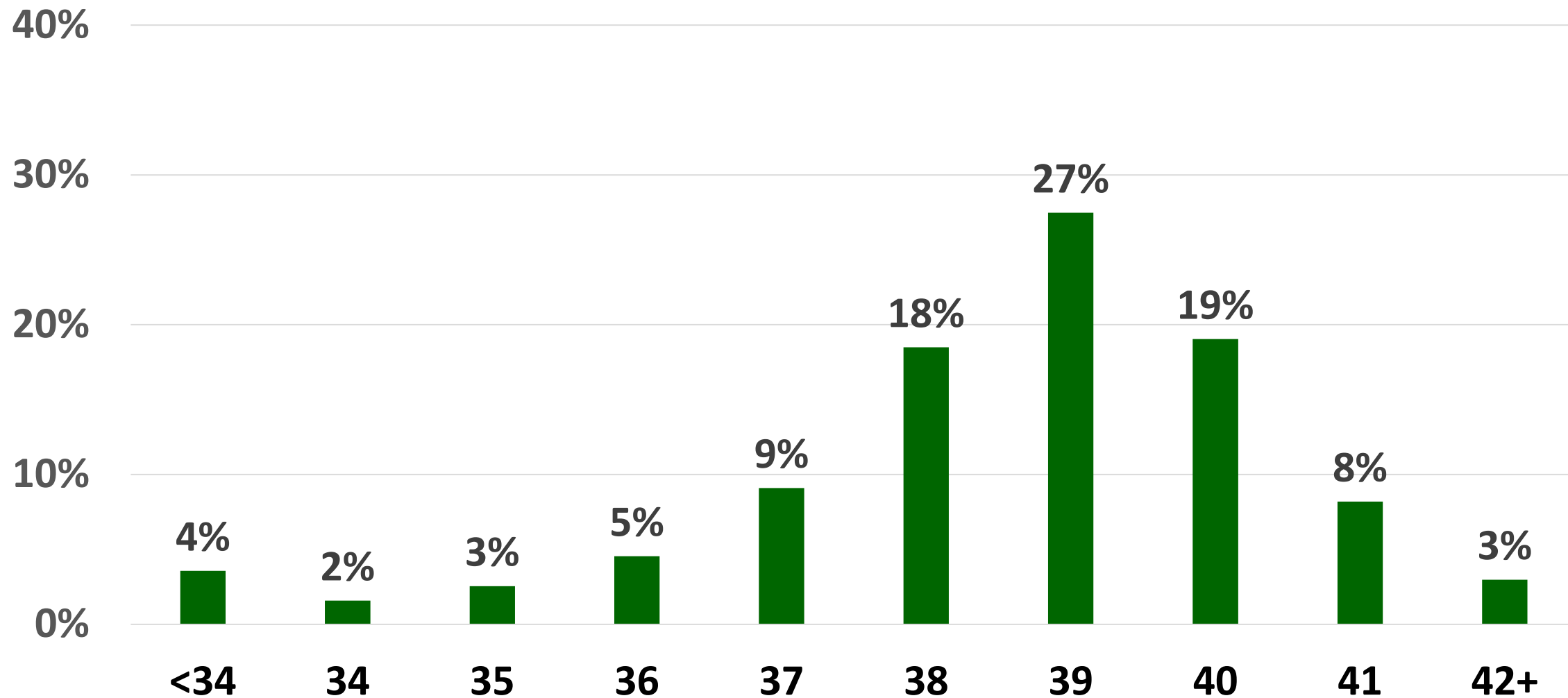
Gestational Age, U. S., LMP, 2007



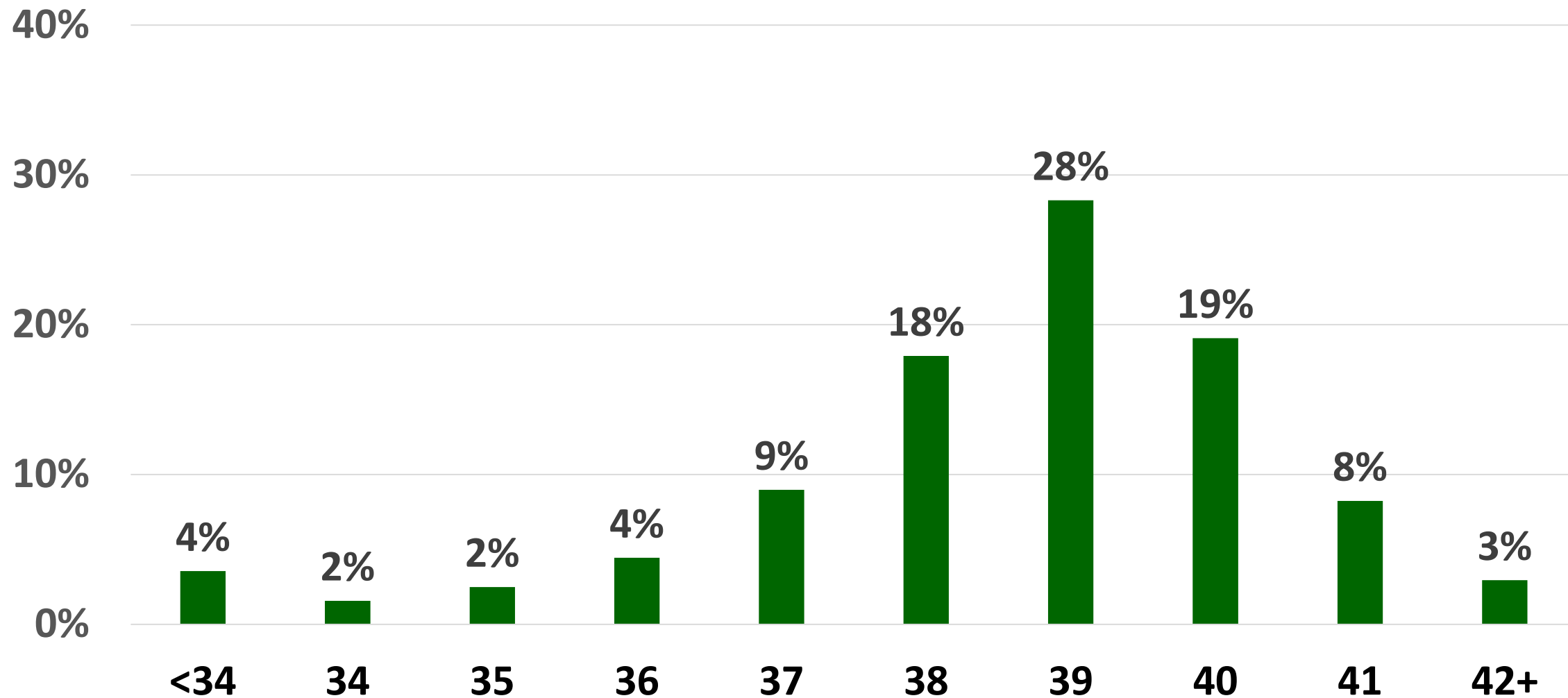
Gestational Age, U. S., LMP, 2008



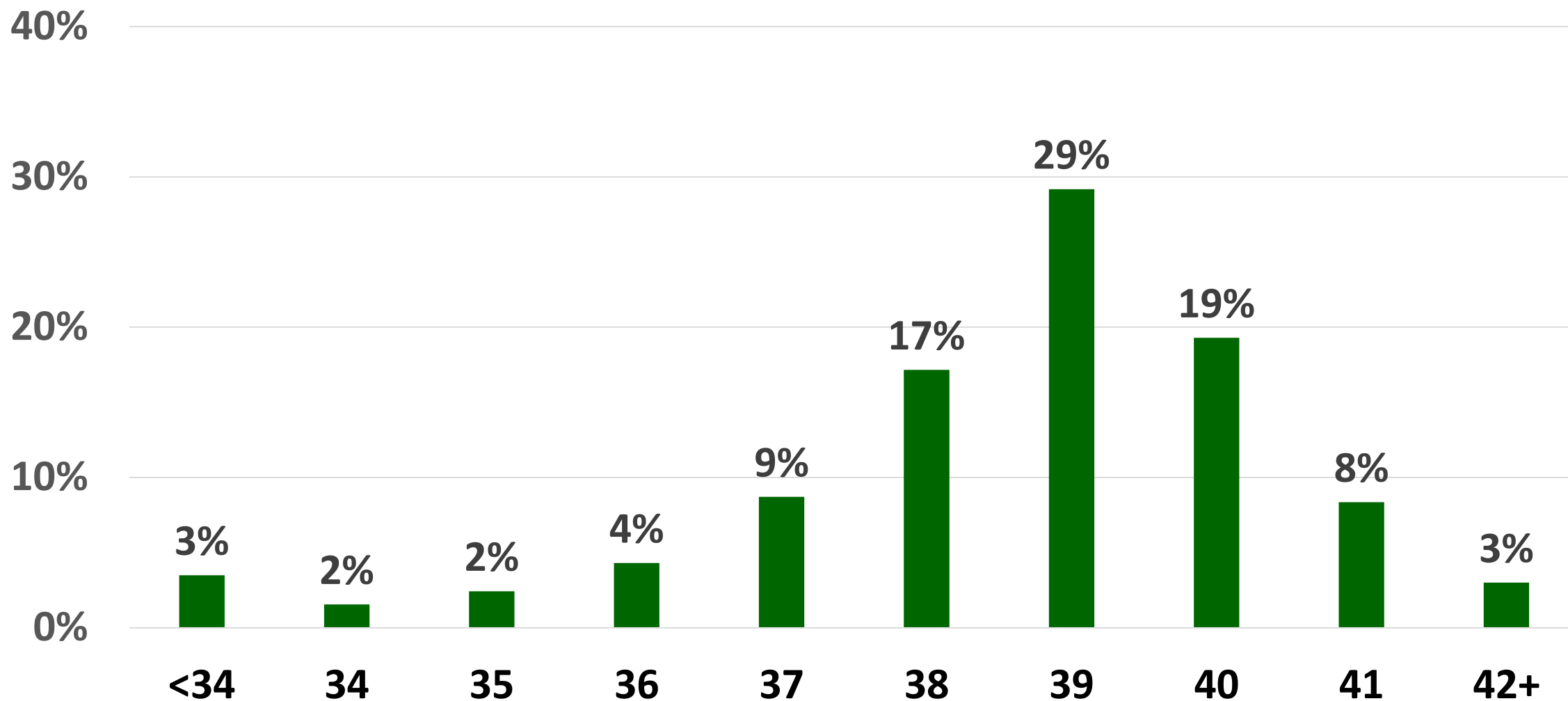
Gestational Age, U. S., LMP, 2009



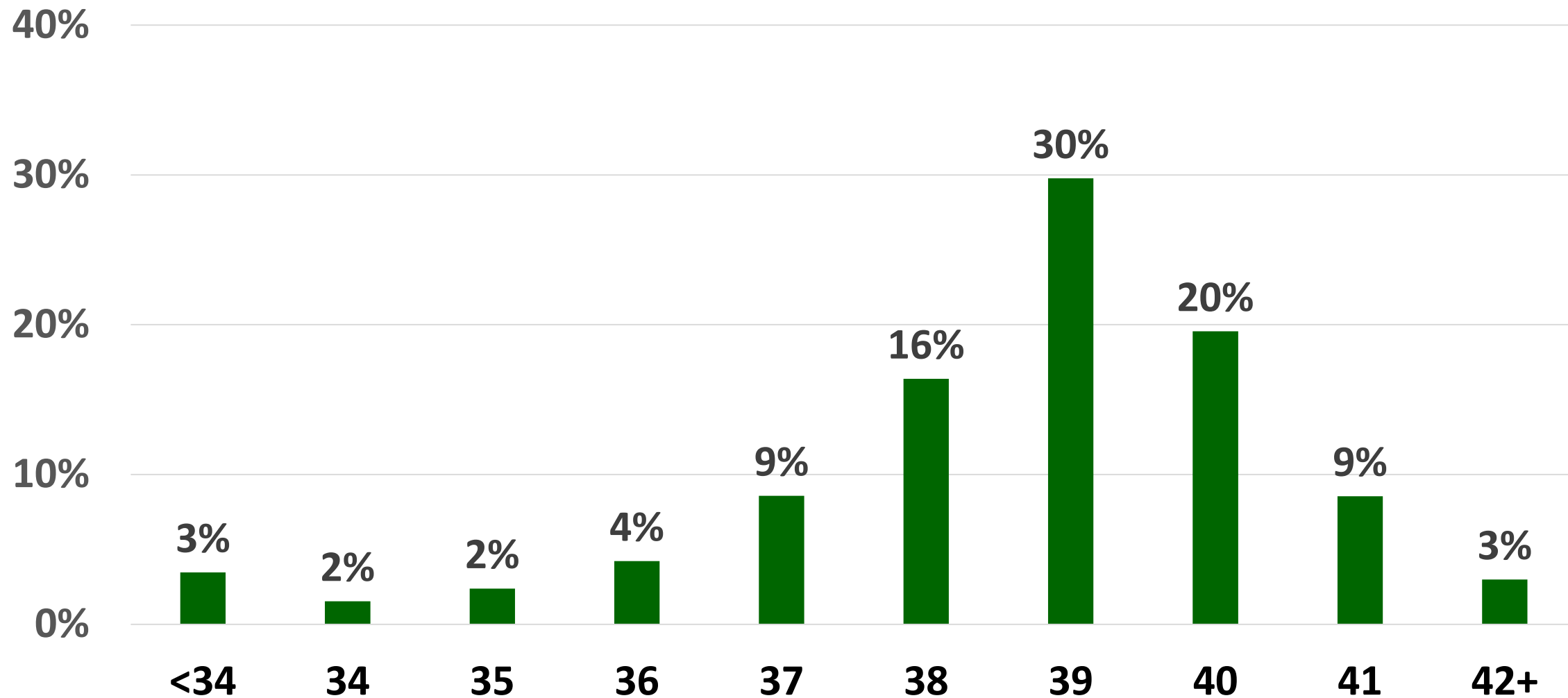
Gestational Age, U. S., LMP, 2010



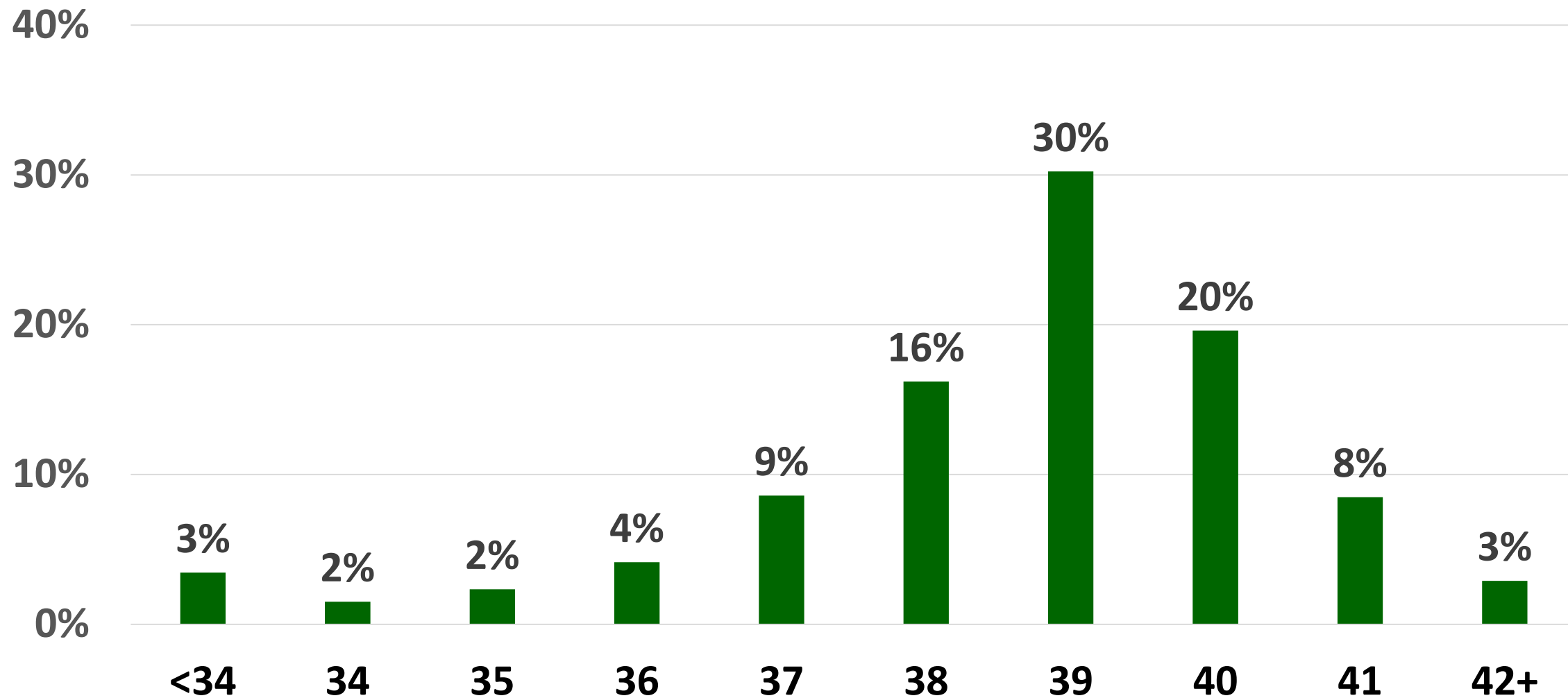
Gestational Age, U. S., LMP, 2011



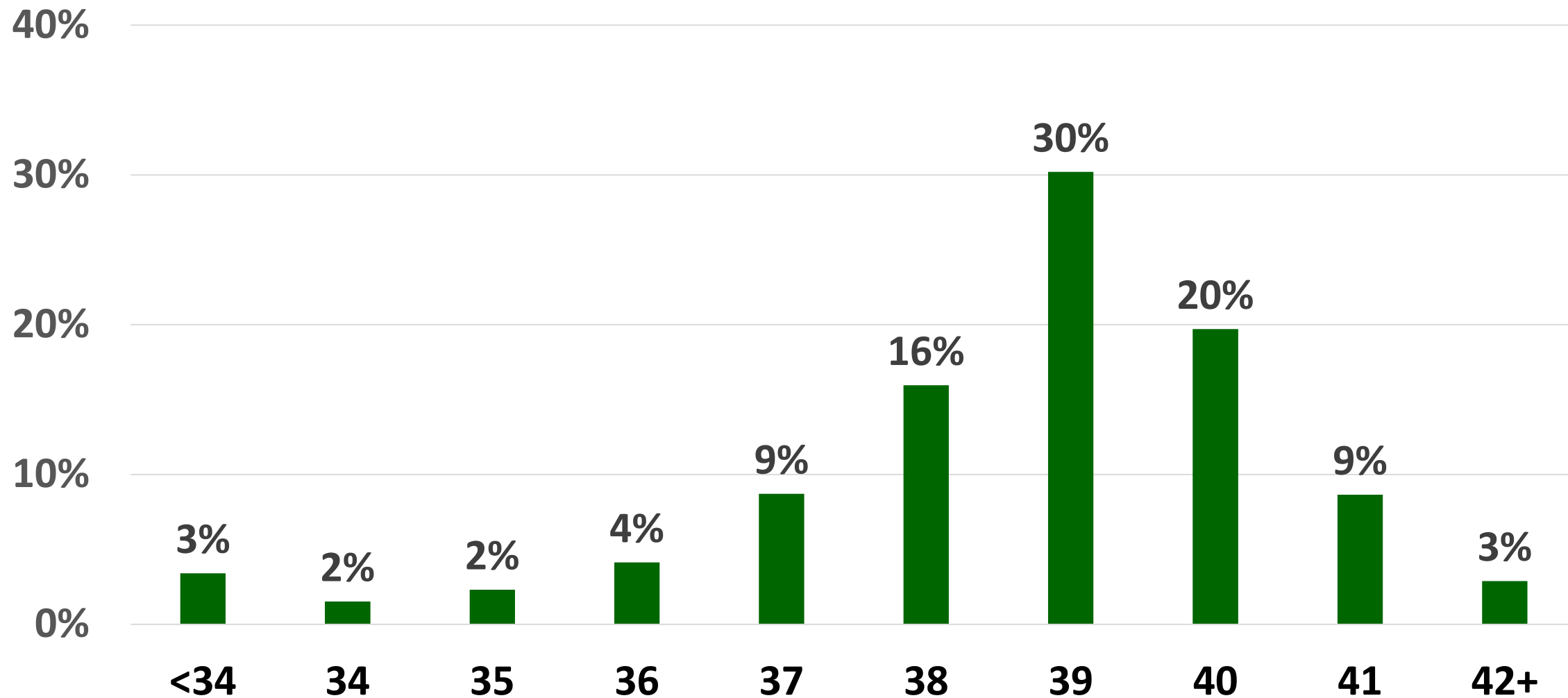
Gestational Age, U. S., LMP, 2012



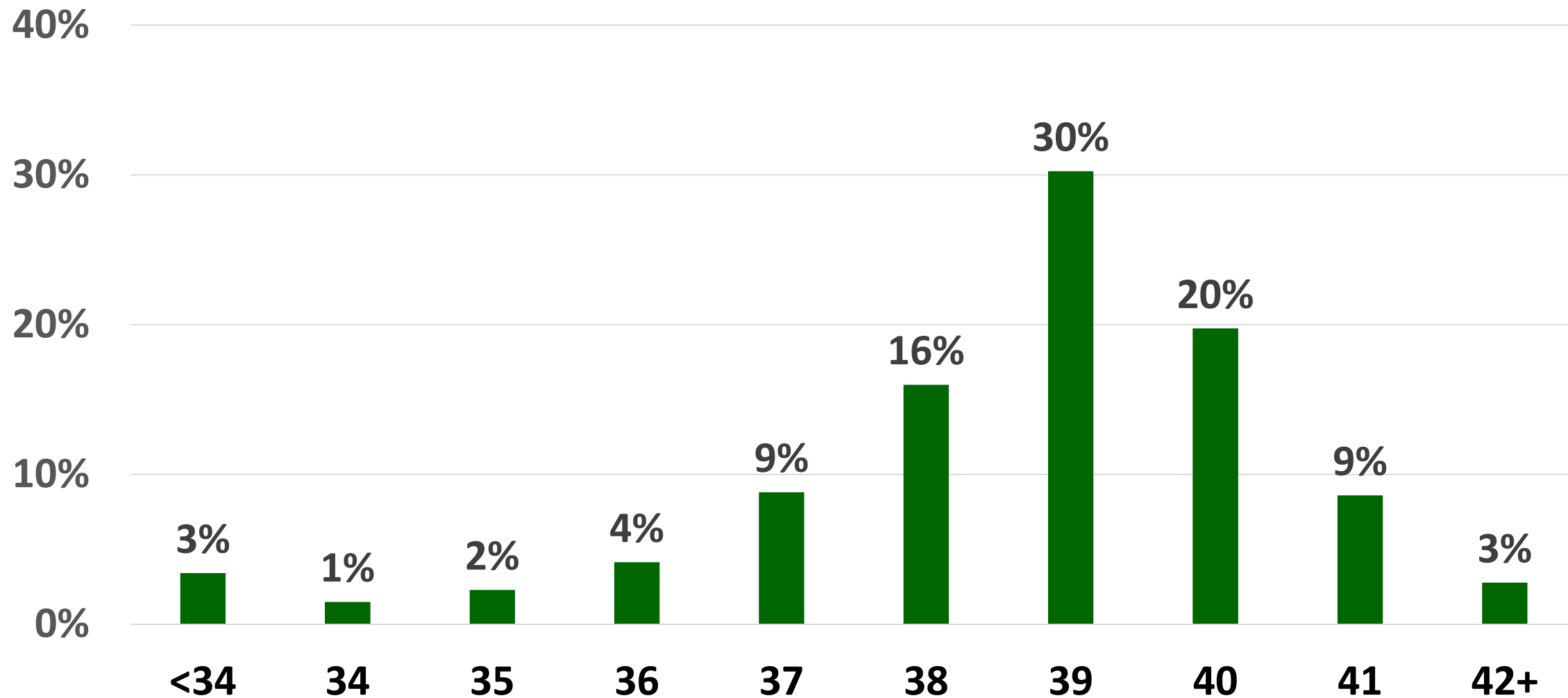
Gestational Age, U. S., LMP, 2013



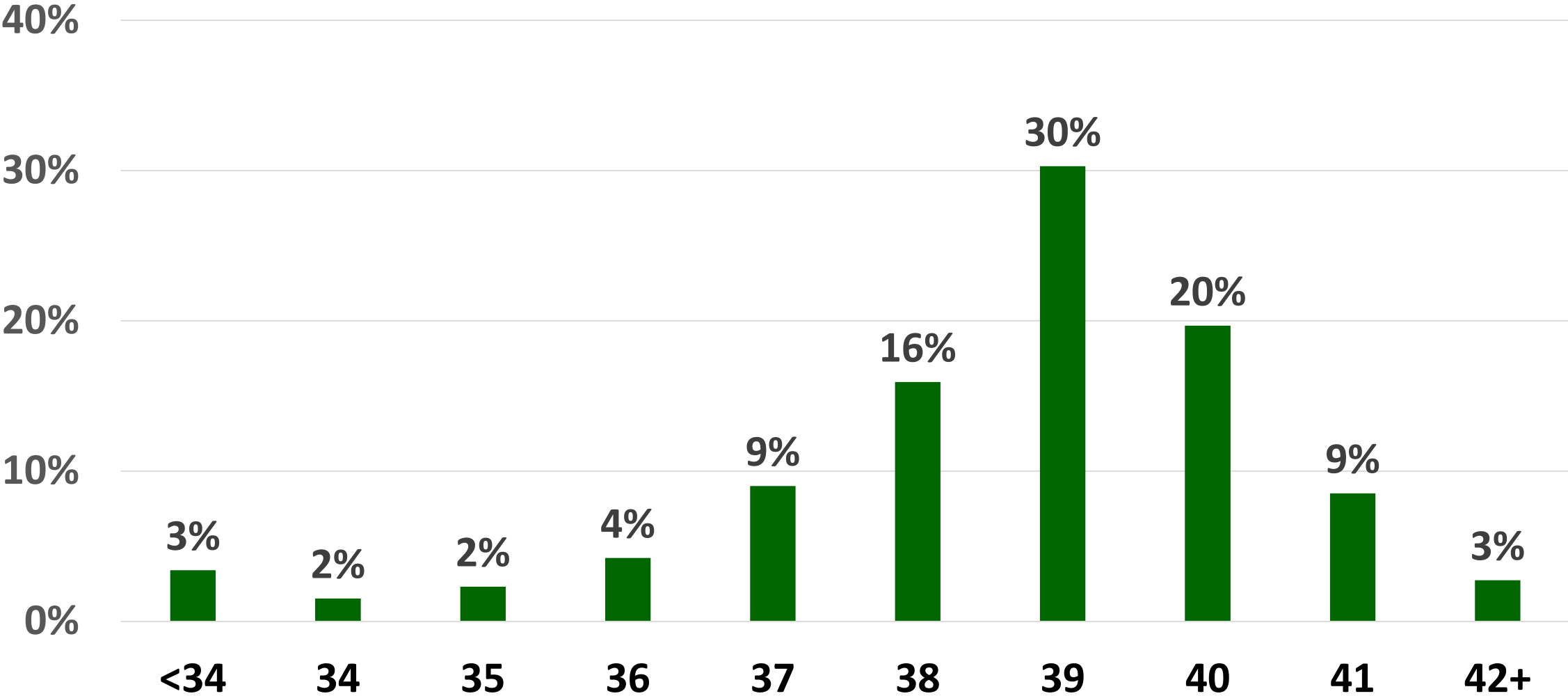
Gestational Age, U. S., LMP, 2014



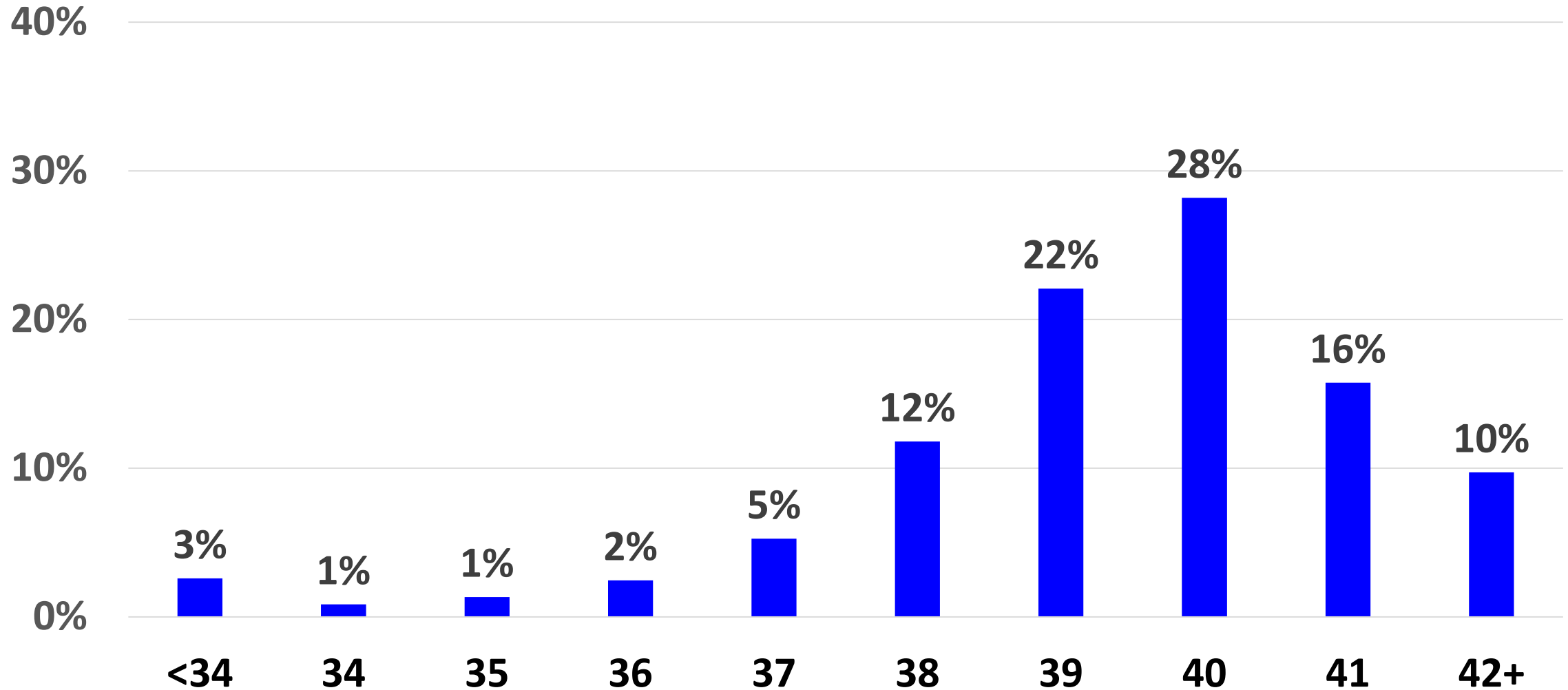
Gestational Age, U. S., LMP, 2015



Gestational Age, U. S., LMP, 2016

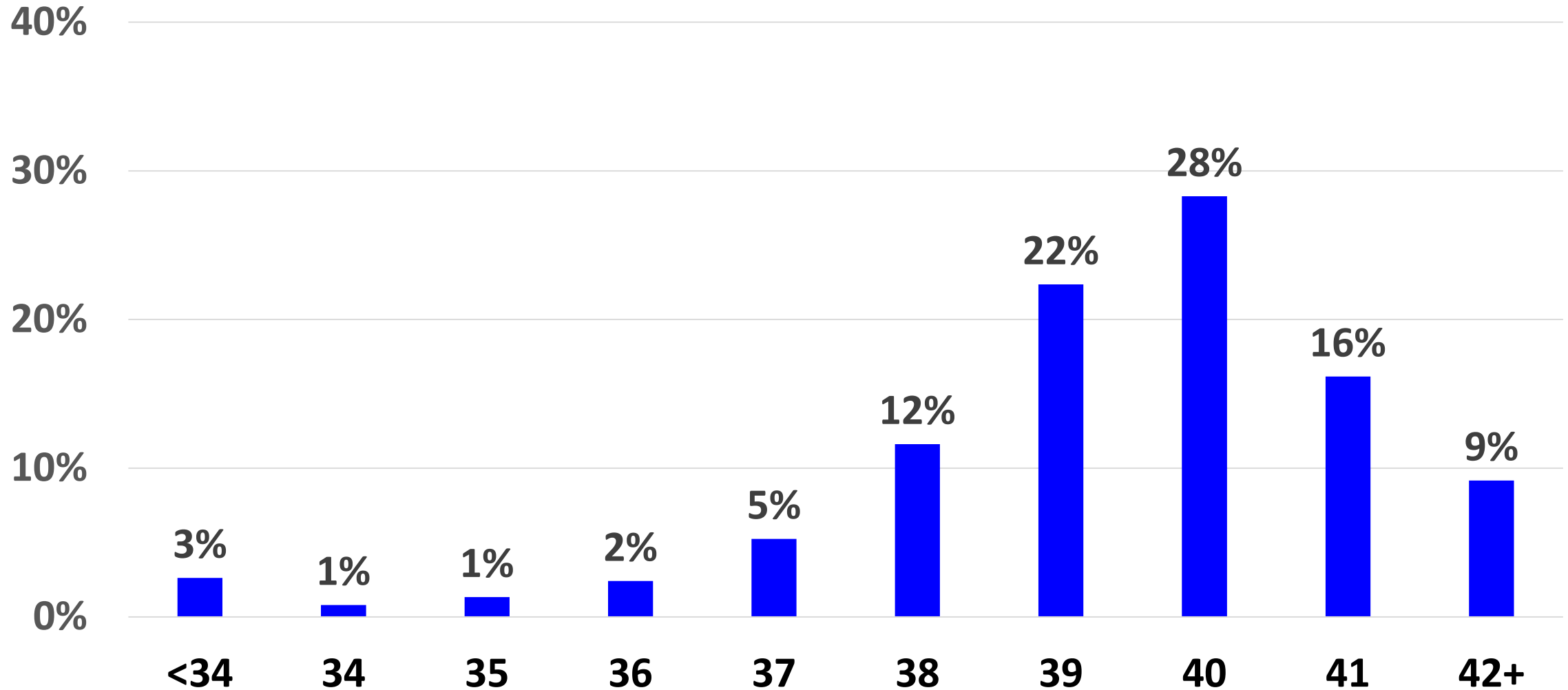


Gestational Age*, U. S., Home Births, 2003



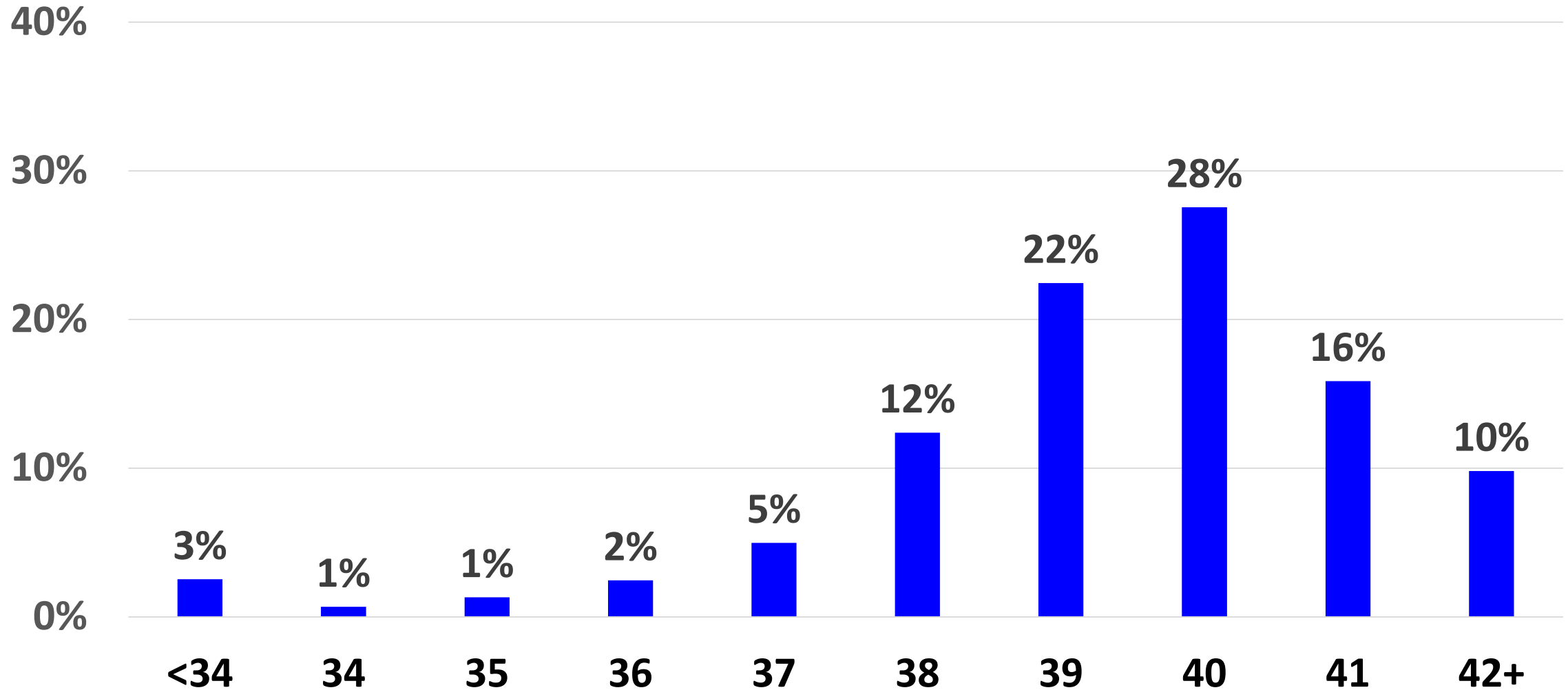
* LMP

Gestational Age*, U. S., Home Births, 2004



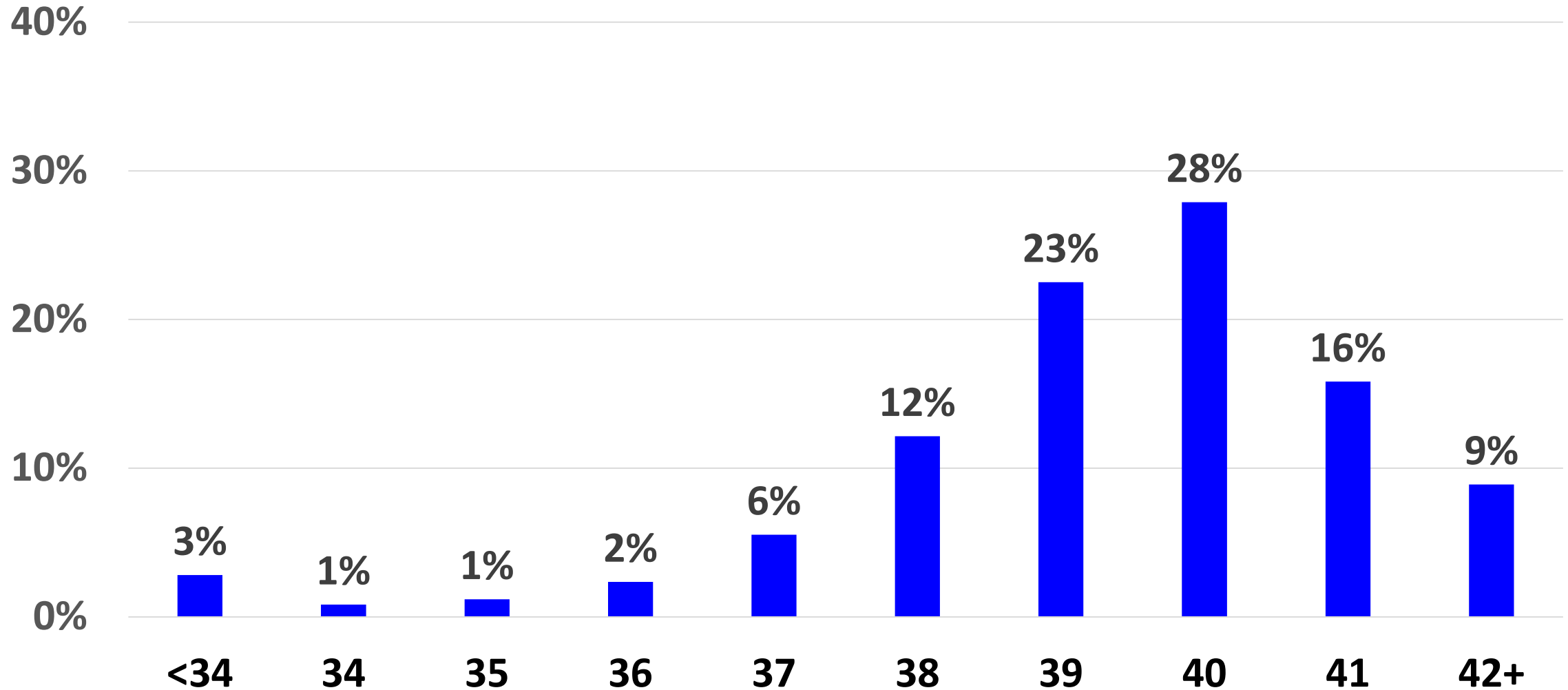
* LMP

Gestational Age*, U. S., Home Births, 2005



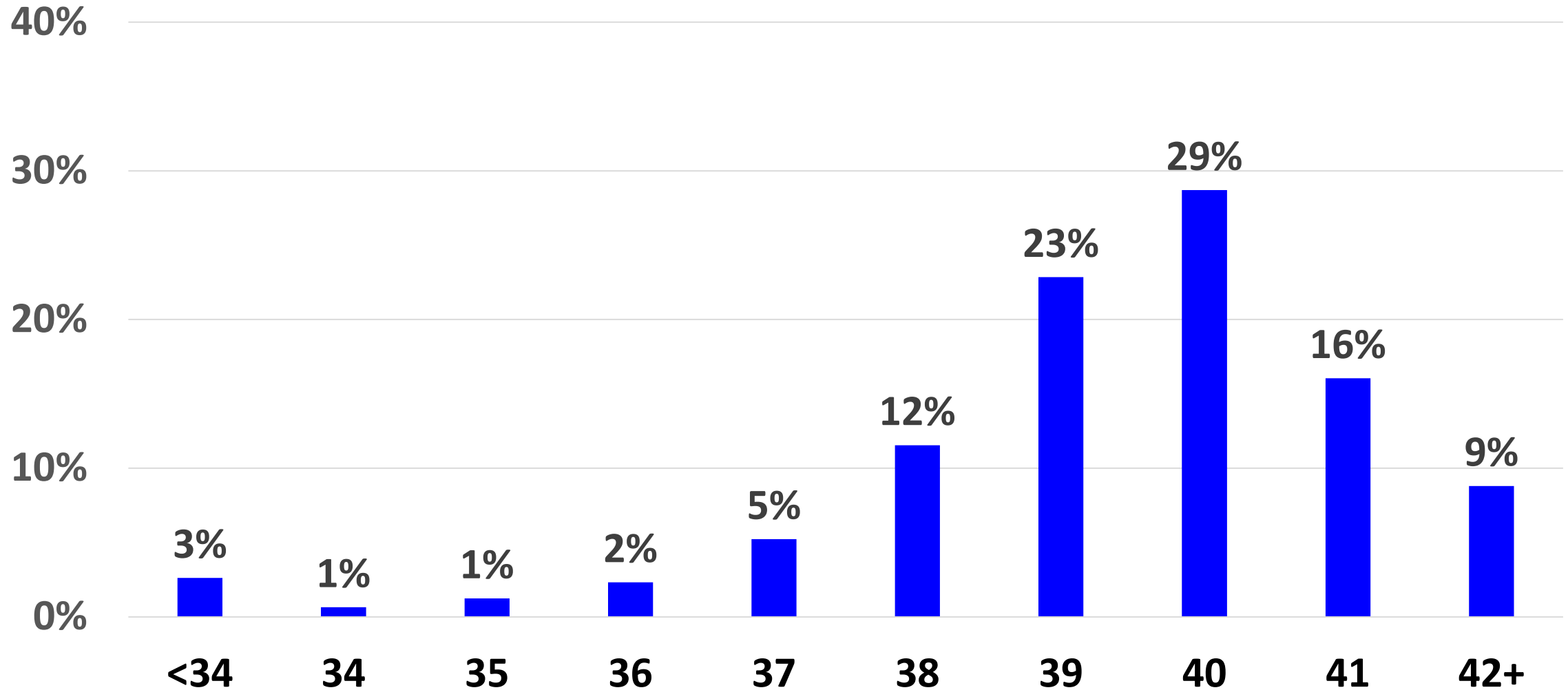
* LMP

Gestational Age*, U. S., Home Births, 2006



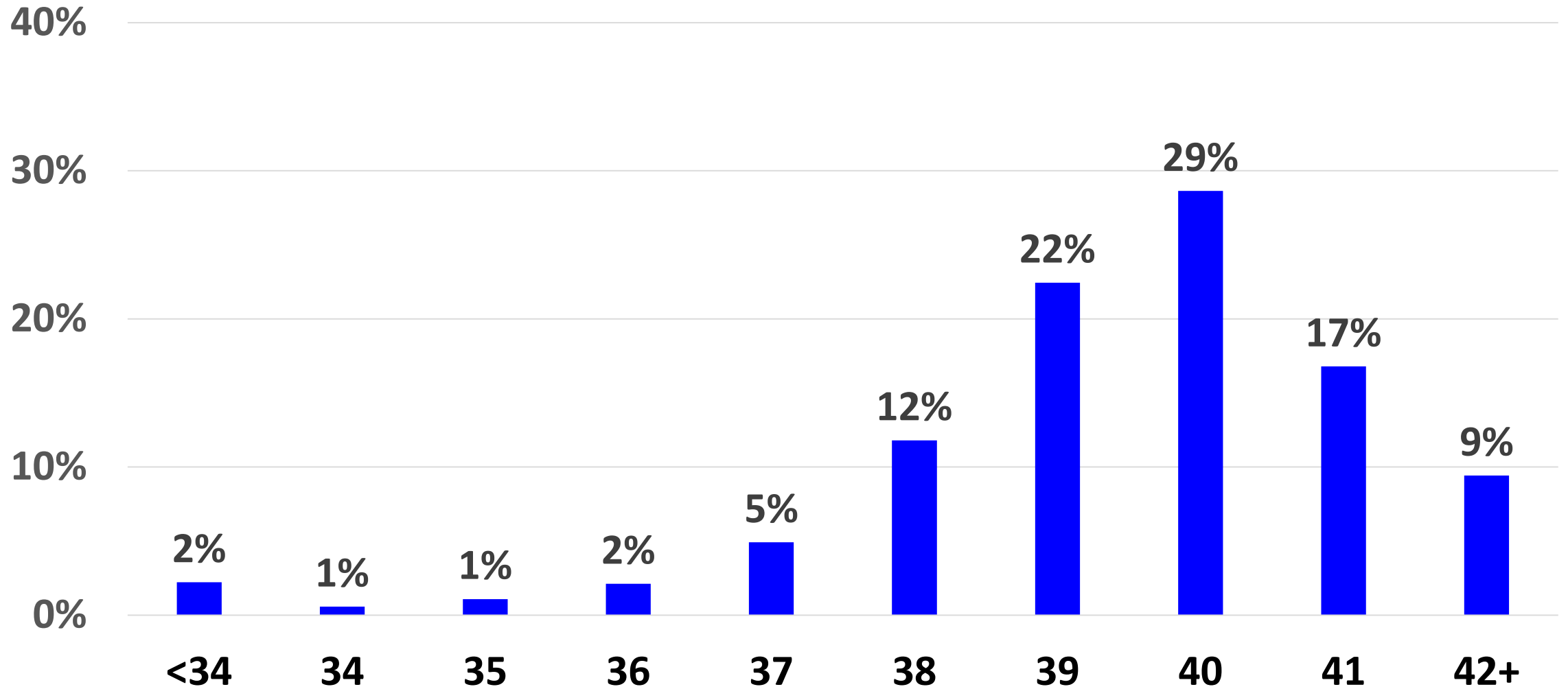
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Gestational Age*, U. S., Home Births, 2007



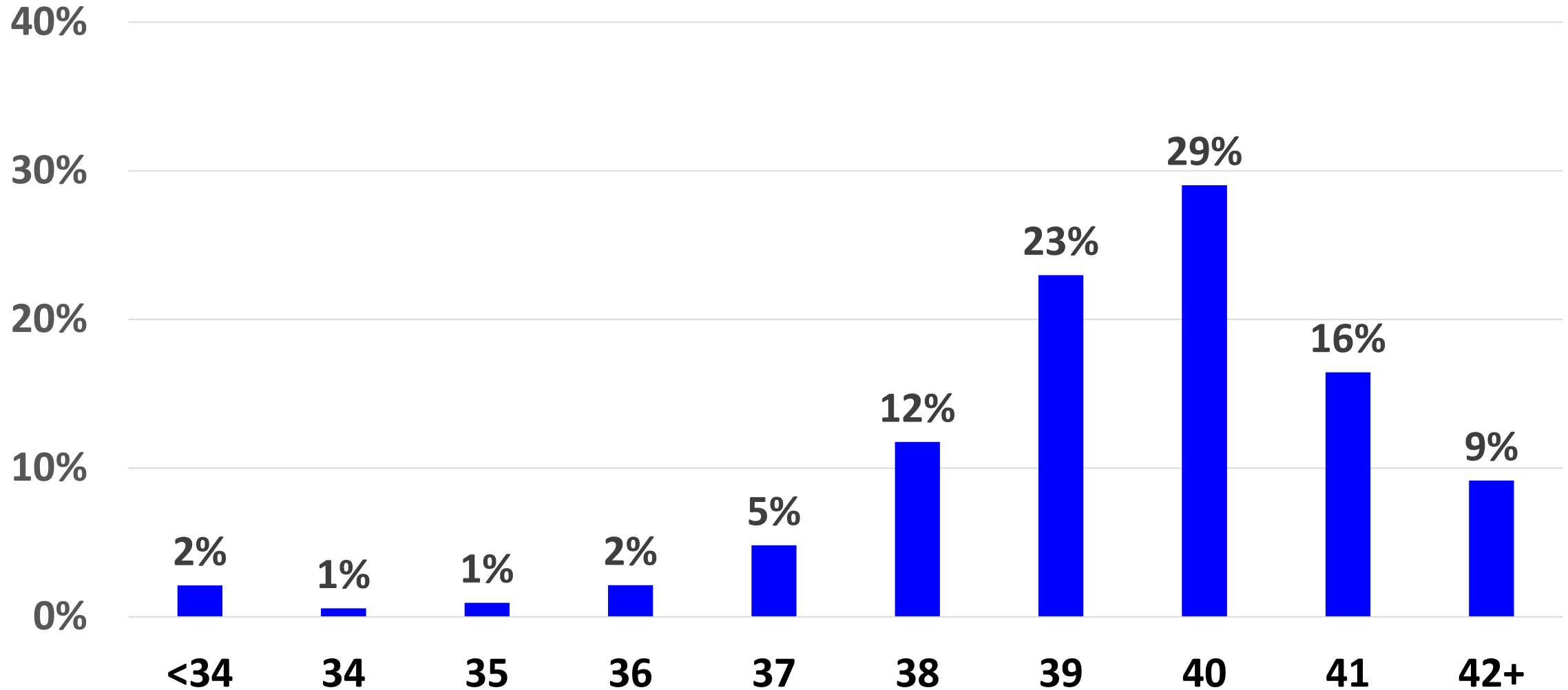
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Gestational Age*, U. S., Home Births, 2008



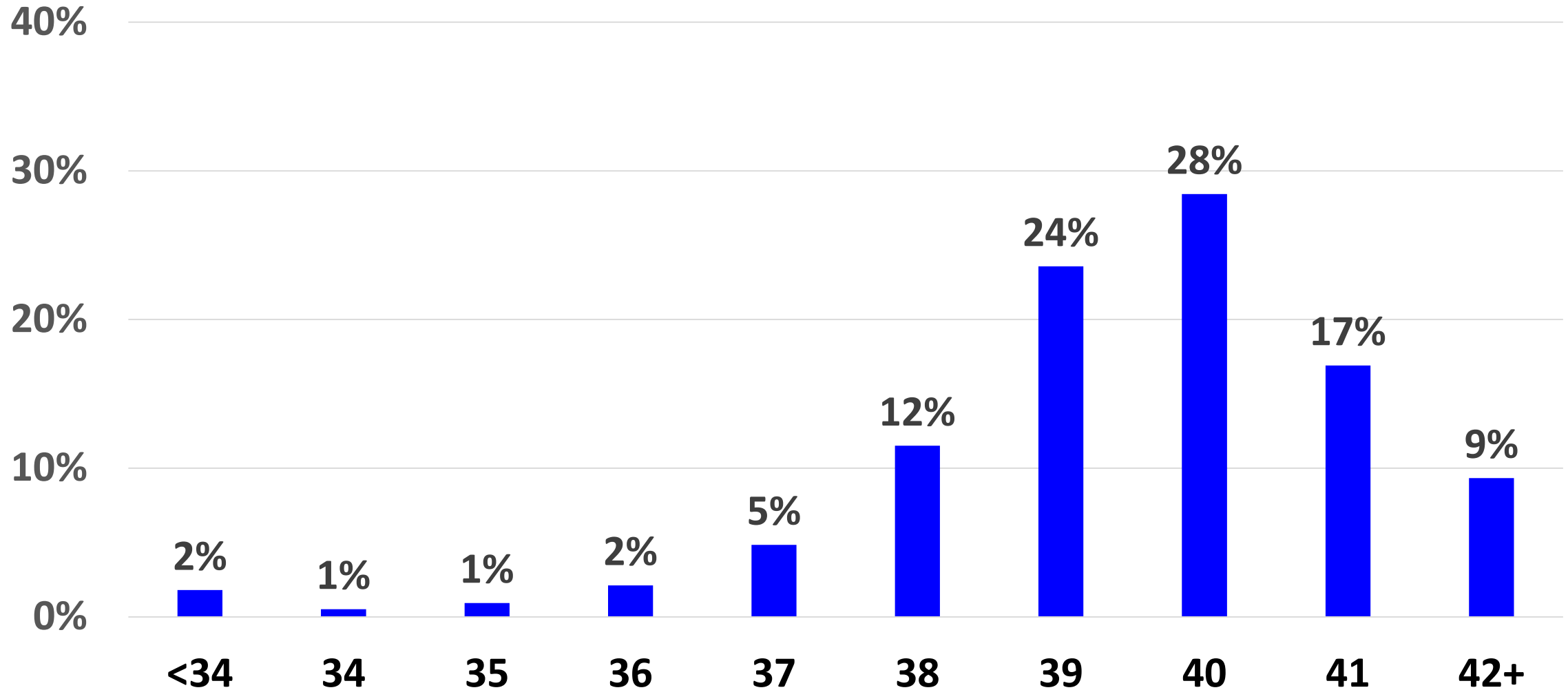
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Gestational Age*, U. S., Home Births, 2009



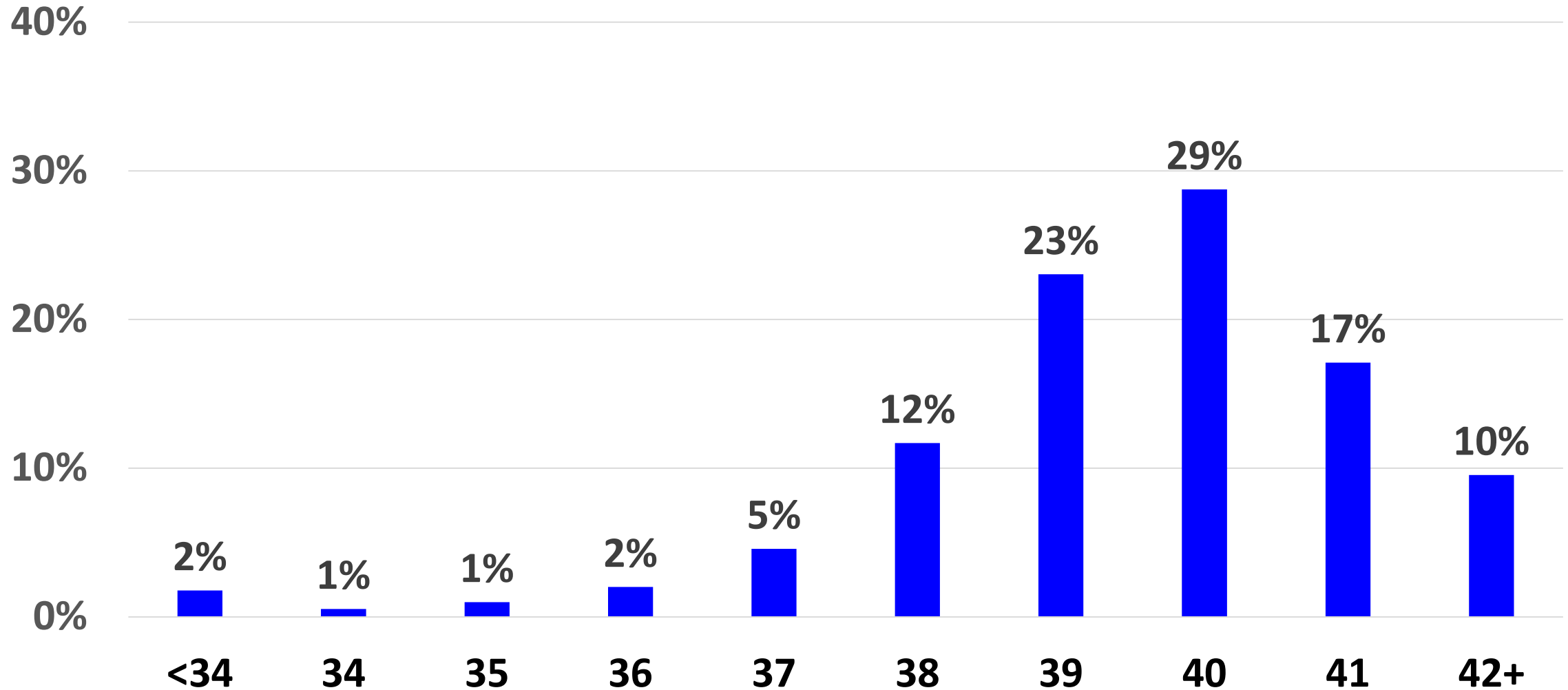
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Gestational Age*, U. S., Home Births, 2010



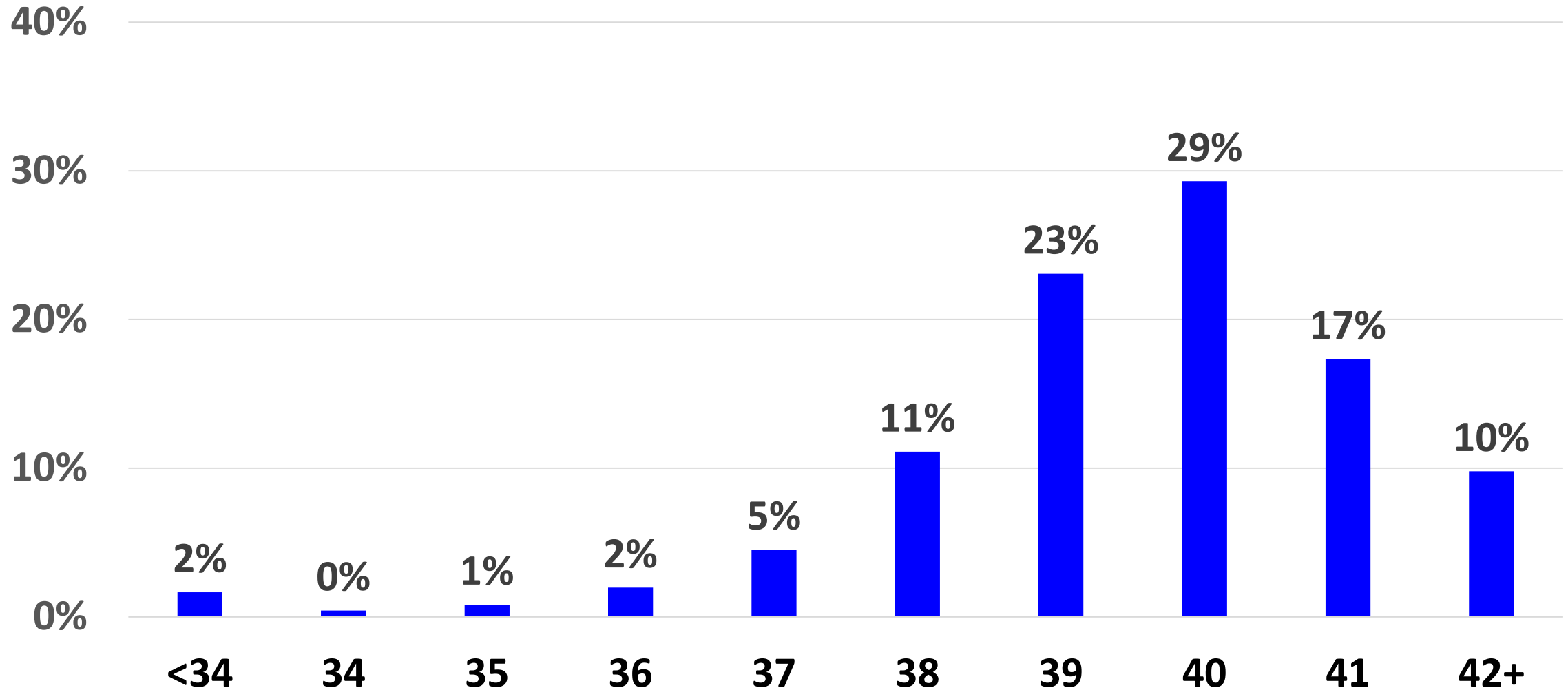
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Gestational Age*, U. S., Home Births, 2011



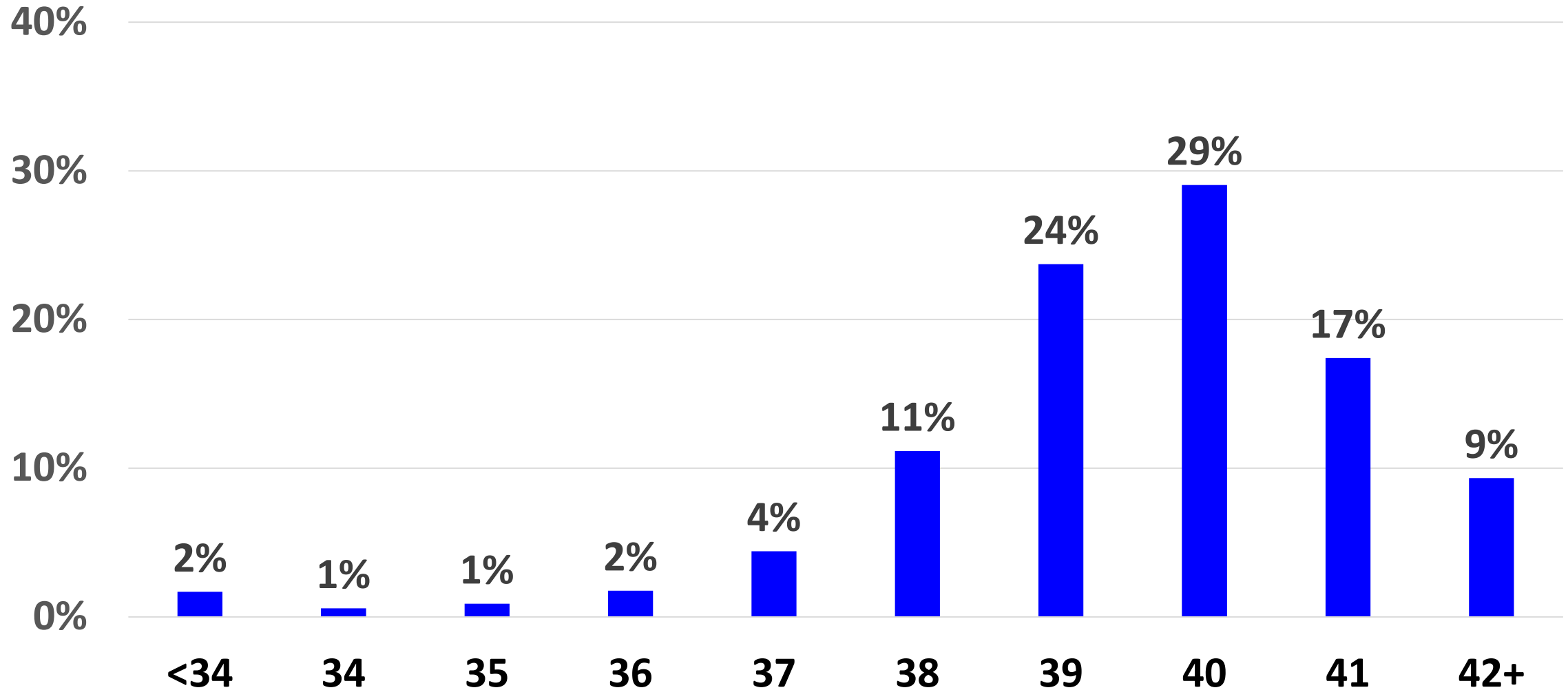
* LMP

Gestational Age*, U. S., Home Births, 2012



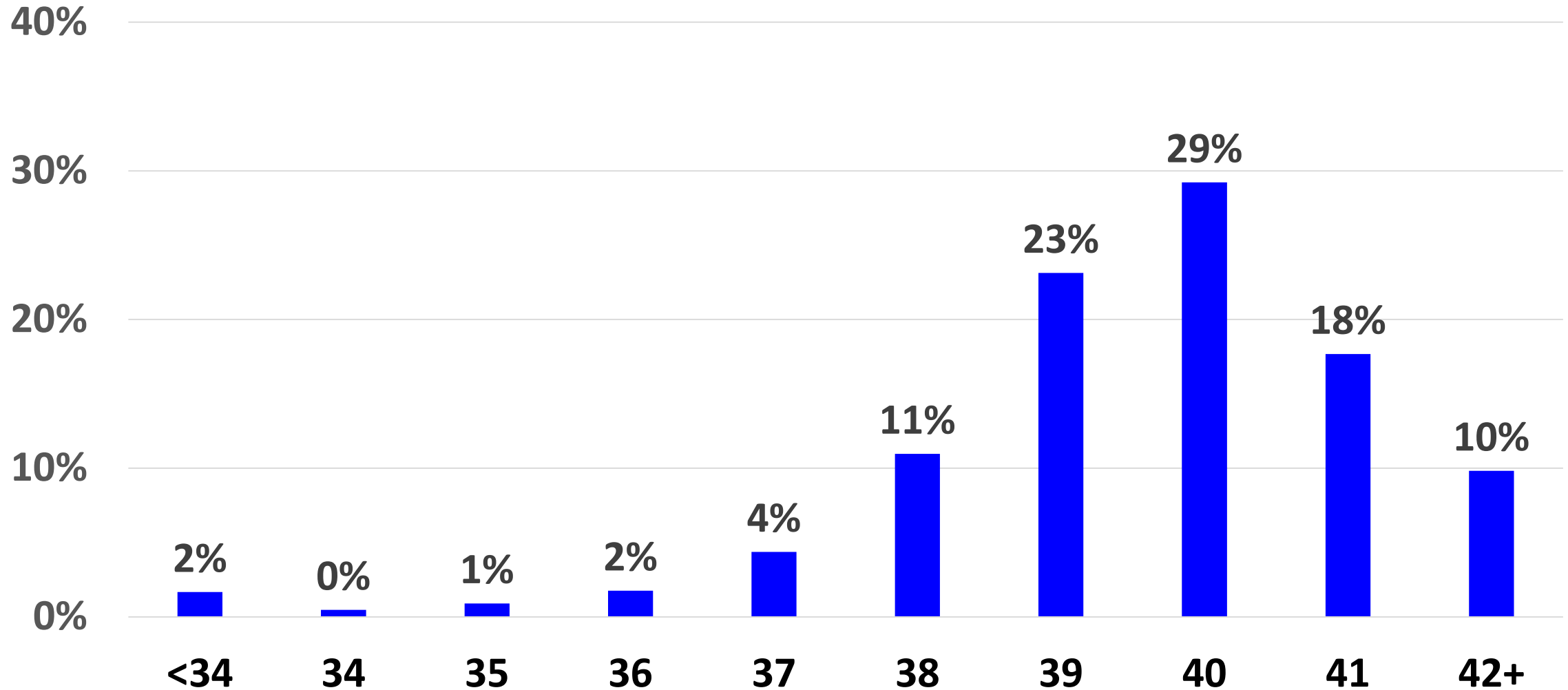
* LMP

Gestational Age*, U. S., Home Births, 2013



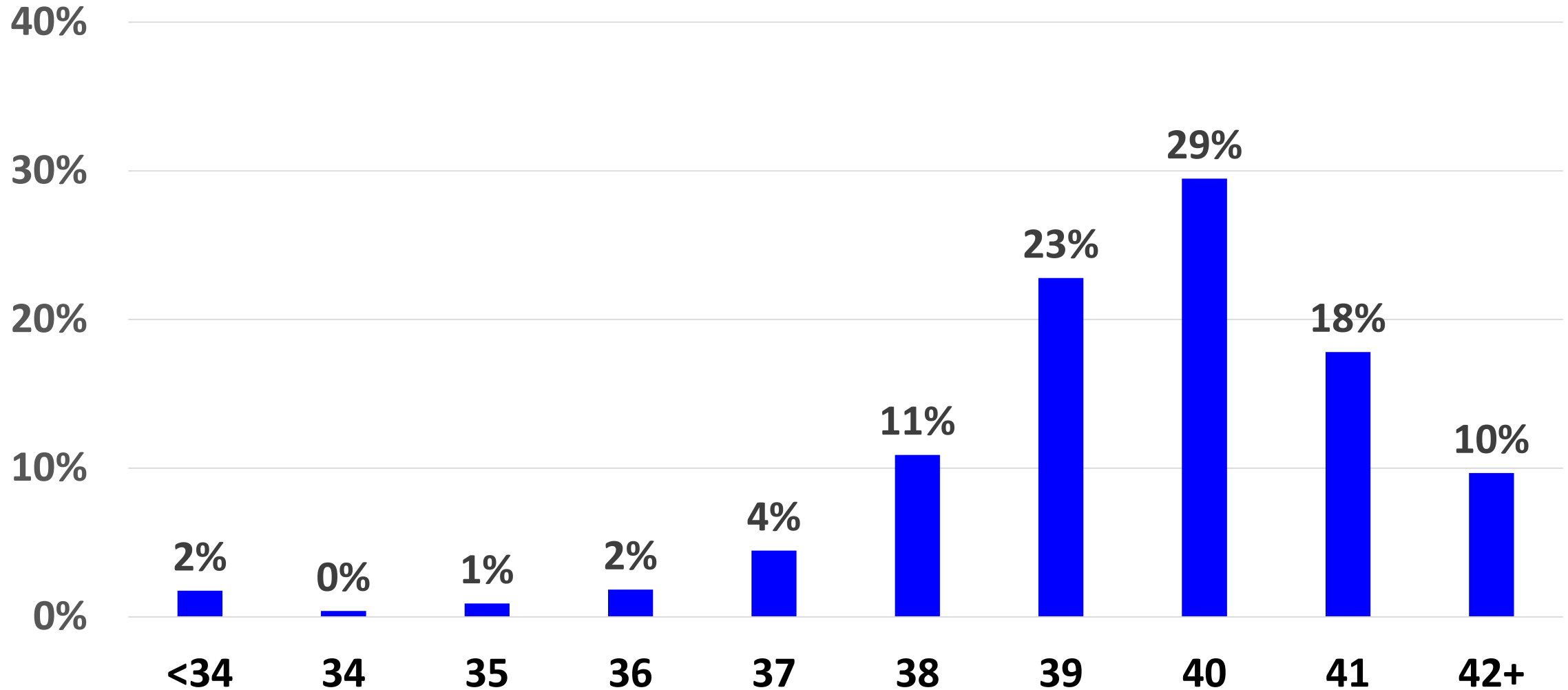
* LMP

Gestational Age*, U. S., Home Births, 2014



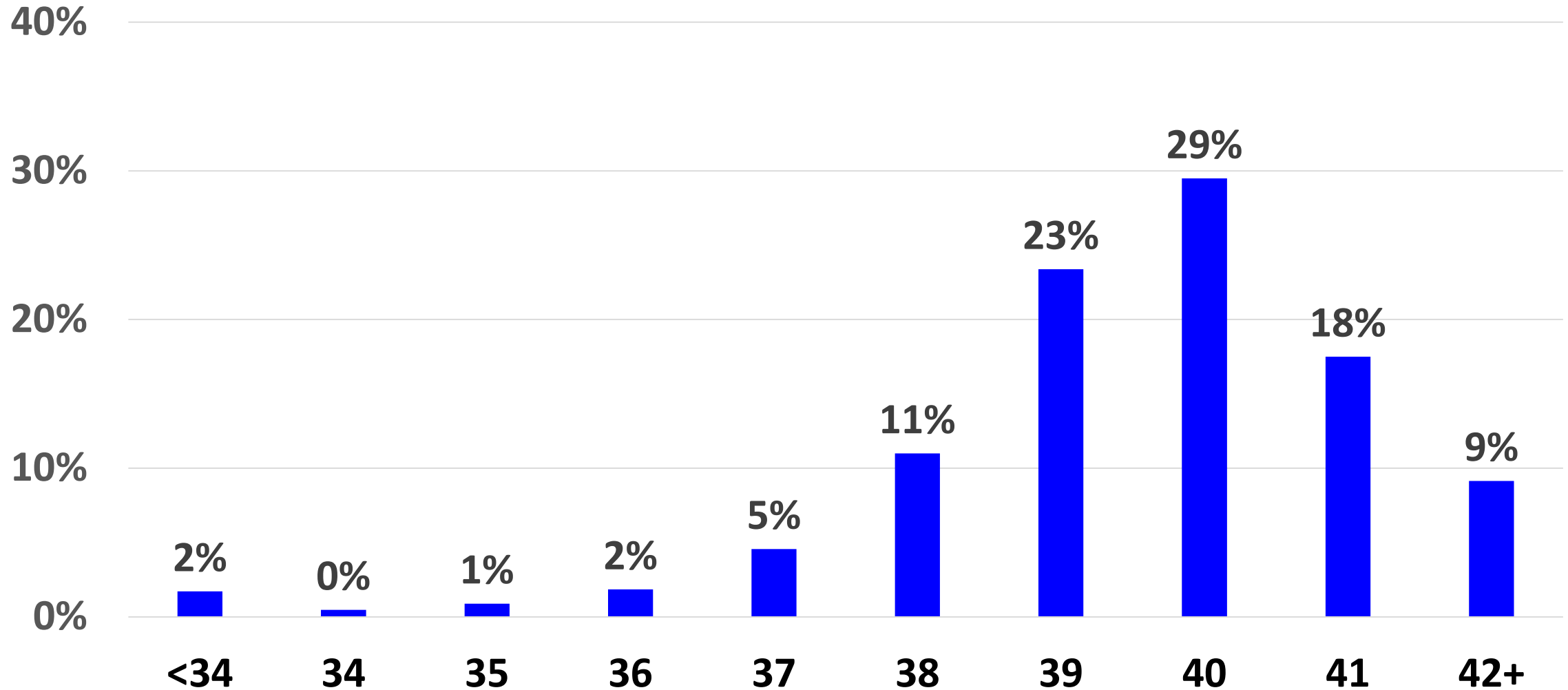
* LMP

Gestational Age*, U. S., Home Births, 2015



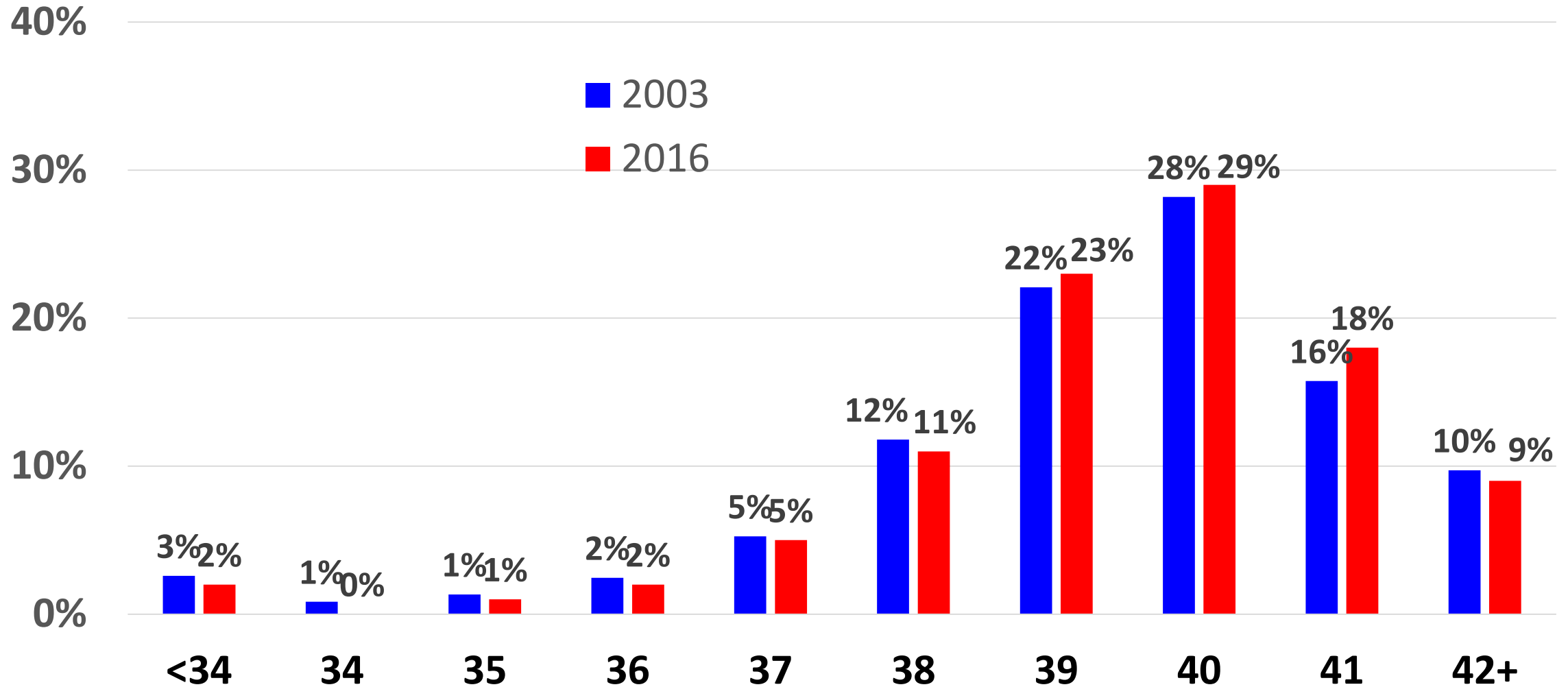
* LMP

Gestational Age*, U. S., Home Births, 2016



* LMP

Gestational Age*, U. S., Home Births, 2003 & 2016



* LMP

**Politically we're at a point where
people are divided and repeatedly
talking past each other.**

**Sense of two worlds with each having
their own reality.**

Is there a parallel in childbirth?

Much of the clinical world sees the solution to the problem of maternal mortality requiring more resources and greater levels of specialized care and medical intervention.

Many here at this conference see the overuse of intervention as the problem and not the solution.

It's not an internal battle, the media is heavily engaged in the issue....

Pro Publica Series& NYT Mag.

***Focus On Infants During
Childbirth Leaves U.S. Moms In
Danger***

***Nothing Protects Black Women
From Dying in Pregnancy and
Childbirth***

***How Many American Women Die
From Causes Related to Pregnancy
or Childbirth? No One Knows.***

*NEW YORK TIMES MAGAZINE
APRIL 19, 2018*

***How can maternal mortality
become politicized?***

Recent Increases in the U.S. Maternal Mortality Rate

Disentangling Trends From Measurement Issues

Marian F. MacDorman, PhD, Eugene Declercq, PhD, Howard Cabral, PhD, and Christine Morton, PhD

RESULTS: The estimated maternal mortality rate (per 100,000 live births) for 48 states and Washington, DC (excluding California and Texas, analyzed separately) increased by 26.6%, from 18.8 in 2000 to 23.8 in 2014. California showed a declining trend, whereas Texas had a sudden increase in 2011–2012. Analysis of the measurement change suggests that U.S. rates in the early 2000s were higher than previously reported.

Obstet Gynecol 2016;128:447–55.

Politicizing Maternal Mortality

“While the authors would not say there was a direct relationship between the cuts and the rise in maternal deaths, we think.....”

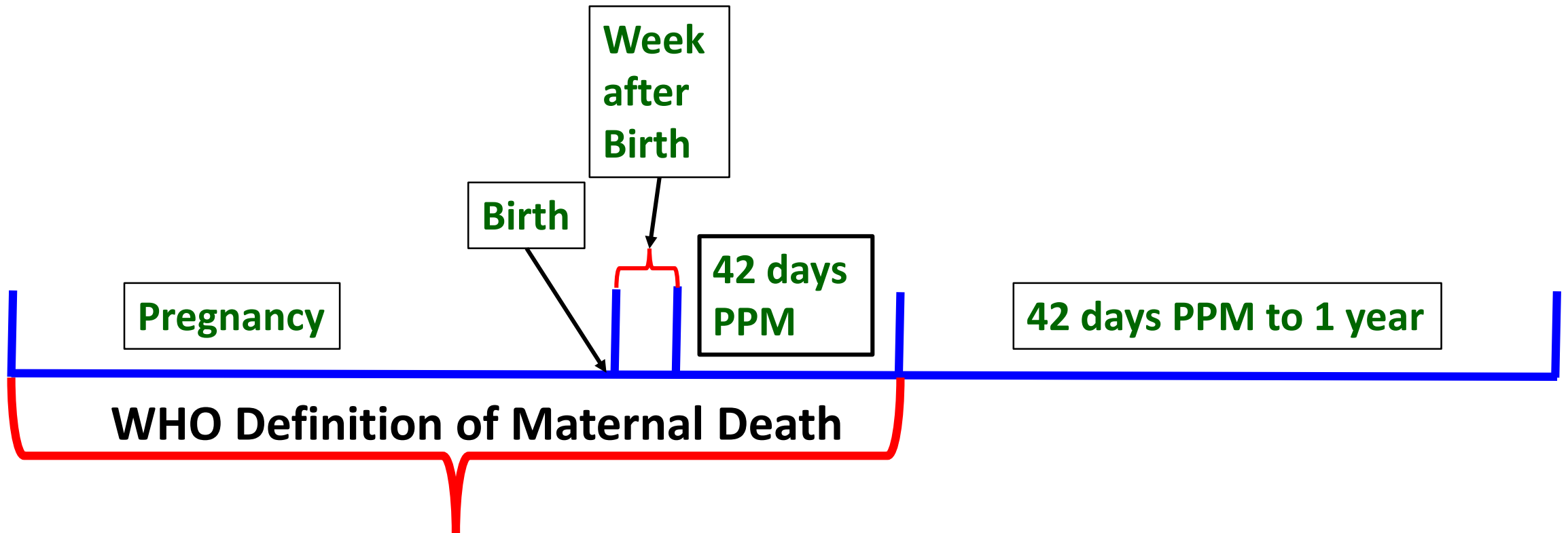
*Can we at least find agreement
on the status of maternal
mortality in the U.S at this time?*

Sort of, but that may not be the
point. First, the sort of....

Definitions (in the U.S.)

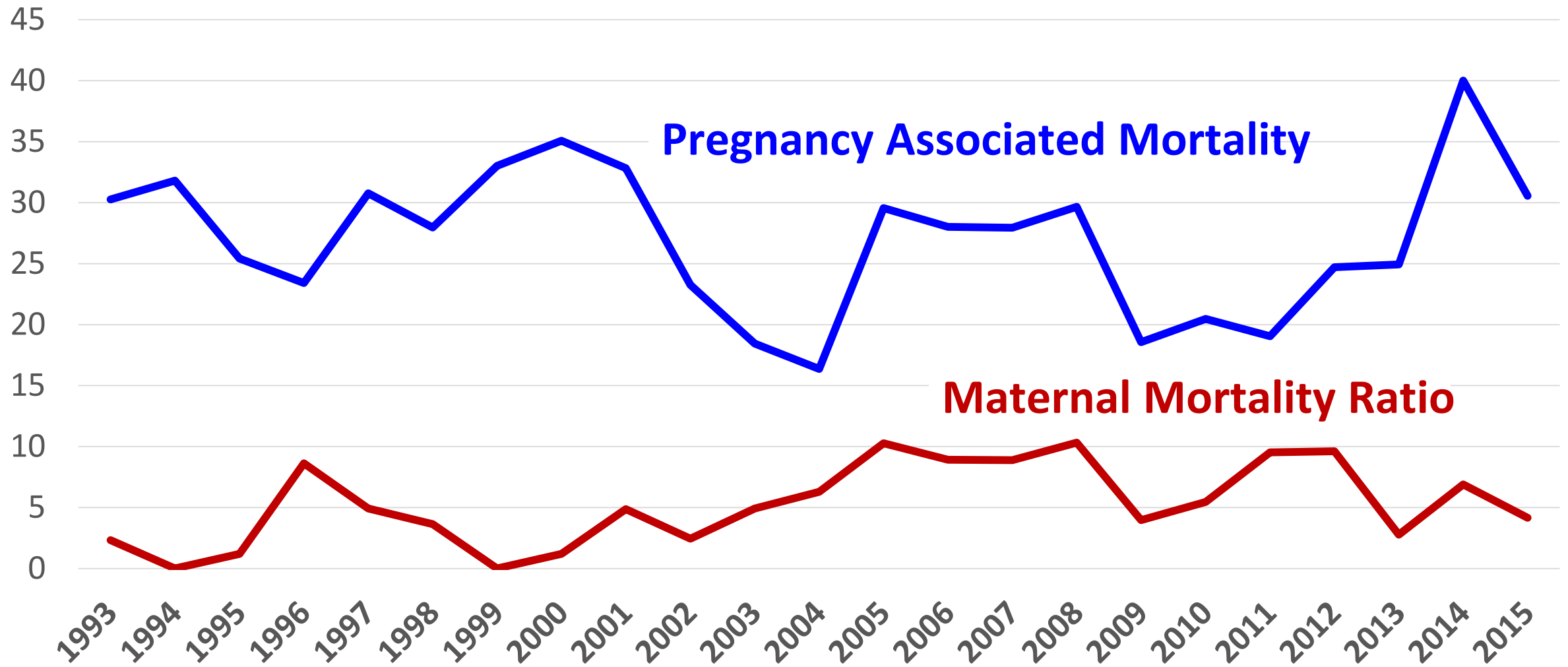
- **Pregnancy Associated Death** – The death of a woman while pregnant or *within one year* of termination of pregnancy, *irrespective of cause*. (WHO calls these “pregnancy related”)
- **Pregnancy Related Death** – the death of a woman during pregnancy or *within one year* of the end of pregnancy from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.
- **Maternal Mortality Ratio** – the death of a woman *while pregnant or within 42 days of termination of pregnancy*, irrespective of the duration and site of the pregnancy, from any cause *related to or aggravated by the pregnancy* or its management but not from accidental or incidental causes. Typically reported as a ratio per 100,000 births.

Timeline of Maternal Mortality Definition



PPM – postpartum –period after the birth

Massachusetts Maternal Deaths, (per 100,000), 1992-2015



MDG region (in bold)	MMR ^a	Range of MMR uncertainty (80% UI)		Number of maternal deaths ^b	Lifetime risk of maternal death: ^c 1 in
		Lower estimate	Upper estimate		
World	216	207	249	303 000	180
Developed regions^d	12	11	14	1 700	4 900
Developing regions	239	229	275	302 000	150
Northern Africa^e	70	56	92	3 100	450
Sub-Saharan Africa^f	546	511	652	201 000	36
Eastern Asia^g	27	23	33	4 800	2 300
Eastern Asia excluding China	43	24	86	378	1 500
Southern Asia^h	176	153	216	66 000	210
Southern Asia excluding India	180	147	249	21 000	190
South-eastern Asiaⁱ	110	95	142	13 000	380
Western Asia^j	91	73	125	4 700	360
Caucasus and Central Asia^k	33	27	45	610	1 100
Latin America and the Caribbean	67	64	77	7 300	670
Latin America ^l	60	57	66	6 600	760
Caribbean ^m	175	130	265	1 300	250
Oceaniaⁿ	187	95	381	500	150

**MMR
Estimates
(per
100,000),
Number of
Deaths &
Estimated
Lifetime Risk**

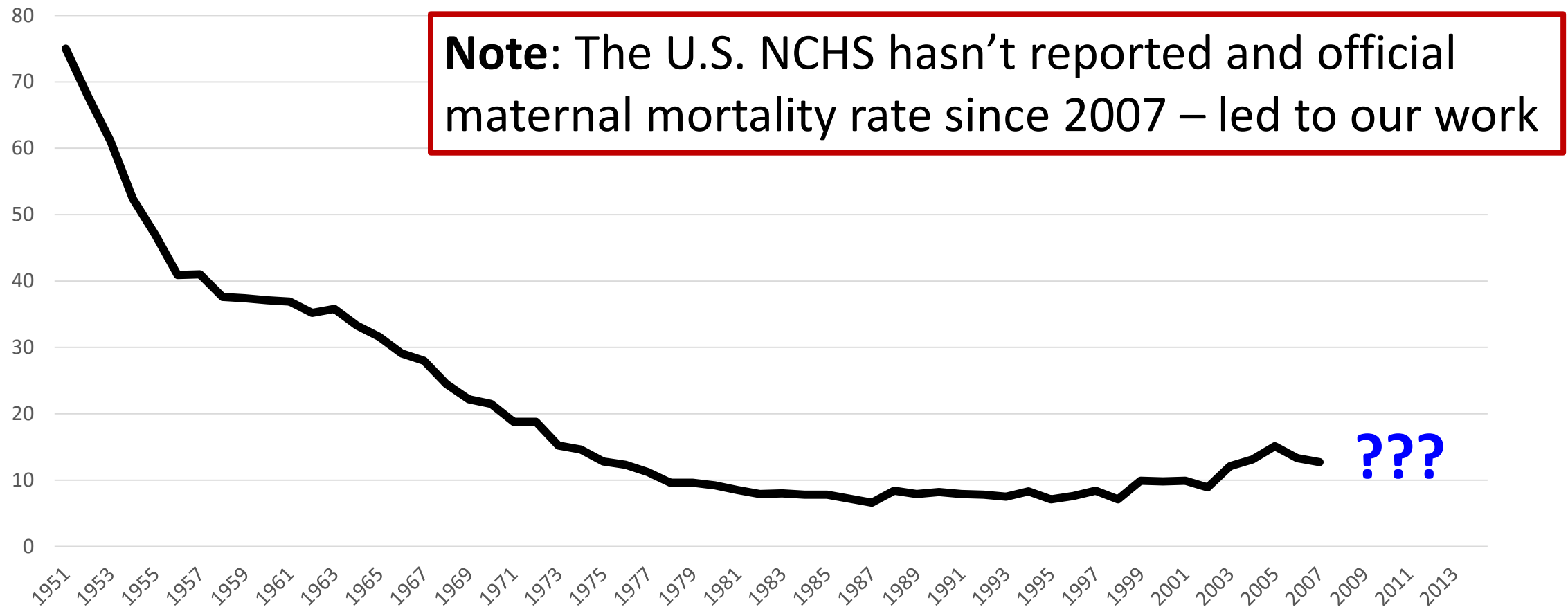
Trends in Maternal Mortality: 1990 to 2015

Estimates by WHO, UNICEF, UNFPA, World Bank Group
and the United Nations Population Division

*Decrease is less a reflection of
improvement and more a function of
the difficulty in estimating the
maternal mortality rate in the U.S.*

Country and territory	MMR ^b	Range of MMR uncertainty (UI 80%)		Number of maternal deaths ^c	Lifetime risk of maternal death: ^d 1 in	% of AIDS- related indirect maternal deaths ^e	PM	Range of PM uncertainty (UI 80%)	
		Lower estimate	Upper estimate					Lower estimate	Upper estimate
United Kingdom	9	8	11	74	5 800	—	0.8	0.6	0.9
United Republic of Tanzania	398	281	570	8 200	45	2.4	18.4	13.0	26.3
United States of America	14	12	16	550	3 800	—	0.8	0.7	0.9
Uruguay	15	11	19	7	3 300	—	0.9	0.7	1.2
Uzbekistan	36	20	65	240	1 000	—	2.2	1.2	4.0

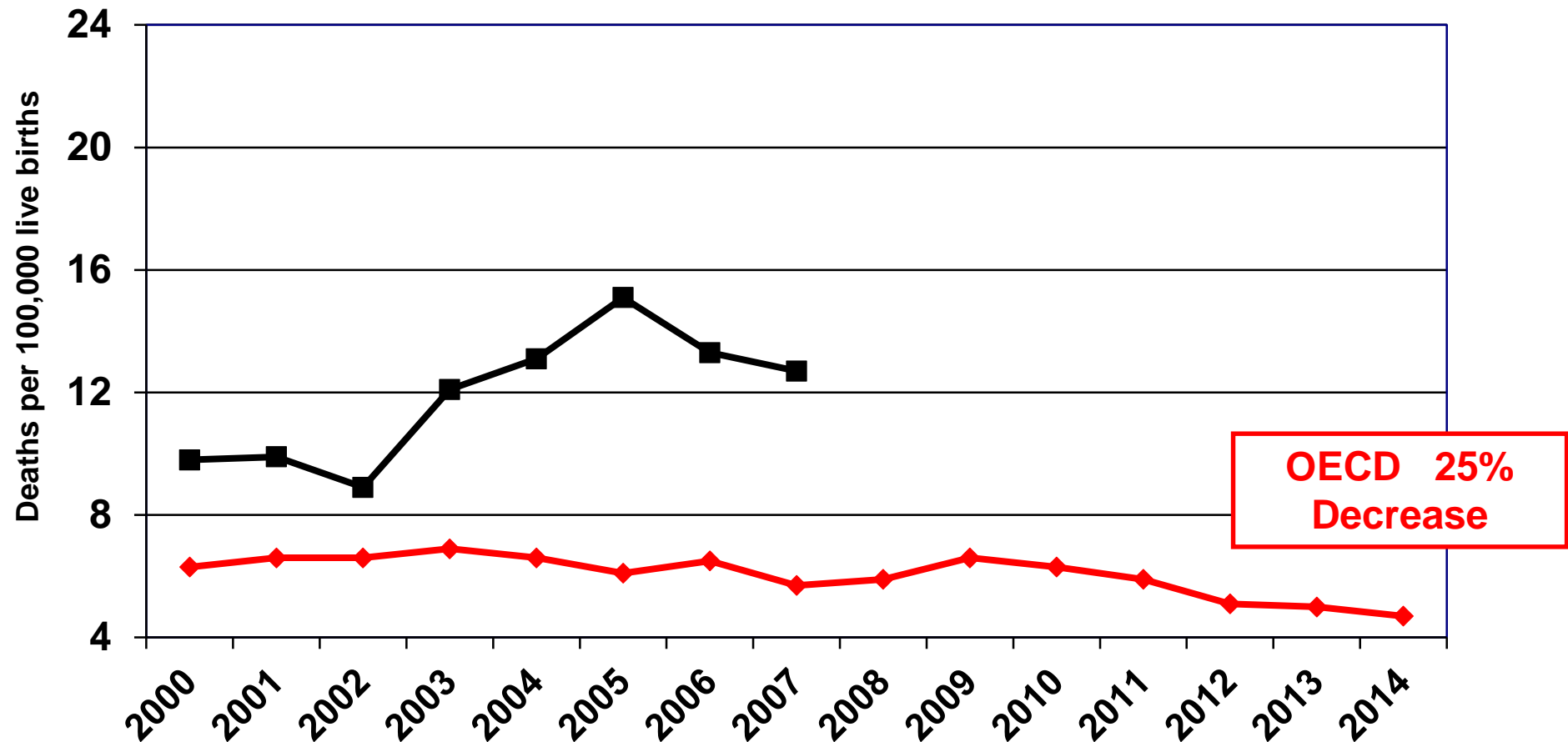
U.S. Maternal Mortality (per 100,000 live births), 1951-2007



Source: NCHS. Deaths: Final Data. Annual Reports.

After 2007 no official maternal mortality rate was available to use for monitoring

*Maternal Mortality Ratios (per 100K births), 2000-2014, U.S. & Comparable Countries **



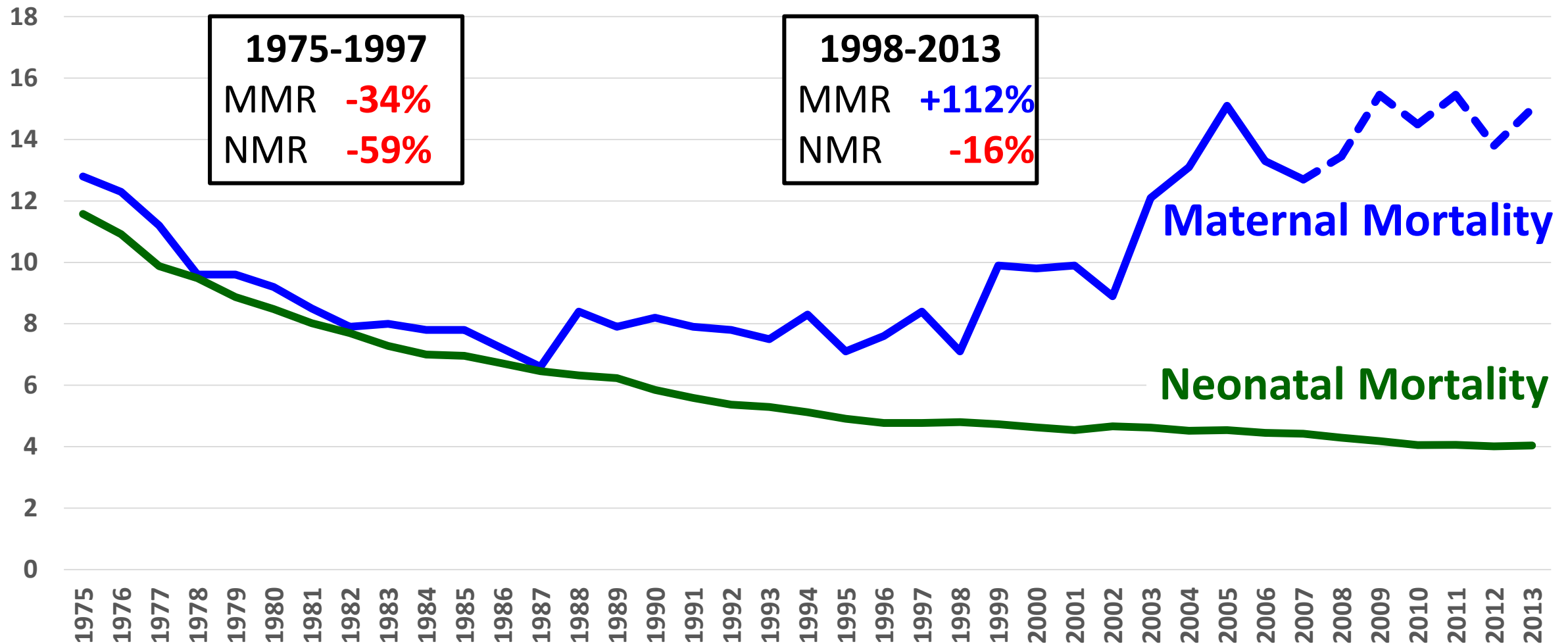
* Countries with 300,000+ births (2014): Australia, Canada, France, Germany, Italy, Japan, S. Korea, Spain, United Kingdom

Sources: OECD Health Data 2018; NCHS. 2009. *Deaths, Final Data, 2007*.

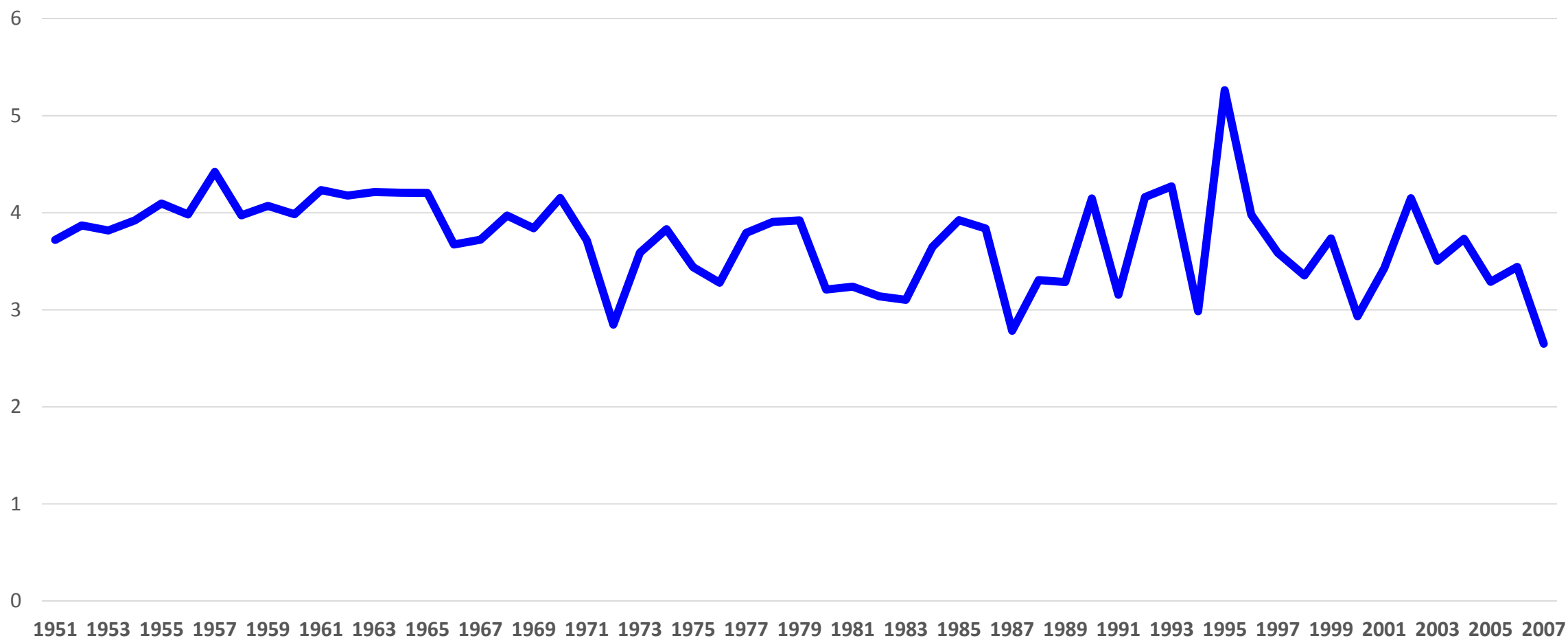
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Two More Problems with U.S. Maternal Mortality

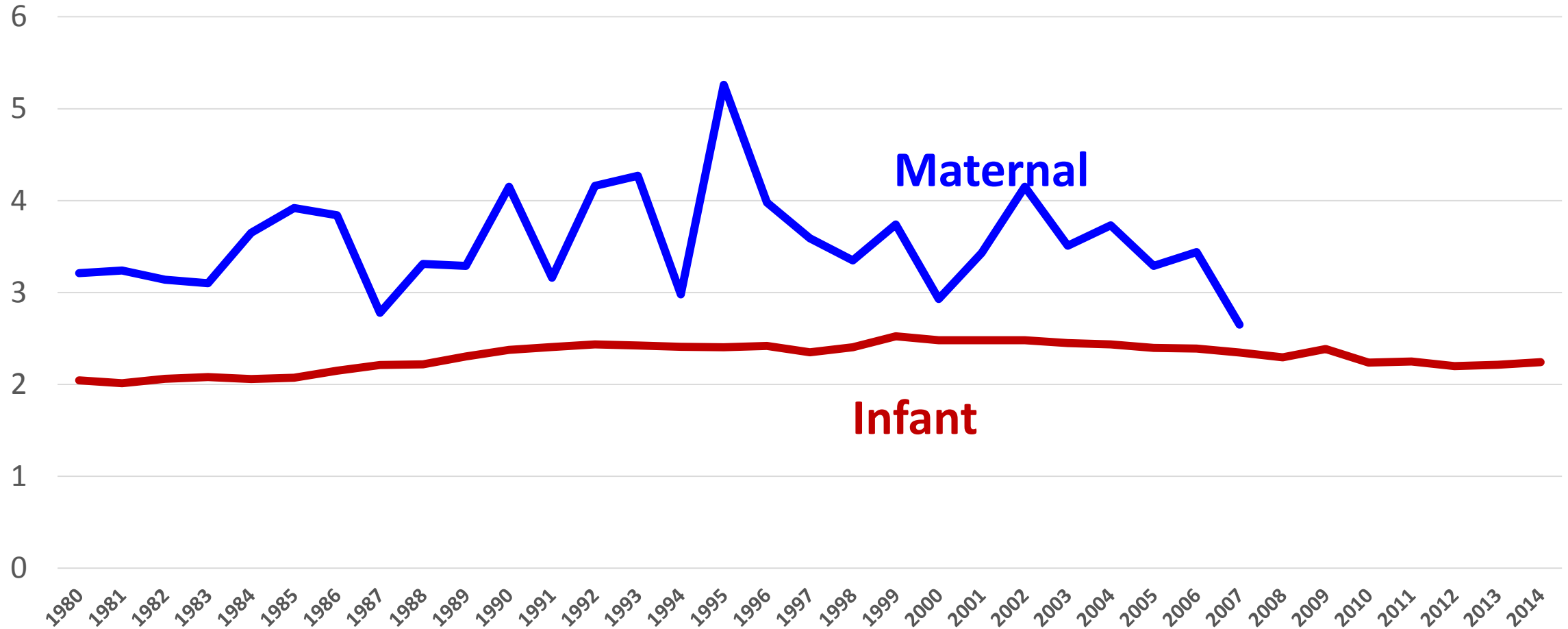
*U.S. Maternal Mortality (per 100,000 live births)
and Neonatal Mortality (per 1,000), 1975-2013*



U.S. Maternal Mortality Ratio of Black to White Rates 1951-2007



U.S. Infant & Maternal Mortality Black to White Ratios of 1980-2014



***So has there been any way to monitor
maternal death since 2007?***

CDC and Pregnancy Related Mortality

Pregnancy Mortality Surveillance System



Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™



CDC A-Z INDEX ▾

Reproductive Health

Reproductive Health

About Us



Data and Statistics



Emergency Preparedness



Maternal and Child Health
Epidemiology Program



Pregnancy Risk Assessment
Monitoring System

Infertility



Assisted Reproductive
Technology (ART)

Depression Among Women



Maternal and Infant Health



Pregnancy Complications



Weight Gain During
Pregnancy

Tobacco Use and Pregnancy



Pregnancy-Related Deaths



Pregnancy Mortality Surveillance System

Perinatal Quality
Collaboratives



Preterm Birth



[CDC](#) > [Reproductive Health](#) > [Maternal and Infant Health](#) > [Pregnancy-Related Deaths](#)

Pregnancy Mortality Surveillance System



When did CDC start conducting national surveillance of pregnancy-related deaths?

CDC initiated national surveillance of pregnancy-related deaths in 1986 because more clinical information was needed to fill data gaps about causes of maternal death.

How does CDC define pregnancy-related deaths?

For reporting purposes, a pregnancy-related death is defined as the death of a woman while pregnant or within 1 year of pregnancy termination—regardless of the duration or site of the pregnancy—from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

How are the data collected and coded?

Each year, CDC requests the 52 reporting areas (50 states, New York City, and Washington DC) to voluntarily send copies of death certificates for all women who died during pregnancy or within 1 year of pregnancy, and copies of the matching birth or fetal death certificates, if they have the ability to perform such record links. All of the information obtained is summarized, and medically trained epidemiologists determine the cause and time of death related to the pregnancy. Causes of death are coded by using a system established in 1986 by the American College of Obstetricians and Gynecologists and the Centers for Disease Control and Prevention Maternal Mortality Study Group.

How are the data used?

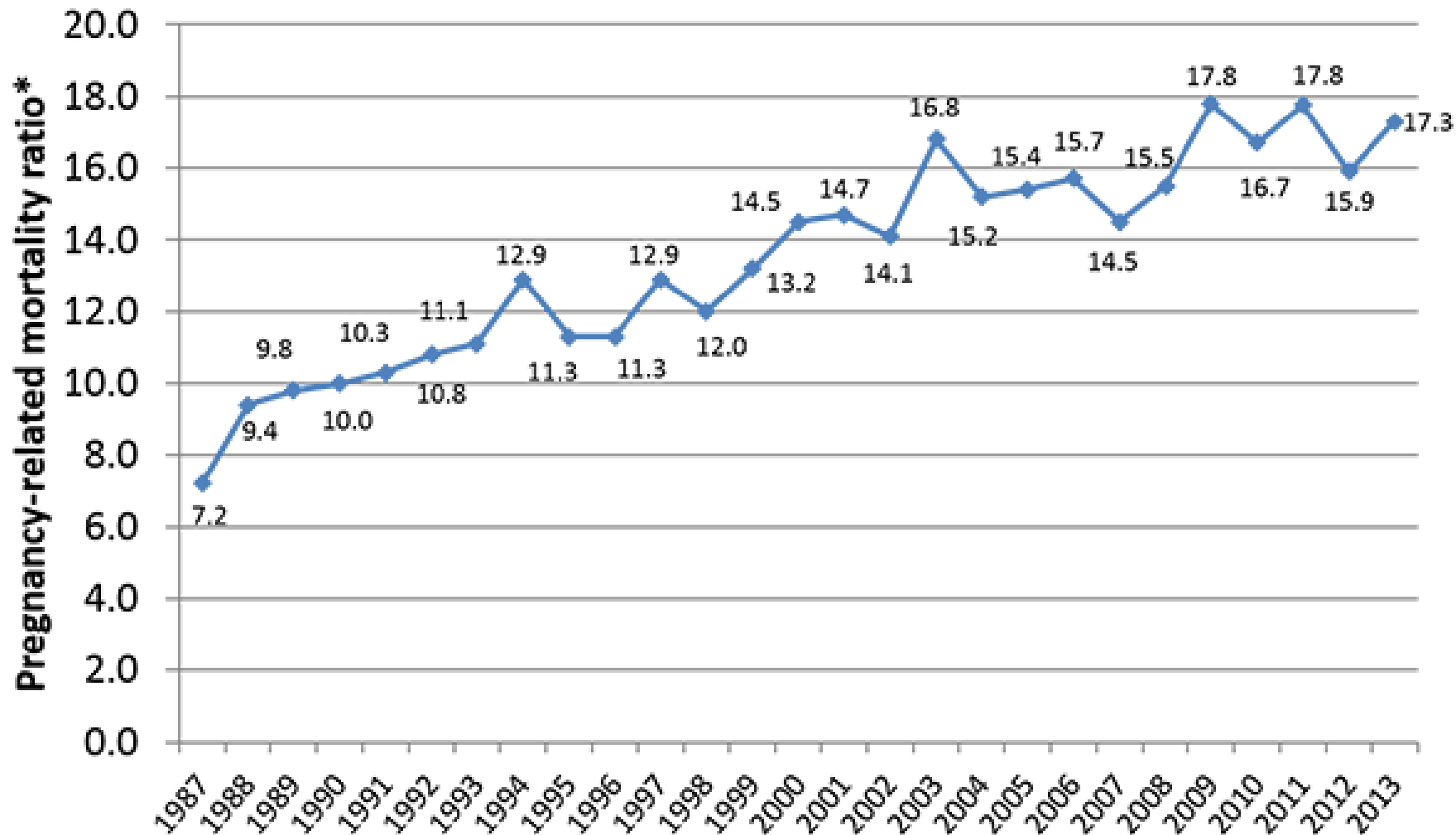
Data are analyzed by CDC scientists. Information about causes of pregnancy-related deaths and risk factors associated with these deaths is released periodically through peer-reviewed literature, CDC's *Morbidity and Mortality Weekly Reports*, and the CDC Web site. This information helps clinicians and public health professionals to better understand circumstances surrounding pregnancy-related deaths and to take appropriate actions to prevent them.



Data for CDCs Pregnancy Related Mortality System

*Each year, CDC requests the 52 reporting areas (50 states, New York City, and Washington DC) to **voluntarily send copies of death certificates for all women who died during pregnancy or within 1 year of pregnancy, and copies of the matching birth or fetal death certificates**, if they have the ability to perform such record links. All of the information obtained is summarized, and medically trained epidemiologists determine the cause and time of death related to the pregnancy. Causes of death are coded by using a system established in 1986 by the American College of Obstetricians and Gynecologists and the Centers for Disease Control and Prevention Maternal Mortality Study Group.*

Pregnancy Related Mortality, U.S., 1987-2013



*Note: Number of pregnancy-related deaths per 100,000 live births per year.

Racial Disparities

Rates for 2011-13:

12.7 white women

43.5 black women

11.0 Hispanic

14.4 other races

Source: CDC.

Creanga. Pregnancy-Related Mortality in the United States. *Obstet Gynecol* 2017.

BirthByTheNumbers.org

Underlying cause of death

Total maternal deaths (during pregnancy or within 42 days after the end of pregnancy) (A34, O00-O95, O98-O99)

Total direct obstetric causes (A34, O00-O92)

Pregnancy with abortive outcome (O00-O07)

Ectopic pregnancy (O00)

Hypertensive disorders (O10-O16)

Pre-existing hypertension (O10)

Eclampsia and pre-eclampsia (O11,O13-O16)

Obstetric Hemorrhage (O20,O43.2,O44-O46,O67,O71.0-O71.1, O71.3-O71.4,O71.7,O72)

Pregnancy-related infection (O23,O41.1,O75.3,O85,O86,O91)

Puerperal sepsis (O85)

Other obstetric complications (O21-O22,O24-O28,O30-O41.0, O41.8-O43.1, O43.8-O43.9,O47--O66,O68-O70,O71.2, O71.5, O71.6, O71.8, O71.9,O73,O75.0-O75.2,O75.4-O75.9,O87-O90,O92)

Diabetes mellitus in pregnancy (O24)

Liver disorders in pregnancy (O26.6)

Other specified pregnancy-related conditions (O26.8)

Obstetric embolism (O88)

Cardiomyopathy in the puerperium (O90.3)

Anesthesia-related complications (O29,O74,O89)

Total indirect causes (O98-O99)

Mental disorders and diseases of the nervous system (O99.3)

Diseases of the circulatory system (O99.4)

Diseases of the respiratory system (O99.5)

Other specified diseases and conditions (O99.8)

Obstetric death of unspecified cause (O95)

Late maternal causes (43 days-1 year after the end of pregnancy) (O96-O97)

**Maternal Death
ICD-10 Codes**

Revised (2003) U.S. Standard Certificate of Death

LOCAL FILE NO.		U.S. STANDARD CERTIFICATE OF DEATH		STATE FILE NO.	
1. DECEDENT'S LEGAL NAME (Include AKA's if any) (First, Middle, Last)		2. SEX		3. SOCIAL SECURITY NUMBER	
4a. AGE-Last Birthday (Years)		4b. UNDER 1 YEAR Months Days		4c. UNDER 1 DAY Hours Minutes	
5. DATE OF BIRTH (Mo/Day/Yr)		6. BIRTH-PLACE (City and State or Foreign Country)			
7a. RESIDENCE-STATE		7b. COUNTY		7c. CITY OR TOWN	
7d. STREET AND NUMBER		7e. APT. NO.		7f. ZIP CODE	
7g. INSIDE CITY LIMITS? <input type="checkbox"/> Yes <input type="checkbox"/> No					
8. EVER IN US ARMED FORCES? <input type="checkbox"/> Yes <input type="checkbox"/> No		9. MARITAL STATUS AT TIME OF DEATH <input type="checkbox"/> Married <input type="checkbox"/> Married, but separated <input type="checkbox"/> Widowed <input type="checkbox"/> Divorced <input type="checkbox"/> Never Married <input type="checkbox"/> Unknown		10. SURVIVING SPOUSE'S NAME (If wife, give name prior to first marriage)	
11. FATHER'S NAME (First, Middle, Last)		12. MOTHER'S NAME PRIOR TO FIRST MARRIAGE (First, Middle, Last)			
13a. INFORMANT'S NAME		13b. RELATIONSHIP TO DECEDENT		13c. MAILING ADDRESS (Street and Number, City, State, Zip Code)	
14. PLACE OF DEATH (Check only one: see instructions)					
IF DEATH OCCURRED IN A HOSPITAL: <input type="checkbox"/> Inpatient <input type="checkbox"/> Emergency Room/Outpatient <input type="checkbox"/> Dead on Arrival					
IF DEATH OCCURRED SOMEWHERE OTHER THAN A HOSPITAL: <input type="checkbox"/> Hospice facility <input type="checkbox"/> Nursing home/Long term care facility <input type="checkbox"/> Decedent's home <input type="checkbox"/> Other (Specify):					
15. FACILITY NAME (If not institution, give street & number)		16. CITY OR TOWN, STATE, AND ZIP CODE		17. COUNTY OF DEATH	
18. METHOD OF DISPOSITION: <input type="checkbox"/> Burial <input type="checkbox"/> Cremation <input type="checkbox"/> Donation <input type="checkbox"/> Entombment <input type="checkbox"/> Removal from State <input type="checkbox"/> Other (Specify):		19. PLACE OF DISPOSITION (Name of cemetery, crematory, other place)			
20. LOCATION-CITY, TOWN, AND STATE		21. NAME AND COMPLETE ADDRESS OF FUNERAL FACILITY			
22. SIGNATURE OF FUNERAL SERVICE LICENSEE OR OTHER AGENT				23. LICENSE NUMBER (Of Licensee)	
ITEMS 24-28 MUST BE COMPLETED BY PERSON WHO PRONOUNCES OR CERTIFIES DEATH				24. DATE PRONOUNCED DEAD (Mo/Day/Yr)	
25. TIME PRONOUNCED DEAD				26. SIGNATURE OF PERSON PRONOUNCING DEATH (Only when applicable)	
27. LICENSE NUMBER				28. DATE SIGNED (Mo/Day/Yr)	
29. ACTUAL OR PRESUMED DATE OF DEATH (Mo/Day/Yr) (Spell Month)		30. ACTUAL OR PRESUMED TIME OF DEATH		31. WAS MEDICAL EXAMINER OR CORONER CONTACTED? <input type="checkbox"/> Yes <input type="checkbox"/> No	
CAUSE OF DEATH (See instructions and examples)					
32. PART I. Enter the chain of events—diseases, injuries, or complications—that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.					
IMMEDIATE CAUSE (Final disease or condition resulting in death) → a. _____ Due to (or as a consequence of): _____					
Sequentially list conditions, if any, leading to the cause listed on line a. Enter the UNDERLYING CAUSE (disease or injury that initiated the events resulting in death) LAST b. _____ Due to (or as a consequence of): _____					
c. _____ Due to (or as a consequence of): _____					
d. _____					
PART II. Enter other significant conditions contributing to death but not resulting in the underlying cause given in PART I					
33. WAS AN AUTOPSY PERFORMED? <input type="checkbox"/> Yes <input type="checkbox"/> No					
34. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> No					
35. DID TOBACCO USE CONTRIBUTE TO DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> Probably <input type="checkbox"/> No <input type="checkbox"/> Unknown		36. IF FEMALE: <input type="checkbox"/> Not pregnant within past year <input type="checkbox"/> Pregnant at time of death <input type="checkbox"/> Not pregnant, but pregnant within 42 days of death <input type="checkbox"/> Not pregnant, but pregnant 43 days to 1 year before death <input type="checkbox"/> Unknown if pregnant within the past year		37. MANNER OF DEATH <input type="checkbox"/> Natural <input type="checkbox"/> Homicide <input type="checkbox"/> Accident <input type="checkbox"/> Pending Investigation <input type="checkbox"/> Suicide <input type="checkbox"/> Could not be determined	
38. DATE OF INJURY (Mo/Day/Yr) (Spell Month)		39. TIME OF INJURY		40. PLACE OF INJURY (e.g., Decedent's home, construction site, restaurant, wooded area)	
41. INJURY AT WORK? <input type="checkbox"/> Yes <input type="checkbox"/> No					
42. LOCATION OF INJURY: State: _____ City or Town: _____					
Street & Number: _____ Apartment No.: _____ Zip Code: _____					
43. DESCRIBE HOW INJURY OCCURRED:		44. IF TRANSPORTATION INJURY, SPECIFY: <input type="checkbox"/> Driver/Operator <input type="checkbox"/> Passenger <input type="checkbox"/> Pedestrian <input type="checkbox"/> Other (Specify):			
45. CERTIFIER (Check only one): <input type="checkbox"/> Certifying physician-To the best of my knowledge, death occurred due to the cause(s) and manner stated. <input type="checkbox"/> Pronouncing & Certifying physician-To the best of my knowledge, death occurred at the time, date, and place, and due to the cause(s) and manner stated. <input type="checkbox"/> Medical Examiner/Coroner-On the basis of examination, and/or investigation, in my opinion, death occurred at the time, date, and place, and due to the cause(s) and manner stated.					
Signature of certifier: _____					
46. NAME, ADDRESS, AND ZIP CODE OF PERSON COMPLETING CAUSE OF DEATH (Item 32)					
47. TITLE OF CERTIFIER		48. LICENSE NUMBER		49. DATE CERTIFIED (Mo/Day/Yr)	
50. FOR REGISTRAR ONLY- DATE FILED (Mo/Day/Yr)					
51. DECEDENT'S EDUCATION-Check the box that best describes the highest degree or level of school completed at the time of death. <input type="checkbox"/> 8th grade or less <input type="checkbox"/> 9th - 12th grade; no diploma <input type="checkbox"/> High school graduate or GED completed <input type="checkbox"/> Some college credit, but no degree <input type="checkbox"/> Associate degree (e.g., AA, AS) <input type="checkbox"/> Bachelor's degree (e.g., BA, AB, BS) <input type="checkbox"/> Master's degree (e.g., MA, MS, MEng, MEd, MSc, MFA) <input type="checkbox"/> Doctorate (e.g., PhD, EdD) or Professional degree (e.g., MD, DDS, DVM, LLB, JD)		52. DECEDENT OF HISPANIC ORIGIN? Check the box that best describes whether the decedent is Spanish/Hispanic/Latino. Check the "No" box if decedent is not Spanish/Hispanic/Latino. <input type="checkbox"/> No, not Spanish/Hispanic/Latino <input type="checkbox"/> Yes, Mexican, Mexican American, Chicano <input type="checkbox"/> Yes, Puerto Rican <input type="checkbox"/> Yes, Cuban <input type="checkbox"/> Yes, other Spanish/Hispanic/Latino (Specify) _____		53. DECEDENT'S RACE (Check one or more races to indicate what the decedent considered himself or herself to be) <input type="checkbox"/> White <input type="checkbox"/> Black or African American <input type="checkbox"/> American Indian or Alaska Native (Name of the enrolled or principal tribe) _____ <input type="checkbox"/> Asian Indian <input type="checkbox"/> Chinese <input type="checkbox"/> Filipino <input type="checkbox"/> Japanese <input type="checkbox"/> Korean <input type="checkbox"/> Vietnamese <input type="checkbox"/> Other Asian (Specify) _____ <input type="checkbox"/> Native Hawaiian <input type="checkbox"/> Guamanian or Chamorro <input type="checkbox"/> Samoan <input type="checkbox"/> Other Pacific Islander (Specify) _____ <input type="checkbox"/> Other (Specify) _____	
54. DECEDENT'S USUAL OCCUPATION (Indicate type of work done during most of working life. DO NOT USE RETIRED).					
55. KIND OF BUSINESS/INDUSTRY					

PART II (Other significant conditions)

•Enter all diseases or conditions contributing to death that were not reported in the chain of events in Part I and that did not result in the underlying cause of death. See attached examples.

•If two or more possible sequences resulted in death, or if two conditions seem to have added together, report in Part I the one that, in your opinion, most directly caused death. Report in Part II the other conditions or diseases.

CHANGES TO CAUSE OF DEATH

Should additional medical information or autopsy findings become available that would change the cause of death originally reported, the original death certificate should be amended by the certifying physician by immediately reporting the revised cause of death to the State Vital Records Office.

ITEMS 33-34 - AUTOPSY

•33 - Enter "Yes" if either a partial or full autopsy was performed. Otherwise enter "No."

•34 - Enter "Yes" if autopsy findings were available to complete the cause of death; otherwise enter "No". Leave item blank if no autopsy was performed.

ITEM 35 - DID TOBACCO USE CONTRIBUTE TO DEATH?

Check "yes" if, in your opinion, the use of tobacco contributed to death. Tobacco use may contribute to deaths due to a wide variety of diseases; for example, tobacco use contributes to many deaths due to emphysema or lung cancer and some heart disease and cancers of the head and neck. Check "no" if, in your clinical judgment, tobacco use did not contribute to this particular death.

ITEM 36 - IF FEMALE, WAS DECEDENT PREGNANT AT TIME OF DEATH OR WITHIN PAST YEAR?

This information is important in determining pregnancy-related mortality.

ITEM 37 - MANNER OF DEATH

•Always check Manner of Death, which is important: 1) in determining accurate causes of death; 2) in processing insurance claims; and 3) in statistical studies of injuries and death.

•Indicate "Pending investigation" if the manner of death cannot be determined whether due to an accident, suicide, or homicide within the statutory time limit for filing the death certificate. This should be changed later to one of the other terms.

•Indicate "Could not be Determined" ONLY when it is impossible to determine the manner of death.

To improve case identification:

U.S. Standard Pregnancy Question, 2003 (sort of)

Checkbox format:

IF FEMALE:

- ☐ Not pregnant within past year
- ☐ Pregnant at time of death
- ☐ Not pregnant, but pregnant within 42 days of death
- ☐ Not pregnant, but pregnant 43 days to 1 year before death
- ☐ Unknown if pregnant within the past year

Meant to solve 2 problems:

(1) Most states had no such question; and

(2) Different questions used in different states

Table III. Separate questions related to pregnancy on state certificates in 2003

Alabama.	Was there a pregnancy in last 42 days? (Specify Yes, No, or Unknown)
California	If female, pregnant in last year? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Florida	If female, was there a pregnancy in the past 3 months? <input type="checkbox"/> Yes <input type="checkbox"/> No If female aged 10–54: <input type="checkbox"/> not pregnant within past year <input type="checkbox"/> pregnant at time of death <input type="checkbox"/> not pregnant, but pregnant within 42 days of death <input type="checkbox"/> not pregnant, but pregnant 43 days to 1 year before death <input type="checkbox"/> unknown if pregnant within the past year
Idaho.	If female, was there a pregnancy in past three months? <input type="checkbox"/> Yes <input type="checkbox"/> No
Illinois	Was decedent pregnant or 90 days postpartum? (Yes or no)
Indiana.	If female, was there a pregnancy in the past 12 months? (Specify yes or no)
Iowa	If female, was there a pregnancy in the past 12 months? <input type="checkbox"/> Yes <input type="checkbox"/> No
Kentucky	If deceased was female 10–49, was she pregnant in the last 90 days? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Louisiana	If female: Was decedent pregnant in the past 12 months? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Maryland	<i>Separate fields on dates of death and delivery support capability to compute the other categories in the standard.</i> Was female pregnant: At death? <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> unknown In last 12 months? <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> unknown
Minnesota.	Had decedent been pregnant within 90 days prior to death? <input type="checkbox"/> Yes <input type="checkbox"/> No
Mississippi	If deceased was female 10–49, was she pregnant in the last 90 days? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Missouri	If female: <input type="checkbox"/> not pregnant within past year <input type="checkbox"/> not pregnant but pregnant with 42 days of death <input type="checkbox"/> not pregnant but pregnant 43 days to 1 year before death <input type="checkbox"/> pregnant at time of death <input type="checkbox"/> unknown if pregnant within past year
Montana.	If female, was there a pregnancy in the past 3 months? <input type="checkbox"/> Yes <input type="checkbox"/> No
Nebraska	If female, was she pregnant at death, or any time 90 days prior to death? <input type="checkbox"/> Yes <input type="checkbox"/> No
New Jersey	Was decedent pregnant within last 6 weeks? <input type="checkbox"/> Yes <input type="checkbox"/> No
New Mexico	If female: <input type="checkbox"/> not pregnant within 1 year of death <input type="checkbox"/> pregnant at time of death <input type="checkbox"/> not pregnant at death, but pregnant within 42 days of death <input type="checkbox"/> not pregnant at death, but pregnant 43 days to 1 year before death <input type="checkbox"/> unknown if pregnant within 1 year of death
New York City	<i>Also have date of outcome, so could compute intervals if needed.</i> If female: <input type="checkbox"/> not pregnant within last year <input type="checkbox"/> pregnant at time of death <input type="checkbox"/> not pregnant, but pregnant within 42 days of death <input type="checkbox"/> not pregnant, but pregnant 43 days to 1 year before death <input type="checkbox"/> unknown if pregnant within past year
New York State	<i>Also have date of delivery, so could compute intervals if needed.</i>
North Dakota	Was deceased pregnant within 18 months of death? <input type="checkbox"/> Yes <input type="checkbox"/> No
Texas	Was decedent pregnant at time of death <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown within last 12 months <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown
Virginia	If female, was there a pregnancy in past 3 months? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown

Time periods used:
42 days;
6 weeks;
3 months;
90 days;
12 mos;
“last year”

Source: Hoyert . *Maternal Mortality and Related Concepts*. NCHS. Vital Health Stat 3(33). 2007. p.12.

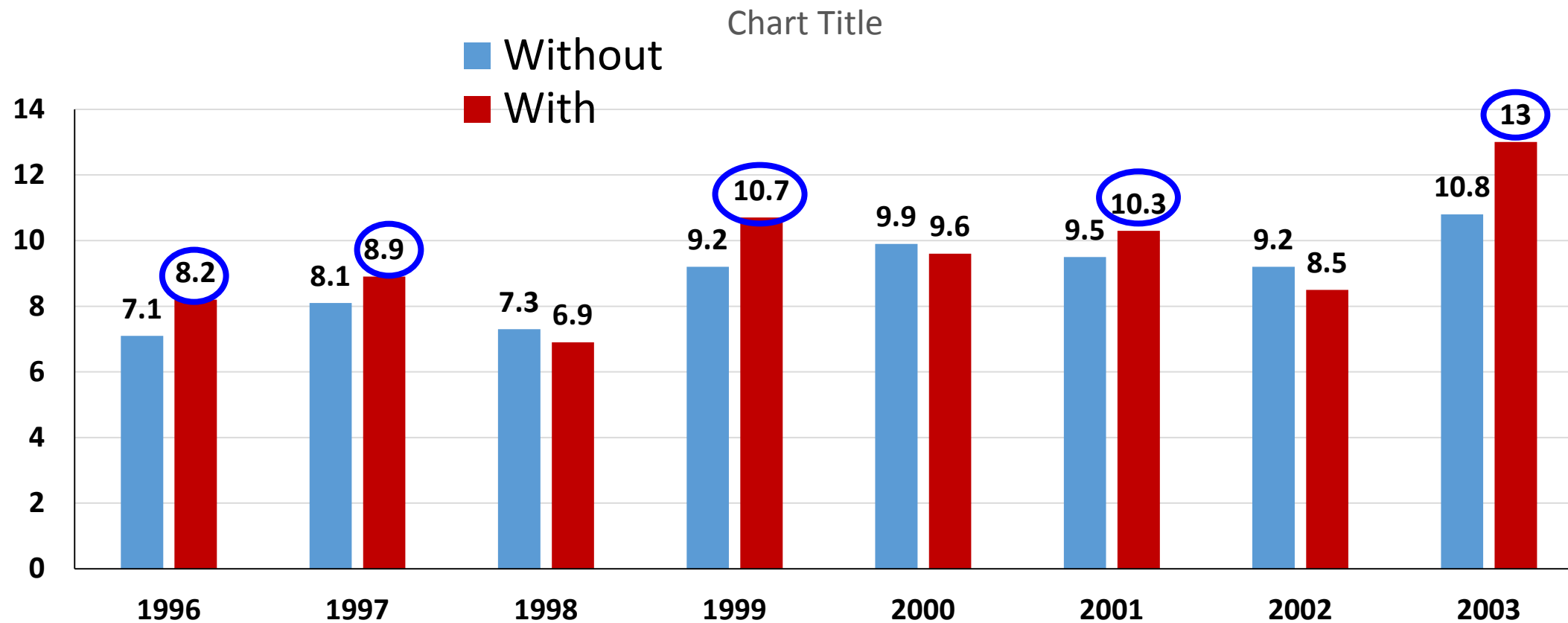
Delays in Adoption of the U.S. Standard Pregnancy Question among States

	New Adopters*	Total
2003	4	4
2004	7	11
2005	7	18
2006	4	22
2007	2	24
2008	7	31
2009	0	31
2010	4	35
2011	2	37
2012	4	41
2013	1	42
2014	5	47
2015	2	49
2016	1	50
2017	1	51

New England	
New Hampshire	4/2004
Connecticut	2005
Rhode Island	2006
Vermont	7/2008
Maine	2010
Massachusetts	9/2014

* Note: Some states adopted change in the middle of the calendar year.

Maternal Mortality Rates (per 100,000) in States with & without a checkbox, 1996-2003



***So adopting the checkbox will solve the problem of under ascertainment
& we can report a more accurate national rate after 2003?***

Our Analysis

We did an analysis that examined data by state, modeled for whether or not they were using the new item, and came up with national estimates.

Not enough cases to do single state analyses, but could look at some of the larger states.

Recent Increases in the U.S. Maternal Mortality Rate

Disentangling Trends From Measurement Issues

Marian F. MacDorman, PhD, Eugene Declercq, PhD, Howard Cabral, PhD, and Christine Morton, PhD

RESULTS: The estimated maternal mortality rate (per 100,000 live births) for 48 states and Washington, DC (excluding California and Texas, analyzed separately) increased by 26.6%, from 18.8 in 2000 to 23.8 in 2014. California showed a declining trend, whereas Texas had a sudden increase in 2011–2012. Analysis of the measurement change suggests that U.S. rates in the early 2000s were higher than previously reported.

2nd Article in Series

Original Research

Trends in Maternal Mortality by Sociodemographic Characteristics and Cause of Death in 27 States and the District of Columbia

Marian F. MacDorman, PhD, Eugene Declercq, PhD, and Marie E. Thoma, PhD

Obstet Gynecol 2017;129:811–8

Over Ascertainment??

- Research into the cause of death category finds much of the increase is coming from *less specific codes*.
- Other specified pregnancy-related conditions (O26.8)
- Other obstetric complications (O21–O22, O24– O41.0, O41.8–O43.1, O43.8–O43.9, O47–O66, O68–O70, O71.2, O71.5, O71.6, O71.8, O71.9, O73–O75.2, O75.4–O75.9, O87–O90, O92)
- Other specified diseases and conditions (O99.8)
- Obstetric death of unspecified cause (O95)

Assessing the impact of ill-defined causes on maternal deaths and mortality rates by cause of death, 27 states and DC, 2008-2009 to 2013-2014

Underlying cause of death (ICD-10 category)	2008-9		2013-14		Percent change 2008-9 to 2013-14
	Number of deaths	Rate~	Number of deaths	Rate~	
Total maternal (A34, O00-O05, O98-O99)	780	20.6	907	25.4	23.3
Ill-defined causes (O26.8, O95, O99.8)	266	7.0	371	10.4	47.9
Total maternal minus ill-defined causes (Remainder)	514	13.5	536	15.0	10.6
Total direct obstetric (A34, O00-O92)	527	13.9	595	16.6	19.7
Other specified pregnancy-related conditions (O26.8)	130	3.4	212	5.9	73.0
Total direct obstetric minus O26.8 (Remainder)	397	10.5	383	10.7	2.3
Total indirect causes (O98-O99)	202	5.3	294	8.2	54.4
Other specified diseases and conditions (O99.8)	85	2.2	141	3.9	75.9
Total indirect causes minus O99.8 (Remainder)	117	3.1	153	4.3	38.7

REPORT FROM MATERNAL MORTALITY REVIEW COMMITTEES: A VIEW INTO THEIR CRITICAL ROLE



MATERNAL MORTALITY REVIEW
INFORMATION APP

BUILDING U.S. CAPACITY TO REVIEW
AND PREVENT MATERNAL DEATHS

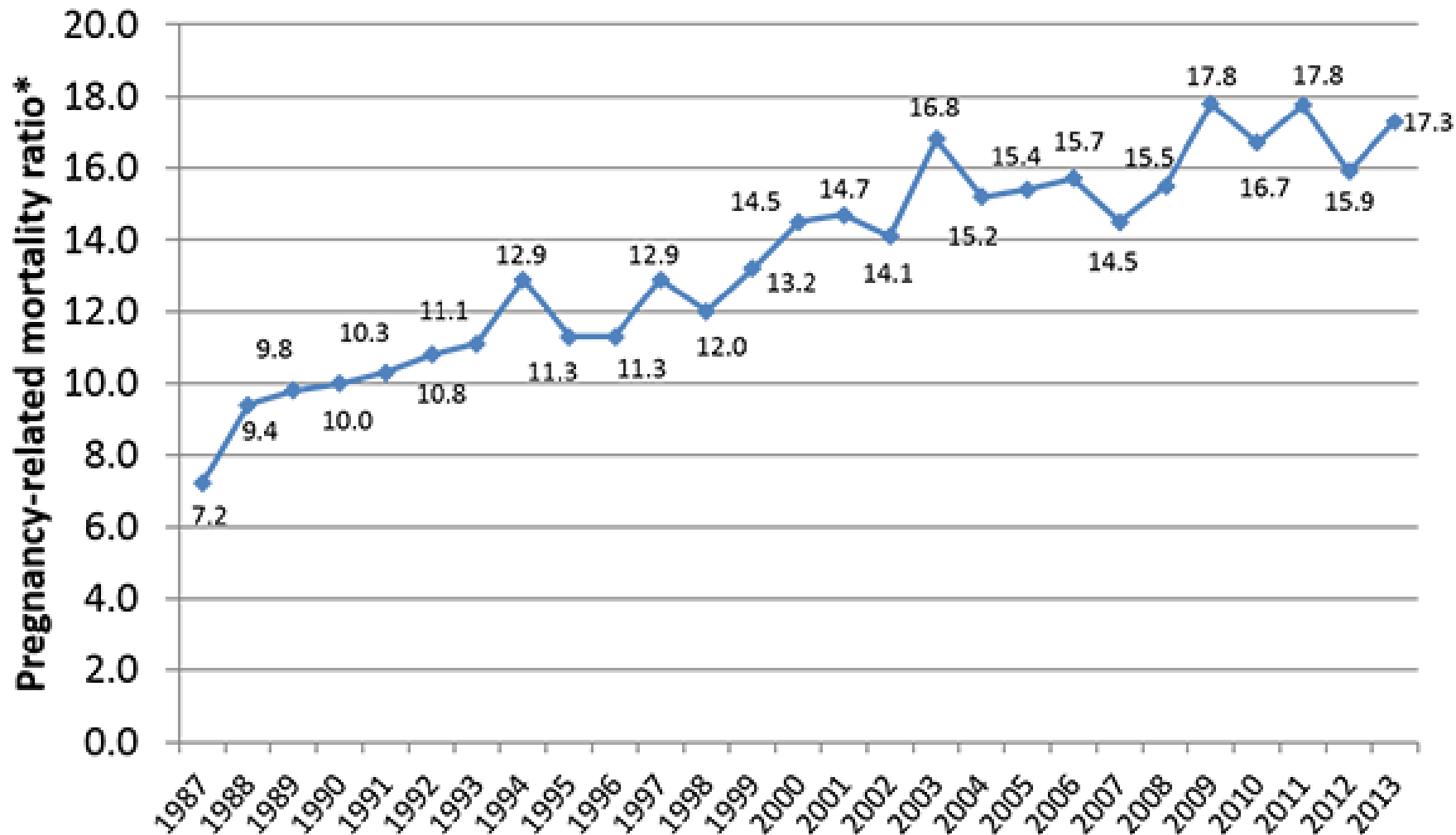


Impact of the Checkbox – Better and Worse Ascertainment

- The Four Committee data includes a total *of 650 potentially pregnancy-related deaths. Among these, 97 [15%] were determined to have no evidence of pregnancy within the year prior to the woman's death* (neither pregnancy-related nor –associated; false positive pregnancy-associated deaths), and so were excluded from further analysis. The *predominant reason for these 97 false positives were errors on the death certificate from the pregnancy checkbox.* While the checkbox contributed to errors, the Four Committee data show that the *checkbox also improved identification of pregnancy-related deaths. Without the pregnancy checkbox, approximately 50% of pregnancy-related deaths that occurred during pregnancy and 11% of pregnancy-related deaths that occurred within 42 days of the end of pregnancy, and 8% of pregnancy-related deaths that occurred within 43 days to 1 year of the end of pregnancy would have been missed.*

**Given the multiple
measurement problems,
let's return to the most reliable
measure of maternal deaths in
the U.S.**

Pregnancy Related Mortality, U.S., 1987-2013



*Note: Number of pregnancy-related deaths per 100,000 live births per year.

Racial Disparities

Rates for 2011-13:

12.7 white women

43.5 black women

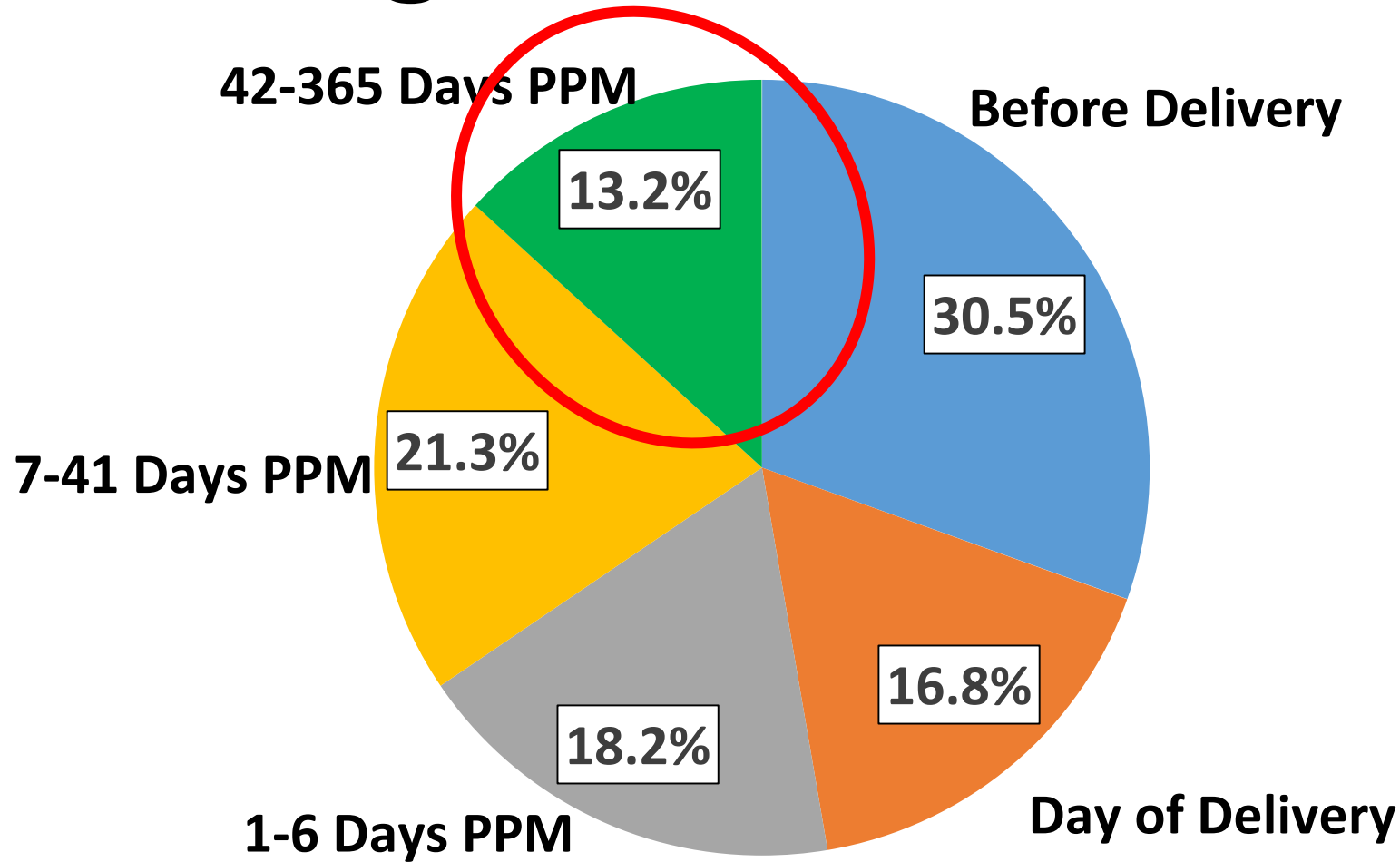
11.0 Hispanic

14.4 other races

Source: CDC.

Creanga. Pregnancy-Related Mortality in the United States. *Obstet Gynecol* 2017.

Timing of Maternal Deaths



Source: Creanga A et al. Pregnancy Related Mortality in the U.S., 2011-2013. *Obstet & Gynec* 2017.

Using a more conservative estimate

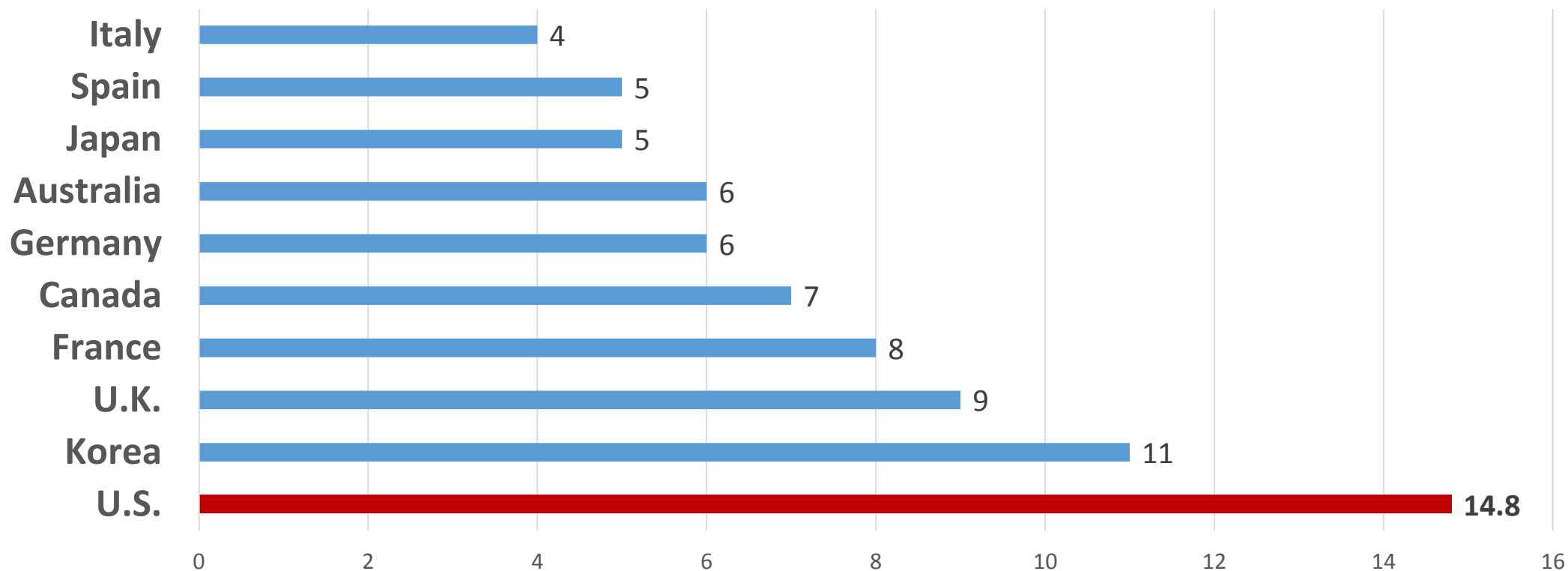
*Adjusting the CDC Pregnancy Related Mortality data
to reflect a maternal mortality rate*

Estimated for 2011-2013 (per 100,000 live births):

- **All women** **14.8**
- Non-Hispanic white women **11.3**
- Non-Hispanic black women **36.2**
- Hispanic women **10.0**
- **Black-white disparity** **3.2**

*So with this data how does the U.S. fare when compared to
wealthy countries with 300,000+ births?*

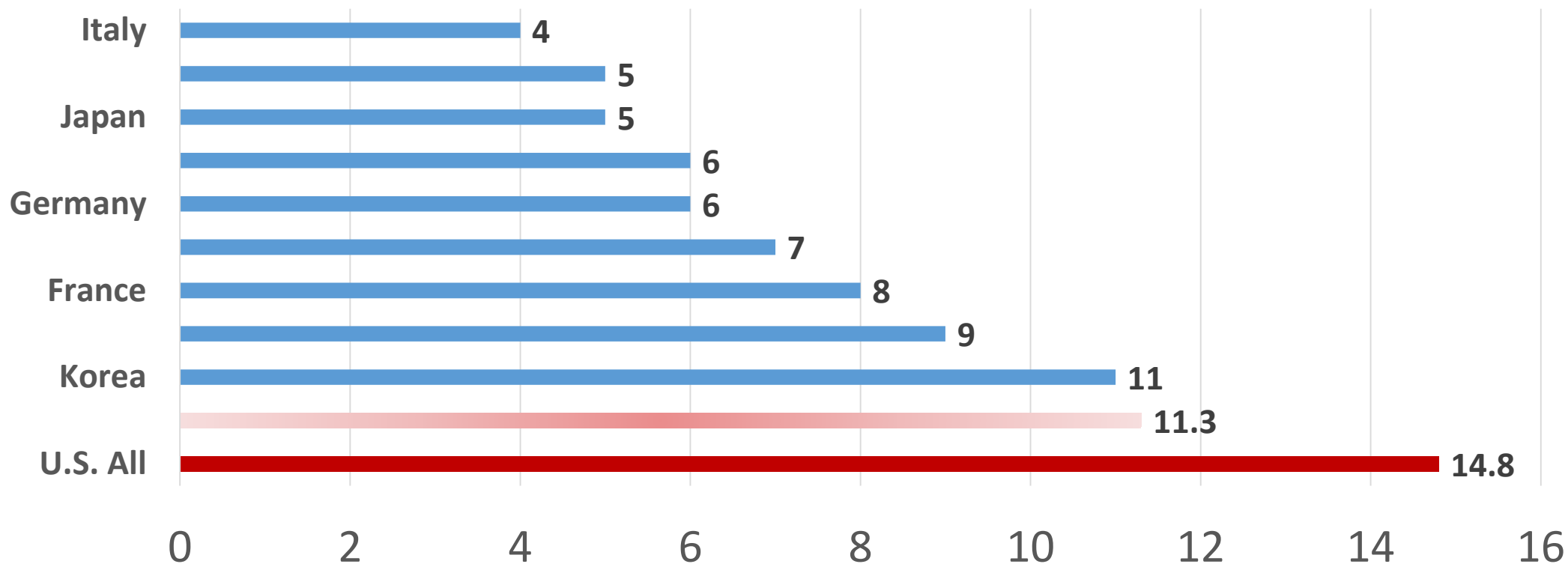
U.S. MMR* Compared to Countries with 300,000+ births, 2014, using WHO Estimates



* Maternal Mortality per 100,000 births

Source: *Maternal Mortality: 1990 to 2015* Estimates by WHO, UNICEF, UNFPA, World Bank Group & UN Population Division. Geneva: 2015.

U.S. MMR* Compared to Countries with 300,000+ births, 2014, using WHO Estimates



* Maternal Mortality Ratio per 100,000 births

Source: *Maternal Mortality: 1990 to 2015* Estimates by WHO, UNICEF, UNFPA, World Bank Group & UN Population Division. Geneva: 2015.

With extensive media coverage and policy concern rising, what's been the response to this poor showing?

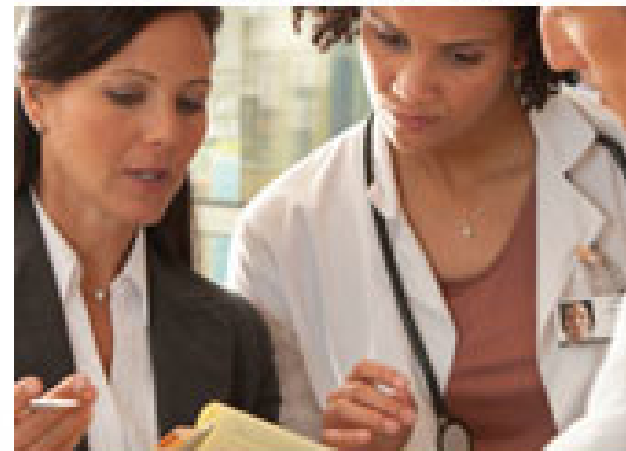


March for Moms



ALLIANCE FOR INNOVATION
ON MATERNAL HEALTH **AIM**

**HOSPITALS: IMPROVE
QUALITY OF CARE
AND REDUCE RISK**



[Learn More](#)

PATIENT
SAFETY
BUNDLE

**Maternal Venous
Thromboembolism Prevention**

Legislation at National & State Levels

115TH CONGRESS
1ST SESSION

H.R. 1318

115TH CONGRESS
1ST SESSION

S. 1112

To support States in their work to save and sustain the health of mothers during pregnancy, childbirth, and in the postpartum period, to eliminate disparities in maternal health outcomes for pregnancy-related and pregnancy-associated deaths, to identify solutions to improve health care quality and health outcomes for mothers, and for other purposes.

Preventing Maternal Deaths Act

New state law requires deeper look at maternal deaths
[TRIBUNE-REVIEW](#) (Pennsylvania) | Thursday, May 10, 2018, 5:03 p.m.

Rep. Kelly (Ill.) sponsors legislation to advance maternal health By Provided News on May 17, 2018 - 12:47pm

Lawmakers (MO) want to solve mysterious maternal deaths by Kimberly Leonard
| May 22, 2018 12:01 AM



State Maternal Mortality Reviews

UNDERSTANDING MATERNAL DEATHS IN COLORADO:

Ohio Department of Health: Bureau of Maternal and Child Health (BMCH)

Ohio Pregnancy-Associated
Mortality Review (PAMR) | 2015



Pregnancy-Associated Mortality Review

Florida Department of Health, Bureau of Family Health Services

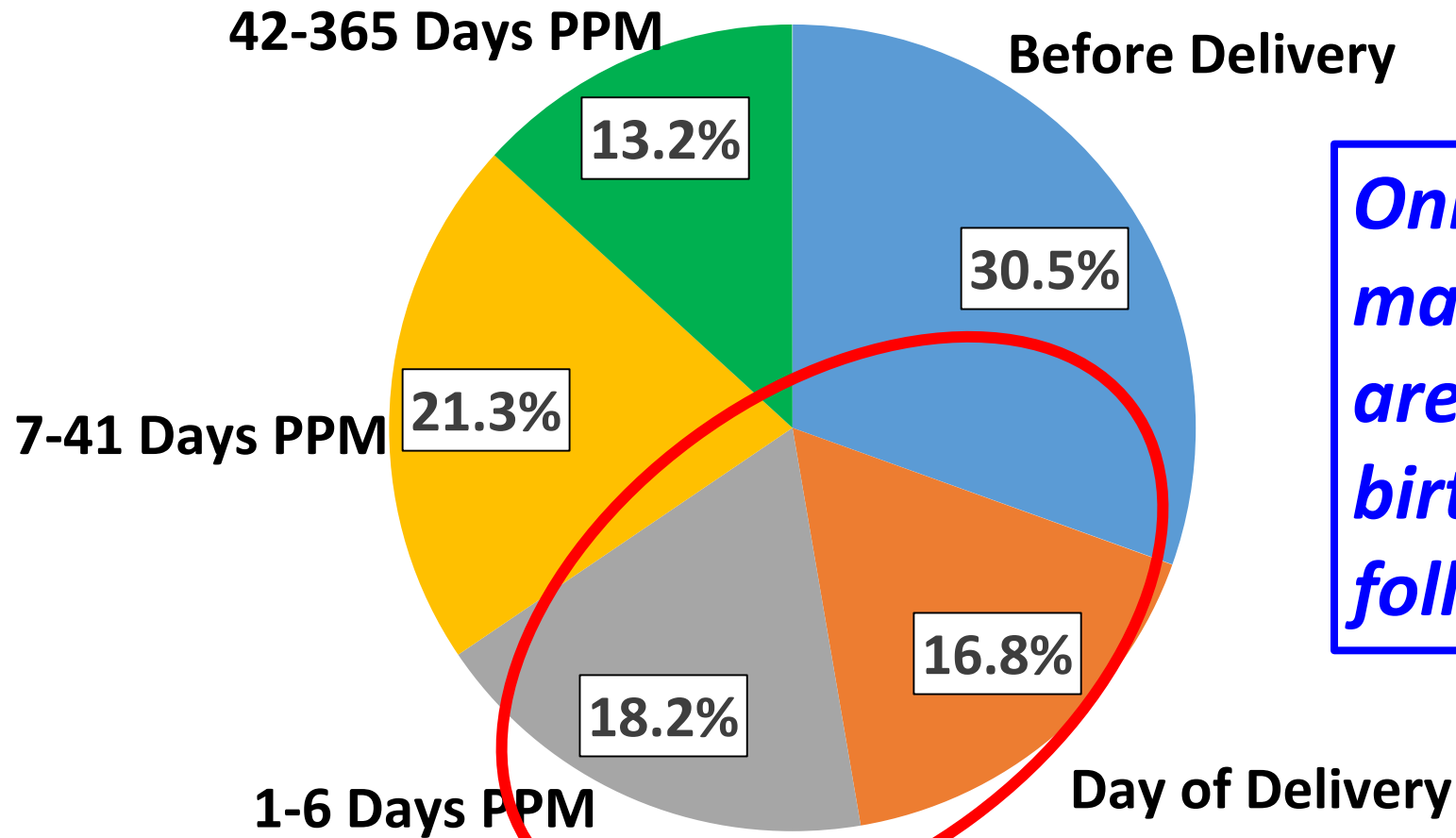
Pregnancy-Related Deaths Due to Infection 2005-2014

***So, we've identified a problem
in the U.S. and we're taken
steps to resolve it. The system's
working right?***

Sort of.....with a focus on two areas: (1) Better measurement; and (2) addressing the clinical problems associated with maternal deaths.

Far less attention is paid to the public health components.

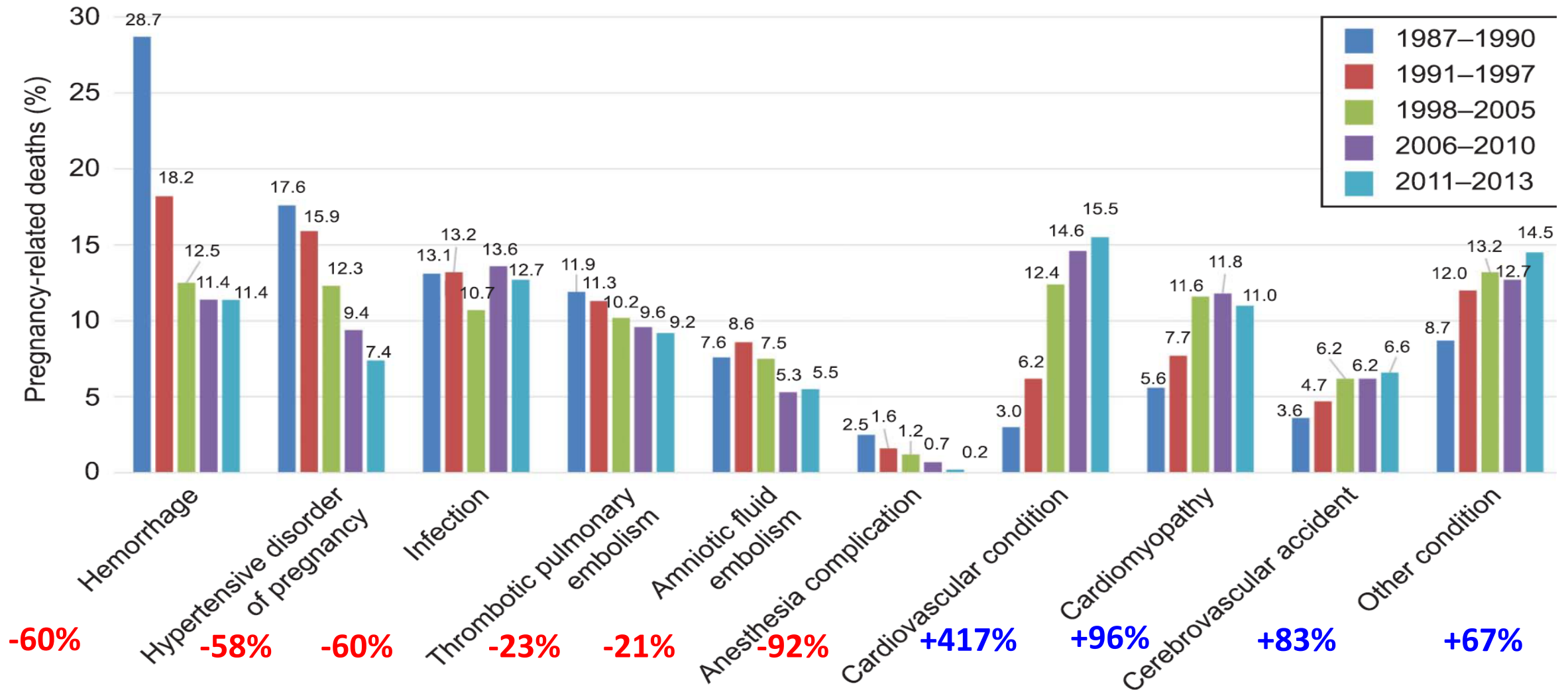
Timing of Maternal Deaths



Only 35% of maternal deaths are occurring at birth or in the following week.

Source: Creanga A et al. Pregnancy Related Mortality in the U.S., 2011-2013. *Obstet & Gynec* 2017 & *MMRIA* (2017).

Cause-specific proportionate pregnancy-related mortality: United States, 1987–2013.



Source: Creanga. Pregnancy-Related Mortality in the United States. *Obstet Gynecol* 2017.

Implication of these distributions is that any attempt to resolve the problem of maternal death that doesn't encompass both clinical and public health approaches is destined to miss a significant portion of women at risk. Also influenced by participation in the Mass. MMRC.

Which got me thinking.....

“Looking where there’s light”



“One searches where there is light”

Johann Wolfgang von Goethe 1749–1832

Source: Barry. *The Great Influenza*. 2004 p. 71

From Listening to Mothers 1

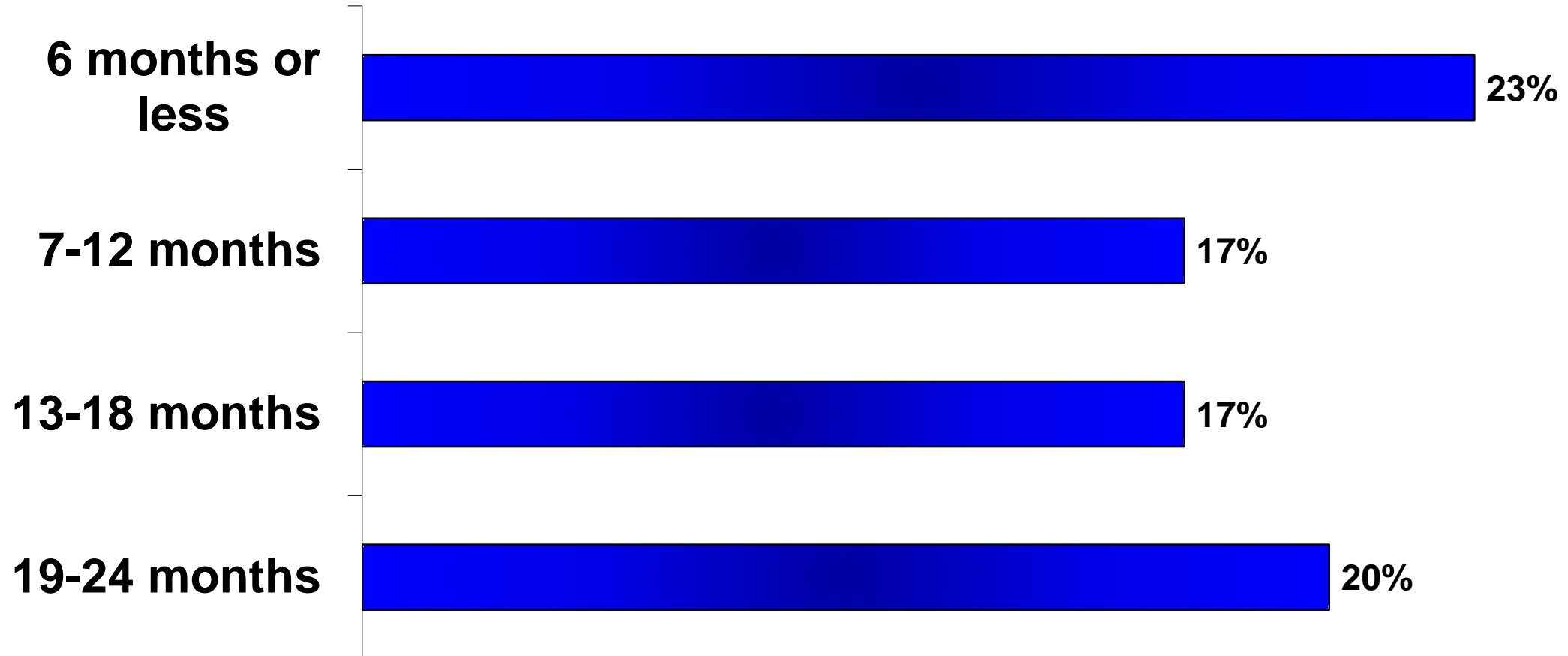
- Women surveyed in May & June, 2002 about their childbirth experiences. Included if they gave birth within 2 years prior to survey

Postpartum Depression

- *19% of mothers scored 13+ on the Edinburgh Postnatal Depression Scale, meaning they were probably experiencing some degree of depression in the week preceding the survey.*

What happened when this overall finding was stratified by time since birth?

Proportion of Women Scoring 13 + on Edinburgh Postnatal Depression Scale



How much of what we term postpartum depression is chronic depression we happen to be measuring at that point in time?

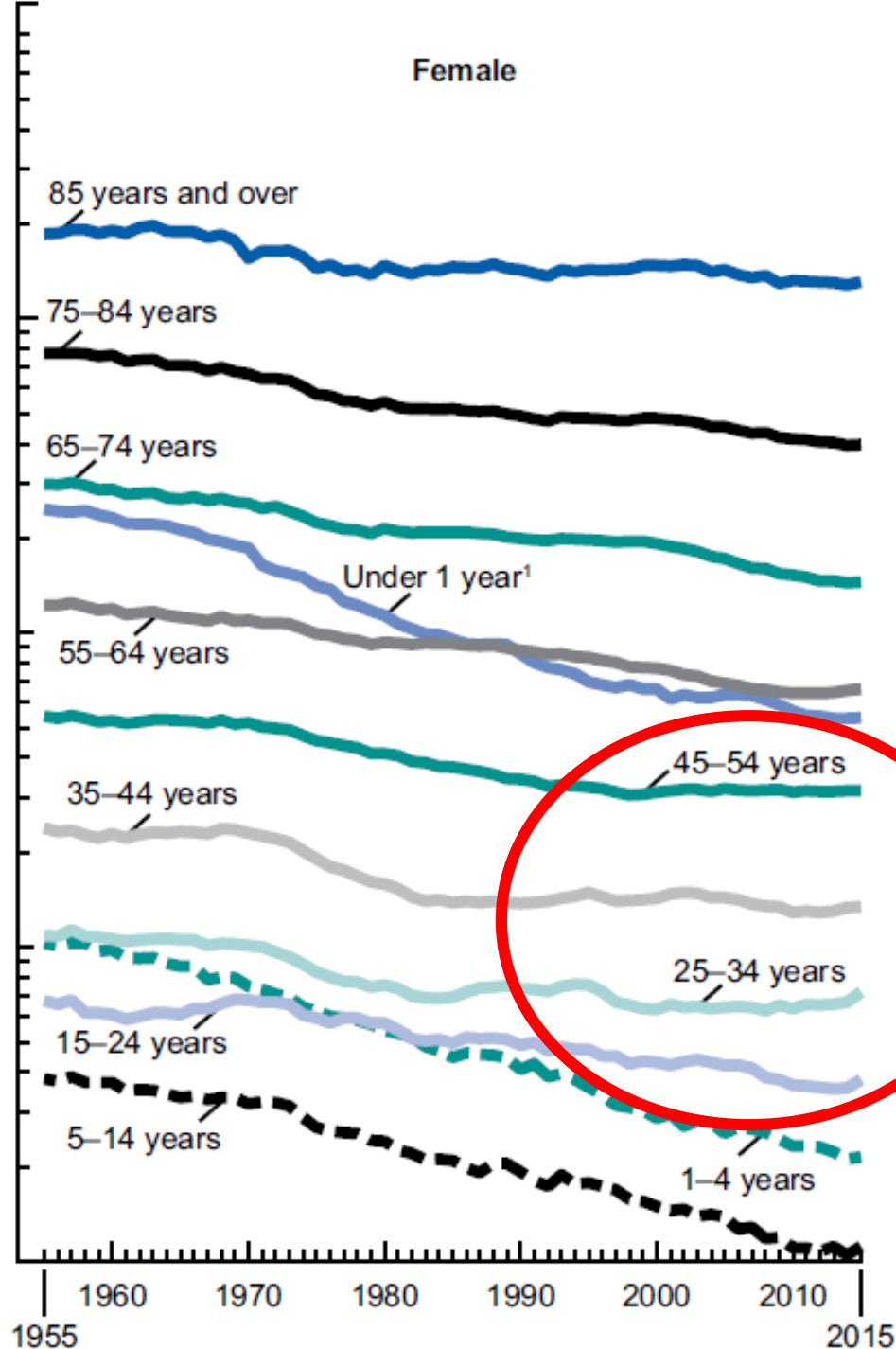
What does this have to do with maternal mortality?

How much of what we're measuring as "the unacceptable level of maternal mortality" is actually capturing a general problem in the health of women of reproductive age and we have chosen to shine a light on it for the period of conception to 1 year postpartum?

Death rates, by age, females: United States, 1955–2015

**Number of female deaths, 15-49 in 2015
76,872.**

**Maternal deaths = ~1%
of all those.**

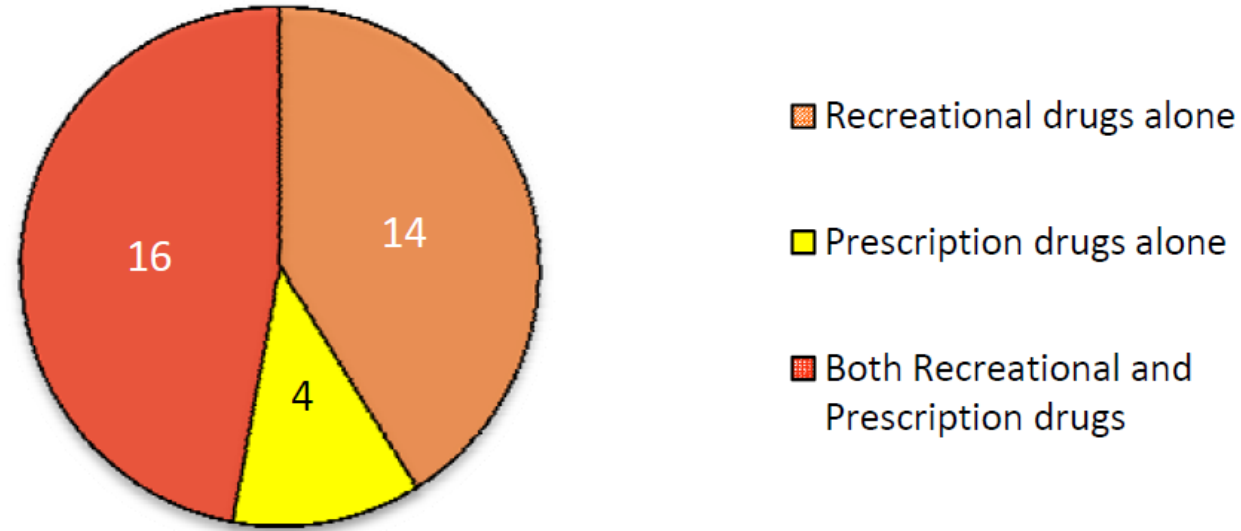


Source: NCHS. *Deaths, Final Data for 2015*

This is a less discussed reason why the work of MMRCs is so important:

MMRCs documentation of pregnancy associated deaths provides our most systematic insights into the death of women of reproductive age

The importance of studying pregnancy associated deaths

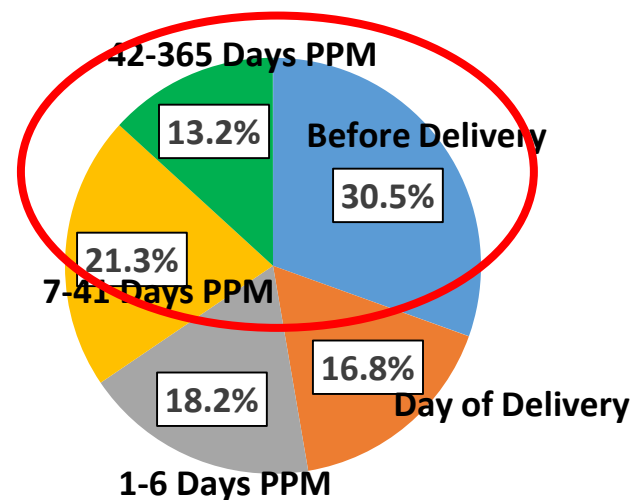


Pregnancy Status	Not pregnancy-related		Pregnancy-related	
	Number	Percent	Number	Percent
During pregnancy	15	12.5	7	33.3
1-42 days postpartum (within 6 weeks)	15	12.5	9	42.9
43-365 days postpartum (7-52 weeks)	90	75.0	5	23.8
Total	120	100.0	21	100.0

So, is there one thing that could be done that would begin to address the larger issue of women's health?

State policies can play a role....with apologies to our colleagues from Canada and Europe

Variation in Medicaid Eligibility by Pregnancy Status



	Medicaid Eligibility for women if:	
	Pregnant	Adult in Family
Massachusetts	214%	138%
Alabama	146%	18%
California	213%	138%
Florida	196%	33%
Iowa	380%	138%
New York	223%	138%
Texas	203%	18%
Michigan	200%	138%

*For a family of 3, the poverty level is \$20,160.
18% of that \$3,629.*

Three Points to Keep in Mind about the problem of Maternal Mortality

- **Clinical care does matter** – need continued efforts to improve care establishment of state or regional *Perinatal Quality Collaboratives* to address clinical care issues and reduce preventable deaths (IL study found 32.4% potentially preventable)
- **Policy Issue as well as medical one** – state policies that fail to cover women when they're not pregnant are a major problem that is reflected in maternal deaths.
- **Focus on women's public health** – since maternal deaths involve more than childbirth, focus on women's health not just because she might someday have a child, but because women's health in itself is important. Can result in women being healthier when they become pregnant and better cared for after they have a baby.

www.birthebythenumbers.org



Birth by the Numbers Team

8 doulas



Twitter: @BirthNumbers

Email: birthbynumbers@gmail.com

FACEBOOK: www.facebook.com/BirthByTheNumbers