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Effects of Maternal Age and Age-Specific Preterm Birth Rates on Overall Preterm Birth Rates — United States, 2007 and 2014

Cynthia Ferré, MA[1]; William Callaghan, MD[1]; Christine Olson, MD[1]; Andrea Sharma, PhD[1]; Wanda Barfield, MD[1]

Reductions in births to teens and preterm birth rates are two recent public health successes in the United States (*1*,*2*). From 2007 to 2014, the birth rate for females aged 15–19 years declined 42%, from 41.5 to 24.2 per 1,000 females. The preterm birth rate decreased 8.4%, from 10.41% to 9.54% of live births (*1*). Rates of preterm births vary by maternal age, being higher among the youngest and oldest mothers. It is unknown how changes in the maternal age distribution in the United States have affected preterm birth rates. CDC used birth data to assess the relative contributions of changes in the maternal age distribution and in age-specific preterm birth rates to the overall decrease in preterm birth rates. The preterm birth rate declined in all age groups. The effects of age distribution changes on the preterm birth rate decrease were different in younger and older mothers. The decrease in the proportion of births to mothers aged ≤19 and 20–24 years and reductions in age-specific preterm rates in all age groups contributed to the overall decline in the preterm birth rate. The increase in births to mothers aged ≥30 years had no effect on the overall preterm birth rate decrease. The decline in preterm births from 2007 to 2014 is related, in part, to teen pregnancy prevention and the changing maternal age distribution. Effective public health strategies for further reducing preterm birth rates need to be tailored to different age groups.

National Vital Statistics System data for all live births to U.S. residents in 2007 and 2014 were analyzed for the effects of maternal age on the decline in preterm birth rates. The analysis was limited to births with gestational age ≥20 weeks, as determined by the obstetric estimate. The year 2007 was the first year the obstetric estimate was available nationally (*1*,*3*). The year 2014 was the most recent year with final birth data available at the time of analysis. Preterm birth rates were defined as <37 completed weeks of gestation and expressed as a percentage of live births. Maternal age was categorized as ≤19, 20–24, 25–29, 30–34, and ≥35 years. Using rate decomposition methods, the change in preterm birth rates from 2007 to 2014 was divided into two components: 1) changes in the maternal age distribution, and 2) changes in the age-specific preterm birth rates (*4*). The two components were calculated relative to each other; one was held constant (by using the average value for the 2 years) as the observed variation in the other component was assessed. The sum of the two components across the age groups equaled the total preterm birth rate difference (*4*).

From 2007 to 2014, maternal age increased from a mean of 27.4 years to 28.3 years (Figure). A decrease in the percentage of births to mothers aged ≤24 years was observed, which included a 39.5% decrease in births to teens and an increase in births to women aged ≥25 years (Table).

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FIGURE. Percentages of live births (LBs) and preterm births (PTBs), by maternal age — United States, 2007 and 2014

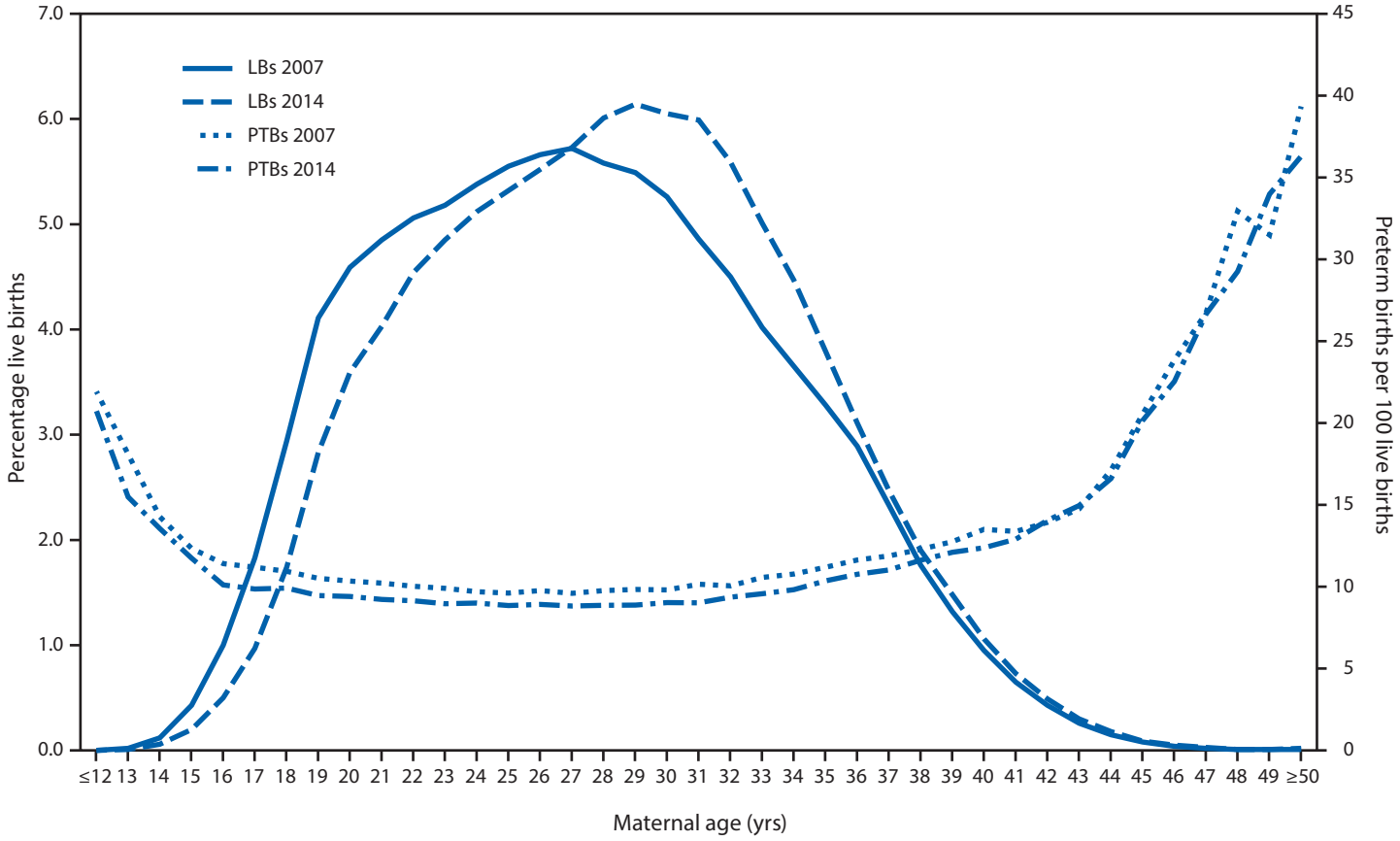

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TABLE. Number and percentage of all births and preterm births and the components of the preterm rate change, by maternal age — United States, 2007 and 2014

Maternal age (yrs)	All births			Preterm births			Rate change components*		
	2007 No. (%)	2014 No. (%)	% Change	2007 No. (%)	2014 No. (%)	Rate difference	Age distribution	Age-specific rate	Total effect
<20	448,461 (10.4)	251,467 (6.3)	-39.5	49,222 (10.98)	24,707 (9.82)	-1.15	-0.43	-0.10	**-0.53**
20–24	1,076,492 (25.1)	881,395 (22.1)	-11.7	107,989 (10.03)	80,477 (9.13)	-0.90	-0.28	-0.21	**-0.49**
25–29	1,202,608 (28.0)	1,144,008 (28.7)	2.6	116,846 (9.72)	101,450 (8.87)	-0.85	0.07	-0.24	**-0.17**
30–34	957,551 (22.3)	1,080,027 (27.1)	21.6	97,982 (10.23)	100,750 (9.33)	-0.90	0.47	-0.22	**0.25**
≥35	609,370 (14.2)	626,513 (15.7)	10.8	74,977 (12.30)	72,523 (11.58)	-0.73	0.18	-0.11	**0.08**
Total	**4,294,482 (100)**	**3,983,410 (100)**	**NA**	**447,016 (10.41)**	**379,901 (9.54)**	**-0.87**	**0.01**	**-0.88**	**-0.87**

Abbreviation: NA = not applicable.

* Per 100 live births. For each age stratum, the decomposition components are calculated as follows: Let P_{2007} = the proportion of the age distribution in 2007 and P_{2014} = the proportion of the age distribution in 2014. Let R_{2007} = the preterm birth rate in 2007 and R_{2014} = the preterm birth rate in 2014. The age distribution component = $(P_{2014} - P_{2007}) \times [(R_{2007} + R_{2014})/2]$. The age-specific rate component = $(R_{2014} - R_{2007}) \times [(P_{2007} + P_{2014})/2]$.

From 2007 to 2014, the preterm birth rate decreased from 10.41% to 9.54%, an absolute rate difference of -0.87% (Table). A U-shaped relationship between maternal age and preterm birth was present in both years with the lowest preterm birth rate occurring among women aged 25–29 years (Table) (Figure). The decrease in preterm birth rates from 2007 to 2014 was observed for mothers at all ages <42 years. The absolute rate difference was highest among teens and lowest among women aged ≥35 years (Table).

The decomposition analysis partitioned the overall observed rate difference of -0.87% into two parts, age distribution and age-specific rate components (Table). The change in age distribution contributed to the preterm birth rate decrease (as indicated by the negative values) only among mothers aged ≤24 years. In contrast, the age distribution component for mothers aged ≥25 years, and especially for mothers aged ≥30 years, offset this decline. When the age distribution components were summed across the age groups, a negligible effect (0.01) was observed on the overall change in preterm birth rates. The change in age-specific preterm birth rates contributed to the decline in preterm birth rate across all age groups.

Examining the total effect of both components on the preterm birth rate decline by age group, the largest total effects were observed among mothers aged ≤19 and mothers aged 20–24 years (Table). In these two groups, the change in age distribution had a larger effect than the change in the age-specific preterm birth rate. For mothers aged 25–29 years, the total effect also contributed to the overall preterm birth rate decline because the age-specific rate component was greater than the age distribution component. For mothers aged ≥30 years, the total effect of both components did not contribute to the overall preterm birth rate decrease; the rate increases from the age distribution components were greater than the rate decreases from the age-specific rate components.

These analyses included all births; however, sensitivity analyses restricting to singleton births produced similar results. The overall absolute rate difference for singletons during this period was -0.85%, compared with the -0.87% for all births.

Discussion

The overall decline in the preterm birth rate from 2007 to 2014 was related to declines in age-specific preterm birth rates and a decrease in prevalence of births to teens and women aged 20–24 years. The contribution from mothers aged ≥24 years to the age-distribution component was offset by an increased prevalence of births to older mothers who have high rates of preterm birth. Thus, the total age distribution component masked divergent influences of younger and older mothers on the overall preterm birth rate decline. Because of this, the influence of younger mothers on the overall preterm birth rate decline is more appropriately indicated by examining the age-specific total effects in the decomposition analysis. Considering relative effects of both age distribution and age-specific preterm birth rate components, only mothers aged ≤29 years contributed to the overall rate decline, with the largest contributions from teens and women aged 20–24 years.

Other studies have documented increased preterm birth rates among teen and older mothers compared with mothers in their mid-twenties to early thirties (*5*). Although teen and older mothers might share some common preterm birth risk factors, such as low socioeconomic status, extremes of body mass index, and smoking, physiologic immaturity is a risk factor for teen mothers and the prevalence of preexisting chronic disease is greater among older mothers (*5*,*6*). This heterogeneity of risk for preterm births according to maternal age and the variation in changes in age-specific preterm birth rates, combined with the changes in maternal age distribution over time, suggest the need for varying preterm birth prevention strategies across the reproductive life span.

The findings in this report are subject to at least one limitation: the relationship of preterm birth with maternal age is associative, not causal. The analysis did not assess the impact

Summary

What is already known about this topic?

Rates of births to teens and of preterm births declined in the United States from 2007 to 2014. Preterm births are more common among the youngest and oldest mothers.

What is added by this report?

Preterm birth rates declined for all age groups and overall from 10.41% to 9.54% of live births. Mean maternal age increased from 27.4 years to 28.3 years. The contribution of fewer births to teens and to women aged 20–24 years to the overall decline in preterm births was offset by increases in births to older mothers.

What are the implications for public health practice?

The changing distribution of maternal age might indicate success of programs to prevent teen and unintended pregnancies. Effective public health strategies for further reducing preterm birth rates need to be tailored to different age groups.

of other pregnancy outcomes, such as elective termination or fetal death, or of potential confounders, such as maternal race/ethnicity, obstetric history, smoking, socioeconomic status, body mass index, chronic or pregnancy-related conditions, prenatal care, and delivery method (*5*–*7*). The effects on preterm birth rates of maternal 17-hydroxyprogesterone use, a preterm birth prevention strategy that increased during this period (*6*), were not examined and the effects of maternal age on spontaneous, medically indicated, early, or late preterm births were not assessed.

The overall decline in the preterm birth rate from 2007 to 2014 is related in part to the changing maternal age distribution associated with the success of teen pregnancy prevention and declines in unintended pregnancy (*8*). Teen pregnancy prevention is one of CDC's Winnable Battles (*9*). Although teen pregnancy prevention and family planning have many positive health and societal effects, the results of this analysis suggest these programs might also have direct effects on reducing preterm birth rates. Based on recent data, 75% of pregnancies to teens aged 15–19 years and 59% of pregnancies to women aged 20–24 years are unintended (*8*). The need for prevention of first and repeat teen pregnancies (*10*) continues. Prevention of unintended pregnancy and encouragement of optimal birth spacing is one part of a five-part strategy for preterm birth prevention (*7*). Other strategies include improved access to preconception care, preterm birth risk identification and treatment, reduction of elective delivery before 39 weeks gestation, and single embryo transfer in assisted reproductive technology (*7*). These strategies need to be implemented throughout the reproductive life span to reduce preterm births for all maternal ages.

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[1]Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, CDC.

Corresponding author: Cynthia Ferré, cferre@cdc.gov, 770-488-6268.

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