OBSTETRICS

The rate of preterm birth in the United States is affected by the method of gestational age assignment

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OBJECTIVE: The objective of the study was to examine the rate of preterm birth in the United States using 2 different methods of gestational age assignment and determine which method more closely correlates with the known morbidities associated with preterm birth.

STUDY DESIGN: Using National Center for Health Statistics data from 2012 United States birth certificates, we computed the rate of preterm birth defined as a birth at 36 or fewer completed weeks with gestational age assigned using the obstetric estimate as specified in the revised birth certificate. This rate was then compared with the rate when gestational age is calculated using the last menstrual period alone. The rates of neonatal morbidities associated with preterm birth were examined for each method of assigning gestational age.

RESULTS: The rate of preterm birth was 9.7% when the obstetric estimate is used to calculate gestational age, which is significantly different from the rate of 11.5% when gestational age is calculated using the last menstrual period alone. In addition, the neonates identified as preterm by obstetric estimate were more likely to qualify as low birthweight (54% vs 42%; $P < .001$) and suffer morbidities such as need for assisted ventilation and surfactant use than those identified with the last menstrual period alone. That is to say obstetric estimate is more sensitive and specific for preterm birth by all available markers of prematurity.

CONCLUSION: The preterm birth rate is 9.7% vs 11.5% and more closely correlates with adverse neonatal outcomes associated with preterm birth when gestational age is assigned using the obstetric estimate. This method of gestational age assignment is currently used by most industrialized nations and should be considered for future reporting of US outcomes.

Key words: obstetric estimate, pregnancy dating, preterm birth

Cite this article as: Duryea EL, McIntire DD, Leveno KJ. The rate of preterm birth in the United States is affected by the method of gestational age assignment. Am J Obstet Gynecol 2015;213:231.e1-5.

Preterm birth is a leading cause of infant mortality in the United States, and the subsequent societal costs have been estimated at more than $26 billion annually.[1,2] Worldwide, preterm birth is the leading cause of newborn deaths, which has prompted the World Health Organization to publish a report detailing the rate of preterm birth by country with an action plan to improve these rates.[3,4]

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Received Dec. 19, 2014; revised March 6, 2015; accepted April 27, 2015.

The authors report no conflict of interest.

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0002-9378/$36.00

http://dx.doi.org/10.1016/j.ajog.2015.04.038

The reported preterm birth rate in the United States is higher than in most other industrialized countries; however, the mortality rate among preterm infants in the United States is lower than that of many other industrialized nations.[5] This rate has been previously noted by Joseph et al, [6] with the implication being that the rate of preterm birth is overestimated in the United States when the last menstrual period alone is used to assign gestational age.

Because there are no current international guidelines on the criteria used to assign gestational age, practice varies among countries. The United States currently reports the rate of preterm birth with gestational age calculated using the last menstrual period alone unless it is unavailable, whereas most European countries calculate gestational age based on a best obstetrical estimate, which incorporates ultrasound estimates.[7] A similar obstetric estimate is available and is now completed on the vast majority of US birth certificates.

The objective of this study was to examine the rate of preterm birth in the United States using 2 different methods of gestational age assignment and determine which method more closely correlates with the known morbidities associated with preterm birth.

Materials and Methods

The publicly available dataset from the National Center for Health Statistics for live births from 2012 was used to estimate the rate of preterm birth in the US population. This study was approved as exempt by the University of Texas Southwestern Institutional Review Board because a publicly available deidentified data set was used for the analysis.

Preterm birth was defined as any live birth at 36 or fewer completed weeks by the last menstrual period or an obstetric estimate of gestational age. Live birth was

TABLE 1
2012 population characteristics for women with preterm birth when gestational age is assigned according to last menstrual period or obstetric estimate

Characteristic	All births (n = 3,480,768)	Preterm by last menstrual period (n = 398,750)	Preterm by obstetric estimate (n = 337,773)	*P* value
Age, y				
≤15	12,680 (0.4)	2245 (18)	1506 (12)	< .001
16–34	2,947,511 (85)	325,980 (11)	275,239 (9)	< .001
≥35	520,577 (15)	70,525 (14)	61,028 (12)	< .001
Maternal race/ethnicity				
Non-Hispanic white	1,876,409 (54)	191,889 (10)	170,565 (9)	< .001
Non-Hispanic black	505,851 (15)	82,897 (16)	67,739 (13)	< .001
Hispanic	817,864 (23)	94,010 (11)	73,924 (9)	< .001
Other or unknown	280,644 (8)	29,954 (11)	25,545 (9)	< .001
Plurality				
Singleton	3,361,198 (97)	329,145 (10)	265,477 (8)	< .001
Multiple	119,570 (3)	69,605 (58)	72,296 (60)	< .001

Data reported as n (%).

Duryea. National preterm birth rate. Am J Obstet Gynecol 2015.

defined as an infant which "after expulsion or extraction breathes or shows any other evidence of life such as beating of the heart, pulsation of the umbilical cord, or definite movement."[8]

The rate of preterm birth was determined using both the gestational age as calculated by the last menstrual period and the obstetric estimate of gestational age. The latter is defined as "the birth attendant's final estimate of gestation, which should be determined by all perinatal factors and assessments such as ultrasound but not the neonatal examination."[9]

Both infants with major congenital anomalies and multiple gestations were included in the analysis, as is currently done for reporting of the US preterm birth rate. When calculating gestational age by the last menstrual period, extreme cases with improbable birthweights were recalculated using the obstetric estimate per the currently used National Vital Statistics reporting method, which was necessary in only 0.1% of births.

Preterm births identified by each method of gestational age assignment were then examined and classified using birthweight and gestational age groupings. This was done in an effort to specifically examine which neonates were not included in the population identified when preterm birth was defined using the obstetrical estimate. In addition, surrogate measures of morbidity commonly associated with preterm birth that were available as data elements in the natality files such as neonatal intensive care unit admission, assisted ventilation at the time of delivery, need for prolonged mechanical ventilation, and use of surfactant were identified according to the method of gestational age assignment.

Statistical tests used included χ^2 and the extended McNemar test to examine the sensitivity and specificity of the 2 methods of gestational age assignment for the detection of neonatal morbidity associated with prematurity.[10] All statistical analyses were performed using SAS 9.3 (SAS Institute Inc, Cary, NC).

Results

In 2012 a total of 3,952,841 live births were reported in the United States. The majority (3,480,768) had both an estimated gestational age by last menstrual period as well as obstetric estimate available. The rate of preterm birth when the last menstrual period alone was used to assign gestational age is 11.5% (n = 398,750). When the obstetric estimate is used to assign gestational age, the rate of preterm live births is reduced to 9.7% (n = 337,773).

The demographics of women with preterm birth differ between the 2 forms of gestational age assignment, with the rate of preterm birth lower for women of all ethnicities with the use of the obstetric estimate for dating but more so for non-Hispanic black women (Table 1). Maternal age less than 15 or older than 35 years remained a risk factor for preterm birth, regardless of the method of gestational age assignment; however, the number of preterm births in women younger than 15 years old was reduced by 33% when the obstetric estimate was used, more so than women of other ages. Also of note, although multiple gestations accounted for only 3% of all births in 2012, they represented approximately 1 of every 5 preterm