Updating National Preterm Birth Costs to 2016 with Separate Estimates for Individual States

Final Report to the March of Dimes

Norman J Waitzman, PhD and Ali Jalali, PhD

Acknowledgment: The authors would like to acknowledge the insights provided on the report by Scott D Grosse, PhD, Reserach Economist, National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention.

EXECUTIVE SUMMARY

Preterm birth is associated with well-documented, manifold adverse consequences to the affected individual, to the individual's family, and to the community and society at large. These consequences include a higher incidence of infant mortality, medical conditions and developmental disabilities than prevail for term births. Considerable resources are devoted to address those heightened risks (direct costs), including medical care, special education, early intervention services and caregiver time. Resources are also lost (indirect costs) through reduction in labor market and household productivity associated with premature mortality and heightened morbidity of preterm birth.

The tabulation of the direct and indirect societal costs associated with preterm birth can serve as the basis for evaluating interventions to reduce it. Estimates on the national societal economic burden of preterm birth generated for the 2007 Institute of Medicine's (IOM) report, *Preterm Birth: Causes, Consequences and Prevention* (Institute of Medicine, 2007) served as the foundation for updating costs to 2016 and for providing first-ever estimates for each state and the District and Columbia in this report.

Costs were updated adjusting for price changes over time and for variation in prices between states. Changes in the rate of preterm birth, the distribution of preterm birth by gestational age (GA), and the rate of infant mortality by GA at the national and state levels were also incorporated.

Highlighted National Results—The total estimated societal burden of preterm birth in 2016 was $25.2 billion, $64,815 per preterm birth (Table 1). At $17.1 billion ($44,116 per preterm birth), medical care services for children born preterm comprised by far the largest category of societal costs, at two-thirds of the total (Table 2). The medical costs of maternal delivery added close to an additional $2.0 billion, yielding a combined medical cost total for child and mother of $19.1 billion. The tally of early intervention and special education services were $700 and $620 million, respectively, contributing over $1.3 billion combined to total costs. Indirect costs associated with lost labor market productivity due to premature mortality and heightened morbidity over the lifespan rounded out the bulk of the remaining costs at about $4.8 billion (Table 2).

Highlighted State Results—Total costs of preterm birth at the state level ranged from $29.6 million in Vermont to $3.2 billion in California (Table 1). Variation across the states of course reflects differences in population size and fertility rates, but other factors as well, including differences in preterm birth rates, the distribution of the preterm birth cohort by gestational age, infant mortality rates by gestational age, and prices.

Several states had per preterm birth costs well below the $64,815 national average, with West Virginia having the lowest at $51,791. At the other end of the spectrum, several states had per preterm birth costs exceeding $70,000, with California topping the list at $75,232. Such state comparisons of per preterm birth costs need to be interpreted with caution, however, as a significant portion of that variation is driven by well-established price variation across the nation. States on the coasts have higher costs of living, for example, than do states in the Midwest and South. The variation in per preterm birth cost provided in Table 1 is therefore not directly reflective of relative state performance in terms of preterm birth outcomes and associated real resource utilization.

A comparison between preterm birth costs in the two largest states in the nation, California and Texas, provides a poignant illustration of the above principle. Texas' per preterm birth cost, at $61,910 was about three-fifths of the $75,232 in California (Table 1). While total births in Texas was four-fifths that of California in 2016, the preterm birth *rate* in Texas exceeded that in California to the extent that there were nearly the same number of preterm births in both states (TX: 41,388, CA: 42,074) Table B2). Moreover, the distribution of Texas' preterm birth cohort was more skewed toward lower, more expensive gestational ages, relative to that in California (Table B3). Price differences between the two states mask the resultant higher preterm birth costs in Texas. If price parity prevailed between California and Texas (i.e., costs expressed in national rather than state-specific prices), the total cost of preterm birth in Texas would be just shy of $2.7 billion, about 4% *higher* than the nearly $2.6 billion total cost in California (Table B13). The corresponding comparison of per preterm birth costs would be $65,073 (TX), slightly above the $64,815 national average, and $61,616 (CA), below the national average (Table B14). Comparison of costs between states, therefore, should be undertaken with care, given the individual component cohort and price factors contributing to sources of state variation.

Comparison to the earlier national estimate--Had price changes been the sole source of change since the societal cost estimates in the IOM report, the total national cost of preterm birth would be *$32 billion*, $6.8 billion higher than the $25.2 billion reported here, an increase of $5.8 billion, or 22%, over the earlier estimate. But other factors affecting costs changed in a way to generate a net *decrease* in total cost of $1 billion relative to the previous estimate of $26.2 billion in 2005 dollars. The major one was the change in 2014 in the official method for assessing GA from the last normal menses (LMP) to the obstetric estimate (OE). This resulted in a significant reduction in the rate of preterm birth. Still other factors, including a decline in the national birth rate and a decline in the preterm birth rate even under the LMP method, contributed to the net decline. A full decomposition of the individual factors involved in the change and the contribution of each of those factors to the change is provided in Appendix C of the report.

Summary--The cost of preterm birth estimates provided here update the most comprehensive national estimates to date to 2016, and provide the first profile of such costs by state for every state and the District of Columbia. They provide an indication of the significant magnitude of the societal economic burden of preterm birth. They can be used to assess the economic value from specific interventions tailored to reduce that burden.

Still, these estimates should be regarded as a floor. They do not include caregiver costs, for example, which are likely substantial. Nor do they include lifetime costs associated with certain disabilities associated with preterm birth. As future work freshly addresses these components and others, the societal economic burden of preterm birth will invariably be larger than the estimates provided here.

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CORE REPORT

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BACKGROUND

Preterm birth is associated with well-documented, manifold adverse consequences to the affected individual, to the individual's family, and to the community and society at large. These consequences include a higher incidence of infant mortality, medical conditions and developmental disabilities than prevail for term births. Considerable resources are devoted to address those heightened risks (direct costs), including medical care, special education, early intervention services and caregiver time. Resources are also lost (indirect costs) through reduction in labor market and household productivity associated with premature mortality and heightened morbidity of preterm birth.

The tabulation of the direct and indirect societal costs associated with preterm birth can serve as the basis for evaluating interventions to reduce it. National estimates of the societal costs of preterm birth were generated for the Institute of Medicine's (IOM) 2007 report on Preterm Birth (Institute of Medicine 2007). Those estimates, the most comprehensive to date, included medical costs; special education costs; lost labor market productivity associated with premature mortality and heightened morbidity; public provision of early intervention services; and maternal delivery costs. The total national cost estimate, reflective of the total number of births in 2004 and the preterm birth and infant mortality rates by gestational age in 2003 (the latest vital statistics available at the time) was $26.2 billion expressed in 2005 dollars. Lifetime medical care costs for individuals born preterm made up close to two-thirds of the total.

The IOM report's estimates formed the basis for providing two major extensions that are the substance of this report: A) updating the national costs of preterm birth to 2016 and B) providing a first-ever state by state breakdown of those costs.

Updating Costs--Costs change over time for a variety of reasons, the most critical sources being 1) changes in the overall birth rate and the incidence of preterm birth; 2) changes in the configuration of preterm births by gestational age (GA), as those born at lower GA incur higher costs; 3) changes in infant mortality by gestational age; 4) changes, mainly increases, in the prices of services delivered; and 5) changes in the intensity of care, that is, changes in the composition of the bundle of services provided to infants by GA. The results of the analyses presented here reflect careful adjustments for 1)-4). Addressing 5), changes in the composition and intensity of care would require the commitment of significant resources to evaluate new raw data on service provision that were not available at this juncture.

Geographic Breakdown—Geographic variation arises for the cost of preterm birth for similar reasons to those that generate changes over time: interstate differences in 1) the birth rate and incidence of preterm birth; 2) the composition of births by GA; 3) infant mortality by GA; 4) the prices of services provided; and 5) the composition of the bundle of services provided by GA. As with the update of national costs, the geographic breakdown by state generated for this analysis reflect state-specific adjustments for 1)-4). Similar to the national update of costs, the analysis does not undertake adjustment related to 5) interstate differences in the composition and intensity care, given the absence of current data on that dimension.

METHODS

Raw data underscoring the estimates for the IOM report were used as the basis for making adjustments in this report and are briefly reviewed in Appendix A1. Per capita national estimates of direct and indirect costs of preterm birth by GA category (<28 weeks, 28-31 weeks, 32-36 weeks) from that report were subjected to longitudinal and geographic price adjustments tailored to detailed direct and indirect cost category. These adjusted per capita cost estimates were then used as multipliers applied to the 2016 birth cohort by GA category for the nation and individual states to generate aggregate cost estimates with that level of geographic specificity. All cost estimates are "incremental", that is, reflect resource use above and beyond what would have transpired on average for infants born term (37 weeks of gestation or more), the so-called "referent case".

Incidence Approach--An "incidence approach" to cost of illness was undertaken in the IOM report and extended to the current estimates. Under the incidence approach, costs are estimated across the lifespan for all individuals newly acquiring or "diagnosed" with the condition of interest, and then aggregated. Costs at ages beyond the year of incidence (base year) are discounted back to that year, reflecting the economic principle that serves as the basis for the real interest rate: current consumption is valued over future consumption. In cost of illness analyses, it is general practice for costs beyond the base year to be discounted at a 3% rate, the rate adopted for the current analysis.

Cohort Estimates--In the case of preterm birth, the incident cohort is comprised of those born prematurely in a given year. Cohort estimates for each year of life are used as multipliers applied to per capita cost estimates to generate annual aggregate costs. Survival estimates at each age are therefore critical to accurately generate cohort size. Given that preterm birth is associated with heightened infant mortality, infant mortality rates, parsed into neonatal and post-neonatal mortality segments, were used to generate cohort estimates for the nation and for each state during infancy. Mortality rates were assumed to revert back to the general rate after infancy. The base year for the analysis was 2016, as that is the latest year for which preterm birth and infant mortality rates were available at the national and state levels. See Appendix A2 for more detail on data and methods used for cohort estimates.

Categories of Cost--Per the IOM report, certain categories of cost were estimated for all children born preterm, while other types of costs were contingent on the incremental risk of one of four developmental disabilities (DDs) associated with preterm birth: mental retardation, cerebral palsy, hearing impairment and vision impairment. Costs estimates beyond age five years were contingent on the presence of a DD, whereas costs through age five were estimated over all premature births.

While there is underlying logic to using the presence of a DD as a filter for long term costs given that eligibility for certain services are contingent on the diagnosis of a DD, or an underlying basis for lost

labor market productivity, the algorithm was necessitated by the paucity of data related to care received, and reduced labor market productivity generated, for the full cohort of those born preterm over the entire lifespan; data related to DDs, in contrast, are more readily available. Cost estimates of a) medical care services before age five, b) maternal delivery services and c) early intervention services were therefore generated over the entire cohort of those born preterm, whereas cost estimates of a) medical care beyond age five, b) special education services and c) lost labor market productivity due to heightened morbidity and premature mortality comprised the overwhelming share of the estimates associated with the subset of those born preterm with one of the four DDs. More detail on estimation by cost category is provided in Appendix A1.

Cost Adjustments—Cost adjustments, both over time and by state, were tailored to specific cost categories, some more narrowly than others. Given its pronounced importance in the cost estimates and its notorious historical departures from general price movements and variation, medical service costs were adjusted separately from other cost categories. Indeed, within medical care, dedicated adjustments were made for inpatient and outpatient medical service costs separately, given the significant variation in price movements between them and the disproportionate share of medical care comprised of inpatient services for preterm infants. Separate indices were used to adjust prices over time and for geographic variation. Detail on the actual indices applied and the methods for their construction and application is provided in Appendix A3.

HIGHLIGHTED RESULTS

[Insert Tables 1 and 2 here]

National Cost Highlights--Table 1 provides the summary results of the 2016 total societal costs of preterm birth for the nation and for each state and District of Columbia after adjustments for cohort and price changes discussed above. All estimates are provided in 2016 dollars. The total cost of preterm birth for the nation was $25.2 billion ($64,815 per preterm birth).

At $17.1 billion ($44,116 per preterm birth), lifetime medical care costs for those born preterm comprised by far the largest category of societal costs, two-thirds of the total (Table 2). Medical costs of maternal delivery added close to an additional $2.0 billion (Table 2), yielding a combined medical cost total for child and mother of $19.1 billion. The tally of early intervention and special education services were $700 and $620 million, respectively, contributing over $1.3 billion combined to total costs. Indirect costs associated with lost labor market productivity due to premature mortality and heightened morbidity over the lifespan rounded out the bulk of the remaining costs at about $4.8 billion (Table 2).

There is significant skew in the distribution of costs. The lifetime per preterm birth cost for an infant born extremely preterm (GA<28 weeks) was $344,355, over 12 times the $28,367 cost of its late pre-term (32-36 week) counterpart (Table B6). As a result, though they made up just 7% of the entire preterm cohort, those born extremely preterm incurred over one-third of the total $25.2 billion costs of preterm birth.

Similarly, a disproportionate share of lifetime preterm costs, about two-thirds of the total, consisted of medical costs incurred during infancy (Table B11). Furthermore, the inpatient portion of medical care during infancy comprised over 90% of total lifetime medical costs for preterm infants.

State Cost Highlights— Total costs of preterm birth at the state level ranged from $29.6 million in Vermont to $3.2 billion in California (Table 1). Variation of costs across the states of course reflected differences in population size and fertility rates. Several states had per preterm birth costs well below the average $64,815 national cost, with West Virginia having the lowest at $51,791. At the other end of the spectrum, several states had per preterm birth costs exceeding $70,000, with California topping the list at $75,232. Such state comparisons of per preterm birth costs need to be interpreted with caution, however, as much of that variation is driven by well-established price variation across the nation. States on the coasts have higher costs of living, for example, than do states in the Midwest and South. The variation in per preterm birth cost provided in Table 1 is therefore not directly reflective of relative state performance in terms of preterm birth outcomes and associated real resource use.

A comparison between preterm birth costs in the two largest states in the nation, California and Texas, provides a poignant illustration of the above principle. Texas' per preterm birth cost, at $61,910 was about three-fifths of the $75,232 in California (Table 1). While total births in Texas was four-fifths that of California in 2016, however, the preterm birth *rate* in Texas exceeded that in California to the extent that nearly the same number of preterm births in both states (TX: 41,388, CA: 42,074) Table B2). Moreover, the distribution of Texas' preterm birth cohort was more skewed toward lower, more expensive gestational ages, relative to that in California (Table B3). Price differences between the two states mask the resultant higher preterm birth costs in Texas. If price parity prevailed between California and Texas (i.e., expressed in national rather than state-specific prices), the total cost of preterm birth in Texas would be just shy of $2.7 billion, about 4% *higher* than the nearly $2.6 billion total cost in California (Table B13). The corresponding comparison of per preterm birth costs would be $65,073 in Texas, slightly above the $64,815 national average, and $61,616 in California, below the national average (Table B14). Comparison of costs between states, therefore, should be undertaken with care, given the individual component cohort and price factors contributing to sources of state variation. Price parity entries of per preterm cost by state provided in Table B14 provide a superior basis for state by state comparisons than do the entries absent price parities in Table 1.

A Note on the Paradox of the Decrease in National Cost-It is paradoxical that the total national cost actually *decreased* from the 2005 IOM report (Institute of Medicine ,2007) estimate by a little over $1 billion, given the significant increase in prices over the period. Indeed, had price increases been the sole source of change since the societal cost estimates in the IOM report, the total national cost of preterm birth would be *$32 billion*, an *increase* of $5.8 billion, or 22%, over the earlier estimate.

Other critical factors affecting costs changed, however, in a manner that resolves the paradox. The most significant change was the change in 2014 in the official method for assessing GA from the last normal menses (LMP) to the obstetric estimate (OE). This resulted in a significant reduction in the rate of preterm birth. Still other factors, including a decline in the national birth rate and a decline in the preterm birth rate even under the LMP method, contributed to the net decline. A full decomposition of the individual factors involved in the change and the contribution of each of those factors to the change is provided in Appendix C of the report.

The increase in the per preterm birth cost over the period, which is unaffected by the preterm birth *rate*, from $51,600 to nearly $64,800—more than a 25% increase--is indicative of the full weight of the increase in costs over the period.

LIMITATIONS

While the estimates provided here have been carefully adjusted and are the most comprehensive for the nation and individual states to date, there are certain limitations with the analyses, the most notable briefly summarized here:

- As noted earlier, the estimates reflect only cohort and price changes and do not reflect changes over time in the intensity or utilization of care, which is assumed to be the same by GA as at that at the juncture of source material used for the IOM report. In other words, the bundles of medical care and other services provided per preterm infant by GA were assumed to be unaltered over nearly the last two decades or more depending on the category of service.

- The bundle of services per preterm infant by GA are also assumed to be identical across geography. Variation by state in cost estimates are therefore driven strictly by interstate differences in cohort size, preterm birth rates, infant mortality rates by GA, or by price differences.

- While more comprehensive than other estimates of preterm birth cost to date, the estimated societal cost burden excludes certain important categories of service utilization and cost. The costs associated with caregiver time, for example, are not included. Maternal delivery costs are included, but additional costs to the mother and family members associated with the presence in the household of a child who experiences complications of preterm birth have not been incorporated. Notably, the cost of family caregiving time, including lost earnings, for a child with disabilities associated with preterm birth are not included.

- As noted above, estimates of cost beyond age five were limited to the subset of those born preterm with four developmental disabilities (DDs). To the extent that costs beyond age five are general to the preterm population and not associated specifically with diagnosis of a DD, they are not incorporated. And perhaps of greater import, there are other DDs than the four for which an association with preterm birth has been established, such as autism, which would invariably carry considerable additional costs but are not included.

CONCLUSION

The cost of preterm birth estimates provided here update the most comprehensive national estimates to date to 2016, and provide the first profile of such costs by state for every state and the District of Columbia. They provide an indication of the significant magnitude of the societal economic burden of preterm birth. They can be used to assess the economic value from specific interventions tailored to reduce that burden.

Still, these estimates should be regarded as a floor. They do not include caregiver costs, for example, which are likely substantial. Nor do they include lifetime costs associated with other developmental disabilities associated with preterm birth. As future work freshly addresses these components and others, the societal economic burden of preterm birth will invariably be larger than the estimates provided here.

Table 1. Total and Per Capita Cost of Preterm Birth by State and District of Columbia, 2016

State	Total Costs ($)	Per Preterm Birth ($)
Alabama	**427,536,389**	**60,361**
Alaska	**66,142,572**	**66,209**
Arizona	**469,324,841**	**61,318**
Arkansas	**243,375,986**	**58,546**
California	**3,165,295,343**	**75,232**
Colorado	**352,517,377**	**59,769**
Connecticut	**242,088,912**	**71,730**
Delaware	**82,255,382**	**74,439**
District of Columbia	**79,124,885**	**74,717**
Florida	**1,472,582,780**	**64,525**
Georgia	**951,181,298**	**65,252**
Hawaii	**138,667,357**	**72,829**
Idaho	**110,124,922**	**54,843**
Illinois	**1,072,247,749**	**67,217**
Indiana	**518,025,195**	**62,511**
Iowa	**212,086,403**	**58,074**
Kansas	**193,512,403**	**55,977**
Kentucky	**368,499,940**	**58,289**
Louisiana	**476,267,930**	**59,668**
Maine	**62,071,851**	**56,999**
Maryland	**516,634,027**	**69,740**
Massachusetts	**435,738,017**	**70,645**
Michigan	**735,214,089**	**63,987**
Minnesota	**392,300,802**	**64,091**
Mississippi	**299,464,614**	**57,879**
Missouri	**448,180,220**	**59,095**
Montana	**64,377,136**	**59,941**
Nebraska	**142,635,741**	**55,848**
Nevada	**244,526,182**	**65,068**
New Hampshire	**61,283,514**	**64,238**
New Jersey	**732,703,052**	**72,359**
New Mexico	**152,102,466**	**61,730**
New York	**1,525,409,607**	**72,791**
North Carolina	**798,628,774**	**63,676**
North Dakota	**68,427,897**	**65,796**
Ohio	**897,657,000**	**62,389**
Oklahoma	**302,378,993**	**54,025**
Oregon	**230,798,921**	**63,757**
Pennsylvania	**842,706,797**	**65,014**
Rhode Island	**68,938,476**	**68,391**
South Carolina	**401,570,677**	**62,794**
South Dakota	**58,788,372**	**53,541**
Tennessee	**518,510,300**	**57,073**
Texas	**2,562,327,911**	**61,910**
Utah	**273,302,635**	**56,339**
Vermont	**29,615,605**	**64,804**
Virginia	**638,178,731**	**65,173**
Washington	**467,990,820**	**63,551**
West Virginia	**116,996,914**	**51,791**
Wisconsin	**386,439,761**	**60,523**
Wyoming	**45,739,045**	**65,341**
United States	**25,162,496,608**	**64,815**

Note to Table 1: All cost entries are net of the cost of term births specific to each state and for the nation. Total preterm birth costs reflect the 2016 preterm birth profile (number of preterm births, the distribution of preterm births by gestational age category, and infant mortality by gestational age category) and 2016 prices specific to each state and the nation. Per preterm birth cost entries reflect total costs divided by the number of preterm births in each state and the nation. Caution should be exercised in drawing conclusions regarding relative state performance from the table entries because interstate price differences for the same set of services drive part of the variance in state estimates. A "price parity" table, which neutralizes such interstate price differences, is provided in Appendix B, Table B14.

Table 2. National Total and Per Capita Cost of Preterm Birth by Category of Cost, 2016

Category of Cost	Total ($)	Per Preterm Birth ($)
Medical Care for Affected Child	17,126,625,946	44,116
Maternal Delivery Costs	1,950,230,570	5,024
Early Intervention Services (EI)	702,014,493	1,808
Special Education Services	622,589,060	1,604
Devices	10,820,563	28
Lost Labor Market Productivity	4,750,215,975	12,236
Total	25,162,496,608	64,815

Note: All cost entries are net of the cost of term births. Detail on each of the cost categories and the corresponding breakdown by cost category for each state is provided in Appendix A.

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Appendix A. Details on Methods

The method for estimating total cost can be characterized most broadly as multiplying per capita costs of preterm births by the number of those born preterm to yield total preterm costs. All costs were "incremental," that is, net of costs estimated for term births, the so-called "referent case." Those costs were adjusted to 2016 dollars for the nation and to each geographic region.

A more specific expository summary of each step, incidentally amenable to translation into a set of equations, follows in this introduction to the Appendix. In each subsequent subsection of the Appendix greater elaboration is provided using the nomenclature for variables introduced here. The general steps for A) *updating estimates to 2016* and B) translating them to *state-specific cost estimates* are:

Updating National Costs to 2016—General Method

1. For each cost category (CC) to be estimated (medical care, special education, early intervention services, lost productivity, etc), we begin with per capita costs in a base year (PC_{by}) that were used to generate estimates for the IOM report on Preterm Birth (Institute of Medicine, 2007). Each PC_{by} estimate within CC for the IOM report was generated more granularly still; by gestational age (GA) category (<28 weeks, 28-31 weeks, 31-36 weeks, and 37 weeks or more (term)) and for the birth cohort surviving to age x (S_x) by each age x in the lifespan for which there are incremental costs in the CC (and for which there was sufficient data available).

i. <u>discounting of costs beyond the birth year</u>--For each PC_{by} incurred at age x beyond the year of birth, the PC_{by} is discounted back to the year of birth at a 3% rate, or divided by 1.03^x.

ii. <u>incremental costs</u>—Each age-specific PC_{by} at GA=37 weeks or more (term) was subtracted from each age specific PC_{by} by preterm GA category to yield incremental PCs by GA category within each CC for those born preterm.

iii. <u>conversion to national PCs_n</u>--If raw data for a PC_{by} cost category was drawn from a specific state rather than a national sample, a state-specific geographic adjustment factor (GAF) for that CC in the base year was applied to yield a national PC_{by}. This conversion was part of the methodology incorporated in the original IOM report.

2. The national PC_{by} was multiplied by the value of the change in the national price index corresponding to each CC (PI_{cc}) between the base year and 2016 to yield national age- and GA- specific PCs in 2016 dollars (PC_{2016}).

3. The PCs_{2016} at each age x within each CC were multiplied by the estimated numbers of survivors in the nation (S_n) to each age x by GA category in 2016 to yield national total costs (TC_n) at each age by GA category in 2016.

4. The summation of age-specific TC_n over all ages yielded CC-specific lifetime national total costs (TC_n) by GA category for the 2016 preterm birth cohort.

i. division by the total number of preterm births nationally in 2016 (TB_n) by GA_n yielded CC-specific national per preterm birth cost (PTB_n) by GA_n in 2016.

5. Summation over all preterm GA categories yielded CC-specific Total National Costs (TC_n).

i division by TB_n yielded CC-specific per preterm birth cost for the nation (PTB_n)

6. Summation over all CCs yielded grand total national preterm birth costs ($GTNC_n$)

i. division by TB_n yielded grand total national per preterm birth costs ($GTPTB_n$)

State-Specific Cost Estimates in 2016—General Method

7. The CC-specific national PCs_{2016} by age and GA category from step 2) above were multiplied by 2016 CC-specific geographic adjustment factors (GAF_i) for each state, i, to yield 2016 state-specific per capita costs ($SPCs_i$) by age and GA category for each CC.

8) Steps analogous to 3)-6) for national estimates were then performed at the state level, using state-specific cohort estimates and the number of survivors (S_i) at each age by GA category in place of national estimates (step 3); dividing by state birth estimates to generate cost category-specific state total (TSC_i) and per preterm birth cost ($SPTB_i$) (steps 4 and 5), and state-specific grand total ($GTSC_i$) and per preterm costs ($GSPTB_i$) (step 6).

The remainder of Appendix A is divided into three subsections (A1, A2 and A3), which provide more detail on critical facets in the step-by-step general method outlined above.

Section A1, *Base Year Costs by Cost Category (PC_{by} by CC),* provides greater detail on the cost categories (CCs) and the raw data used to generate base year PCs by CC that served as the basis for this update.

Section A2, *Cohort Estimates (TB_n and TB_i ; S_n and S_i),* provides an elaboration on the underlying data and methods for estimates of the 2016 birth cohort by GA for the nation and each state (TB_n and TB_i); and survival by GA to each age x for the nation and each state (S_n and S_i).

Section A3, *Price Adjustments to 2016 and Geographic Adjustment Factors (PIs and GAFs),* provides a more detailed review of 1) the CC-specific national price indices (PIs) used to update costs to 2016 from the base year, and 2) the CC-specific geographic adjustment factors ($GAFs_i$) described in steps 3iii and 7 above.

A1. ***Base Year Costs by Cost Category (PC_{by} by CC)***

As noted in the introduction of the Appendix, per capita costs in the base year (PC_{by}) by cost category, by GA, and by age formed the basis for the adjustments to per capita costs in 2016 (PC_{2016}).

Appendix A1 provides an overview on methods specific to the cost categories and the sources of data for each category.

Cost Categories (CC)--Direct costs of preterm birth were estimated for a) medical care services from birth through end of life, b) maternal delivery inpatient services through initial discharge at delivery c) special education services from age five years through eighteen years, d) publicly provided early intervention services for the first three years of life, and e) medical devices from age five through the end of life. Indirect costs associated from f) productivity losses due to heightened morbidity and excess mortality were calculated from age sixteen through the end of life.

For certain categories of cost, estimation was over all of those born preterm: medical care through age five, maternal delivery, early intervention services. Estimates for the other cost categories (medical care beyond age five, special education, devices and lost productivity) were estimated only for the preterm population diagnosed with one of four developmental disabilities (DDs): mental retardation, cerebral palsy, hearing loss and vision loss. Using the presence of a DD as a filter to estimate cost beyond age five was necessitated by the absence of longitudinal (lifetime) data on costs exclusive to the preterm birth population as a whole. Data was available, on the other hand, for the incremental incidence of DDs by GA and cost by DD (see A1), which permitted the generation of cost estimates for the sub-population of those born preterm with any of the four DDs for the cost categories noted above.

While the restriction to those born preterm with a DD for specific cost categories invariably created a downward bias to estimates of cost by category, eligibility criteria for receipt of certain categories of service, such as special education, stipulate the presence of a disability. A disproportionate share of incremental medical costs beyond age five and labor market productivity losses also are likely associated with the presence of a disability. Furthermore, as noted in the report, medical costs constitute by far the largest category of cost, and a disproportionate share of that cost is borne in the first year of life.

Another factor associated with using the diagnosis of a disability as a contingency for estimates of cost beyond age five that invariably made the estimates conservative, however, was the absence of data on the incidence of other disabilities by GA, such as autism, for which preterm birth is a known risk factor.

Raw Data by Cost Category—The raw data for base year per capita cost estimates by cost category (PC_{by}) used in this report were those used in the IOM report on preterm birth. A brief review of that data is provided here, but the reader is directed to the section of that volume devoted societal preterm birth costs (chapter 12, pp 398-429), and to the background articles cited there, for a more in depth review of estimates underlying base year per capita costs by cost category.

Medical Care Costs to Age 5—The data for these estimates came from administrative claims and reimbursement records for the 1998-2000 birth cohorts (23,631 births) under an IHC closed panel plan followed for up to seven years. The estimates from this data were subjected to validations relative to other less robust preterm- and low birthweight-specific estimates available at the time. Estimates from these data were converted to national cost using Utah-specific inpatient and outpatient geographic adjustment factors (GAFs) as described below in section A3.

Maternal Delivery Costs—Data for these estimates came from the maternal delivery administrative records for the birth cohorts described above from IHC.

Early Intervention (EI) Services Costs—Data for cost estimates from publicly provided EI services in the first three years of life were from Massachusetts (Clements et al., 2007). Estimates from these data were converted to national cost using a Massachusetts-specific geographic adjustment factor (GAF) as described below in section A3.

Costs associated with Developmental Disabilities (DDs) beyond age 5—Data on the incremental risk for one of the four DDs (mental retardation, cerebral palsy, vision loss and hearing loss) for those born preterm by GA came from the Centers for Disease Control and Prevention's (CDC's) Metropolitan Atlanta Developmental Disabilities Surveillance Program (MADDSP) for survivors at age 3 of the 1981-1991 birth cohorts in the metropolitan Atlanta region through age 10. (https://www.cdc.gov/ncbddd/developmentaldisabilities/maddsp.html). Data estimates on incremental cost by DD by age and by cost category (medical care beyond the age of 5, special education services, medical devices and indirect productivity loss) is described in more detail in the IOM report and in Honeycutt et al. (2003).

A2. ***Cohort Estimates (TB_n and TB_i; S_n and S_i)***

Under the incidence approach to the cost of illness undertaken for this study, cost estimates are generated across the lifespan for each individual born preterm by GA category. As indicated in the introductory section to this Appendix, per capita costs are multiplied by cohort estimates at each age. Cohort estimates by age (S) and GA are therefore required for the cost estimates for the nation and for each state. In other words, the birth cohort by GA is required coupled with mortality/survival estimates to yield S for each age x.

Birth Cohort--The data for preterm birth rates and numbers of preterm births by GA for the nation and each state were taken from vital statistics linked birth/death records compiled by the National Center for Health Statistics (NCHS)--https://wonder.cdc.gov/lbd.html. The 2016 cohort served as the base for all estimates, as data for that cohort was the latest available at the inception of the study.

Infant Cohort—As noted above, data were required for each age across the lifespan for which cost estimates were available. Therefore, mortality data by GA were required to generate the size of the cohort by GA at each age. Of particular import for preterm birth is infant mortality, given both the high concentration of costs in the first year of life and the well-documented elevated rate of infant mortality associated with preterm birth. Infant mortality rates and the number of infant deaths by GA for the 2016 cohort at the national and state levels were taken as well from the linked birth-death record database compiled by the NCHS--https://wonder.cdc.gov/lbd.html.

Given that medical costs are concentrated not just in the first year of life, but in the first few months of life, the analysis took advantage of the fact that infant mortality from the NCHS database was parsed into neonatal and post-neonatal mortality rates by GA, permitting a more granular adjustment to estimates of infant medical care costs. While infant mortality by GA was available for every state, however, there were missing values for the more detailed breakdown of infant mortality into neonatal and post-neonatal mortality rates by GA category in several states due to small cell size. State-specific

infant mortality rates by GA were therefore partitioned into neonatal and post-neonatal mortality rates by GA according to the national distribution. The results of a separate sub-analysis on those states with complete neo-natal post-neonatal infant mortality indicated that such assignment had no significant effect on rates of neonatal and post-neonatal mortality rates by GA in the nation as a result of that assignment.

Raw data on medical cost in infancy were available by month, so the infant cohort was adjusted for neo-natal and post-neonatal mortality separately. This was performed with a discrete function. All infants were assumed to contribute to costs in the first month; neonatal mortality was fully applied to the cohort after the first month of life, so the infant cohort consisted strictly of post-neonatal survivors after the first month; post-neonatal mortality was fully applied after the third month, so the cohort consisted strictly of those surviving infancy from the fourth to twelfth month of life.

Cohort estimates beyond infancy—Mortality was assumed to revert back to population mortality rates after infancy. The rates were taken from NCHS vital statistics (https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Publications/NVSR/68_04/) to generate cohort size at each age after infancy by GA for the nation and for each state.

A3. ***Price Adjustments to 2016 and Geographic Adjustment Factors (PIs and GAFs)***

Updating prices and costs to 2016—Costs in the IOM report were expressed in 2005 dollars ($ 2005) for the nation. These costs were often inflated to 2005 from a prior base year or range of years covered by the raw data. Since cost estimates reflected the base year's per capita cost distribution by GA and by age, it was desirable from the standpoint of accuracy to use the base year's costs as the starting point to adjust to 2016 costs where possible. Cost adjustments to 2016 were tailored to specific cost categories, some more narrowly than others. The following provides a discussion of methods for updating costs by cost component.

Medical Cost--Given its pronounced importance in the cost estimates and its notorious historical departures from general price movements and variation, medical service costs were adjusted separately from other cost categories. Indeed, within medical care, dedicated adjustments were made for inpatient and outpatient medical service costs separately, given the significant variation in price movements between them and the disproportionate share of medical care comprised of inpatient services for preterm infants. Indices used to adjust prices over time are discussed here. The overview of Indices used to adjust for geographic variation are provided in the section below dedicated to that topic.

As noted above, age-specific costs were required (by month during infancy, by year thereafter) to adjust for neonatal, post-neonatal, and subsequent mortality so that per preterm costs could be multiplied by appropriate cohort sizes.

Inpatient--The Producer Price Index PPI index tailored to general inpatient care was used to adjust for changes in national inpatient costs to 2016. More specifically, the change in the "PPI by Industry: General and Surgical Hospitals" (https://www.bls.gov/ppi/) from 1998 to 2016 (a factor of 1.675) was applied to national per capita costs by GA by age in to arrive at per preterm birth costs by GA by age in 2016. The PPI is designed to reflect actual, or "transaction" prices paid by public and private payers to hospitals for inpatient services. Elaboration on the use of 1998 as the base year for this as well as for the outpatient adjustment is provided below in the section devoted to Category of Cost (A3).

Outpatient--The "Personal Consumption Expenditure" for health (PCE-Health) was used analogously as the PPI to adjust for changes in national outpatient costs by GA by age from 1998 to 2016 (https://meps.ahrq.gov/about_meps/Price_Index.shtml, table 3), a factor of 1.546. PCE-Health is a chain-weighted or "Fisher Ideal," index comprised of deflators (price indices) that reflect the composite of services that go into health care.

Other Direct Service Costs and Indirect Productivity Cost--Services other than medical care that were part of the preterm cost calculations, such as special education (SE) and early intervention (EI) services, were largely comprised of compensation to public employees. The Bureau of Labor Statistics' Employee Compensation Index (ECI), government employee sub-component, was therefore used as the PI to update national per capita base year costs to 2016 for SE and EI services (https://www.bls.gov/eci/). The general ECI was used to update labor market productivity losses. The PI for devices was composed of a weighted average of the ECI (60%), the inpatient deflator described above (25%) and the outpatient deflator described above (15%) with the respective weights in parentheses.

Geographic Adjustment Factors (GAFs)--Per the general discussion of methods in the introduction to the Appendix, national per capita cost estimates by GA and by age expressed in 2016 dollars can be adjusted for geographic differences in prices and costs to arrive at state-specific cost estimates in 2016. This is accomplished by multiplying geographic adjustment factors (GAFs) for each state. As with indices used to update prices and costs, different GAFs were applied to separate cost category for greater accuracy in the adjustment. This section is primarily devoted to review of the specific GAFs by cost category used in that exercise.

The final part of the section reviews a similar set of GAFs applied to base year service costs for medical care services through age 5 and for early intervention services, as raw data for the cost of these service categories were taken from specific states. Those GAF were used to adjust state costs to national costs in the base year.

Medical Cost--As with the indices used to update of costs to 2016, special GAFs were used to adjust national per capita medical care costs to state per capita medical care costs. Two sets of GAFs were used, one for inpatient care and the other for outpatient care.

Inpatient-- The Centers for Medicare and Medicaid Services (CMS) adjusts Inpatient Prospective Payment System (IPPS) reimbursements to hospitals for geographic differences in inpatient hospital costs at the geographic level of the core-based statistical area (CBSA). CBSAs are one or more counties with economic ties. IPPS payments consist of a combination of two components, an operating component, based on a hospital wage index (HWI) reflecting personnel and supply costs, and a capital component, reflecting interest payments and depreciation. The capital component is equal to a simple transformation of the HWI (in 2016, the HWI raised to the power 0.6848). A summary of the algorithms used in this study for constructing these components of the inpatient GAF is provided in http://www.medpac.gov/docs/default-source/payment-basics/medpac_payment_basics_16_hospital_final.pdf and https://oig.hhs.gov/oas/reports/region1/11700500.pdf.

IPPS rates are updated by CMS annually for geographic changes in costs. The specific HWIs and GAFs used for this study are the CMS Acute Inpatient PPS Wage Index Files, Table 3 – Proposed Wage Index Table by CBSA, FY 2017 (https://www.cms.gov/Medicare/Medicare-Fee-for-Service-

Payment/AcuteInpatientPPS/Wage-Index-Files-Items/FY2017-Wage-Index-Home-Page.html). Since the data were provided at the CBSA level and GAFs were desired at the state level, a crosswalk delineating boundaries from CSBAs to states from the National Bureau of Economic Research (https://www.nber.org/data/cbsa-msa-fips-ssa-county-crosswalk.html) were combined with Census population estimates (https://factfinder.census.gov) to generate state-specific inpatients GAFs for each state.

Outpatient--GAFs for outpatient services were based on the geographic practice cost indices (GPCIs) under Medicare's 2016 physician fee schedule (PFS). Physician payment is based on relative value units (RVUs) and divided into three components: a work RVU, a practice expense RVU (PE), and a malpractice RVU (MP). RVUs are converted into dollars according to a conversion factor updated every year by CMS (https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/MedcrePhysFeeSchedfctsht.pdf).

Each of the three components of physician expense has a corresponding GPCI, reflecting the market characteristics relevant to each of the expenses. GPCI data by area for each component were available from https://www.cms.gov/apps/physician-fee-schedule/search/search-criteria.aspx. General weights of the RVUs among the three practice expenses (50.9 % Work RVU, 44.8% PE RVU, and 4.3% MP RVU) were applied to the three GCPIs by area to generate area-specific weighted GCPIs. Several states have multiple CMS areas with distinct component and weighted GCPI values. Beneficiary population by CMS area from the "Geographic Variation Public Use File, 2016 Beneficiary Population State," (https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html) were used as weights applied to these areas to generate a single weighted GCPI, or outpatient GAF, by state.

Other Direct Services and Indirect Productivity Cost--GAFs for non-medical direct costs (special education and early intervention services), and for the indirect costs of lost productivity, were taken from the 2016 Regional Price Parity index by state (SARPP) generated from the Bureau of Economic Analysis (https://apps.bea.gov/regional/histdata/releases/0917spi/index.cfm).

Base Year GAFs--Unlike the GAFs described above to adjust 2016 per capita national cost estimates to 2016 individual state levels, data for three categories of base year per capita cost estimates for the IOM report (medical care through age 5, maternal delivery costs, and early intervention costs) came from individual states. Estimates for these three categories had to be converted from state to national estimates in the base year using individual state GAFs. They were then adjusted for price increases using the national price indices (PIs) reviewed above to 2016, and then subjected to the relevant state-specific GAFs in 2016 described above to generate state level estimates.

Estimates of medical care cost through age 5 years and maternal delivery costs, as described in A1, came from administrative records on birth cohorts between 1998 and 2000 and on maternal records attached to those cohorts. Early intervention services estimates were taken from Massachusetts data. Utah per capita inpatient and outpatient costs by GA and age were adjusted to the nation separately using the same algorithms to generate GAFs for that set of services reviewed above. The GAF applied to Massachusetts (MA) early intervention costs to generate national estimates was based on a weighted average of American Chamber of Commerce Research Association (ACCRA) cost of living indices (COL) for metropolitan and non-metropolitan areas in MA using area population as weights. More detail on these base year data sources are provided in the IOM report, chapter 12, on the societal costs of preterm birth.

State Costs expressed in Parity Prices—Tables B13 and B14 provide total cost and per preterm birth cost estimates by state in terms of "parity prices" that eliminate price and cost of living differentials between states so as to facilitate comparative results on preterm birth outcomes and associated real resource utilization. These results were generated by eliminating GAF adjustments discussed above and expressing all costs in terms of national prices, that is, using national prices as a numeraire.

Updating National Preterm Birth Costs to 2016 with Separate Estimates for Individual States

Final Report to the March of Dimes
Norman J Waitzman, PhD and Ali Jalali, PhD

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Appendix B. Detailed Results

Tables 1 and 2 included in the body of the report provided global summary results on costs at the national and state levels. Summary background data and a more granular breakdown of those results aid in interpretation and understanding, and ultimately in policy formation. This Appendix provides a tabular presentation of such background data and granular breakdown in selected detailed tables.

There is a two-part structure to the detailed tabular results in this appendix. Tables B1-B5 extend the background information on birth and preterm *cohort data*. Tables B6-B14 provide additional detailed breakdowns of data on *state and national costs* by relevant categories. Tables B13 and B14, within the cost section, provide results on an important "price parity" exercise that permits cost comparisons between states absent state price variation.

List of Tables

Cohort Tables

Cost Tables

Table B1: Preterm Birth Rates by Gestational Age Category by State (GA), 2016				
	<28	28-31	32-36	Total Preterm
Alabama	1.0%	1.1%	9.8%	12.0%
Alaska	0.5%	0.6%	7.8%	8.9%
Arizona	0.6%	0.8%	7.7%	9.1%
Arkansas	0.7%	1.1%	9.0%	10.9%
California	0.5%	0.8%	7.3%	8.6%
Colorado	0.5%	0.8%	7.6%	8.9%
Connecticut	0.6%	0.9%	7.9%	9.4%
Delaware	1.0%	1.0%	8.1%	10.1%
District of Columbia	0.9%	1.1%	8.8%	10.7%
Florida	0.8%	1.0%	8.4%	10.1%
Georgia	0.9%	1.1%	9.2%	11.2%
Hawaii	0.7%	0.9%	8.9%	10.5%
Idaho	0.5%	0.8%	7.6%	8.9%
Illinois	0.8%	1.0%	8.5%	10.3%
Indiana	0.7%	1.0%	8.3%	10.0%
Iowa	0.6%	0.8%	7.9%	9.3%
Kansas	0.6%	0.7%	7.8%	9.1%
Kentucky	0.7%	1.1%	9.6%	11.4%
Louisiana	0.9%	1.3%	10.5%	12.6%
Maine	0.5%	0.8%	7.3%	8.6%
Maryland	0.8%	1.0%	8.3%	10.1%
Massachusetts	0.6%	0.7%	7.4%	8.6%
Michigan	0.7%	1.0%	8.4%	10.1%
Minnesota	0.6%	0.8%	7.4%	8.8%
Mississippi	1.0%	1.4%	11.3%	13.6%
Missouri	0.7%	0.9%	8.5%	10.2%
Montana	0.5%	0.8%	7.5%	8.7%
Nebraska	0.5%	0.9%	8.2%	9.6%
Nevada	0.6%	0.9%	8.8%	10.4%
New Hampshire	0.4%	0.7%	6.6%	7.8%
New Jersey	0.6%	0.9%	8.3%	9.9%
New Mexico	0.6%	1.1%	8.2%	10.0%
New York	0.6%	0.9%	7.5%	8.9%
North Carolina	0.9%	1.0%	8.5%	10.4%
North Dakota	0.7%	0.9%	7.5%	9.1%
Ohio	0.8%	1.0%	8.6%	10.4%
Oklahoma	0.7%	0.8%	9.1%	10.6%
Oregon	0.5%	0.7%	6.8%	7.9%
Pennsylvania	0.7%	0.9%	7.7%	9.3%
Rhode Island	0.6%	1.0%	7.7%	9.3%
South Carolina	0.8%	1.1%	9.2%	11.2%
South Dakota	0.4%	0.8%	7.8%	8.9%
Tennessee	0.7%	1.1%	9.4%	11.2%
Texas	0.7%	1.0%	8.7%	10.4%
Utah	0.5%	0.9%	8.3%	9.6%
Vermont	0.5%	0.8%	6.7%	7.9%
Virginia	0.7%	0.9%	8.0%	9.6%
Washington	0.4%	0.7%	7.0%	8.1%
West Virginia	0.7%	0.9%	10.2%	11.8%
Wisconsin	0.6%	0.9%	8.1%	9.6%
Wyoming	0.7%	0.9%	7.9%	9.5%
United States	**0.7%**	**0.9%**	**8.2%**	**9.8%**

Note: See notes at the end of the Appendix on data sources for each table or set of tables.

Table B2: Preterm Birth Cohort Numbers by GA Category by State 2016					
	<28	28-31	32-36	Total Preterm	Total Births
Alabama	601	675	5,807	7,083	59,151
Alaska	58	69	872	999	11,209
Arizona	482	637	6,535	7,654	84,520
Arkansas	285	422	3,450	4,157	38,274
California	2,478	3,725	35,871	42,074	488,827
Colorado	330	500	5,068	5,898	66,613
Connecticut	220	321	2,834	3,375	36,015
Delaware	105	111	889	1,105	10,992
District of Columbia	87	108	864	1,059	9,858
Florida	1,713	2,174	18,935	22,822	225,022
Georgia	1,220	1,439	11,918	14,577	130,042
Hawaii	133	163	1,608	1,904	18,059
Idaho	112	185	1,711	2,008	22,482
Illinois	1,202	1,563	13,187	15,952	154,445
Indiana	610	795	6,882	8,287	83,091
Iowa	254	300	3,098	3,652	39,403
Kansas	225	280	2,952	3,457	38,053
Kentucky	403	611	5,308	6,322	55,449
Louisiana	564	806	6,612	7,982	63,178
Maine	65	98	926	1,089	12,705
Maryland	595	751	6,062	7,408	73,136
Massachusetts	409	513	5,246	6,168	71,317
Michigan	847	1,092	9,551	11,490	113,315
Minnesota	414	526	5,181	6,121	69,749
Mississippi	376	513	4,285	5,174	37,928
Missouri	521	684	6,379	7,584	74,705
Montana	64	94	916	1,074	12,282
Nebraska	142	239	2,173	2,554	26,589
Nevada	223	333	3,202	3,758	36,260
New Hampshire	52	90	812	954	12,267
New Jersey	640	955	8,531	10,126	102,647
New Mexico	157	270	2,037	2,464	24,692
New York	1,374	2,014	17,568	20,956	234,283
North Carolina	1,027	1,210	10,305	12,542	120,779
North Dakota	77	104	859	1,040	11,383
Ohio	1,122	1,363	11,903	14,388	138,085
Oklahoma	350	446	4,801	5,597	52,592
Oregon	215	312	3,093	3,620	45,535
Pennsylvania	974	1,258	10,730	12,962	139,409
Rhode Island	69	105	834	1,008	10,798
South Carolina	477	659	5,259	6,395	57,342
South Dakota	44	101	953	1,098	12,275
Tennessee	566	924	7,595	9,085	80,807
Texas	2,766	3,827	34,795	41,388	398,047
Utah	253	431	4,167	4,851	50,464
Vermont	28	46	383	457	5,756
Virginia	719	920	8,153	9,792	102,460
Washington	375	659	6,330	7,364	90,505
West Virginia	134	174	1,951	2,259	19,079
Wisconsin	411	580	5,394	6,385	66,615
Wyoming	50	64	586	700	7,386
United States	**26,618**	**36,239**	**325,361**	**388,218**	**3,945,875**

Note: See notes at the end of the Appendix on data sources for each table or set of tables.

Table B3: Percent Distribution of Preterm Births by GA Category by State, 2016			
	% < 28 Weeks	% 28-31 Weeks	% 32-36 Weeks
Alabama	8%	10%	82%
Alaska	6%	7%	87%
Arizona	6%	8%	85%
Arkansas	7%	10%	83%
California	6%	9%	85%
Colorado	6%	8%	86%
Connecticut	7%	10%	84%
Delaware	10%	10%	80%
District of Columbia	8%	10%	82%
Florida	8%	10%	83%
Georgia	8%	10%	82%
Hawaii	7%	9%	84%
Idaho	6%	9%	85%
Illinois	8%	10%	83%
Indiana	7%	10%	83%
Iowa	7%	8%	85%
Kansas	7%	8%	85%
Kentucky	6%	10%	84%
Louisiana	7%	10%	83%
Maine	6%	9%	85%
Maryland	8%	10%	82%
Massachusetts	7%	8%	85%
Michigan	7%	10%	83%
Minnesota	7%	9%	85%
Mississippi	7%	10%	83%
Missouri	7%	9%	84%
Montana	6%	9%	85%
Nebraska	6%	9%	85%
Nevada	6%	9%	85%
New Hampshire	5%	9%	85%
New Jersey	6%	9%	84%
New Mexico	6%	11%	83%
New York	7%	10%	84%
North Carolina	8%	10%	82%
North Dakota	7%	10%	83%
Ohio	8%	9%	83%
Oklahoma	6%	8%	86%
Oregon	6%	9%	85%
Pennsylvania	8%	10%	83%
Rhode Island	7%	10%	83%
South Carolina	7%	10%	82%
South Dakota	4%	9%	87%
Tennessee	6%	10%	84%
Texas	7%	9%	84%
Utah	5%	9%	86%
Vermont	6%	10%	84%
Virginia	7%	9%	83%
Washington	5%	9%	86%
West Virginia	6%	8%	86%
Wisconsin	6%	9%	84%
Wyoming	7%	9%	84%
United States	**7%**	**9%**	**84%**

Note: See notes at the end of the Appendix on data sources for each table or set of tables.

Table B4: Infant Mortality by GA Category by State, 2016			
	< 28 weeks	28-31 weeks	32-36 weeks
Alabama	0.39	0.05	0.01
Alaska	0.34	0.04	0.02
Arizona	0.36	0.05	0.01
Arkansas	0.32	0.06	0.02
California	0.35	0.04	0.01
Colorado	0.42	0.06	0.01
Connecticut	0.45	0.03	0.01
Delaware	0.49	0.06	0.01
District of Columbia	0.39	0.05	0.01
Florida	0.41	0.05	0.01
Georgia	0.41	0.04	0.01
Hawaii	0.41	0.04	0.01
Idaho	0.47	0.07	0.01
Illinois	0.42	0.04	0.01
Indiana	0.41	0.04	0.02
Iowa	0.39	0.04	0.01
Kansas	0.40	0.04	0.01
Kentucky	0.31	0.05	0.01
Louisiana	0.35	0.07	0.01
Maine	0.62	0.05	0.01
Maryland	0.45	0.03	0.01
Massachusetts	0.40	0.03	0.01
Michigan	0.38	0.04	0.01
Minnesota	0.40	0.03	0.01
Mississippi	0.39	0.05	0.01
Missouri	0.39	0.04	0.01
Montana	0.41	0.06	0.01
Nebraska	0.48	0.03	0.01
Nevada	0.36	0.05	0.01
New Hampshire	0.38	0.06	0.01
New Jersey	0.36	0.03	0.01
New Mexico	0.39	0.04	0.01
New York	0.38	0.04	0.01
North Carolina	0.42	0.06	0.01
North Dakota	0.40	0.05	0.01
Ohio	0.42	0.04	0.01
Oklahoma	0.43	0.06	0.01
Oregon	0.45	0.05	0.01
Pennsylvania	0.45	0.03	0.01
Rhode Island	0.54	0.04	0.02
South Carolina	0.36	0.05	0.01
South Dakota	0.41	0.04	0.01
Tennessee	0.41	0.05	0.01
Texas	0.33	0.04	0.01
Utah	0.45	0.04	0.01
Vermont	0.31	0.04	0.02
Virginia	0.37	0.05	0.01
Washington	0.39	0.03	0.01
West Virginia	0.40	0.05	0.01
Wisconsin	0.45	0.05	0.01
Wyoming	0.38	0.04	0.01
United States	**0.39**	**0.04**	**0.01**

Note: See notes at the end of the Appendix on data sources for each table or set of tables.

Table B5: Estimated Survivors of the 2016 Preterm Birth Cohort to Age 5 by GA Category			
	< 28 weeks	28-31 weeks	32-36 weeks
Alabama	363	642	5726
Alaska	38	66	856
Arizona	307	604	6441
Arkansas	194	395	3393
California	1601	3566	35546
Colorado	191	469	5014
Connecticut	120	311	2809
Delaware	54	105	879
District of Columbia	53	102	855
Florida	1017	2073	18721
Georgia	718	1382	11777
Hawaii	78	156	1594
Idaho	59	172	1691
Illinois	696	1498	13043
Indiana	356	760	6762
Iowa	154	288	3062
Kansas	135	267	2905
Kentucky	279	580	5226
Louisiana	364	752	6532
Maine	25	93	918
Maryland	327	725	5995
Massachusetts	246	498	5206
Michigan	524	1044	9437
Minnesota	249	508	5136
Mississippi	231	487	4237
Missouri	319	655	6283
Montana	38	88	903
Nebraska	74	230	2144
Nevada	142	318	3162
New Hampshire	32	85	806
New Jersey	409	921	8478
New Mexico	95	259	2008
New York	857	1927	17437
North Carolina	598	1142	10196
North Dakota	46	98	847
Ohio	646	1310	11746
Oklahoma	200	421	4738
Oregon	119	295	3066
Pennsylvania	538	1213	10617
Rhode Island	32	100	816
South Carolina	303	628	5190
South Dakota	26	96	938
Tennessee	332	878	7495
Texas	1851	3651	34362
Utah	138	413	4119
Vermont	19	44	375
Virginia	455	877	8071
Washington	227	635	6267
West Virginia	81	164	1920
Wisconsin	228	550	5321
Wyoming	31	61	579

Note: See notes at the end of the Appendix on data sources for each table or set of tables.

Table B6: Per Preterm Birth Total Costs by GA category by State ($ 2016)			
	< 28 weeks	28-31 weeks	32-36 weeks
Alabama	295,201	160,287	24,441
Alaska	406,495	213,097	31,952
Arizona	349,935	185,079	27,966
Arkansas	315,164	161,687	24,731
California	436,793	229,225	34,263
Colorado	342,666	187,469	28,750
Connecticut	378,352	213,252	31,898
Delaware	335,516	191,003	29,049
District of Columbia	362,500	196,642	30,498
Florida	327,919	179,562	27,488
Georgia	316,785	174,093	26,362
Hawaii	388,695	213,087	32,486
Idaho	302,114	170,161	26,188
Illinois	338,717	186,890	28,285
Indiana	321,663	176,145	26,413
Iowa	316,233	171,705	25,904
Kansas	311,941	169,692	25,682
Kentucky	326,550	167,454	25,355
Louisiana	312,992	164,091	25,330
Maine	288,367	180,739	27,663
Maryland	333,453	189,523	29,016
Massachusetts	390,996	212,637	31,784
Michigan	332,914	178,771	27,015
Minnesota	349,227	190,017	28,522
Mississippi	297,893	160,610	24,519
Missouri	318,018	171,655	25,879
Montana	339,078	183,193	27,790
Nebraska	306,437	175,497	26,313
Nevada	375,226	198,188	29,623
New Hampshire	368,451	196,583	30,088
New Jersey	399,325	212,431	32,149
New Mexico	322,678	175,543	26,532
New York	392,055	210,209	32,068
North Carolina	313,365	171,351	26,149
North Dakota	337,241	181,956	27,400
Ohio	313,125	173,185	26,067
Oklahoma	302,550	166,724	25,438
Oregon	357,680	197,865	29,798
Pennsylvania	324,191	182,720	27,687
Rhode Island	337,642	199,065	29,663
South Carolina	320,809	170,655	25,876
South Dakota	333,110	181,557	27,066
Tennessee	303,822	166,452	25,378
Texas	340,653	177,556	27,032
Utah	320,577	180,816	27,421
Vermont	364,075	187,030	28,246
Virginia	340,085	181,421	27,812
Washington	375,241	203,328	30,534
West Virginia	300,708	162,631	24,810
Wisconsin	326,123	181,207	27,309
Wyoming	347,348	185,978	28,104
United States	**344,355**	**186,731**	**28,367**

Note: See Table 1 for per preterm cost for all preterm categories combined. See notes at the end of the Appendix on data sources for each table or set of tables.

Table B7: Total Preterm Cost by Cost Category by State (2016 $)						
	Medical	Maternal Delivery	Special Education	Early Intervention Services	Productivity Loss	Other
Alabama	293,960,942	31,225,846	10,494,065	11,620,120	80,052,126	183,289
Alaska	45,297,419	5,345,249	1,579,727	1,773,333	12,119,426	27,419
Arizona	319,199,524	37,297,091	11,524,168	12,973,373	88,130,522	200,162
Arkansas	165,611,003	18,314,257	6,092,441	6,821,200	46,430,941	106,143
California	2,162,549,419	260,239,210	75,852,926	86,003,693	579,334,382	1,315,714
Colorado	235,298,367	28,412,192	9,055,200	10,367,619	69,227,420	156,579
Connecticut	166,465,695	19,477,030	5,738,966	6,562,641	43,745,175	99,406
Delaware	57,880,734	6,178,167	1,866,113	2,078,847	14,218,961	32,559
District Columbia	53,007,072	5,631,713	2,101,202	2,339,247	16,008,984	36,668
Florida	996,323,212	109,571,956	37,546,790	42,118,203	286,369,034	653,584
Georgia	656,755,442	70,514,612	22,959,318	25,571,630	174,979,738	400,557
Hawaii	92,932,629	10,748,483	3,575,463	4,023,669	27,324,986	62,127
Idaho	74,072,806	8,937,250	2,765,388	3,195,906	21,105,840	47,732
Illinois	736,968,247	81,667,702	25,973,508	29,231,919	197,954,494	451,878
Indiana	359,138,915	40,284,492	12,143,015	13,666,158	92,581,389	211,225
Iowa	144,662,809	16,530,560	5,200,569	5,829,962	39,772,073	90,430
Kansas	131,111,007	15,216,767	4,817,572	5,429,972	36,853,448	83,637
Kentucky	250,473,452	28,289,823	9,187,506	10,323,633	70,065,665	159,861
Louisiana	323,000,384	35,397,032	12,075,994	13,541,000	92,043,226	210,293
Maine	42,010,080	5,136,444	1,519,815	1,782,917	11,596,468	26,126
Maryland	347,186,741	37,712,623	13,500,297	15,202,280	102,797,148	234,938
Massachusetts	297,958,691	35,028,377	10,495,867	11,833,226	80,239,597	182,258
Michigan	505,825,025	56,101,590	17,746,548	19,869,171	135,362,689	309,064
Minnesota	268,656,640	31,073,987	9,460,690	10,659,903	72,285,230	164,351
Mississippi	204,363,920	22,469,781	7,439,695	8,359,382	56,702,347	129,488
Missouri	306,626,003	34,713,498	10,928,491	12,293,093	83,429,125	190,010
Montana	44,020,579	5,210,812	1,546,062	1,760,392	11,812,510	26,782
Nebraska	97,194,772	11,739,262	3,438,954	3,986,091	26,217,323	59,340
Nevada	168,561,613	20,007,979	5,716,260	6,483,970	43,657,218	99,142
New Hampshire	41,058,773	4,933,475	1,561,373	1,790,652	11,912,228	27,012
New Jersey	493,886,784	57,052,669	18,591,885	21,039,251	141,809,610	322,854
New Mexico	103,542,629	11,694,541	3,776,622	4,315,889	28,707,274	65,511
New York	1,021,923,151	117,082,173	39,535,099	44,712,863	301,469,581	686,740
North Carolina	552,043,230	59,927,223	19,126,017	21,326,194	145,872,643	333,468
North Dakota	47,790,693	5,334,794	1,567,518	1,762,536	11,945,076	27,280
Ohio	622,682,058	68,541,022	21,140,910	23,699,131	161,225,793	368,087
Oklahoma	204,569,397	24,103,005	7,517,461	8,524,532	57,534,331	130,267
Oregon	158,449,145	19,224,542	5,419,106	6,203,380	41,409,017	93,732
Pennsylvania	575,699,918	64,113,362	20,770,197	23,468,547	158,293,801	360,972
Rhode Island	48,148,524	5,614,012	1,552,003	1,794,072	11,803,034	26,831
South Carolina	275,470,344	30,090,002	9,844,101	11,023,905	74,970,773	171,551
South Dakota	39,999,398	5,114,410	1,392,852	1,633,791	10,623,973	23,947
Tennessee	350,575,413	40,145,235	13,072,825	14,942,569	99,547,690	226,568
Texas	1,723,270,154	194,076,381	66,014,330	73,961,055	503,856,886	1,149,105
Utah	182,761,650	22,326,316	6,954,242	8,053,270	53,087,203	119,953
Vermont	19,836,938	2,269,479	769,026	868,464	5,858,328	13,370
Virginia	427,924,553	47,343,253	16,683,330	18,638,224	127,298,703	290,668
Washington	313,977,251	38,762,653	11,756,821	13,550,550	89,740,478	203,067
West Virginia	78,567,911	9,293,481	2,970,614	3,363,801	22,749,626	51,481
Wisconsin	265,957,201	31,191,189	9,120,957	10,396,624	69,615,761	158,030
Wyoming	31,377,688	3,523,566	1,109,161	1,242,645	8,466,679	19,306

Note: See notes at the end of the Appendix on data sources for each table or set of tables.

Table B8: Total Preterm Medical Cost and Percent Medical of Total Cost by GA Category by State ($ 2016)								
	<28 weeks		28-31 weeks		32-36 weeks		All Preterm (<37 weeks)	
	Medical Cost	% Total	Medical Cost	% Total	Medical Cost	% Total	Medical Cost	% Total
Alabama	145,349,891	82%	84,729,939	78%	95,106,958	67%	325,186,788	76%
Alaska	19,482,007	83%	11,784,352	80%	19,376,309	70%	50,642,668	77%
Arizona	138,689,581	82%	93,424,422	79%	124,382,613	68%	356,496,615	76%
Arkansas	72,669,474	81%	53,768,247	79%	57,487,540	67%	183,925,261	76%
California	895,745,156	83%	681,818,946	80%	845,224,527	69%	2,422,788,629	77%
Colorado	93,150,334	82%	73,418,950	78%	97,141,275	67%	263,710,559	75%
Connecticut	70,022,562	84%	54,240,310	79%	61,679,853	68%	185,942,724	77%
Delaware	29,738,376	84%	16,793,845	79%	17,526,681	68%	64,058,902	78%
District of Columbia	25,322,977	80%	16,267,878	77%	17,047,930	65%	58,638,784	74%
Florida	458,397,896	82%	303,207,935	78%	344,289,338	66%	1,105,895,169	75%
Georgia	318,977,425	83%	196,734,155	79%	211,558,474	67%	727,270,054	76%
Hawaii	42,305,327	82%	26,954,763	78%	34,421,021	66%	103,681,112	75%
Idaho	28,268,808	84%	24,749,518	79%	29,991,730	67%	83,010,056	75%
Illinois	337,243,185	83%	229,796,576	79%	251,596,188	67%	818,635,949	76%
Indiana	163,642,190	83%	111,272,443	79%	124,508,775	68%	399,423,408	77%
Iowa	66,271,715	83%	40,600,419	79%	54,321,236	68%	161,193,369	76%
Kansas	57,827,935	82%	37,372,422	79%	51,127,416	67%	146,327,774	76%
Kentucky	106,676,387	81%	80,819,449	79%	91,267,439	68%	278,763,275	76%
Louisiana	142,997,901	81%	103,607,610	78%	111,791,905	67%	358,397,416	75%
Maine	16,236,355	87%	13,851,735	78%	17,058,434	67%	47,146,524	76%
Maryland	161,949,795	82%	108,902,834	77%	114,046,735	65%	384,899,364	75%
Massachusetts	132,897,791	83%	86,421,926	79%	113,667,352	68%	332,987,069	76%
Michigan	232,366,874	82%	154,314,052	79%	175,245,690	68%	561,926,616	76%
Minnesota	119,963,067	83%	79,122,057	79%	100,645,502	68%	299,730,627	76%
Mississippi	91,704,819	82%	64,626,648	78%	70,502,235	67%	226,833,701	76%
Missouri	136,586,573	82%	92,700,355	79%	112,052,572	68%	341,339,501	76%
Montana	18,067,836	83%	13,722,876	80%	17,440,679	69%	49,231,391	76%
Nebraska	36,748,749	84%	33,204,672	79%	38,980,613	68%	108,934,034	76%
Nevada	69,664,473	83%	53,004,012	80%	65,901,108	69%	188,569,592	77%
New Hampshire	15,709,607	82%	13,913,403	79%	16,369,238	67%	45,992,249	75%
New Jersey	208,364,072	82%	158,903,738	78%	183,671,643	67%	550,939,453	75%
New Mexico	41,654,516	82%	37,204,911	78%	36,377,743	67%	115,237,170	76%
New York	437,463,757	81%	329,099,748	78%	372,441,819	66%	1,139,005,324	75%
North Carolina	266,443,922	83%	163,556,813	79%	181,969,718	68%	611,970,453	77%
North Dakota	21,709,704	84%	15,153,647	80%	16,262,136	69%	53,125,487	78%
Ohio	292,757,010	83%	186,887,106	79%	211,578,964	68%	691,223,079	77%
Oklahoma	87,787,720	83%	58,570,834	79%	82,313,848	67%	228,672,401	76%
Oregon	64,884,313	84%	49,365,695	80%	63,423,678	69%	177,673,687	77%
Pennsylvania	261,825,111	83%	179,532,329	78%	198,455,840	67%	639,813,280	76%
Rhode Island	20,047,387	86%	16,674,916	80%	17,040,233	69%	53,762,536	78%
South Carolina	125,192,396	82%	88,529,402	79%	91,838,549	67%	305,560,347	76%
South Dakota	12,346,924	84%	14,759,292	80%	18,007,592	70%	45,113,808	77%
Tennessee	141,411,388	82%	120,393,851	78%	128,915,408	67%	390,720,648	75%
Texas	759,866,046	81%	530,592,920	78%	626,887,569	67%	1,917,346,535	75%
Utah	67,493,013	83%	61,047,030	78%	76,547,923	67%	205,087,967	75%
Vermont	8,180,135	80%	6,714,559	78%	7,211,723	67%	22,106,417	75%
Virginia	197,165,354	81%	129,140,558	77%	148,961,893	66%	475,267,805	74%
Washington	116,312,826	83%	105,671,444	79%	130,755,634	68%	352,739,904	75%
West Virginia	33,085,201	82%	22,233,972	79%	32,542,219	67%	87,861,392	75%
Wisconsin	112,610,385	84%	83,648,581	80%	100,889,423	68%	297,148,389	77%
Wyoming	14,304,809	82%	9,411,211	79%	11,185,234	68%	34,901,254	76%
United States	**7,535,581,058**	**82%**	**5,322,239,305**	**79%**	**6,219,036,153**	**67%**	**19,076,856,516**	**76%**

Note: Medical costs entries include maternal delivery costs in addition to lifetime medical costs for the preterm infant. See notes at the end of the Appendix on data sources for each table or set of tables.

Table B9: Per Preterm Birth Medical Cost ($ 2016) and Percent Medical of Per Preterm Total Cost by GA Category by State								
	< 28 weeks		28-31 weeks		32-36 weeks		All Preterm	
	Per Preterm Medical Cost	% Total	Per Preterm Medical Cost	% Total	Per Preterm Medical Cost	% Total	Per Preterm Medical Cost	% Total
Alabama	241,847	82%	125,526	78%	16,378	67%	45,911	76%
Alaska	335,897	83%	170,788	80%	22,221	70%	50,693	77%
Arizona	287,738	82%	146,663	79%	19,033	68%	46,577	76%
Arkansas	254,981	81%	127,413	79%	16,663	67%	44,245	76%
California	361,479	83%	183,039	80%	23,563	69%	57,584	77%
Colorado	282,274	82%	146,838	78%	19,168	67%	44,712	75%
Connecticut	318,284	84%	168,973	79%	21,764	68%	55,094	77%
Delaware	283,223	84%	151,296	79%	19,715	68%	57,972	78%
District of Columbia	291,069	80%	150,628	77%	19,731	65%	55,372	74%
Florida	267,599	82%	139,470	78%	18,183	66%	48,457	75%
Georgia	261,457	83%	136,716	79%	17,751	67%	49,892	76%
Hawaii	318,085	82%	165,367	78%	21,406	66%	54,454	75%
Idaho	252,400	84%	133,781	79%	17,529	67%	41,340	75%
Illinois	280,568	83%	147,023	79%	19,079	67%	51,319	76%
Indiana	268,266	83%	139,965	79%	18,092	68%	48,199	77%
Iowa	260,912	83%	135,335	79%	17,534	68%	44,138	76%
Kansas	257,013	82%	133,473	79%	17,320	67%	42,328	76%
Kentucky	264,706	81%	132,274	79%	17,194	68%	44,094	76%
Louisiana	253,542	81%	128,545	78%	16,907	67%	44,901	75%
Maine	249,790	87%	141,344	78%	18,422	67%	43,293	76%
Maryland	272,185	82%	145,010	77%	18,813	65%	51,957	75%
Massachusetts	324,933	83%	168,464	79%	21,667	68%	53,986	76%
Michigan	274,341	82%	141,313	79%	18,348	68%	48,906	76%
Minnesota	289,766	83%	150,422	79%	19,426	68%	48,968	76%
Mississippi	243,896	82%	125,978	78%	16,453	67%	43,841	76%
Missouri	262,162	82%	135,527	79%	17,566	68%	45,008	76%
Montana	282,310	83%	145,988	80%	19,040	69%	45,839	76%
Nebraska	258,794	84%	138,932	79%	17,939	68%	42,652	76%
Nevada	312,397	83%	159,171	80%	20,581	69%	50,178	77%
New Hampshire	302,108	82%	154,593	79%	20,159	67%	48,210	75%
New Jersey	325,569	82%	166,391	78%	21,530	67%	54,408	75%
New Mexico	265,315	82%	137,796	78%	17,858	67%	46,768	76%
New York	318,387	81%	163,406	78%	21,200	66%	54,352	75%
North Carolina	259,439	83%	135,171	79%	17,658	68%	48,794	77%
North Dakota	281,944	84%	145,708	80%	18,931	69%	51,082	78%
Ohio	260,924	83%	137,115	79%	17,775	68%	48,042	77%
Oklahoma	250,822	83%	131,325	79%	17,145	67%	40,856	76%
Oregon	301,788	84%	158,223	80%	20,506	69%	49,081	77%
Pennsylvania	268,814	83%	142,713	78%	18,495	67%	49,361	76%
Rhode Island	290,542	86%	158,809	80%	20,432	69%	53,336	78%
South Carolina	262,458	82%	134,339	79%	17,463	67%	47,781	76%
South Dakota	280,612	84%	146,132	80%	18,896	70%	41,087	77%
Tennessee	249,843	82%	130,296	78%	16,974	67%	43,007	75%
Texas	274,717	81%	138,645	78%	18,017	67%	46,326	75%
Utah	266,771	83%	141,640	78%	18,370	67%	42,277	75%
Vermont	292,148	80%	145,969	78%	18,830	67%	48,373	75%
Virginia	274,222	81%	140,370	77%	18,271	66%	48,536	74%
Washington	310,168	83%	160,351	79%	20,656	68%	47,901	75%
West Virginia	246,904	82%	127,781	79%	16,680	67%	38,894	75%
Wisconsin	273,991	84%	144,222	80%	18,704	68%	46,539	77%
Wyoming	286,096	82%	147,050	79%	19,087	68%	49,859	76%
United States	**283,101**	**82%**	**146,865**	**79%**	**19,114**	**67%**	**49,140**	**76%**

Note: Medical costs entries include maternal delivery costs in addition to lifetime medical costs for the preterm infant. See notes at the end of the Appendix on data sources for each table or set of tables.

Table B10: Total Inpatient Medical Costs and Percent Inpatient of Total Medical Costs by GA Category by State								
	< 28 weeks		28-31 weeks		32-36 weeks		All Preterm	
	Cost (2016 $)	% All Medical	Cost (2016 $)	% All Medical	Cost (2016 $)	% All Medical	Cost (2016 $)	% All Medical
Alabama	121,354,478	83%	64,576,979	76%	57,543,027	61%	243,474,484	75%
Alaska	16,080,845	83%	8,947,063	76%	11,690,519	60%	36,718,428	73%
Arizona	116,520,535	84%	72,345,073	77%	76,904,718	62%	265,770,326	75%
Arkansas	60,218,217	83%	41,312,253	77%	35,092,091	61%	136,622,561	74%
California	762,851,740	85%	538,367,001	79%	536,750,721	64%	1,837,969,462	76%
Colorado	78,860,076	85%	56,838,737	77%	59,868,306	62%	195,567,119	74%
Connecticut	59,972,255	86%	42,262,569	78%	38,529,161	62%	140,763,985	76%
Delaware	25,466,563	86%	13,026,626	78%	10,835,756	62%	49,328,945	77%
District of Columbia	21,109,059	83%	12,390,195	76%	10,284,488	60%	43,783,742	75%
Florida	384,256,346	84%	231,777,640	76%	209,091,065	61%	825,125,052	75%
Georgia	268,404,677	84%	150,895,786	77%	129,246,592	61%	548,547,055	75%
Hawaii	36,021,693	85%	21,037,451	78%	21,498,181	62%	78,557,325	76%
Idaho	24,097,969	85%	19,147,445	77%	18,438,712	61%	61,684,126	74%
Illinois	284,937,027	84%	176,969,047	77%	154,482,786	61%	616,388,859	75%
Indiana	138,520,328	85%	86,063,849	77%	77,026,914	62%	301,611,091	76%
Iowa	55,808,654	84%	31,291,810	77%	33,411,262	62%	120,511,727	75%
Kansas	48,619,000	84%	28,722,931	77%	31,331,904	61%	108,673,836	74%
Kentucky	88,453,255	83%	62,159,900	77%	55,931,629	61%	206,544,784	74%
Louisiana	118,482,755	83%	79,074,220	76%	67,485,170	60%	265,042,146	74%
Maine	14,197,012	87%	10,726,503	77%	10,521,349	62%	35,444,863	75%
Maryland	136,889,807	85%	83,255,813	76%	69,422,808	61%	289,568,427	75%
Massachusetts	113,295,539	85%	67,669,234	78%	71,465,402	63%	252,430,175	76%
Michigan	195,121,873	84%	118,878,911	77%	107,626,730	61%	421,627,514	75%
Minnesota	101,699,485	85%	61,476,547	78%	62,583,344	62%	225,759,377	75%
Mississippi	76,596,515	84%	49,391,703	76%	42,767,737	61%	168,755,956	74%
Missouri	114,629,896	84%	71,250,877	77%	68,704,088	61%	254,584,860	75%
Montana	15,249,834	84%	10,613,181	77%	10,742,479	62%	36,605,494	74%
Nebraska	31,440,246	86%	25,688,271	77%	24,124,681	62%	81,253,199	75%
Nevada	58,865,751	84%	41,343,123	78%	41,163,931	62%	141,372,805	75%
New Hampshire	13,285,103	85%	10,838,140	78%	10,166,912	62%	34,290,154	75%
New Jersey	175,543,556	84%	123,371,429	78%	113,987,806	62%	412,902,790	75%
New Mexico	34,992,453	84%	28,570,152	77%	22,279,407	61%	85,842,011	74%
New York	368,975,623	84%	255,331,739	78%	230,699,252	62%	855,006,614	75%
North Carolina	224,572,995	84%	125,851,263	77%	111,277,191	61%	461,701,448	75%
North Dakota	18,364,359	85%	11,757,651	78%	10,073,243	62%	40,195,253	76%
Ohio	247,113,346	84%	143,566,900	77%	129,607,100	61%	520,287,346	75%
Oklahoma	74,091,328	84%	45,035,763	77%	50,316,607	61%	169,443,698	74%
Oregon	55,662,341	86%	38,736,742	78%	39,856,384	63%	134,255,466	76%
Pennsylvania	222,024,992	85%	138,053,735	77%	121,701,671	61%	481,780,397	75%
Rhode Island	17,369,789	87%	12,998,224	78%	10,666,895	63%	41,034,908	76%
South Carolina	104,683,927	84%	68,045,240	77%	56,225,171	61%	228,954,338	75%
South Dakota	10,466,805	85%	11,446,395	78%	11,172,819	62%	33,086,019	73%
Tennessee	118,915,603	84%	92,354,694	77%	78,659,826	61%	289,930,123	74%
Texas	632,596,307	83%	408,272,811	77%	384,341,746	61%	1,425,210,864	74%
Utah	57,400,338	85%	47,104,444	77%	47,125,902	62%	151,630,684	74%
Vermont	6,816,401	83%	5,194,870	77%	4,468,780	62%	16,480,051	75%
Virginia	165,017,358	84%	99,365,481	77%	91,235,330	61%	355,618,169	75%
Washington	98,984,550	85%	82,648,970	78%	82,057,514	63%	263,691,035	75%
West Virginia	27,675,424	84%	17,004,067	76%	19,770,849	61%	64,450,340	73%
Wisconsin	95,952,665	85%	64,951,015	78%	62,597,945	62%	223,501,625	75%
Wyoming	12,022,152	84%	7,264,692	77%	6,886,714	62%	26,173,559	75%
United States	**6,350,548,844**	**84%**	**4,115,265,156**	**77%**	**3,839,740,613**	**62%**	**14,305,554,614**	**75%**

Note: Medical costs entries include maternal delivery costs in addition to lifetime medical costs for the preterm infant. See notes at the end of the Appendix on data sources for each table or set of tables.

Table B11: Medical Costs in Infancy as % of Lifetime Total Costs by GA Category by State				
	< 28 weeks	28-31 weeks	32-36 weeks	All Peterm
Alabama	76%	69%	59%	68%
Alaska	76%	71%	61%	68%
Arizona	76%	70%	60%	68%
Arkansas	74%	70%	59%	68%
California	77%	72%	61%	70%
Colorado	77%	70%	59%	67%
Connecticut	79%	71%	60%	70%
Delaware	79%	71%	60%	71%
District of Columbia	74%	68%	56%	66%
Florida	76%	69%	58%	67%
Georgia	77%	70%	59%	69%
Hawaii	76%	69%	58%	68%
Idaho	78%	70%	59%	68%
Illinois	77%	70%	59%	69%
Indiana	78%	71%	61%	70%
Iowa	77%	70%	60%	68%
Kansas	76%	70%	59%	68%
Kentucky	74%	70%	60%	68%
Louisiana	74%	69%	58%	67%
Maine	83%	70%	59%	69%
Maryland	76%	68%	57%	67%
Massachusetts	78%	71%	61%	69%
Michigan	76%	70%	60%	69%
Minnesota	77%	70%	60%	69%
Mississippi	76%	69%	59%	68%
Missouri	76%	70%	60%	69%
Montana	77%	71%	60%	69%
Nebraska	79%	70%	60%	69%
Nevada	77%	72%	62%	70%
New Hampshire	76%	70%	59%	68%
New Jersey	75%	70%	59%	68%
New Mexico	76%	70%	59%	68%
New York	75%	69%	58%	67%
North Carolina	77%	70%	59%	69%
North Dakota	78%	71%	61%	70%
Ohio	77%	70%	60%	69%
Oklahoma	77%	70%	59%	68%
Oregon	79%	72%	61%	70%
Pennsylvania	77%	69%	59%	69%
Rhode Island	82%	71%	61%	71%
South Carolina	75%	70%	59%	68%
South Dakota	78%	72%	62%	69%
Tennessee	76%	69%	59%	68%
Texas	74%	69%	59%	67%
Utah	78%	70%	59%	68%
Vermont	74%	69%	59%	67%
Virginia	74%	69%	58%	67%
Washington	77%	70%	60%	68%
West Virginia	76%	70%	59%	67%
Wisconsin	79%	71%	61%	70%
Wyoming	76%	70%	60%	69%
United States	**76%**	**70%**	**59%**	68%

Note: Medical Costs in infancy include maternal delivery costs. See notes at the end of the Appendix on sources for each table or set of tables.

Table B12: Total Inpatient Medical Costs in infancy as a % of Total Costs and as a % of Medical Costs by GA Category by State								
	< 28 weeks		28-31 weeks		32-36 weeks		All Preterm	
	% of Total Costs	% of Medical Costs	% of Total Costs	% of Medical Costs	% of Total Costs	% of Medical Costs	% of Total Costs	% of Medical Costs
Alabama	72%	88%	63%	81%	52%	78%	63%	83%
Alaska	72%	87%	64%	80%	54%	77%	63%	82%
Arizona	73%	88%	65%	82%	54%	79%	63%	84%
Arkansas	70%	87%	64%	81%	53%	78%	63%	83%
California	74%	90%	67%	84%	56%	81%	65%	85%
Colorado	74%	89%	64%	82%	53%	79%	62%	84%
Connecticut	76%	90%	65%	82%	55%	80%	65%	85%
Delaware	76%	91%	65%	82%	54%	79%	66%	85%
District of Columbia	71%	88%	62%	81%	50%	77%	61%	83%
Florida	72%	88%	63%	81%	52%	78%	62%	83%
Georgia	73%	89%	64%	81%	53%	78%	64%	84%
Hawaii	74%	90%	64%	83%	53%	80%	63%	85%
Idaho	75%	90%	64%	82%	53%	79%	63%	84%
Illinois	74%	89%	64%	81%	53%	79%	64%	84%
Indiana	74%	89%	65%	82%	54%	79%	65%	84%
Iowa	73%	89%	64%	81%	53%	79%	64%	84%
Kansas	73%	89%	64%	81%	53%	79%	63%	83%
Kentucky	71%	87%	64%	81%	53%	79%	63%	83%
Louisiana	71%	87%	63%	81%	52%	77%	62%	82%
Maine	81%	93%	64%	82%	53%	79%	64%	85%
Maryland	73%	89%	62%	81%	51%	78%	62%	84%
Massachusetts	75%	90%	66%	83%	55%	81%	65%	85%
Michigan	73%	88%	64%	81%	54%	79%	64%	84%
Minnesota	74%	89%	65%	82%	54%	80%	64%	84%
Mississippi	72%	88%	63%	81%	52%	78%	63%	83%
Missouri	73%	88%	64%	81%	53%	79%	63%	83%
Montana	74%	89%	65%	82%	54%	79%	64%	84%
Nebraska	76%	90%	65%	82%	54%	79%	64%	84%
Nevada	74%	89%	66%	83%	56%	80%	65%	84%
New Hampshire	73%	89%	65%	82%	53%	80%	63%	84%
New Jersey	72%	89%	64%	82%	53%	80%	63%	84%
New Mexico	73%	89%	64%	81%	53%	79%	63%	83%
New York	72%	89%	64%	82%	53%	79%	63%	84%
North Carolina	74%	89%	64%	81%	53%	78%	64%	84%
North Dakota	75%	89%	66%	82%	55%	80%	65%	84%
Ohio	74%	89%	64%	81%	54%	79%	64%	84%
Oklahoma	74%	89%	64%	81%	53%	78%	63%	83%
Oregon	76%	91%	66%	83%	55%	81%	65%	85%
Pennsylvania	74%	90%	63%	81%	53%	79%	64%	84%
Rhode Island	79%	92%	66%	82%	55%	80%	67%	85%
South Carolina	72%	88%	64%	81%	53%	79%	63%	83%
South Dakota	75%	89%	66%	82%	56%	80%	64%	83%
Tennessee	73%	89%	64%	81%	52%	78%	63%	83%
Texas	71%	88%	64%	81%	52%	79%	62%	83%
Utah	75%	90%	64%	82%	53%	79%	63%	83%
Vermont	70%	88%	64%	82%	53%	80%	62%	83%
Virginia	71%	88%	63%	81%	52%	79%	62%	83%
Washington	74%	90%	65%	83%	54%	81%	63%	84%
West Virginia	72%	88%	64%	81%	52%	78%	62%	83%
Wisconsin	76%	90%	65%	82%	55%	80%	65%	84%
Wyoming	73%	89%	65%	82%	54%	79%	64%	84%
United States	**69%**	**89%**	**64%**	**82%**	**53%**	**79%**	**63%**	**84%**

Note: Medical Costs in infancy include maternal delivery costs. See notes at the end of the Appendix on sources for each table or set of tables.

Table B13. Total Costs by State by Gestational Age Category (GA) under Price Parity*				
	< 28 weeks	28-31 weeks	32-36 weeks	All Preterm GA
Alabama	207,313,880	125,929,226	164,392,095	497,635,202
Alaska	20,699,178	12,897,288	24,609,288	58,205,754
Arizona	169,511,210	118,666,903	184,892,900	473,071,013
Arkansas	102,923,074	78,080,363	97,490,723	278,494,160
California	877,005,147	696,909,345	1,018,532,754	2,592,447,246
Colorado	111,917,267	92,690,386	143,740,444	348,348,096
Connecticut	73,029,824	60,416,415	80,481,104	213,927,343
Delaware	34,150,282	20,603,574	25,210,666	79,964,522
District of Columbia	30,076,396	20,095,655	24,508,670	74,680,720
Florida	586,892,910	405,942,631	536,835,510	1,529,671,051
Georgia	416,537,215	269,588,446	337,802,997	1,023,928,657
Hawaii	45,326,903	30,472,158	45,682,131	121,481,191
Idaho	36,728,443	34,131,568	48,502,416	119,362,427
Illinois	407,932,252	292,613,439	373,971,927	1,074,517,617
Indiana	207,730,758	148,655,836	194,318,397	550,704,992
Iowa	87,650,324	56,236,165	87,819,773	231,706,262
Kansas	77,337,365	52,300,545	83,433,597	213,071,507
Kentucky	146,542,791	113,890,906	150,079,590	410,513,286
Louisiana	199,597,525	148,992,757	187,410,739	536,001,021
Maine	19,322,907	18,234,759	26,311,494	63,869,160
Maryland	198,259,152	141,086,054	171,894,142	511,239,348
Massachusetts	140,708,633	96,569,760	149,083,720	386,362,113
Michigan	294,755,347	204,161,849	270,704,052	769,621,248
Minnesota	142,429,468	98,822,772	147,157,757	388,409,997
Mississippi	130,406,066	95,642,714	121,526,205	347,574,985
Missouri	180,674,877	128,015,277	180,394,548	489,084,703
Montana	21,912,067	17,421,100	25,926,273	65,259,440
Nebraska	46,393,438	44,868,949	61,527,144	152,789,532
Nevada	78,417,976	62,187,255	90,708,066	231,313,297
New Hampshire	18,045,774	16,686,694	23,077,155	57,809,623
New Jersey	225,584,101	179,294,180	242,695,379	647,573,660
New Mexico	54,136,779	50,586,408	57,638,472	162,361,659
New York	479,513,049	376,687,033	499,388,587	1,355,588,670
North Carolina	349,294,069	224,837,342	292,339,775	866,471,187
North Dakota	26,423,538	19,331,929	24,307,362	70,062,829
Ohio	380,007,634	255,449,099	337,076,490	972,533,223
Oklahoma	118,147,955	82,847,520	135,984,201	336,979,675
Oregon	71,743,185	58,057,767	87,845,969	217,646,922
Pennsylvania	324,993,009	236,137,165	304,387,690	865,517,864
Rhode Island	21,689,591	19,625,692	23,483,734	64,799,018
South Carolina	167,578,528	123,055,990	148,927,070	439,561,588
South Dakota	15,001,961	18,878,499	26,944,998	60,825,459
Tennessee	193,125,041	172,268,829	215,102,902	580,496,773
Texas	992,650,919	714,817,904	985,759,440	2,693,228,263
Utah	83,985,406	80,644,476	118,124,868	282,754,750
Vermont	10,190,936	8,597,897	10,784,287	29,573,120
Virginia	252,440,465	171,780,630	231,366,618	655,587,713
Washington	129,325,923	123,703,960	179,627,044	432,656,927
West Virginia	46,188,392	32,341,559	55,148,020	133,677,971
Wisconsin	137,258,516	108,062,000	152,694,812	398,015,328
Wyoming	17,438,038	11,962,389	16,614,848	46,015,276

* Parity Prices: All state costs are expressed using national prices rather than state-specific prices so as to eliminate state price differences in comparative total costs.

Table B14. Per Preterm Birth Costs by State by Gestational Age (GA) Category under Price Parity*				
	< 28 weeks	28-31 weeks	32-36 weeks	All Preterm GA
Alabama	344,948	186,562	28,309	70,258
Alaska	356,882	186,917	28,222	58,264
Arizona	351,683	186,290	28,293	61,807
Arkansas	361,134	185,025	28,258	66,994
California	353,917	187,090	28,394	61,616
Colorado	339,143	185,381	28,362	59,062
Connecticut	331,954	188,213	28,398	63,386
Delaware	325,241	185,618	28,358	72,366
District of Columbia	345,706	186,071	28,367	70,520
Florida	342,611	186,726	28,351	67,026
Georgia	341,424	187,344	28,344	70,243
Hawaii	340,804	186,946	28,409	63,803
Idaho	327,933	184,495	28,347	59,443
Illinois	339,378	187,213	28,359	67,359
Indiana	340,542	186,988	28,236	66,454
Iowa	345,080	187,454	28,347	63,446
Kansas	343,722	186,788	28,263	61,635
Kentucky	363,630	186,401	28,274	64,934
Louisiana	353,896	184,855	28,344	67,151
Maine	297,275	186,069	28,414	58,649
Maryland	333,209	187,864	28,356	69,012
Massachusetts	344,031	188,245	28,419	62,640
Michigan	347,999	186,961	28,343	66,982
Minnesota	344,033	187,876	28,403	63,455
Mississippi	346,825	186,438	28,361	67,177
Missouri	346,785	187,157	28,279	64,489
Montana	342,376	185,331	28,304	60,763
Nebraska	326,714	187,736	28,314	59,824
Nevada	351,650	186,749	28,329	61,552
New Hampshire	347,034	185,408	28,420	60,597
New Jersey	352,475	187,743	28,449	63,952
New Mexico	344,820	187,357	28,296	65,894
New York	348,991	187,034	28,426	64,687
North Carolina	340,111	185,816	28,369	69,086
North Dakota	343,163	185,884	28,297	67,368
Ohio	338,688	187,417	28,319	67,593
Oklahoma	337,566	185,757	28,324	60,207
Oregon	333,689	186,083	28,402	60,123
Pennsylvania	333,668	187,708	28,368	66,773
Rhode Island	314,342	186,911	28,158	64,285
South Carolina	351,318	186,731	28,319	68,735
South Dakota	340,954	186,916	28,274	55,397
Tennessee	341,210	186,438	28,322	63,896
Texas	358,876	186,783	28,330	65,073
Utah	331,958	187,110	28,348	58,288
Vermont	363,962	186,911	28,157	64,711
Virginia	351,099	186,718	28,378	66,951
Washington	344,869	187,715	28,377	58,753
West Virginia	344,689	185,871	28,267	59,176
Wisconsin	333,962	186,314	28,308	62,336
Wyoming	348,761	186,912	28,353	65,736

* Parity Prices: All state costs are expressed using national prices as a numeraire rather using state-specific prices, thereby eliminating state price differences in comparative costs. Remaining per preterm birth cost differences by GA category reflect the infant mortality profile for each GA category. Differences in per preterm birth cost in the last "all preterm GA" column additionally reflect the profile of preterm births across the three GA categories in each state.

Notes to Tables

Tables B1-B5. Estimates of birth cohorts by gestational age (GA) category, and of infant mortality by GA category, at the nation and state levels, were taken from United States Department of Health and Human Services (US DHHS), Centers of Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), Division of Vital Statistics (DVS). Linked Birth / Infant Death Records 2007-2017, as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program, on CDC WONDER On-line Database. (https://wonder.cdc.gov/lbd.html). See Appendix A for more detail on cohort estimates.

Table B5. Estimates of survival were taken from National Center for Health Statistics, National Vital Statistics System, Mortality. Table 1, Life Table for the Total Population, United States, 2016 (https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Publications/NVSR/68_04/).

Tables B6-B14. All cost estimates are "incremental," net of costs for term infants (gestational ages 37 weeks or more). Medical care costs included maternal delivery costs as well as lifetime medical costs associated with services delivered to those born preterm. All maternal delivery costs were inpatient costs. Raw data for each cost category is taken from the IOM report, "Preterm Birth: Causes, Consequences and Prevention" (Institute of Medicine, 2007). See also Appendix A for a brief review of those raw data.

Costs at the national level are updated for inflation from estimates reported in the IOM report (Institute of Medicine, 2007) for inflation using specific inflation factors: the producer price index (PPI) for inpatient services, General and Surgical Hospitals, for inpatient medical care; the personal consumption index--health (PCE-H) for outpatient medical care; the Employment Compensation Index (ECI), Government Employees for Early Intervention and Special Education Services; the general ECI for lost labor market productivity; the index used for devices was a weighted index of the inpatient and outpatient medical care services indices, and of the ECI. See Appendix A for more detail on the inflation factors applied by cost category.

Tables B6-12. Costs at the state level reflect the application of geographic adjustment factors (GAFs) by cost category to 2016 national prices. The GAFs used were: Inpatient Prospective Payment System hospital wage and capital indices for inpatient care; geographic practice cost indices (GPCIs) for outpatient care; and the 2016 Regional Price Parity index by state (SARPP) generated from the Bureau of Economic Analysis for other costs. See Appendix A for more detail on the GAFs applied by cost category.

Tables B13-14 do not apply the GAFs so as to express costs according to "price parity" at the state level using national prices as the numeraire.

Table B11. First year medical costs included all maternal delivery costs.

Table B12. First year inpatient medical costs included all maternal delivery costs.

Updating National Preterm Birth Costs to 2016 with Separate Estimates for Individual States

Final Report to the March of Dimes
Norman J Waitzman, PhD and Ali Jalali, PhD

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Appendix C. Decomposition of the change in Societal Costs of Preterm Birth from 2005 to 2016

The estimated total cost of preterm birth for the nation in 2005, at $26.2 billion, paradoxically *exceeded* the $25.2 billion total cost in 2016 reported here by $1 billion despite the adjustment for increases in prices. In fact, several non-price factors contributing to the costs of preterm birth changed between 2005 and 2016 that resolves the paradox. Had those non-price factors not changed, the total cost in 2016 would have been $32.0 billion, a $5.8 billion increase over the earlier estimate. This appendix provides the results of a formal decomposition of the contribution of each component factor so as to fully explain the paradox.

Factors affecting the change in cost--The total cost in each year is contingent on 1) the national preterm birth rate, 2) the number of births in the nation, the 3) the distribution of births within each gestational age (GA) category, as early preterm births are more costly than late preterm births, 4) the infant mortality rate within GA category, and 5) the prices of services delivered, or costs of lost labor market productivity, associated with preterm births. While an additional factor, the quantity or intensity of services are also critical to cost, the update of costs provided in this report assume the level of provision of services for each GA category as in the earlier estimate.

All of the factors listed above, 1)-5), changed between 2005 and 2016*, thereby affecting the total costs of preterm birth. The major factor increasing cost was 5) the increase in prices and costs. But, the major counteracting influence acting to decrease cost was the change in 2014 in the official measure of GA from the LMP (last menstrual period) to the OE (obstetric estimate). The 2016 OE was used for estimates in this report whereas the 2003 LMP* was used for the IOM estimates. The major impact of this change on cost was through factor 1), lowering the national preterm birth rate, although adoption of the OE also affected factors 3) and 4), as outlined below. But even if the method for assessing GA had not changed from the LMP to the OE, there were other counteracting influences to the increase in total cost associated with the pure price change. There was a decline from 2003* to 2016 in 1) the preterm birth rate using strictly the LMP measure. In addition, there was an overall reduction from 2004 to 2016* in 2) the number of births in the nation. Each of these influences are considered in turn in the decomposition in Table C1 and discussed below.

Table C1 provides the result of the decomposition.

Pure Price Change--The first entry in Table C1 summarizes the result of the pure price change from 2005 to 2016 on total preterm birth costs. It assumes only an adjustment for prices to 2016, retaining the number of 2004 births and the 2003 LMP measure (overall preterm birth rate, rate of preterm birth by GA, and rate of infant mortality by GA). As noted above, the resulting total cost would be $32 billion.

Change in the Number of Births--The second entry in Table C1 incorporates the reduction in the first entry due to the decrease in the total number of births in the nation from 2004 to 2016. That decrease reduced the total costs by $1.3 billion to $30.7 billion.

Switch to the 2016 LMP--The third entry in Table C1 summarizes the additional decline in cost from the second entry associated strictly with substituting the 2016 LMP measure of GA for the 2003 LMP measure. That change lowers the cost estimate by an additional $1.4 billion to $29.3 billion and is the net result of two changes summarized in entries 3a) the lower preterm birth rate under the 2016 LMP (11.4%) than the 2003 LMP (12.3%), a decline of $2.4 billion, and 3b) the change in the distribution of preterm birth and infant mortality by GA category from the 2003 LMP to the 2016 LMP, a counteracting increase of $1.0 billion.

Switch to the 2016 OE--The remaining decline of $4.1 billion in total cost, yielding the $25.2 billion total cost estimate in this report, is attributable to the change from the 2016 LMP to the 2016 OE, the fourth bolded entry in the table. This is the net result of two changes as well, 4a) the lower preterm birth rate associated with the 2016 OE (9.8%) than the 2016 LMP (11.4%), yielding a decrease of $4.8 billion, and 4b) the change in the distribution of preterm birth and infant mortality by GA from the LMP to the OE, yielding an increase of $0.7 billion.

Summary

An increase in total cost from 2005 to 2016 of $5.8 billion would have prevailed to yield a $32 billion total cost of preterm birth in 2016 had price increases been the sole factor affecting preterm birth cost over the period. Instead, there was a $1 billion *decrease*, a $6.8 billion overall decrease from $32 billion, due to other factors affecting costs. The main contributor to the $6.8 billion reduction was the decrease in $4.1 billion, about sixty percent of the total, attributable to the change in measurement of GA from the LMP to the OE estimate. The remaining $2.7 billion decrease was attributable to the overall decline in births in the country, the reduction in the preterm birth rate under the LMP, and the change in distribution of preterm births and infant mortality by GA from 2005 to 2016.

[*] The total cost of preterm birth in the IOM report was expressed in $ 2005 but was based on the number of births in 2004 and the 2003 LMP preterm birth rate by GA (the latest vital statistics available at the time).

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Table C1. Decomposition of the Change in total costs of preterm birth from 2005 to 2016

	Description	*Costs*
1.	**Pure Price Change from 2005 to 2016**	**$32.0 billion**
2.	**Reduction in the Number of Births from 2004 to 2016***	**$30.7 billion**
3.	**Switch to the 2016 LMP from the 2003 LMP***	**$29.3 billion**
a)	Lower Preterm Birth Rate	- $2.4 billion
b)	Change in the Distribution of Preterm Birth and Infant Mortality	+ $1.0 billion
4.	**Switch to the 2016 OE from the 2016 LMP**	**$25.2 billion**
a)	Lower Preterm Birth Rate	- $4.8 billion
b)	Change in the Distribution of Preterm Birth and Infant Mortality	+ $0.7 billion

*The total cost of preterm birth in the IOM report was expressed in $ 2005 but was based on the number of births in 2004 and the 2003 LMP preterm birth rate by GA (the latest vital statistics available at the time).

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