

# **Short Interpregnancy Intervals and The Risks of Adverse Birth Outcomes in Indiana**

**Statistics from the Live Birth Data**

**1990-2005**

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# Executive Summary

## Purpose

The purpose of this report (*Short Interpregnancy Intervals and the Risks of Adverse Birth Outcomes in Indiana: Statistics from the Live Birth Data 1990-2005*) is to assess trends in the prevalence of short interpregnancy intervals in Indiana from 1990 to 2005 and to evaluate its association with low birth weight, preterm, and small-for-gestational age birth.

## Methods

Data for this study are obtained from the birth certificates of singleton infants born to multiparous mothers between 1990 and 2005. Time trends in the prevalence of short interpregnancy intervals are presented in four-year intervals and by race and Hispanic origin, age, and education of mother. Prevalence of adverse birth outcomes according to interpregnancy interval is presented by race and Hispanic origin for the 2002-2005 period. Association of short interpregnancy interval with adverse outcomes was examined by multiple regression analysis, controlling for the potential confounding variables. Short interpregnancy interval is defined as less than 12 completed months between the last live birth and the conception and was computed as the interval between two consecutive deliveries minus the gestational age of the second infant.

## Results

### **Modest decline in prevalence of short interpregnancy interval**

The prevalence of short interpregnancy interval in Indiana declined only modestly since the early 1990's. Between the two periods of 1990-1993 and 2002-2005, the percentage of births following a short interpregnancy interval of less than 12 months declined by 14 percent, from 21.1 to 18.3 percent. This modest decline occurred mainly between 1990-1993 and 1994-1997.

### **Racial disparity persists**

The prevalence of short interpregnancy intervals declined to a greater extent among non-Hispanic blacks compared to non-Hispanic whites resulting in narrowing of racial gap with time. Despite this fact, short interpregnancy interval remained considerably more prevalent among non-Hispanic blacks compared to non-Hispanic whites. In the 2002-2005 period, 9.2 percent of non-Hispanic black multiparous mothers had an interpregnancy interval of less than 6 months compared to 5.5 and 6.9 percent among their non-Hispanic white and Hispanic counterparts, respectively.

### **Vulnerable population**

In general, mothers with short interpregnancy interval were more likely to be black, Hispanic, under 25 years of age, less educated, unmarried, of higher parity, smoker, and receiving inadequate or no prenatal care compared to mothers with longer interpregnancy interval. The prevalence of short interpregnancy intervals was highest among multiparous teen mothers followed by those in their early twenties and declined only modestly over the years. However, Indiana has succeeded in lowering the number and proportion of live births to teenage mothers in general and to teenage multiparous mothers in particular, especially among non-Hispanic black women.

### **Short interpregnancy interval and increased risk of adverse birth outcomes**

Controlling for the potential confounding variables, short interpregnancy interval was associated with significantly higher risks of low birth weight, preterm, and small-for-gestational age births. The negative impact of short interpregnancy interval was stronger on very low birth weight and very preterm births (compared to moderately low birth weight, moderately preterm, or late preterm births) and continued to be statistically significant even at interpregnancy interval of 6-12 month.

### **Recommendation**

Continued efforts to prevent repeat pregnancies among teenagers and interventions to lower short birth spacing among young adult mothers deserve high priority. Higher prevalence of short interpregnancy interval among non-Hispanic blacks and Hispanics and among the young, less educated, and unmarried mothers warrants special attention and allocation of resources to improve birth spacing among minorities and vulnerable populations. Considering the adverse effect of short interpregnancy intervals of up to 12 months on birth outcomes, efforts of public health agencies to improve birth spacing should continue beyond 6 months postpartum.

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# Preface

This report (*Short Interpregnancy Intervals and the Risks of Adverse Birth Outcomes in Indiana: Statistics from the Live Birth Data 1990-2005*) presents time trends in short interpregnancy intervals among multiparous mothers in Indiana according to a variety of maternal characteristics. The data for this study were obtained from the birth certificates of singleton infants born alive between 1990 and 2005. Data are presented in four-year intervals and time trends in the prevalence of short interpregnancy intervals are presented by race and Hispanic origin (non-Hispanic white, non-Hispanic black, and Hispanic), age, and education of mother. In this report, the U.S. Office of Management and Budget race definition of "Black or African American" is referred to as "Black" and ethnicity definition of "Hispanic or Latino" is referred to as "Hispanic".

This report also includes information on low birth weight, preterm birth, and small-for-gestational age rates at various interpregnancy intervals and on the association of short interpregnancy interval and adverse birth outcomes controlling for the potential confounding variables.

Information on the methods used for statistical analysis and on random variation and stability of rates are presented in the Technical Notes. Information on birth weight and gestational age edits, computation of interpregnancy interval, education of mother, and adequacy of prenatal care is also provided in the Technical Notes. The numbers of live births with the selected characteristics used in calculating percentages/rates are presented in the Appendix.

## **Short interpregnancy interval in Indiana compared to US**

According to published data from Pregnancy Nutrition Surveillance System (PNSS) collected among women during prenatal clinic visits in public health programs (WIC, MCH, etc.), prevalence of short interpregnancy interval was higher in Indiana compared to the national average throughout the recent years.

Based on PNSS data, in 2006, 15.6 percent of women in Indiana had a short interpregnancy interval of less than 6 months compared to 13.4 percent nationwide. A similar trend is observed in 2005 (15.7 percent in Indiana vs. 13.0 percent in US) and 2004 (15.6 percent in Indiana vs. 13.1 percent in US).

US data: [http://www.cdc.gov/pednss/pnss\\_tables/tables\\_numeric.htm](http://www.cdc.gov/pednss/pnss_tables/tables_numeric.htm)

IN data: Annual CDC's Pregnancy Nutrition Surveillance Report/  
Summary of Health Indicators (Indiana)

For more information contact PNSS Coordinator at [www.statehealth.in.gov](http://www.statehealth.in.gov)

# Highlights

## Trends in short interpregnancy intervals

- During the period of 2002-2005, 61.1 percent of all singleton live births in Indiana were to multiparous mothers; among those, 6.1 and 12.2 percent were births following short interpregnancy intervals of less than 6 months and 6-11 months, respectively.  
([Table 1](#), [Figure 1](#))
- Between the two periods of 1990-1993 and 2002-2005:
  - Percentage of births following an interpregnancy interval of less than 12 months declined from 21.1 to 18.3 percent whereas interpregnancy interval of 24 months or longer increased from 52.1 to 55.8 percent.  
([Table 1](#), [Figure 2](#))
  - Percentage of births after short interpregnancy intervals of less than 3 and 3-5 months declined (by 12 and 19 percent) to 2.5 and 3.6 percent, respectively. Interpregnancy intervals of 6-8 and 9-11 months declined similarly (by 14 and 10 percent), to 5.7 and 6.5 percent, respectively.  
([Table 1](#), [Figure 3](#))
  - Prevalence of short interpregnancy intervals of less than 3 months and 3-5 months declined among non-Hispanic whites by 7 and 16 percent, respectively, in comparison to a corresponding decline of 28 and 30 percent among non-Hispanic blacks and 38 and 39 percent among Hispanics, respectively.  
([Table 1](#), [Figures 4-5](#))
  - Among non-Hispanic whites and blacks, the decline in short interpregnancy interval happened mainly between 1990-1993 and 1994-1997 whereas among Hispanics, the decline was gradual and consistent throughout the years.  
([Table 1](#), [Figures 4-5](#))
  - Despite a greater decline in the prevalence of short interpregnancy intervals among non-Hispanic blacks compared to non-Hispanic whites, short interpregnancy intervals (of less than 9 months) remained more prevalent among blacks compared to whites and the racial disparity grew wider as interpregnancy intervals became shorter.  
([Table 1](#), [Figure 7](#))
- Compared to mothers with interpregnancy interval of 12-23 months, mothers with shorter intervals were more likely to be non-Hispanic black, Hispanic, under 25 years of age, less educated, unmarried, smoker, of higher parity, and receiving inadequate or no prenatal care.  
([Table 2](#))

- The prevalence of short interpregnancy interval declined as age of mother advanced. In the period of 2002-2005, 21.9 percent of multiparous teen mothers (under 20 years of age) had interpregnancy intervals of less than 6 months compared to 10.4 percent for those in their early twenties, 4.8 percent for those in their late twenties, and 2.9 percent for those 30 years of age and older.  
(Table 3, Figure 8)
- Between 1990-1993 and 2002-2005, prevalence of short interpregnancy interval of less than 6 months among teen mothers declined slightly (by 13 percent ) for non-Hispanic whites compared to no change for non-Hispanic black teens and a noticeable decline (by 28 percent) for Hispanic teens. Among young adult mothers (20-24 years of age), short interpregnancy interval declined by only 7 percent for non-Hispanic whites in contrast to a 24 and 39 percent decline for their non-Hispanic black and Hispanic counterparts, respectively.  
(Table 3, Figures 9-11)
- Prevalence of short interpregnancy interval of less than 6 months was somewhat higher among non-Hispanic black mothers compared to non-Hispanic whites and Hispanics across all age groups.  
(Table 3, Figure 12)
- Among non-Hispanic teen mothers, prevalence of short interpregnancy interval of less than 6 months was similarly high whether the mother had an adequate or inadequate education-for-age, whereas among Hispanic teens, those with adequate education-for-age had higher prevalence of short interpregnancy interval than those with inadequate education.  
(Table 4, Figures 14-16)
- Among adult mothers (20 years of age and older), prevalence of short interpregnancy interval declined as educational level of mother increased for both non-Hispanic whites and blacks but not for Hispanics.  
(Table 4, Figures 14-16)
- Prevalence of short interpregnancy interval of less than 6 months was higher among non-Hispanic blacks compared to non-Hispanic whites at all ages and educational levels. For Hispanics, prevalence of short interpregnancy interval was lower than non-Hispanic whites among the least educated mothers, whereas among the more educated mothers, Hispanics had a higher prevalence of short interpregnancy interval compared to non-Hispanic whites.  
(Table 4, Figures 17-18)
- Between 1990-1993 and 2002-2005:
  - Prevalence of short interpregnancy interval among teen mothers declined modestly for non-Hispanic white and remained unchanged among non-Hispanic blacks regardless of their educational level. Among Hispanic teens, it declined consistently and noticeably especially for mothers with inadequate education-for-age.  
(Table 4, Figures 19-22)

- Prevalence of short interpregnancy interval among adult non-Hispanic white mothers remained almost the same at all age and educational groups except a 20 percent decline among the 20-24 year olds with more than 12 years of education; among adult non-Hispanic blacks, short intervals declined by 16-32 percent among various age and educational groups in comparison to a 24-45 percent decline among Hispanics.  
(Table 4, Figures 19-22)
- Despite the alarmingly high prevalence of short interpregnancy interval among teen mothers (under 20 years of age) and only a modest decline in rates since the early 1990's, Indiana has succeeded in lowering the number and proportion of teen mothers in general, and multiparous teen mothers in particular.  
(Figures 23-26)
- Between the two periods of 1990-1993 and 2002-2005:
  - Among all singleton live births, the percentage of teen mothers declined by 22 percent for all races (to 11.3 percent), by 21 percent for non-Hispanic whites (to 10.0 percent), by 30 percent for non-Hispanic blacks (to 19.8 percent), and by 26 percent for Hispanics (to 13.7 percent).  
(Figure 24)
  - Among teen mothers, the percentage of multiparous mothers declined by 17 percent for all races (to 18.6 percent), by 13 percent for non-Hispanic whites (to 16.9 percent), by 31 percent for non-Hispanic blacks (to 22.5 percent), and by 5 percent for Hispanics (to 23.3 percent).  
(Figure 25)
  - Among all multiparous mothers, the number and percentage of teen mothers declined by 37 percent for all races to 3.5 percent (N=7,023), by 34 percent for non-Hispanic whites to 2.8 percent (N=4,428), and by 52 percent for non-Hispanic blacks to 7.0 percent (N=1,617).  
(Figures 26)
  - For Hispanics, despite a 35 percent decline in the proportion of teens among multiparous mothers from 7.5 to 4.9 percent, the number of multiparous teen mothers more than doubled (from 344 to 881) due to an increase in births to Hispanic mothers in all age categories.  
(Figures 26)

## Short interpregnancy intervals and risk of adverse birth outcomes

- As interpregnancy intervals increased from less than 6 months to 18-24 months, low birth weight rate decreased from 7.3 to 4.2 percent, preterm birth rate decreased from 13.8 to 9.5 percent, and small-for-gestational age rate decreased from 10.5 to 6.7 percent.  
(Table 5, Figure 27-29)



- A similar pattern of decreasing rates of adverse birth outcomes with increasing interpregnancy interval was observed for non-Hispanic whites, non-Hispanic blacks and Hispanics. The rate of adverse birth outcomes, however, was considerably higher among non-Hispanic blacks compared to non-Hispanic whites and Hispanics regardless of the interpregnancy interval.  
(Table 5)
- Controlling for the potentially important confounders (maternal race, Hispanic origin, age, education, marital status, parity, adequacy of prenatal care, and smoking status), interpregnancy interval of less than 6 months increased the risk of low birth weight (less than 2,500 grams) by 40 percent and the risks of preterm birth (less than 37 weeks) or small-for-gestational age by 30 percent.  
(Table 6, Figure 30)
- Short interpregnancy intervals increased the risks of very low birth weight and very preterm births (less than 32 weeks) birth to a considerably greater extent (by 80 percent) than the risk of moderately low birth weight or moderately and late preterm births (by 30 percent).  
(Table 6, Figure 31-32)
- The adverse effect of short interpregnancy interval on birth outcomes was evident even at interpregnancy interval of 6-12 months. Controlling for the potential confounders, an interpregnancy interval of 6-12 months increased the risk of very low birth weight and very preterm birth by 30 and 40 percent, respectively. There was no significant association between interpregnancy interval of 12-17 months and adverse birth outcomes.  
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**Table 1. Percent distribution of births according to interpregnancy interval and percent change over time by race and Hispanic origin of mother, four-year averages: Indiana, 1990-2005 singleton live births**

Interpregnancy Interval (month)	1990-1993	1994-1997	1998-2001	2002-2005	% change from 1990-1993 to 2002-2005
<b>All races</b>					
All	100.0	100.0	100.0	100.0	
<b>&lt;12</b>	<b>21.1</b>	<b>19.0</b>	<b>18.5</b>	<b>18.3</b>	<b>-14</b>
< 6	7.2	6.3	6.2	6.1	-16
< 3	2.8	2.5	2.4	2.5	-11
3-5	4.4	3.8	3.7	3.6	-19
<b>6 - 11</b>	<b>13.9</b>	<b>12.7</b>	<b>12.4</b>	<b>12.2</b>	<b>-12</b>
6 - 8	6.6	5.9	5.7	5.7	-14
9 - 11	7.3	6.8	6.7	6.5	-10
<b>12 - 23</b>	<b>26.8</b>	<b>26.2</b>	<b>26.1</b>	<b>25.9</b>	<b>-3</b>
12 - 17	14.5	14.0	14.0	13.9	-4
12 - 14	7.5	7.2	7.1	7.1	-6
15 - 17	7.0	6.8	6.9	6.8	-3
18 - 23	12.2	12.2	12.1	12.0	-2
18 - 20	6.4	6.3	6.3	6.2	-3
21 - 23	5.9	5.9	5.8	5.8	-1
<b>&gt;= 24</b>	<b>52.1</b>	<b>54.9</b>	<b>55.4</b>	<b>55.8</b>	<b>7</b>
24 - 59	35.4	37.9	37.1	37.5	6
60 - 119	13.1	13.4	14.9	14.5	11
>= 120	3.6	3.6	3.4	3.9	8
<b>Non-Hispanic white</b>					
All	100.0	100.0	100.0	100.0	
<b>&lt;12</b>	<b>19.8</b>	<b>18.0</b>	<b>17.8</b>	<b>17.8</b>	<b>-10</b>
< 6	6.3	5.6	5.6	5.5	-13
< 3	2.3	2.1	2.1	2.1	-7
3-5	4.0	3.5	3.5	3.4	-16
<b>6 - 11</b>	<b>13.5</b>	<b>12.4</b>	<b>12.2</b>	<b>12.2</b>	<b>-9</b>
6 - 8	6.3	5.6	5.5	5.6	-12
9 - 11	7.2	6.8	6.7	6.7	-7
<b>12 - 23</b>	<b>27.3</b>	<b>26.7</b>	<b>26.9</b>	<b>27.0</b>	<b>-1</b>
12 - 17	14.8	14.2	14.4	14.5	-2
12 - 14	7.6	7.2	7.3	7.3	-3
15 - 17	7.2	7.0	7.1	7.1	0
18 - 23	12.6	12.5	12.5	12.5	-1
18 - 20	6.5	6.4	6.5	6.4	-1
21 - 23	6.1	6.1	6.0	6.1	-1
<b>&gt;= 24</b>	<b>52.8</b>	<b>55.3</b>	<b>55.4</b>	<b>55.2</b>	<b>5</b>
24 - 59	36.4	38.5	37.5	37.8	4
60 - 119	13.0	13.3	14.5	13.8	6
>= 120	3.4	3.5	3.4	3.7	8

Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services  
 Report: Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005.

**Table 1. Percent distribution of births according to interpregnancy interval and percent change over time by race and Hispanic origin of mother, four-year averages: Indiana, 1990-2005 singleton live births--Con.**

Interpregnancy interval	1990 -1993	1994 -1997	1998 -2001	2002 -2005	% change from 1990-1993 to 2002-2005
<b>Non-Hispanic black</b>					
All	100.0	100.0	100.0	100.0	
<b>&lt;12</b>	30.0	25.1	23.2	22.1	-26
<b>&lt; 6</b>	13.1	10.5	9.5	9.2	-29
< 3	5.8	4.8	4.2	4.2	-28
3-5	7.2	5.7	5.3	5.0	-30
<b>6 - 11</b>	17.0	14.6	13.7	12.9	-24
6 - 8	8.9	7.5	6.8	6.7	-25
9 - 11	8.0	7.1	6.9	6.2	-23
<b>12 - 23</b>	23.0	22.6	21.9	21.8	-5
12 - 17	13.0	12.2	12.4	11.9	-9
12 - 14	7.0	6.5	6.6	6.3	-10
15 - 17	6.0	5.7	5.8	5.6	-7
18 - 23	10.0	10.4	9.5	10.0	0
18 - 20	5.5	5.5	4.9	5.1	-7
21 - 23	4.5	4.9	4.6	4.9	8
<b>&gt;= 24</b>	47.0	52.3	55.0	56.0	19
24 - 59	28.7	33.4	34.0	34.6	21
60 - 119	13.6	14.2	17.1	16.5	22
>= 120	4.7	4.7	3.8	4.9	4
<b>Hispanic</b>					
All	100.0	100.0	100.0	100.0	
<b>&lt;12</b>	25.4	24.2	20.6	18.2	-28
<b>&lt; 6</b>	11.2	10.0	8.5	6.9	-38
< 3	5.0	4.7	3.8	3.1	-38
3-5	6.2	5.3	4.7	3.8	-39
<b>6 - 11</b>	14.3	14.2	12.1	11.3	-21
6 - 8	7.2	6.9	5.7	5.4	-24
9 - 11	7.1	7.3	6.4	5.9	-17
<b>12 - 23</b>	24.9	23.9	23.1	21.7	-13
12 - 17	14.3	13.2	12.4	11.4	-20
12 - 14	7.3	7.3	6.5	6.1	-16
15 - 17	7.0	5.9	5.9	5.3	-25
18 - 23	10.6	10.7	10.7	10.3	-2
18 - 20	5.9	5.7	5.6	5.3	-9
21 - 23	4.7	5.0	5.1	5.0	6
<b>&gt;= 24</b>	49.7	51.9	56.4	60.0	21
24 - 59	31.1	35.6	36.6	37.9	22
60 - 119	14.9	13.2	16.7	18.1	22
>= 120	3.8	3.1	3.1	4.0	6

Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services  
 Report: Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005.

**Table 2. Percent distribution of selected maternal characteristics according to interpregnancy interval:  
Indiana, 2002-2005 singleton live births**

Maternal characteristics	Interpregnancy interval, month			
	< 6	6 - 11	12 - 17	18 - 23
All	100.0	100.0	100.0	100.0
Race and Hispanic origin				
Non-Hispanic white	71.8	78.8	81.8	81.9
Non-Hispanic black	16.9	11.7	9.5	9.2
Hispanic	10.0	8.2	7.3	7.6
Other	1.3	1.4	1.5	1.4
Age, year				
<20	12.3	7.2	4.9	3.6
20-24	44.2	36.4	30.9	28.8
25-29	25.1	29.7	30.8	31.7
30-34	13.3	19.1	23.9	25.3
35+	5.2	7.7	9.6	10.6
Education, year				
<12	35.6	28.2	23.5	20.5
=12	35.2	31.3	28.3	28.6
>12	29.2	40.5	48.1	50.9
Marital status				
Married	53.3	66.6	73.1	73.6
Unmarried	46.7	33.4	26.9	26.4
Parity				
Second + third	75.0	77.1	78.9	81.5
Fourth and higher	25.0	22.9	21.1	18.5
Trimester prenatal care began				
First trimester	63.1	72.4	78.4	81.7
Not first trimester	36.9	27.6	21.6	18.3
Adequacy of prenatal care				
Adequate or more	56.4	64.9	70.6	73.9
Intermediate	15.1	14.7	14.1	13.3
Inadequate or no care	28.6	20.3	15.3	12.8
Smoking				
Yes	27.3	20.9	16.6	16.9
No	72.7	79.1	83.4	83.1



**Table 3. Percentage of births with short interpregnancy intervals and percent change in prevalence by age and by race and Hispanic origin of mother, four-year averages: Indiana, 1990-2005 singleton live births**

Age of mother and interpregnancy interval	1990-1993	1994-1997	1998-2001	2002-2005	% change from 1990-1993 to 2002-2005
<b>All races</b>					
Under 20 years of age					
< 6 mo	24.7	22.6	21.0	21.9	-11
6 - 11 mo	29.8	28.3	25.9	25.9	-13
20-24 years of age					
< 6 mo	11.8	10.1	10.0	10.4	-12
6 - 11 mo	19.6	17.2	17.0	17.2	-13
25-29 years of age					
< 6 mo	4.9	4.8	4.8	4.8	-2
6 - 11 mo	12.0	11.5	11.2	11.5	-4
30 years of age and older					
< 6 mo	3.1	2.8	2.9	2.9	-7
6 - 11 mo	8.8	8.5	8.6	8.3	-5
<b>Non-Hispanic white</b>					
Under 20 years of age					
< 6 mo	24.3	22.3	20.4	21.1	-13
6 - 11 mo	30.4	28.9	26.8	27.4	-10
20-24 years of age					
< 6 mo	10.8	9.4	9.5	10.0	-7
6 - 11 mo	19.5	17.2	17.2	17.5	-10
25-29 years of age					
< 6 mo	4.5	4.4	4.5	4.5	1
6 - 11 mo	11.9	11.5	11.3	11.8	0
30 years of age and older					
< 6 mo	2.8	2.6	2.7	2.7	-4
6 - 11 mo	8.8	8.5	8.7	8.5	-3
<b>Non-Hispanic black</b>					
Under 20 years of age					
< 6 mo	24.8	21.7	21.6	24.7	0
6 - 11 mo	28.8	27.2	24.1	21.6	-25
20-24 years of age					
< 6 mo	15.9	13.0	12.2	12.0	-24
6 - 11 mo	20.2	16.8	16.7	16.5	-18
25-29 years of age					
< 6 mo	8.7	7.6	6.0	6.7	-23
6 - 11 mo	13.1	11.9	10.5	10.6	-19
30 years of age and older					
< 6 mo	5.5	4.1	4.2	4.0	-27
6 - 11 mo	8.1	8.0	7.9	8.0	-2

Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services  
 Report: Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005.

**Table 3. Percentage of births with short interpregnancy intervals and percent change in prevalence by age and by race and Hispanic origin of mother, four-year averages: Indiana, 1990-2005 singleton live births--Con.**

Age of mother and interpregnancy interval	1990 -1993	1994 -1997	1998 -2001	2002 -2005	% change from 1990-1993 to 2002-2005
<b>Hispanic</b>					
Under 20 years of age					
< 6 mo	29.3	29.6	24.3	20.3	-31
6 - 11 mo	29.3	27.2	23.7	26.4	-10
20-24 years of age					
< 6 mo	16.6	13.1	10.9	10.1	-39
6 - 11 mo	19.1	18.2	15.5	15.4	-19
25-29 years of age					
< 6 mo	8.4	6.9	6.6	5.3	-37
6 - 11 mo	12.0	11.7	10.0	9.9	-18
30 years of age and older					
< 6 mo	4.8	4.6	4.4	3.7	-23
6 - 11 mo	8.6	8.8	8.1	7.0	-19

**Table 4. Percentage of births with short (less than 6 months) interpregnancy interval and percent change in prevalence by education and age, and by race and Hispanic origin of mother, four-year averages: Indiana, 1990-2005 singleton live births**

Age and education of mother	1990 -1993	1994 -1997	1998 -2001	2002 -2005	% change from 1990-1993 to 2002-2005
<b>All races</b>					
Under 20 years of age					
Inadequate education-for-age	24.3	22.6	20.9	21.3	-12
Adequate education-for-age	25.2	22.6	21.3	22.6	-11
20-24 years of age					
< 12 years of education	13.5	12.2	12.0	11.7	-13
12 years of education	10.9	9.3	9.4	10.0	-8
> 12 years of education	10.8	8.6	8.2	8.7	-20
25 years of age and older					
< 12 years of education	6.0	5.6	5.7	5.5	-9
12 years of education	4.0	3.6	3.6	3.9	-4
> 12 years of education	3.4	3.4	3.4	3.2	-6
<b>Non-Hispanic white</b>					
Under 20 years of age					
Inadequate education-for-age	24.0	22.4	20.8	20.9	-13
Adequate education-for-age	24.9	22.1	20.0	21.3	-15
20-24 years of age					
< 12 years of education	12.3	11.4	11.7	11.9	-3
12 years of education	9.9	8.7	8.8	9.5	-4
> 12 years of education	10.2	8.2	7.7	8.1	-20
25 years of age and older					
< 12 years of education	5.4	4.8	5.6	5.5	2
12 years of education	3.7	3.3	3.3	3.7	-1
> 12 years of education	3.2	3.2	3.3	3.1	-4
<b>Non-Hispanic black</b>					
Under 20 years of age					
Inadequate education-for-age	24.0	20.3	20.4	25.2	5
Adequate education-for-age	25.1	22.6	22.6	24.5	-2
20-24 years of age					
< 12 years of education	19.1	16.1	14.2	12.9	-32
12 years of education	15.0	12.4	12.0	11.8	-21
> 12 years of education	13.0	9.7	10.0	10.9	-16
25 years of age and older					
< 12 years of education	9.9	9.8	6.8	8.2	-17
12 years of education	7.2	6.2	5.1	5.1	-29
> 12 years of education	6.2	4.5	4.8	4.8	-23
<b>Hispanic</b>					
Under 20 years of age					
Inadequate education-for-age	29.4	30.1	23.0	19.0	-36
Adequate education-for-age	29.6	28.8	26.9	23.2	-22
20-24 years of age					
< 12 years of education	17.5	13.9	11.3	9.5	-45
12 years of education	15.2	11.7	10.3	11.3	-25
> 12 years of education	17.9	13.6	9.3	10.6	-41
25 years of age and older					
< 12 years of education	8.2	6.6	5.7	4.7	-43
12 years of education	5.8	4.3	5.5	4.3	-26
> 12 years of education	5.9	5.9	5.3	4.5	-24

**Table 5. Prevalence of adverse birth outcomes according to interpregnancy intervals by race and Hispanic origin of mother: Indiana, 2002-2005 singleton live births**

Race and Hispanic origin, and birth outcome	Interpregnancy interval, month			
	< 6	6 - 11	12 - 17	18 - 23
<b>All races</b>				
Low birth weight	7.3	5.4	4.4	4.2
Very low birth weight	1.2	0.7	0.6	0.5
Moderately low birth weight	6.1	4.7	3.8	3.7
Preterm births	13.8	11.3	10.1	9.5
Very preterm	1.8	1.1	0.9	0.8
Moderately preterm	1.7	1.2	1.0	1.0
Late preterm	10.3	9.0	8.2	7.7
Small-for-gestational age	10.5	8.5	7.2	6.7
<b>Non-Hispanic white</b>				
Low birth weight	6.3	4.9	3.9	3.6
Very low birth weight	0.9	0.6	0.5	0.4
Moderately low birth weight	5.3	4.3	3.4	3.2
Preterm births	12.7	10.3	9.4	8.7
Very preterm	1.4	1.1	0.7	0.6
Moderately preterm	1.4	1.1	0.9	0.8
Late preterm	9.9	8.2	7.8	7.3
Small-for-gestational age	9.6	7.6	6.4	6.0
<b>Non-Hispanic black</b>				
Low birth weight	12.8	9.7	9.1	9.5
Very low birth weight	2.5	1.4	1.6	1.8
Moderately low birth weight	10.2	8.3	7.6	7.7
Preterm births	19.6	17.7	15.4	14.8
Very preterm	3.7	2.0	2.3	2.3
Moderately preterm	3.0	2.3	2.2	2.1
Late preterm	12.9	13.4	10.9	10.4
Small-for-gestational age	15.9	14.9	13.5	12.5
<b>Hispanic</b>				
Low birth weight	5.7	4.6	4.4	3.9
Very low birth weight	--	--	--	--
Moderately low birth weight	4.8	4.1	3.7	3.5
Preterm births	12.4	12.6	11.6	10.2
Very preterm	1.7	--	--	--
Moderately preterm	2.0	1.4	1.6	1.7
Late preterm	8.6	10.4	9.2	7.8
Small-for-gestational age	8.4	7.3	7.4	6.6

Note: Low birth weight is under 2,500 grams, very low birth weight is under 1,500 grams, and moderately low birth weight is 1,500-2,499 grams; preterm birth is under 37 weeks, very preterm birth is under 32 weeks, moderately preterm birth is 32-33 weeks, and late preterm is 34-36 weeks of gestation; small-for-gestational age is birth weight below the 10th percentile for the infant's gestational age and sex.

--Figure does not meet standard of reliability or precision; based on fewer than 20 births in the numerator.

Table 6. Logistic regression analysis of the association between short interpregnancy intervals and adverse birth outcomes: Indiana, 2002-2005 singleton live births

Interpregnancy Interval (month)	Unadjusted		Adjusted <sup>2</sup>	
	OR <sup>1</sup>	95% CI <sup>1</sup>	OR <sup>1</sup>	95% CI <sup>1</sup>
Low birth weight				
< 6	1.8	1.6-2.0	1.4	1.3-1.5
6 - 11	1.3	1.2-1.4	1.2	1.1-1.3
12 - 17	1.1	1.0-1.2	1.1	1.0-1.2
18 - 23 <sup>3</sup>	1.0			
Very low birth weight				
< 6	2.6	2.0-3.3	1.8	1.4-2.4
6 - 11	1.5	1.2-2.0	1.3	1.1-1.7
12 - 17	1.2	0.9-1.6	1.2	0.9-1.5
18 - 23 <sup>3</sup>	1.0		1.0	
Moderately low birth weight				
< 6	1.7	1.5-1.9	1.3	1.2-1.5
6 - 11	1.3	1.2-1.4	1.2	1.1-1.3
12 - 17	1.0	0.9-1.1	1.0	0.9-1.1
18 - 23 <sup>3</sup>	1.0		1.0	
Preterm birth				
< 6	1.5	1.4-1.6	1.3	1.2-1.4
6 - 11	1.2	1.1-1.3	1.2	1.1-1.3
12 - 17	1.1	1.0-1.1	1.1	1.0-1.1
18 - 23 <sup>3</sup>	1.0			
Very preterm birth				
< 6	2.4	2.0-3.0	1.8	1.4-2.2
6 - 11	1.6	1.3-2.0	1.4	1.2-1.7
12 - 17	1.2	1.0-1.5	1.2	1.0-1.5
18 - 23 <sup>3</sup>	1.0			
Moderately preterm birth				
< 6	1.8	1.5-2.2	1.4	1.1-1.7
6 - 11	1.2	1.0-1.5	1.1	1.0-1.3
12 - 17	1.0	0.9-1.2	1.0	0.9-1.2
18 - 23 <sup>3</sup>	1.0		1.0	
Late preterm birth				
< 6	1.4	1.3-1.5	1.3	1.2-1.4
6 - 11	1.2	1.1-1.3	1.1	1.1-1.2
12 - 17	1.1	1.0-1.1	1.1	1.0-1.2
18 - 23 <sup>3</sup>	1.0			
Small-for-gestational age				
< 6	1.6	1.5-1.8	1.3	1.2-1.4
6 - 11	1.3	1.2-1.4	1.2	1.1-1.3
12 - 17	1.1	1.0-1.2	1.1	1.0-1.2
18 - 23 <sup>3</sup>	1.0		1.0	

<sup>1</sup>OR=odds ratio, CI=confidence interval

<sup>2</sup>Adjusted for maternal race and Hispanic origin, age at delivery, education, marital status, parity, adequacy of prenatal care, and smoking during pregnancy.

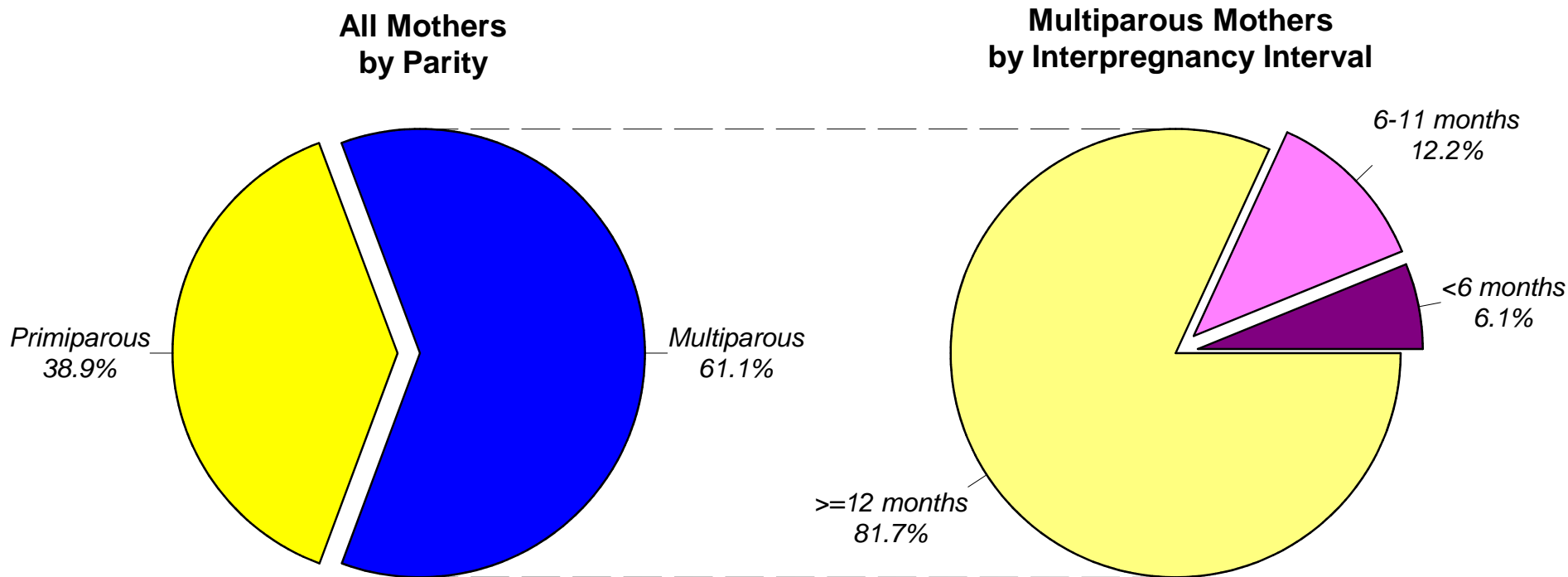
<sup>3</sup>The reference group.

Note: Low birth weight is under 2,500 grams, very low birth weight is under 1,500 grams, and moderately low birth weight is 1,500-2,499 grams; preterm birth is under 37 weeks, very preterm birth is under 32 weeks, moderately preterm birth is 32-33 weeks, and late preterm is 34-36 weeks of gestation; small-for-gestational age is birth weight below the 10th percentile for the infant's gestational age and sex.

Figure 1

## Percent Distribution of Mothers By Parity and Percent Distribution of Multiparous Mothers by Interpregnancy Interval

Indiana, 2002-2005 Singleton Live Births



*\*Note: Multiparous Mothers are those with one or more previous live births.*

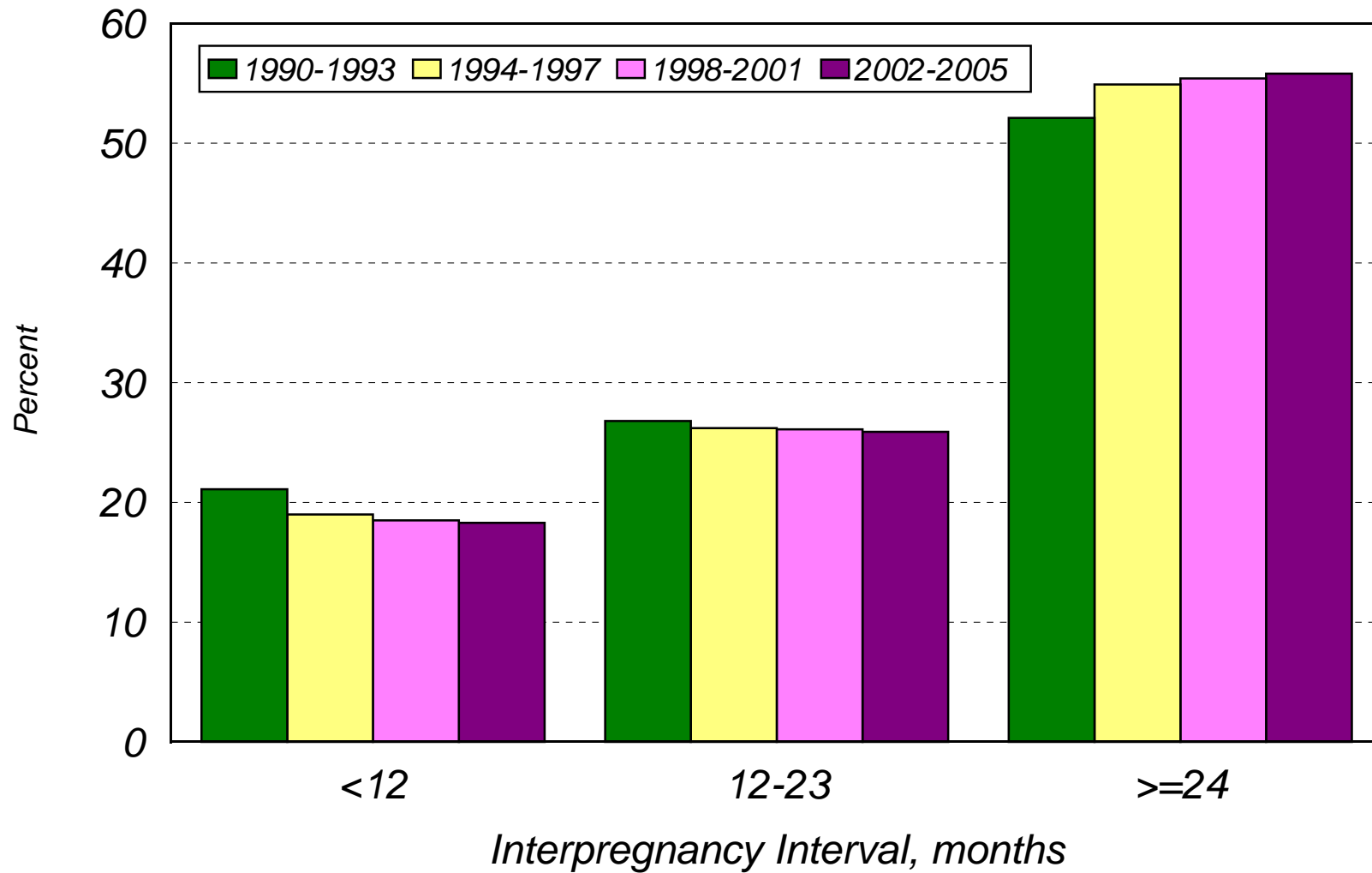
Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

Report: Short Interpregnancy intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005

Figure 2

## Trends in Interpregnancy Intervals

Four-year Averages: Indiana, 1990-2005 Singleton Live Births

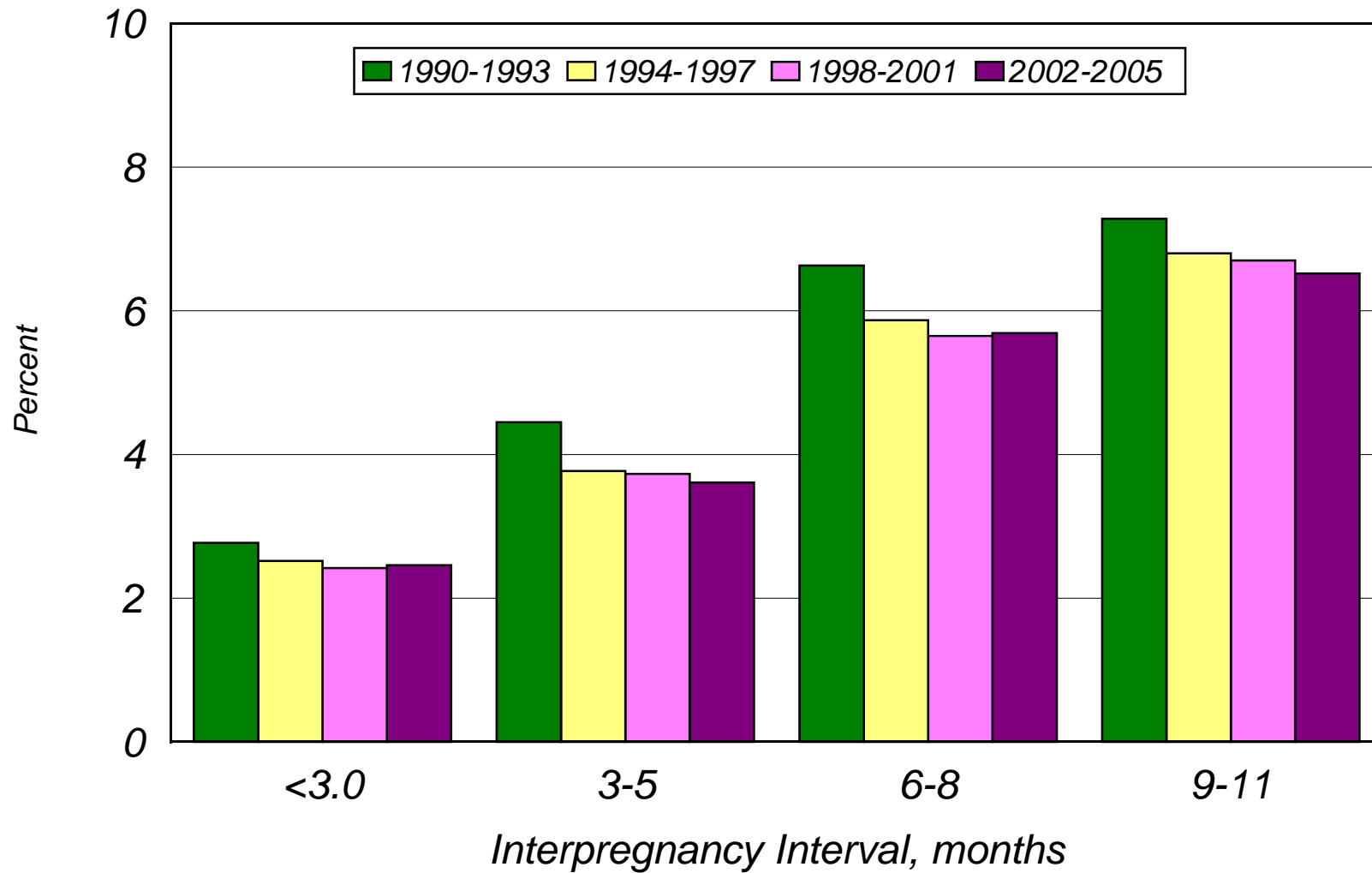


Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services  
Report: Short Interpregnancy intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005, [Table 1](#)

Figure 3

## Prevalence of Short Interpregnancy Intervals

Four-year Averages: Indiana, 1990-2005 Singleton Live Births



Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services  
Report: Short Interpregnancy intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005, [Table 1](#)



Figure 4

## Prevalence of Interpregnancy Interval of Less Than 3 Months By Race and Hispanic Origin of Mother

Four-year Averages: Indiana, 1990-2005 Singleton Live Births

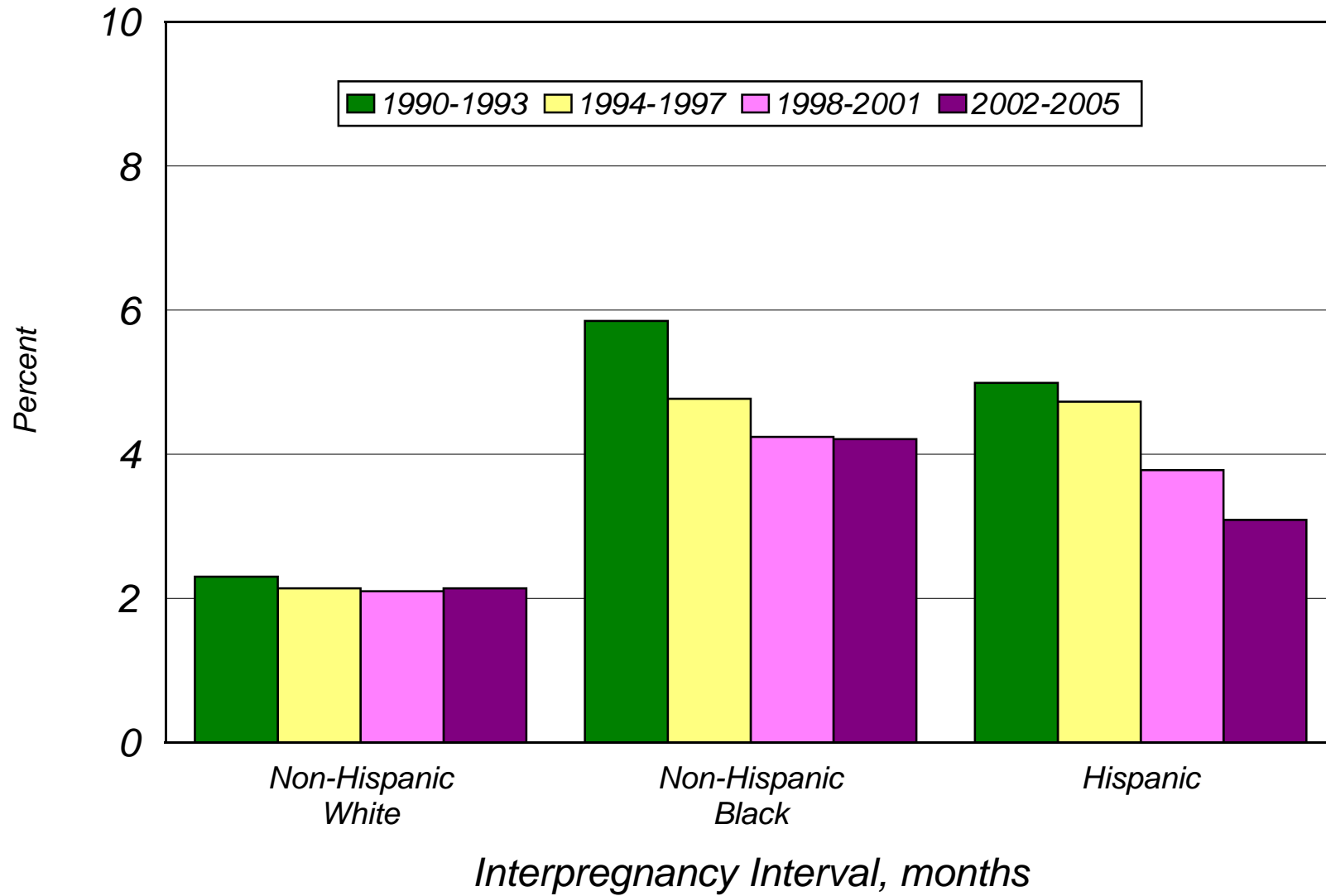


Figure 5

## Prevalence of Interpregnancy Interval of 3-5 Months By Race and Hispanic Origin of Mother

Four-year Averages: Indiana, 1990-2005 Singleton Live Births

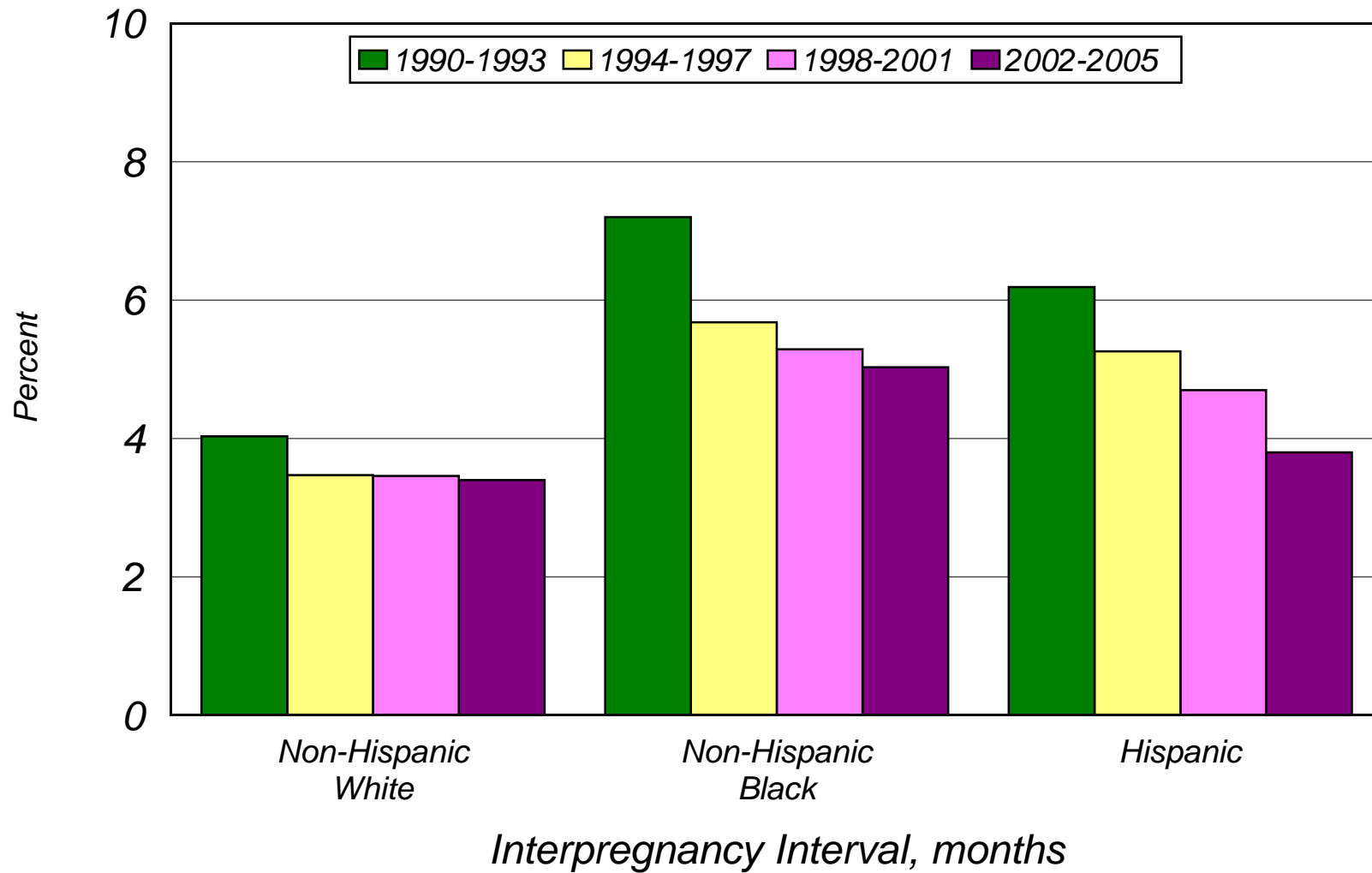


Figure 6

## Prevalence of Interpregnancy Interval of Less Than 6 Months By Race and Hispanic Origin of Mother

Four-year Averages: Indiana, 1990-2005 Singleton Live Births

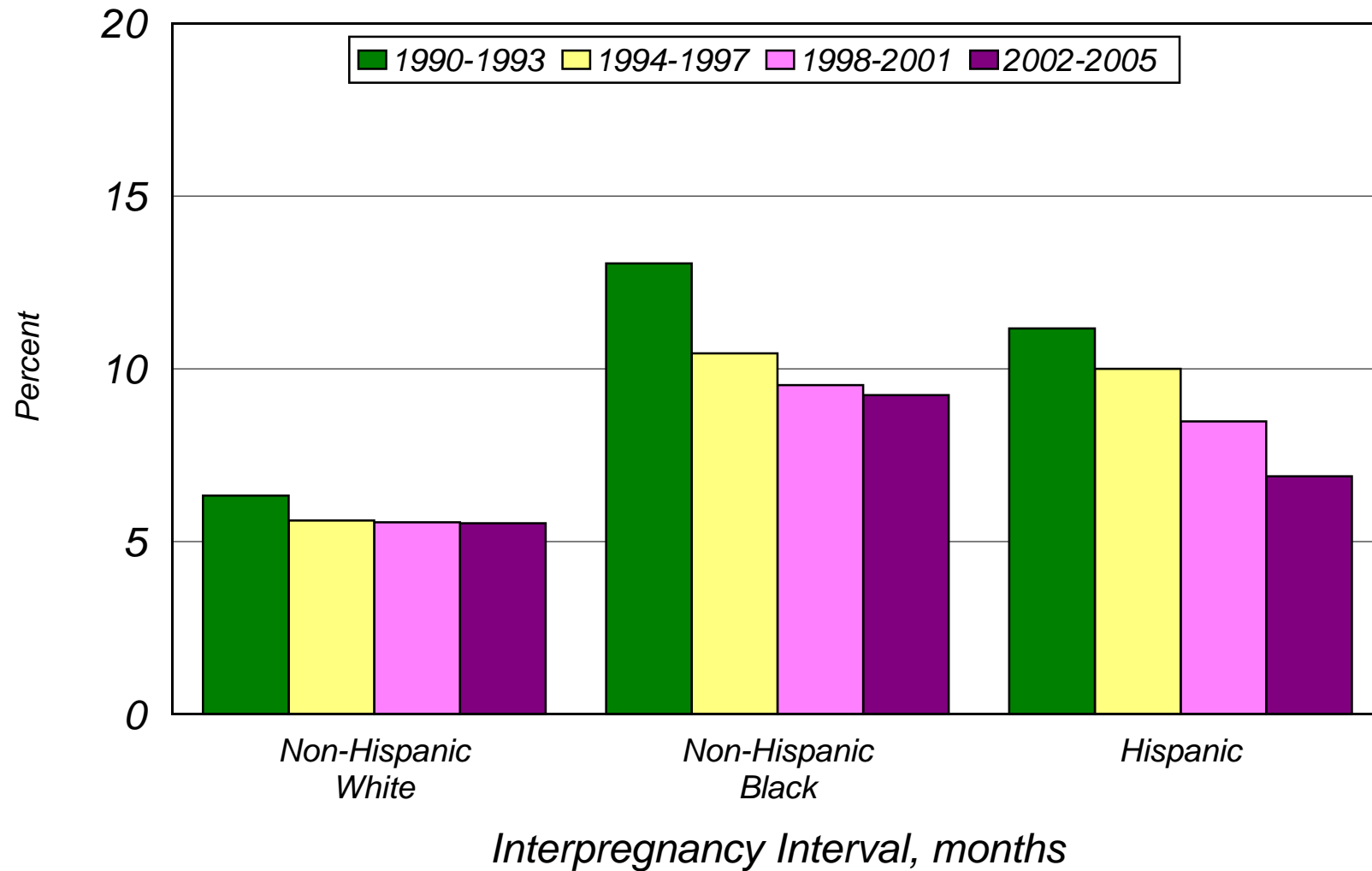
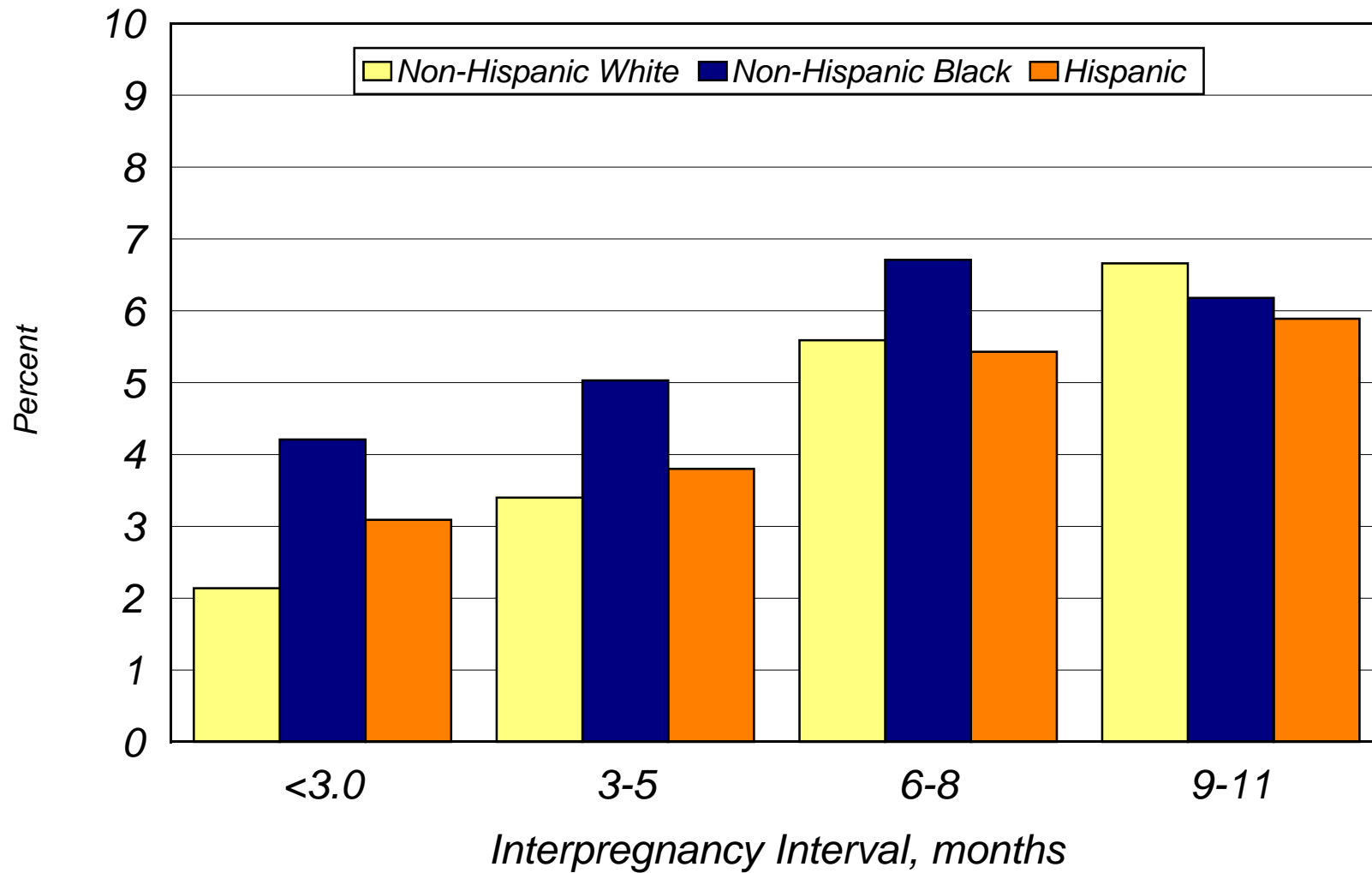


Figure 7

## Prevalence of Short Interpregnancy Intervals By Race and Hispanic Origin of Mother

Indiana, 2002-2005 Singleton Live Births



Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services  
Report: Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005, [Table 1](#)

Figure 8

## Prevalence of Short Interpregnancy Interval of Less Than 6 Months By Age of Mother Among All Races

Four-year Averages: Indiana, 1990-2005 Singleton Live Births

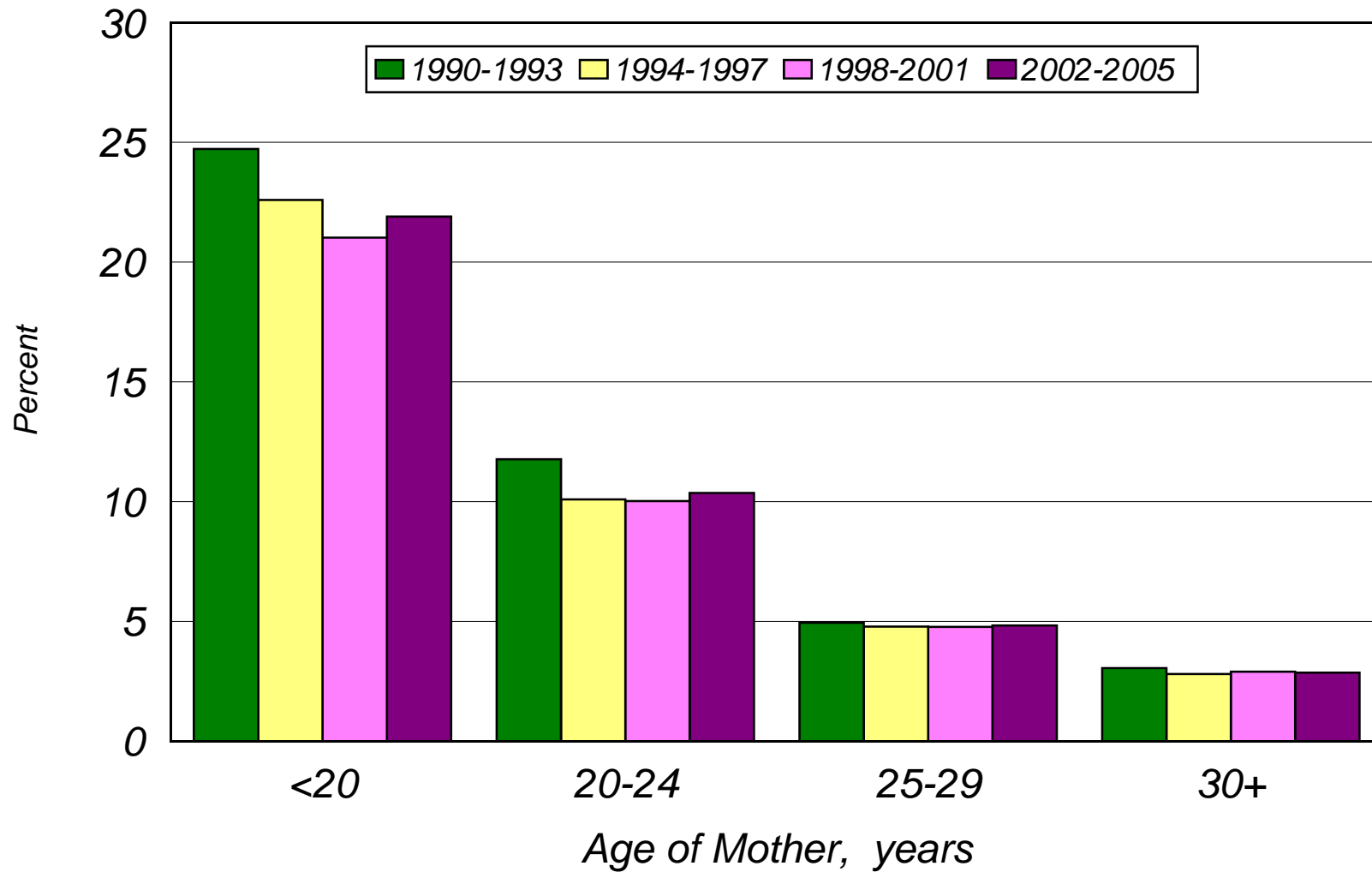
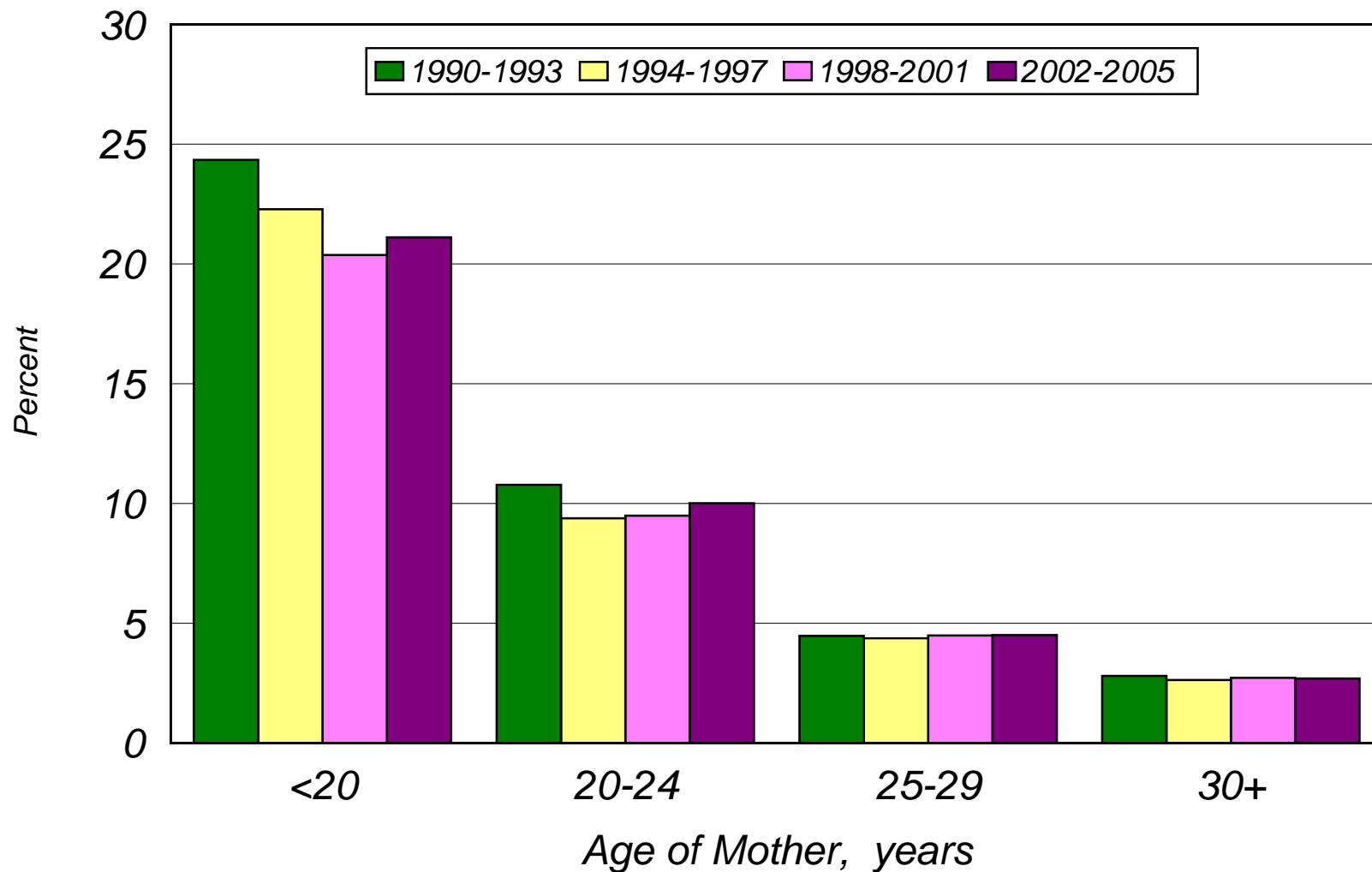


Figure 9

## Prevalence of Short Interpregnancy Interval of Less Than 6 Months By Age of Mother Among Non-Hispanic Whites

Four-year Averages: Indiana, 1990-2005 Singleton Live Births



Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services  
Report: Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005, [Table 3](#)

Figure 10

## Prevalence of Short Interpregnancy Interval of Less Than 6 Months By Age of Mother Among Non-Hispanic Blacks

Four-year Averages: Indiana, 1990-2005 Singleton Live Births

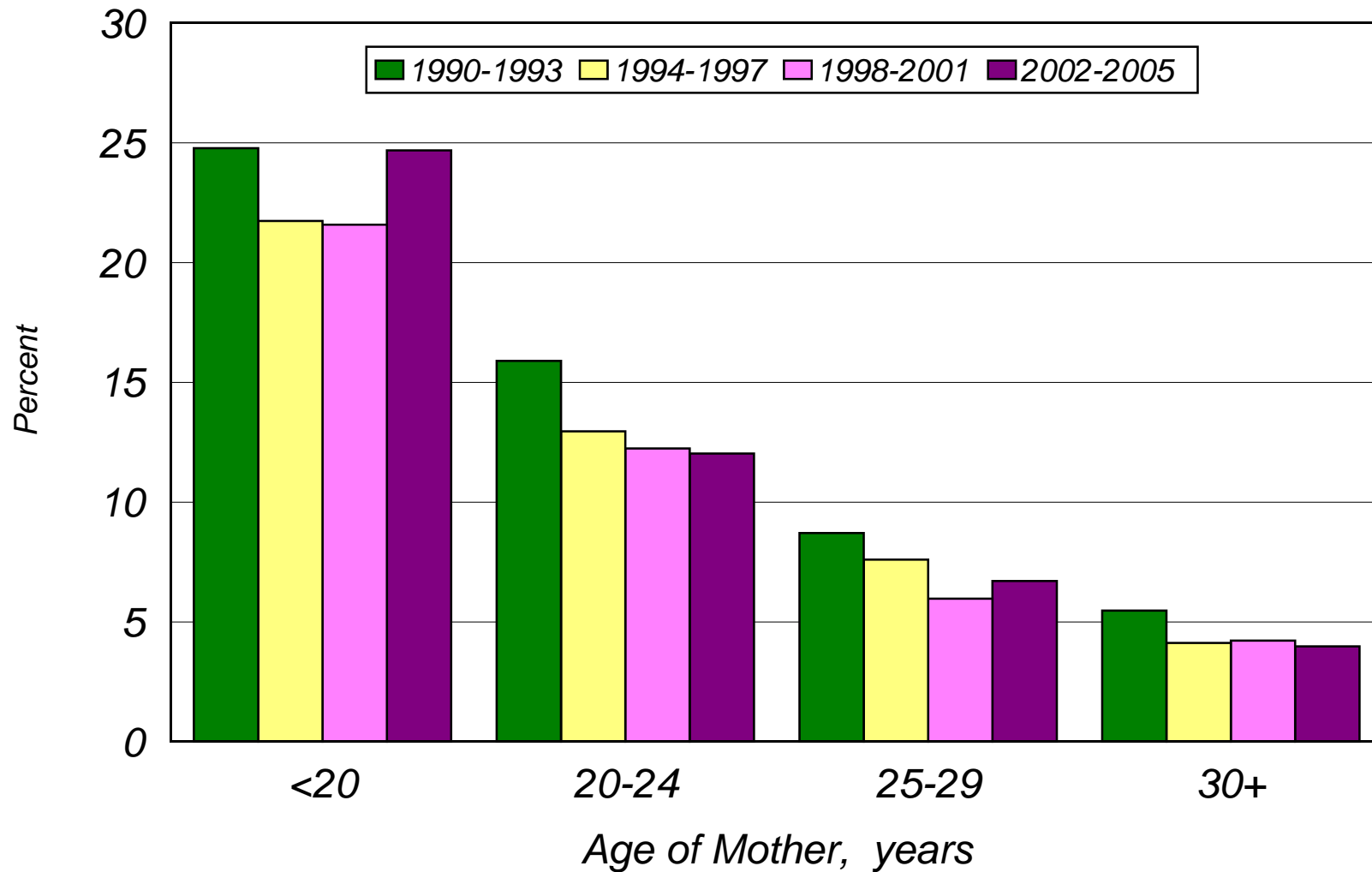


Figure 11

## Prevalence of Short Interpregnancy Interval of Less Than 6 Months By Age of Mother Among Hispanics

Four-year Averages: Indiana, 1990-2005 Singleton Live Births

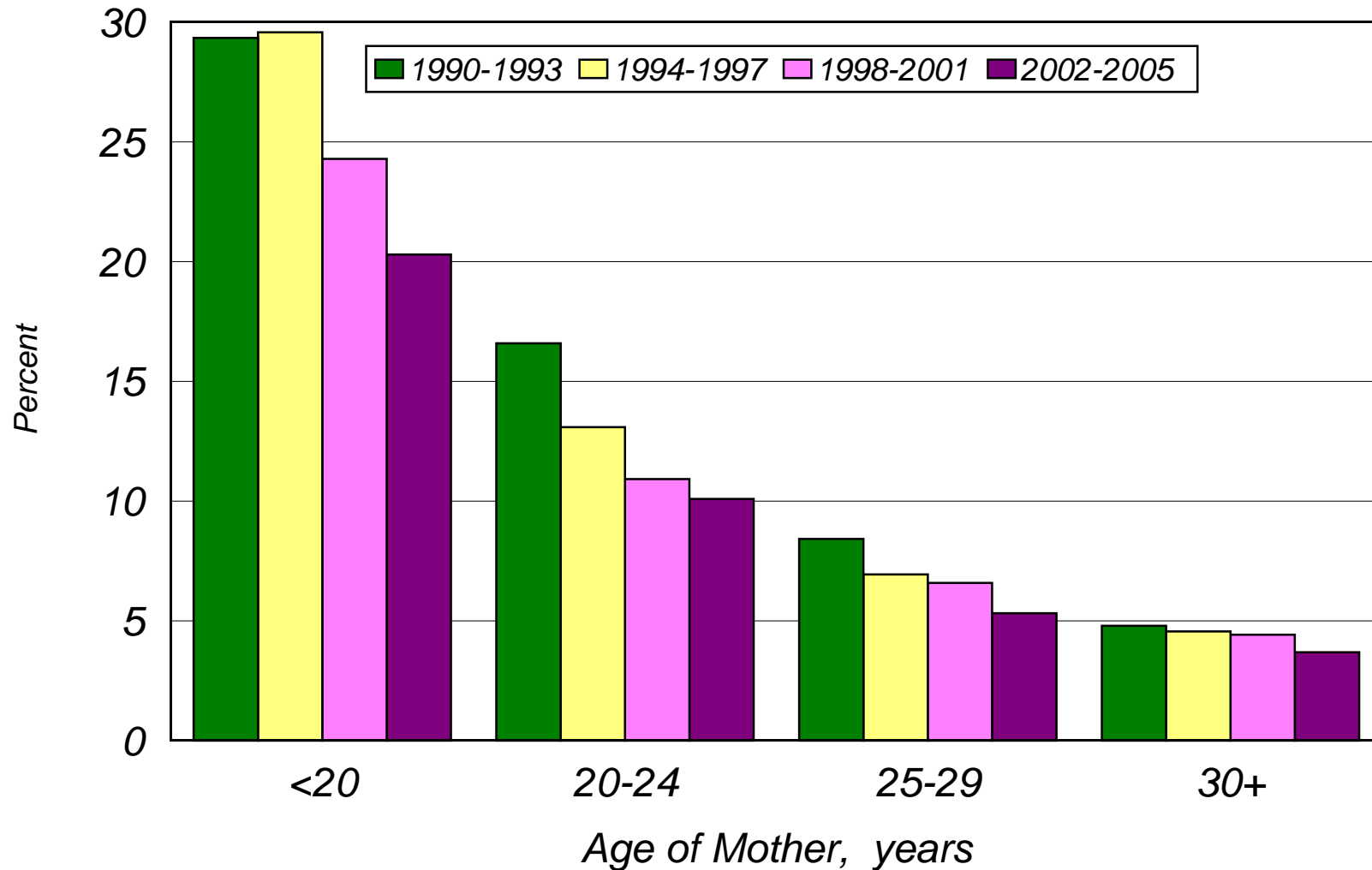




Figure 12

## Prevalence of Short Interpregnancy Interval of Less Than 6 Months By Age, Race, and Hispanic Origin of Mother

Indiana, 2002-2005 Singleton Live Births

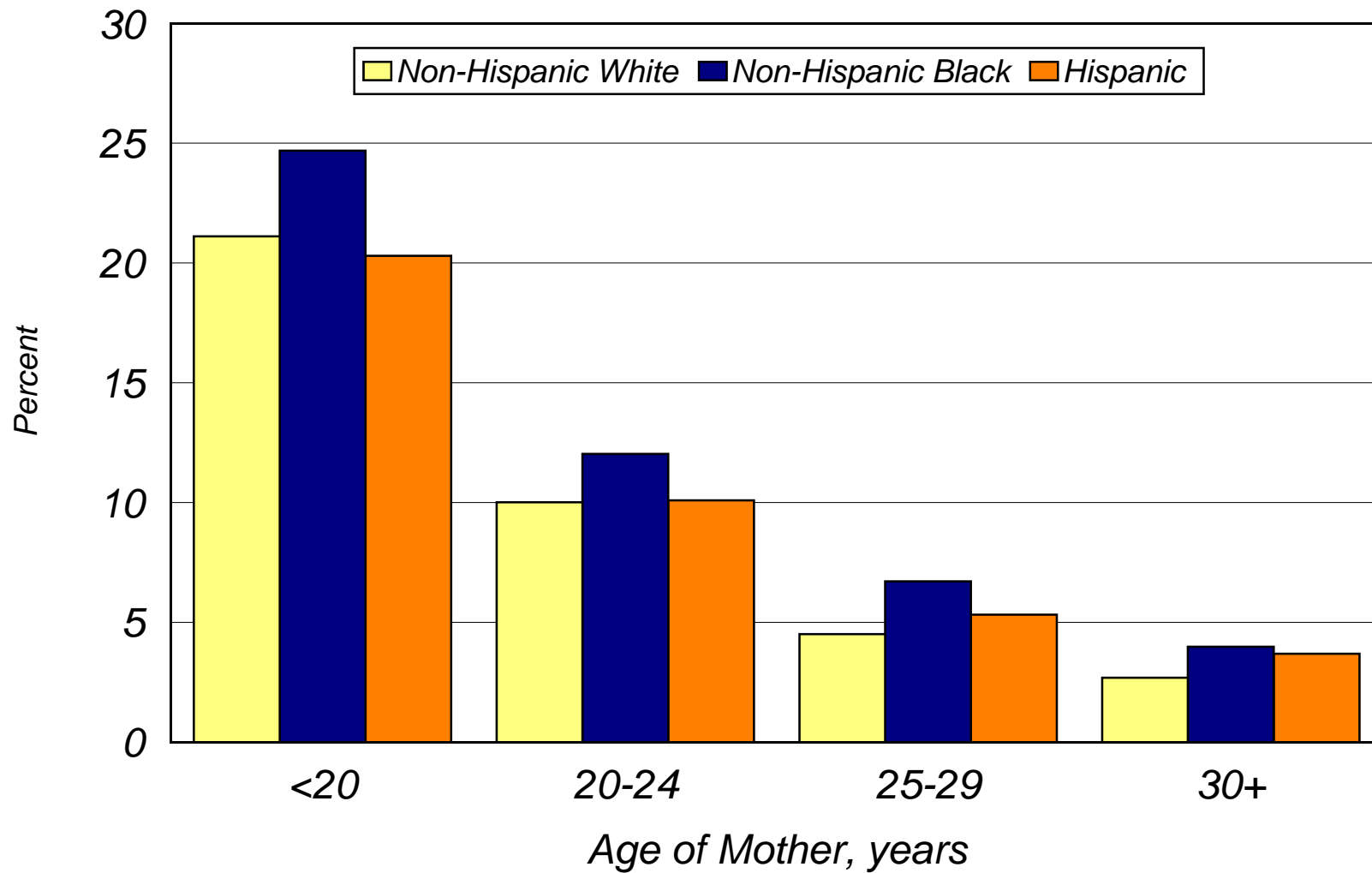
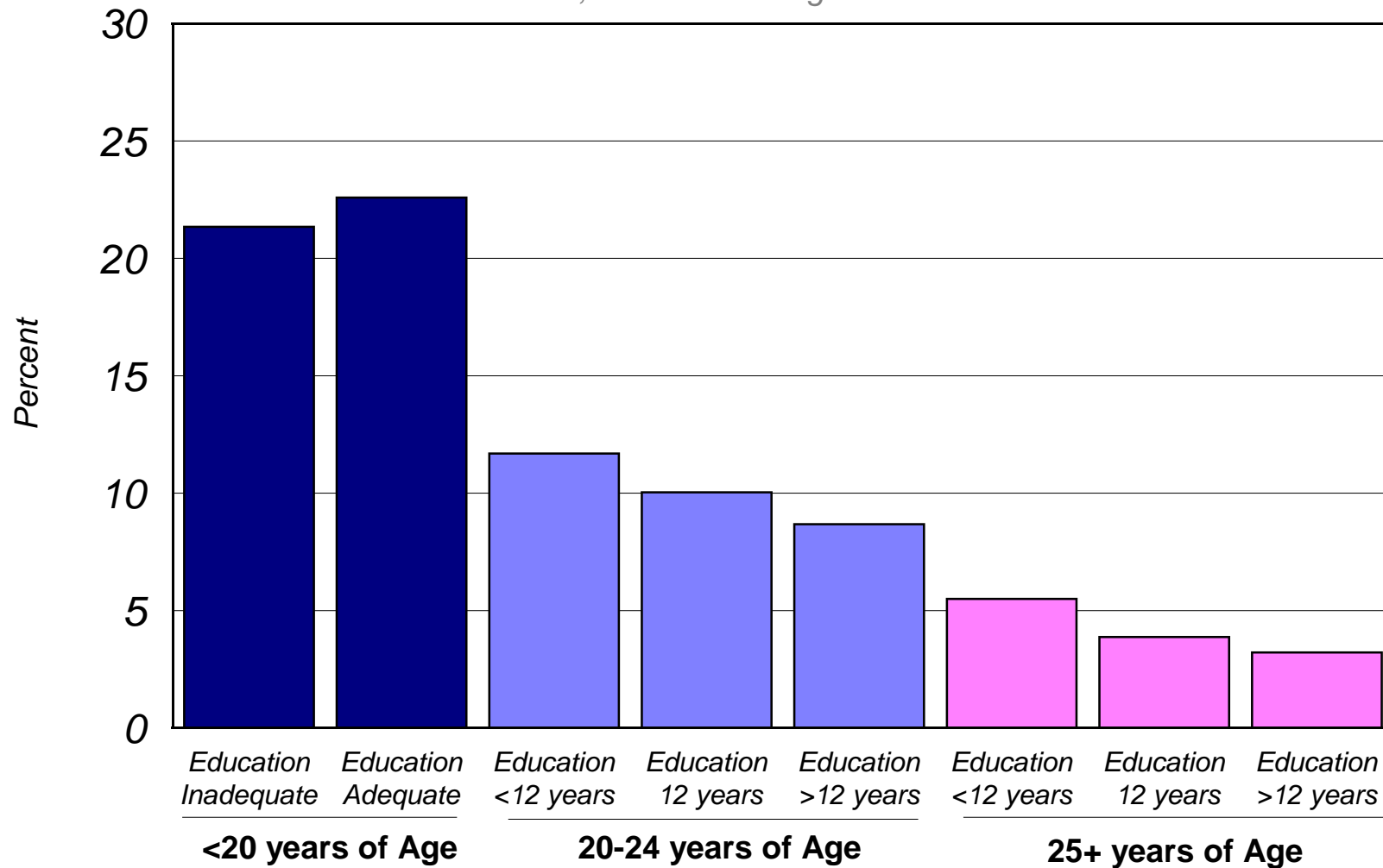


Figure 13

## Prevalence of Short Interpregnancy Interval of Less Than 6 Months By Age and Education of Mother Among All Races

Indiana, 2002-2005 Singleton Live Births



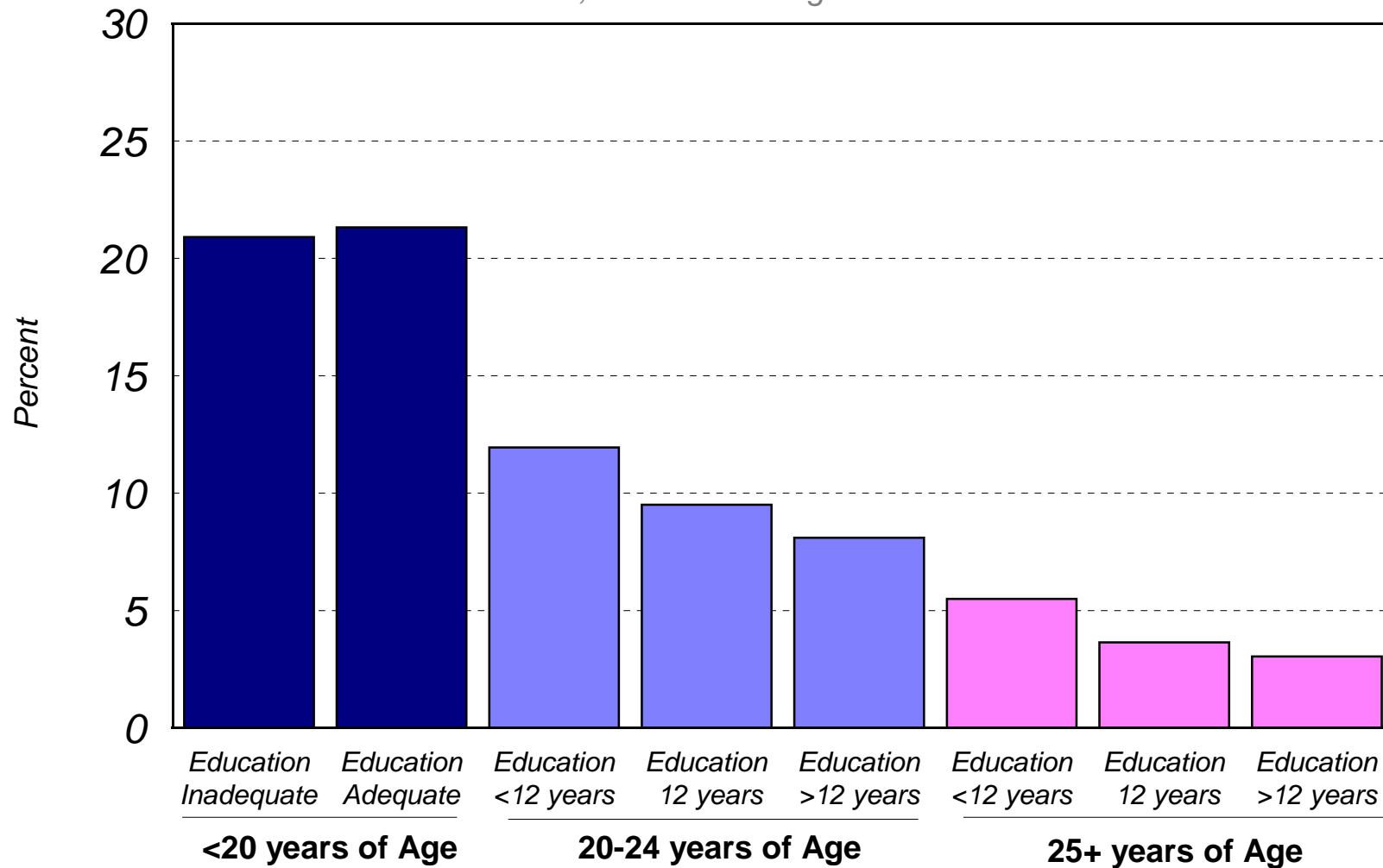
Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

Report: Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from Live Birth Data 1990-2005, [Table 4](#)

Figure 14

## Prevalence of Short Interpregnancy Interval of Less Than 6 Months By Age and Education of Mother Among Non-Hispanic Whites

Indiana, 2002-2005 Singleton Live Births



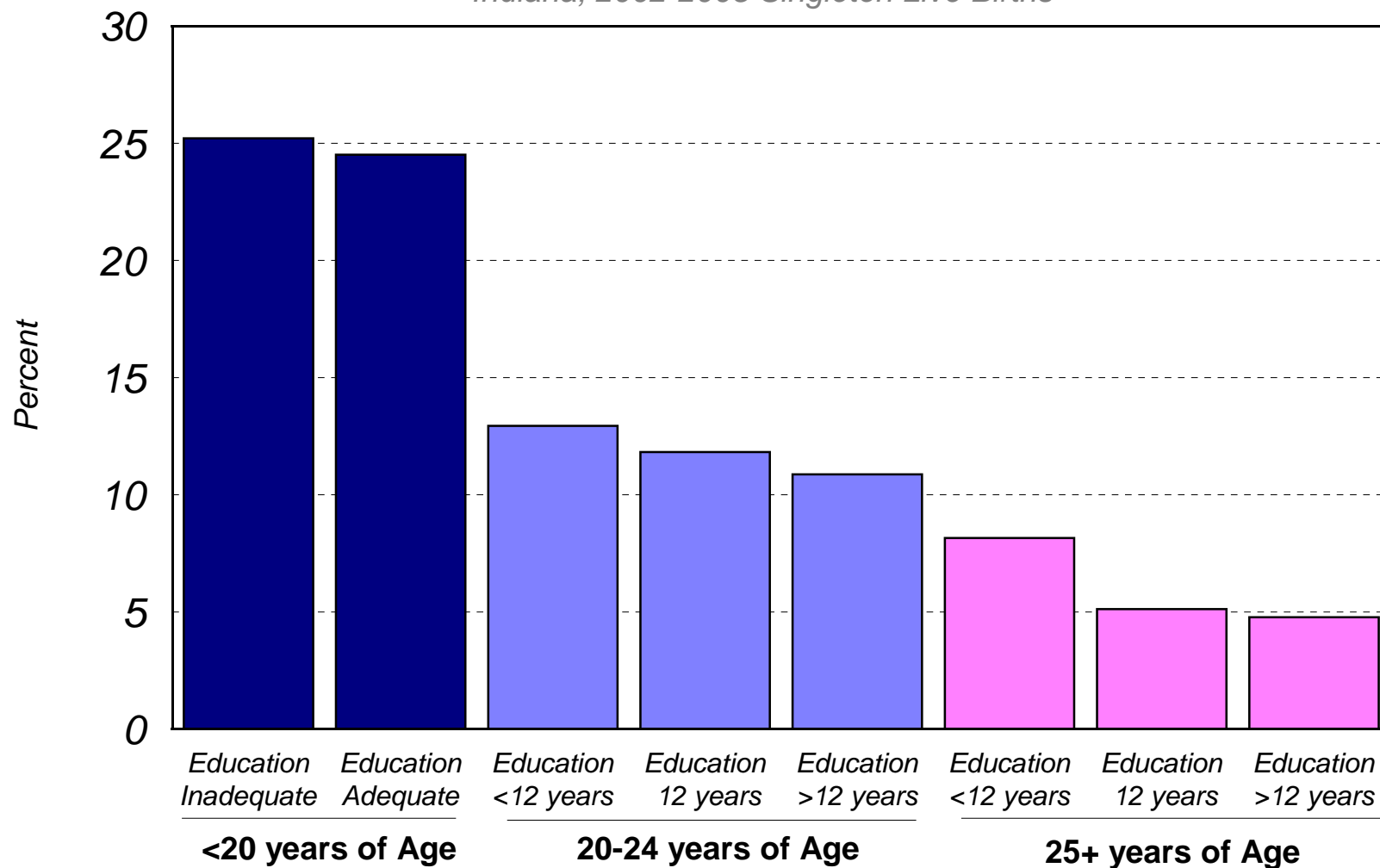
Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

Report: Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from Live Birth Data 1990-2005, [Table 4](#)

Figure 15

## Prevalence of Short Interpregnancy Interval of Less Than 6 Months By Age and Education of Mother Among Non-Hispanic Blacks

Indiana, 2002-2005 Singleton Live Births



Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

Report: Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from Live Birth Data 1990-2005, [Table 4](#)

Figure 16

## Prevalence of Short Interpregnancy Interval of Less Than 6 Months By Age and Education of Mother Among Hispanics

Indiana, 2002-2005 Singleton Live Births

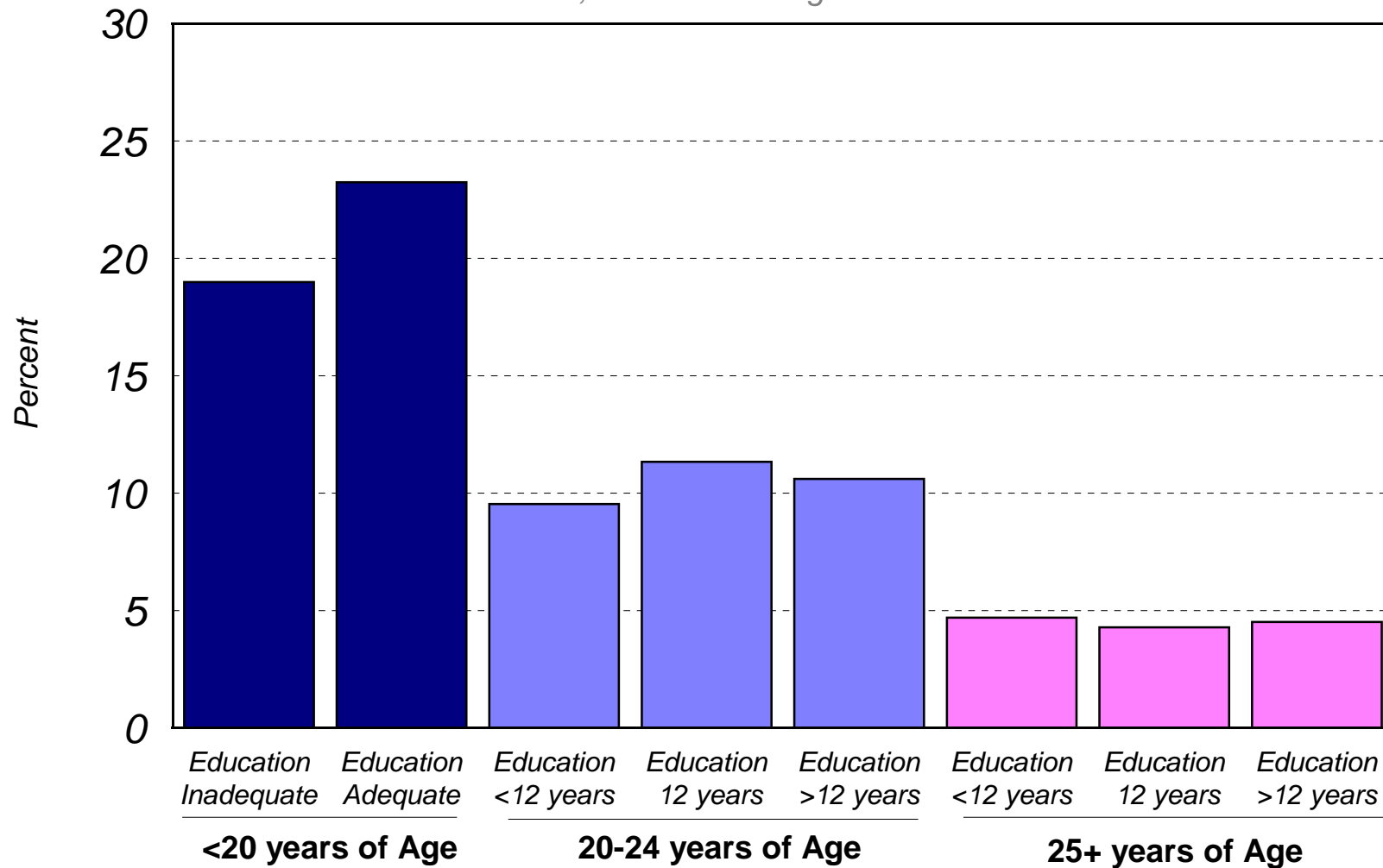
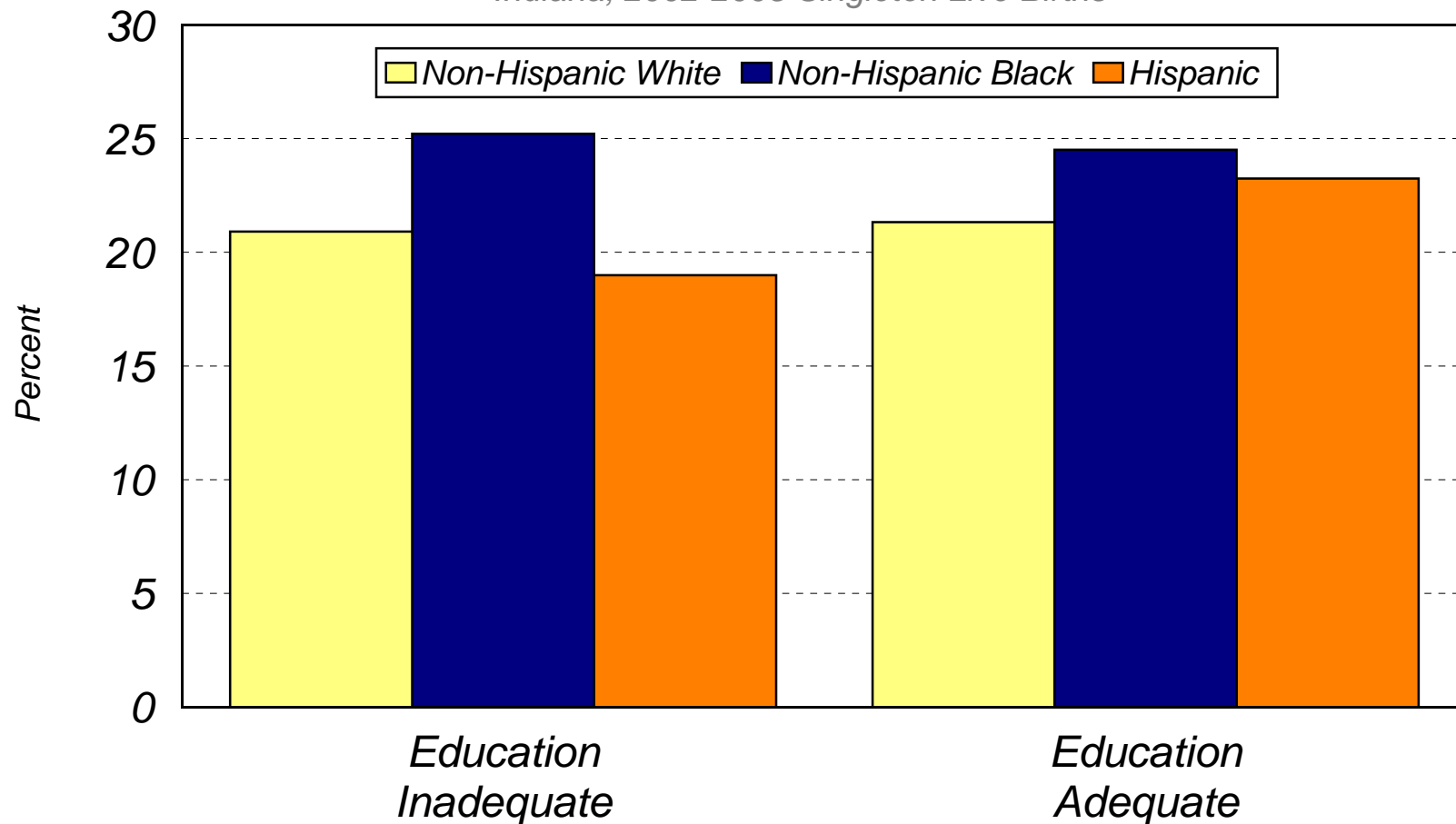


Figure 17

## Prevalence of Short Interpregnancy Interval of Less Than 6 Months Among Teen Mothers By Adequacy of Education, and Race and Hispanic Origin

Indiana, 2002-2005 Singleton Live Births



*\*Note: Teen mothers are those under 20 years of age.*

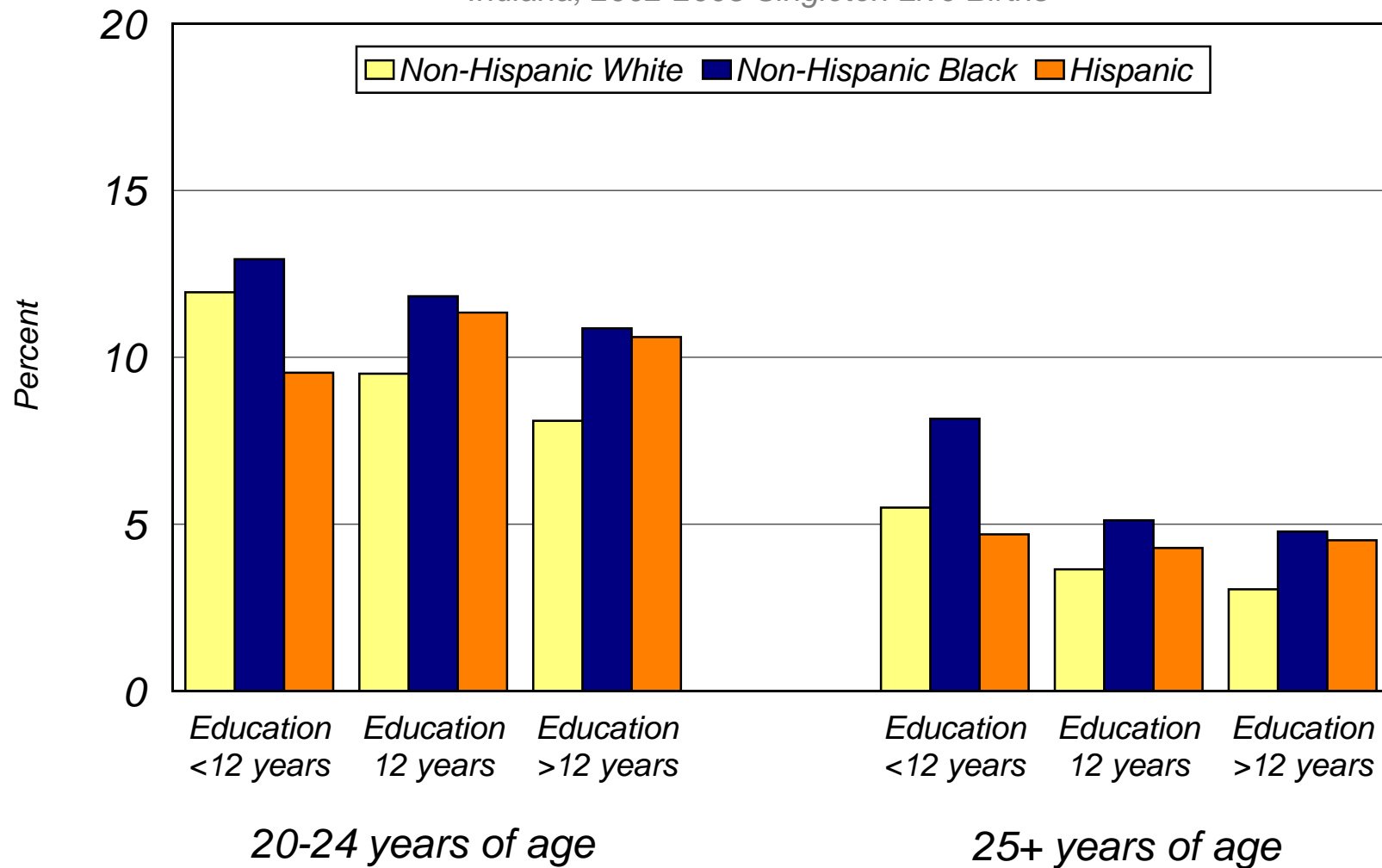
Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

Report: Short Interpregnancy intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005, [Table 4](#)

Figure 18

## Prevalence of Short Interpregnancy Interval of Less Than 6 Months Among Adult Mothers By Years of Education, and Race and Hispanic Origin

Indiana, 2002-2005 Singleton Live Births



*\*Note: Adult mothers are those 20 years of age and older.*

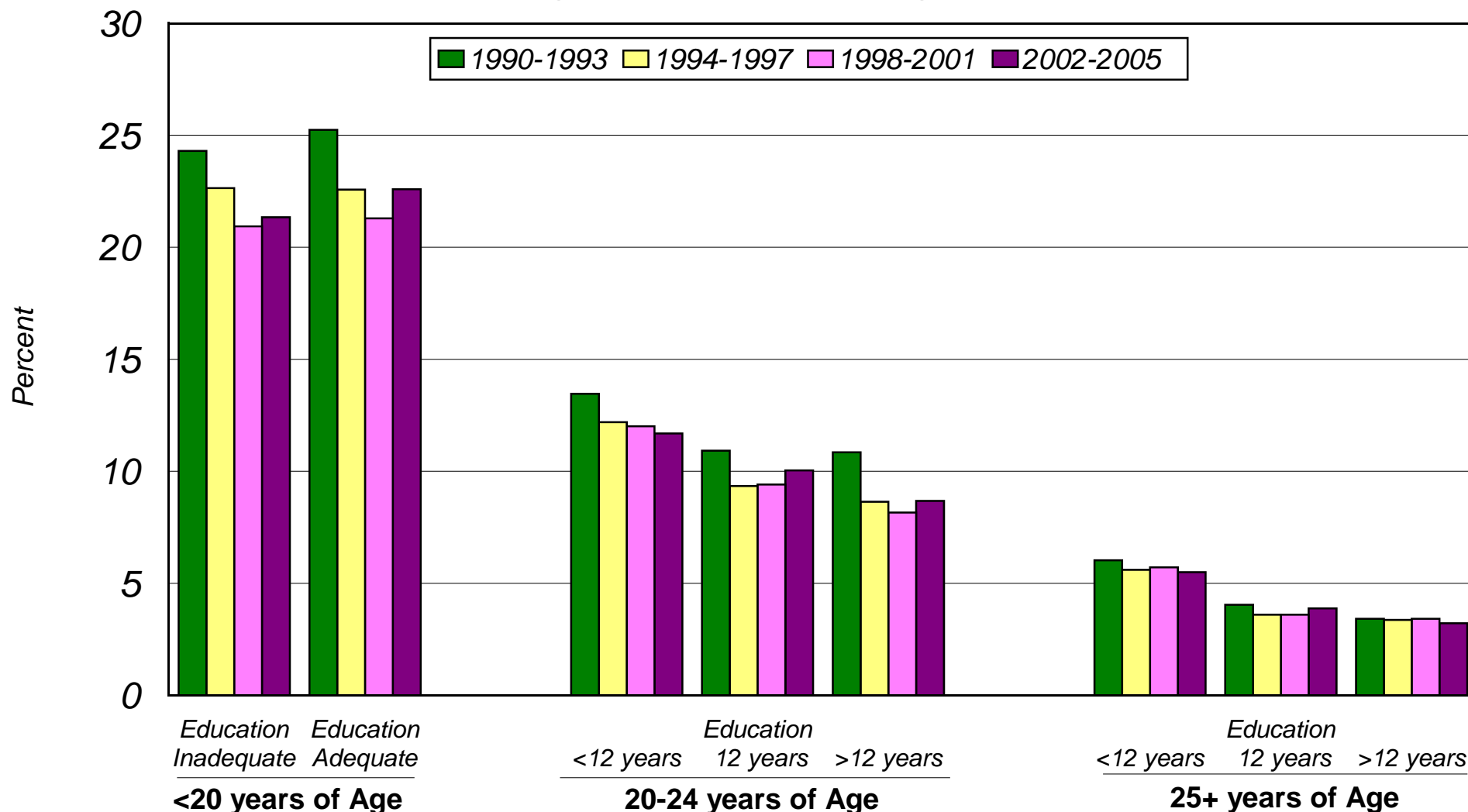
Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

Report: Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005, [Table 4](#)

Figure 19

## Prevalence of Short Interpregnancy Interval of Less Than 6 Months By Age and Education of Mother Among All Races

*Four-year Averages, Indiana, 1990-2005 Singleton Live Births*



Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

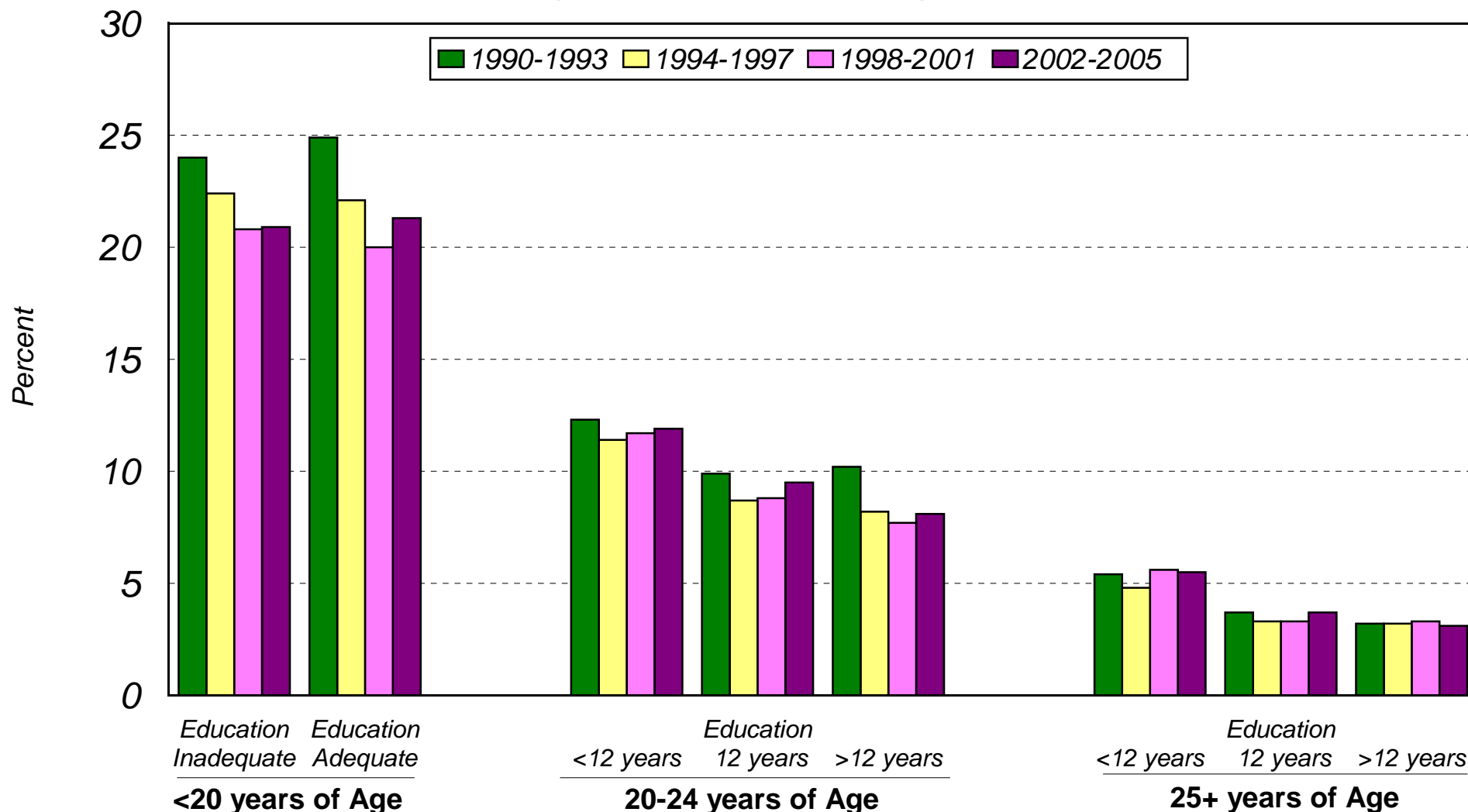
Report: Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005, [Table 4](#)



Figure 20

## Prevalence of Short Interpregnancy Interval of Less Than 6 Months By Age and Education of Mother Among Non-Hispanic Whites

*Four-year Averages, Indiana, 1990-2005 Singleton Live Births*



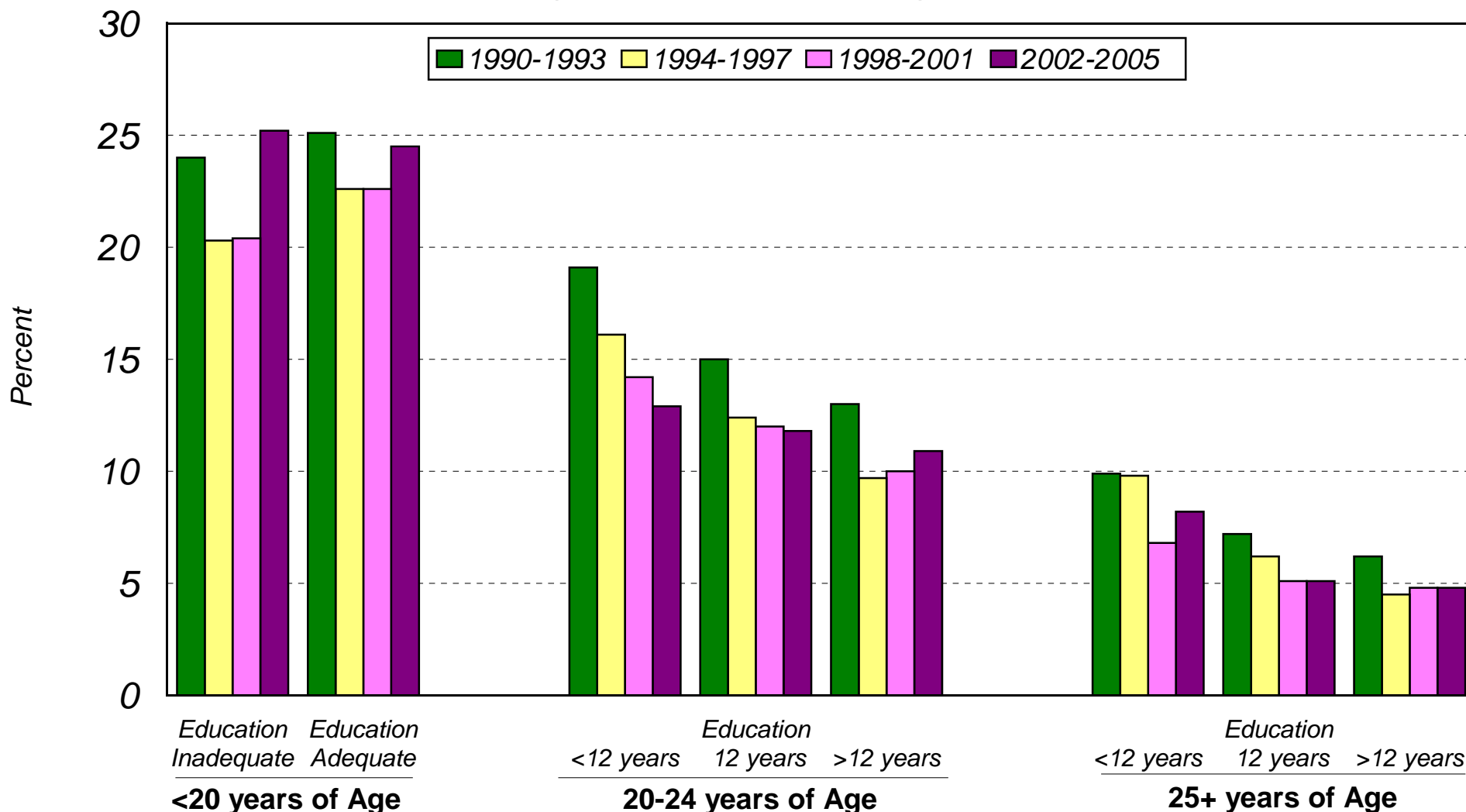
Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

Report: Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005, [Table 4](#)

Figure 21

## Prevalence of Short Interpregnancy Interval of Less Than 6 Months By Age and Education of Mother Among Non-Hispanic Blacks

*Four-year Averages, Indiana, 1990-2005 Singleton Live Births*

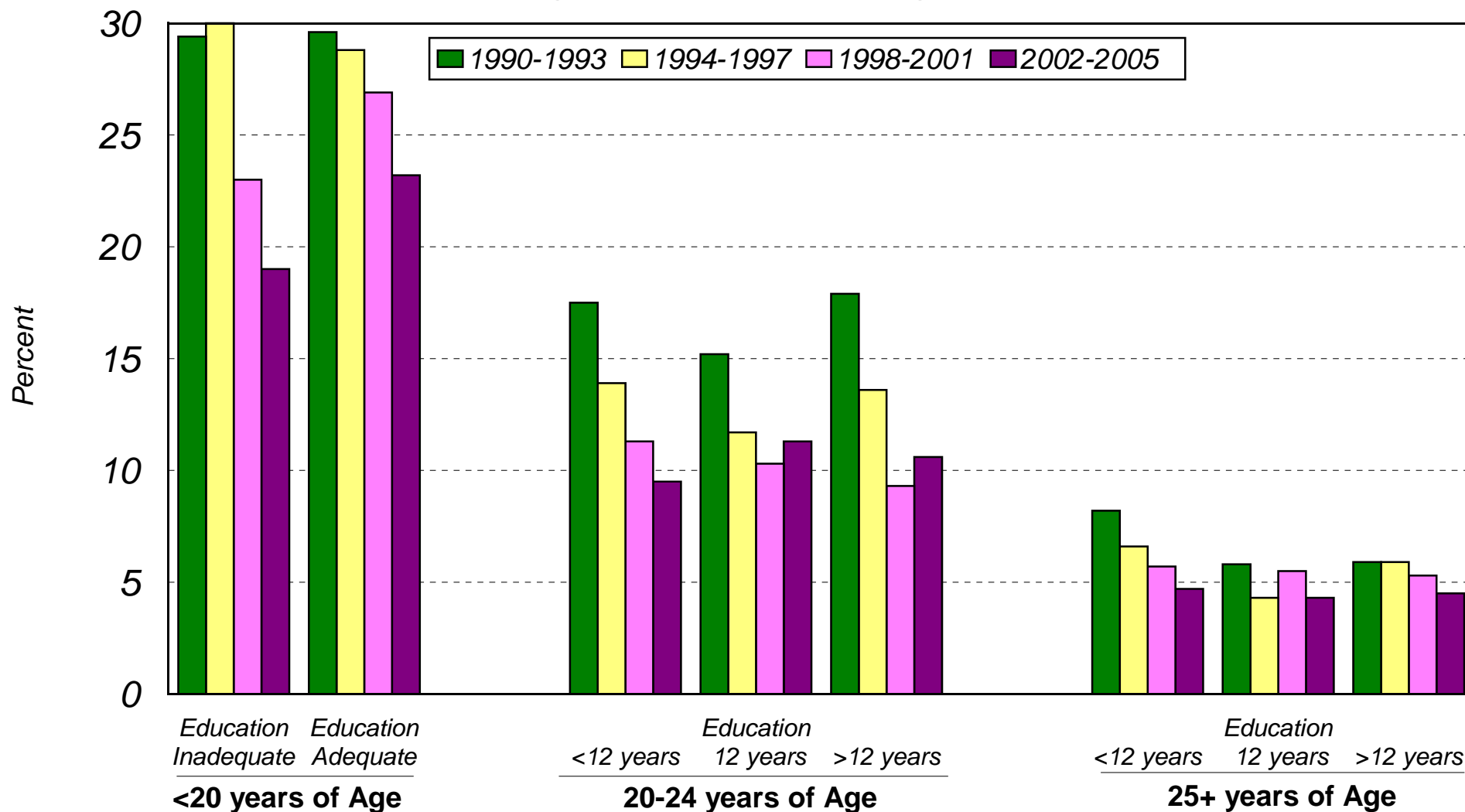


Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services  
Report: Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005, [Table 4](#)

Figure 22

## Prevalence of Short Interpregnancy Interval of Less Than 6 Months By Age and Education of Mother Among Hispanics

*Four-year Averages, Indiana, 1990-2005 Singleton Live Births*

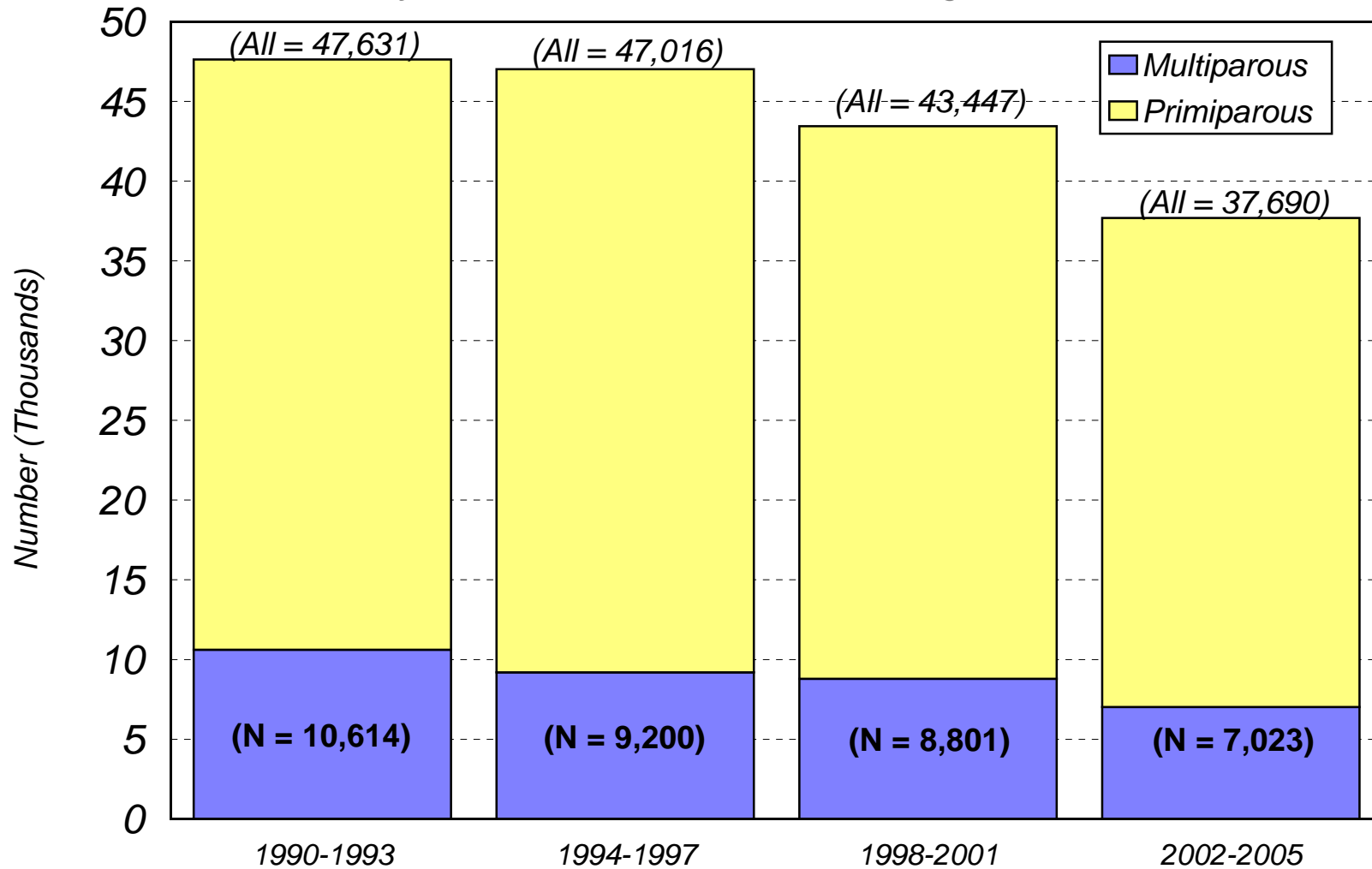


Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services  
 Report: Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005, [Table 4](#)

Figure 23

## Number of Teen Mothers By Parity

Four-year Intervals, Indiana, 1990-2005 Singleton Live Births



*\*Note: Teen mothers are those under 20 years of age; Multiparous Mothers are those with one or more previous live births.*

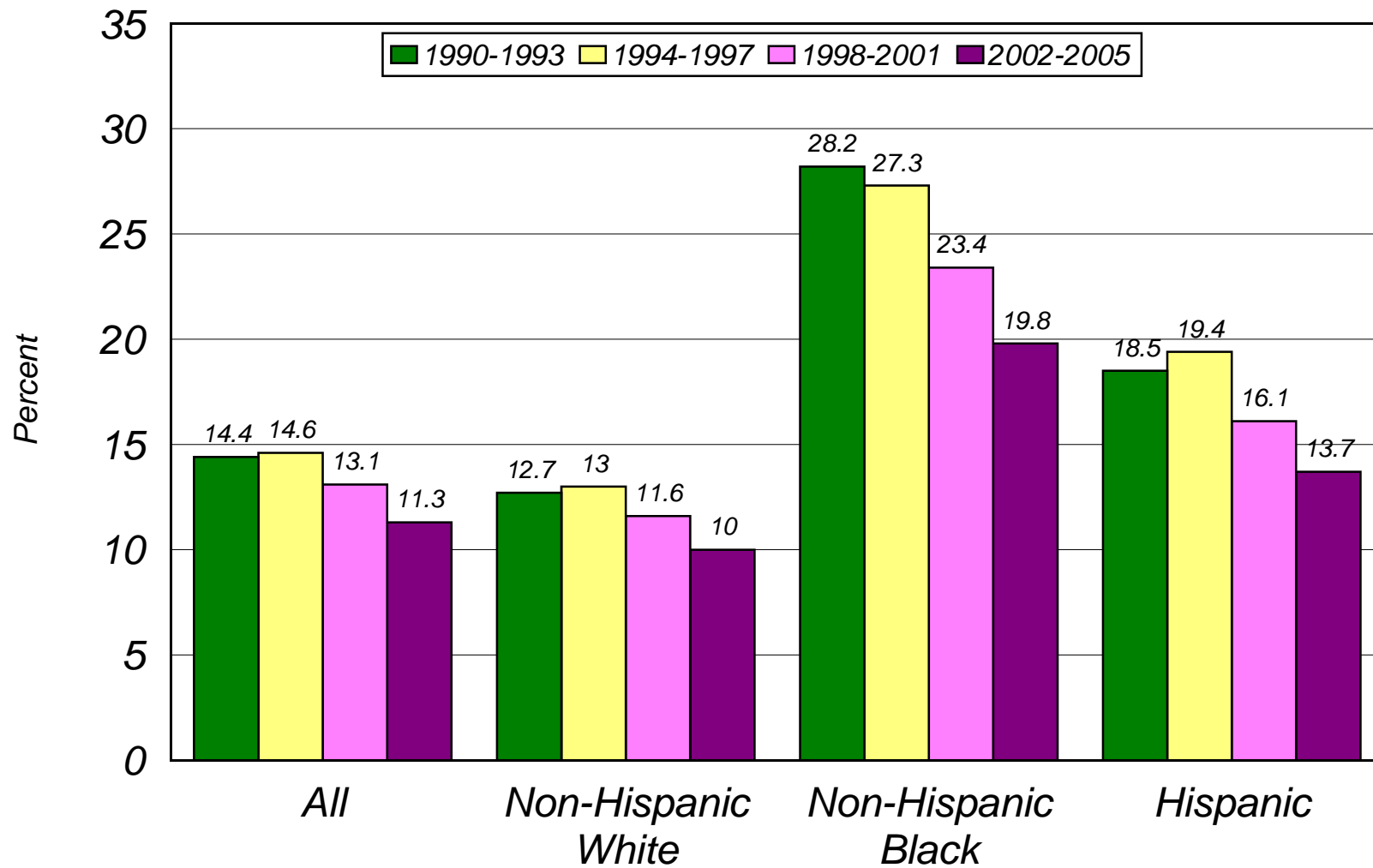
Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

Report: Short Interpregnancy intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005

Figure 24

## Percentage of Teens Among All Mothers By Race and Hispanic Origin

Four-year Averages, Indiana, 1990-2005 Singleton Live Births



*\*Note: Teen mothers are those under 20 years of age.*

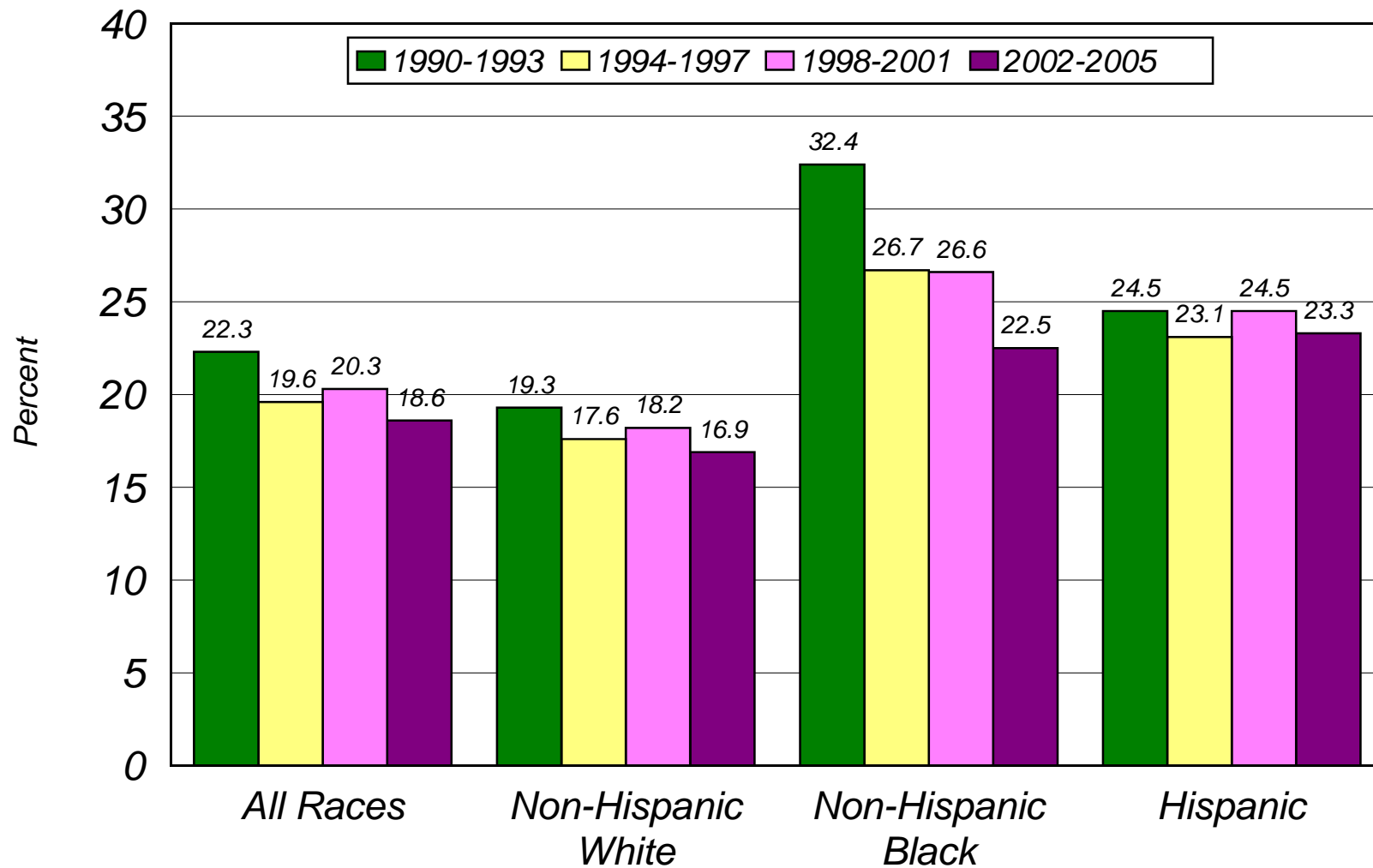
Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

Report: Short Interpregnancy intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005

Figure 25

## Percentage of Multiparous Mothers Among Teens By Race and Hispanic Origin

Four-year Averages, Indiana, 1990-2005 Singleton Live Births



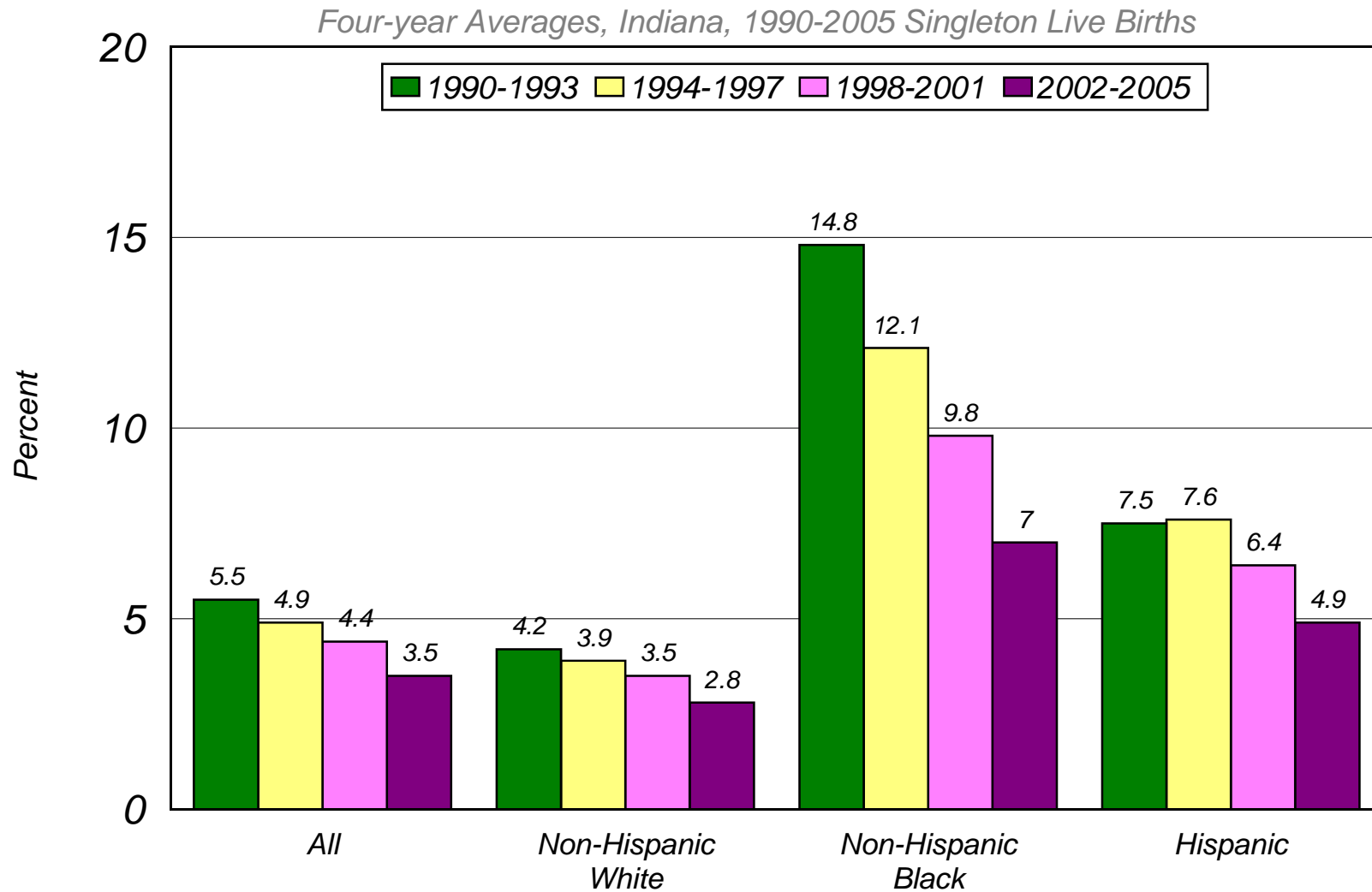
*\*Note: Teen mothers are those under 20 years of age; Multiparous Mothers are those with one or more previous live births.*

Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

Report: Short Interpregnancy intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005

Figure 26

## Percentage of Teens Among Multiparous Mothers By Race and Hispanic Origin



*\*Note: Teen mothers are those under 20 years of age; Multiparous Mothers are those with one or more previous live births.*

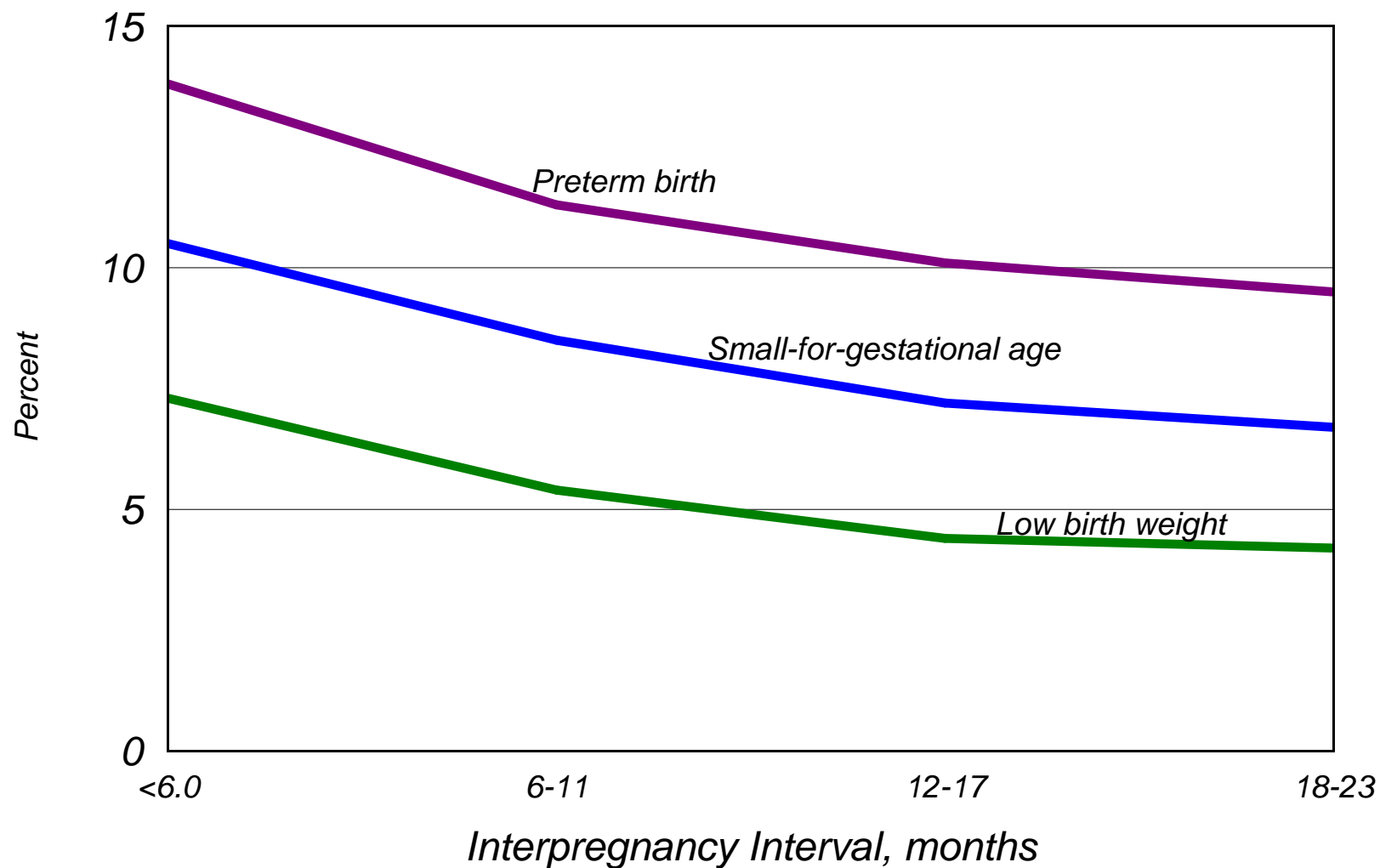
Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

Report: Short Interpregnancy intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005

Figure 27

## Prevalence of Low Birth Weight, Preterm, and Small-for-Gestational Age Births According to Interpregnancy Interval

Indiana, 2002-2005 Singleton Live Births



\*Note: Low birth weight is under 2,500 grams; preterm birth is under 37 completed weeks of gestation; small-for-gestational age is birth weight below the 10th percentile for the gestational age and sex of infant.

Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

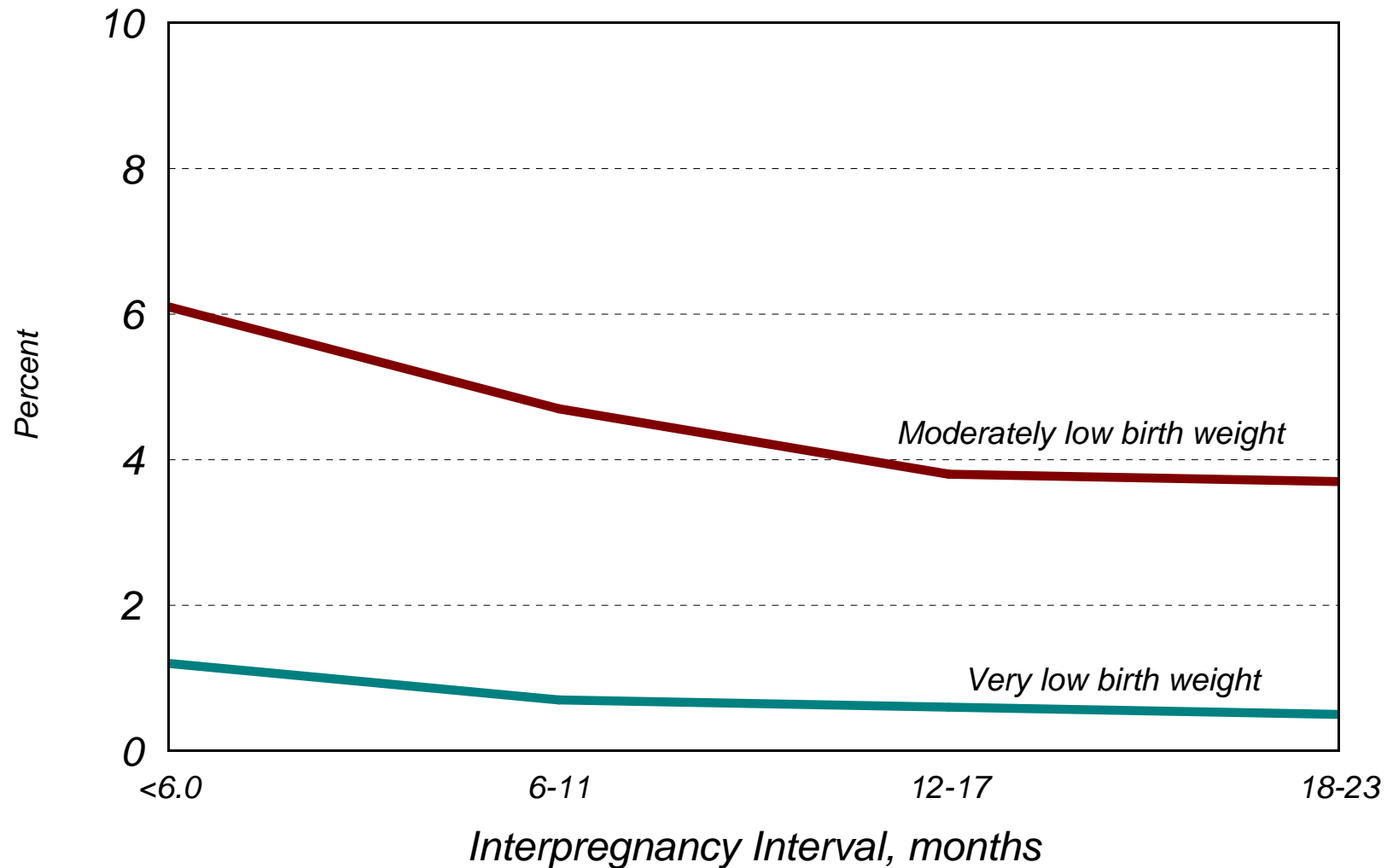
Report: Short Interpregnancy intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005, [Table 5](#)



Figure 28

## Prevalence of Very Low Birth Weight and Moderately Low Birth Weight Births According to Interpregnancy Interval

Indiana, 2002-2005 Singleton Live Births



\*Note: Very low birth weight is under 1,500 grams and moderately low birth weight is 1,500-2,499 grams.

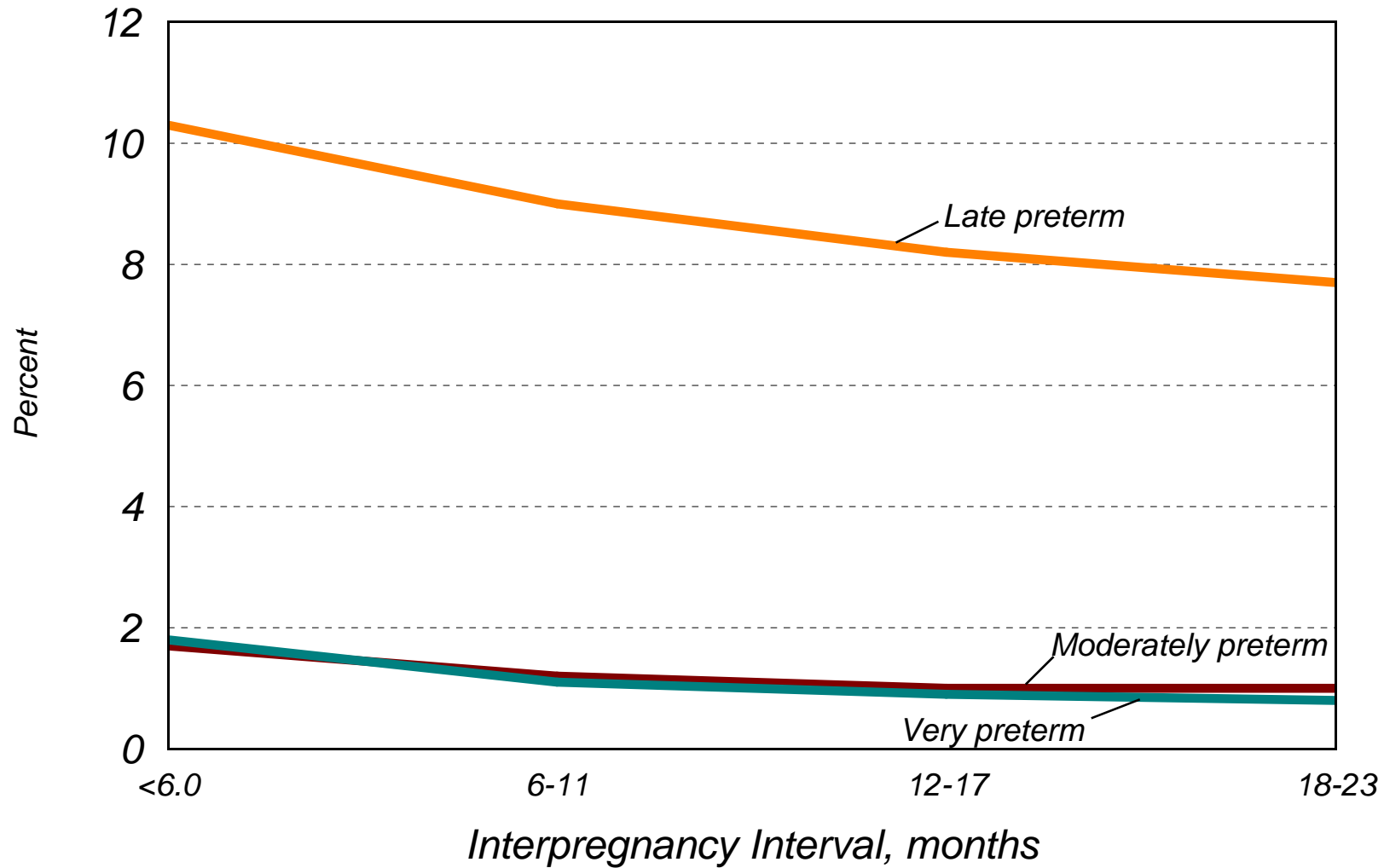
Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

Report: Short Interpregnancy intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005, [Table 5](#)

Figure 29

## Prevalence of Very Preterm, Moderately Preterm, and Late Preterm Births According to Interpregnancy Interval

Indiana, 2002-2005 Singleton Live Births



\*Note: Very preterm is under 32 weeks, moderately preterm is 32-33 weeks, and late preterm is 34-36 weeks of gestation.

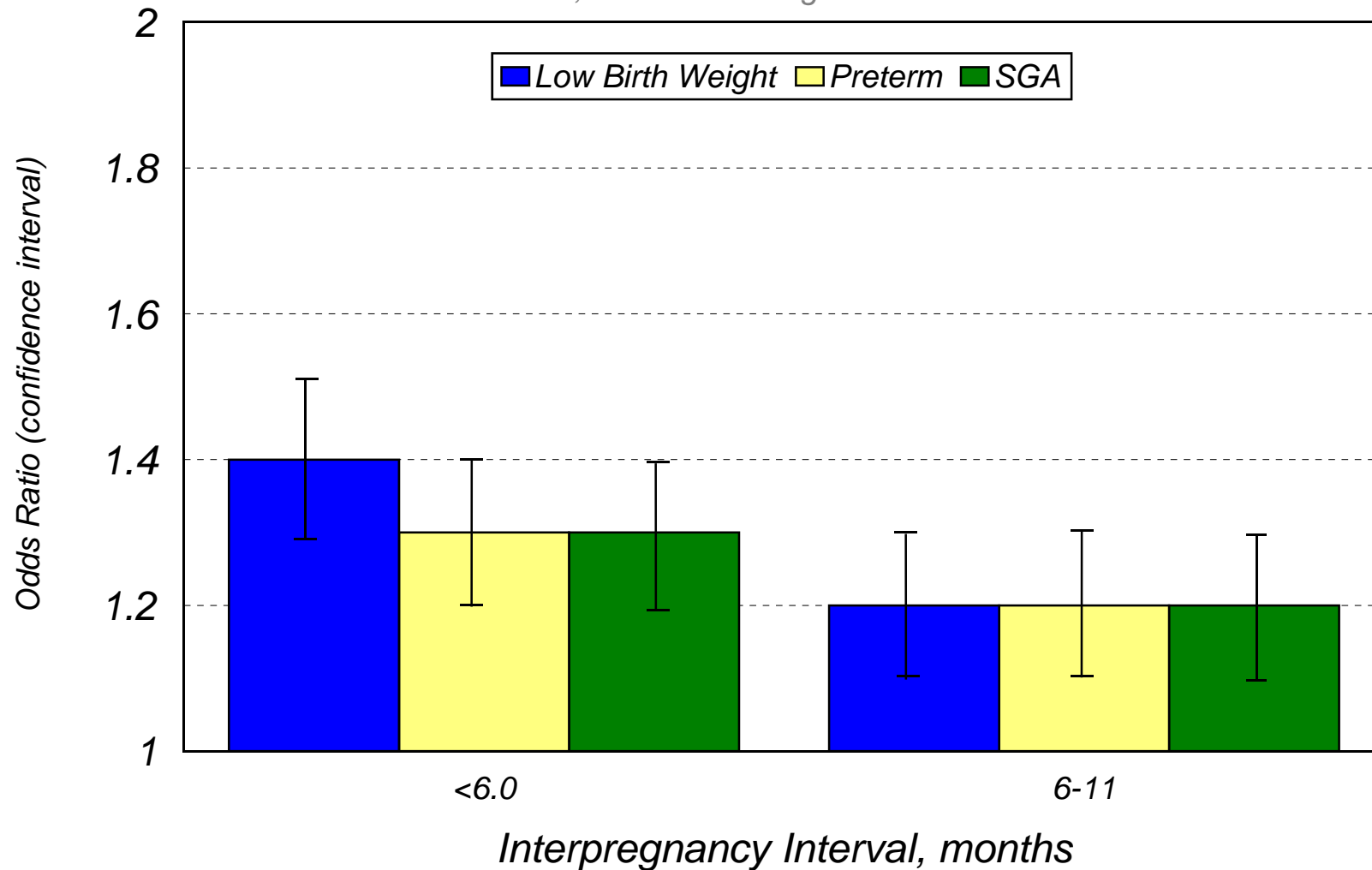
Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

Report: Short Interpregnancy intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005, [Table 5](#)

Figure 30

## Adjusted Odds Ratios with 95% Confidence Intervals For the Association of Short Interpregnancy Interval with Low Birth Weight, Preterm, and Small-for-Gestational Age Births

Indiana, 2002-2005 Singleton Live Births



\*Note: Reference group: mothers with interpregnancy interval of 18-24 months; adjusted for age, education, marital status, parity, smoking status, and prenatal care.

Low birth weight is under 2,500 grams; preterm is under 37 weeks of gestation;

small-for-gestational age (SGA) is birth weight below the 10th percentile for the gestational age and sex of infant.

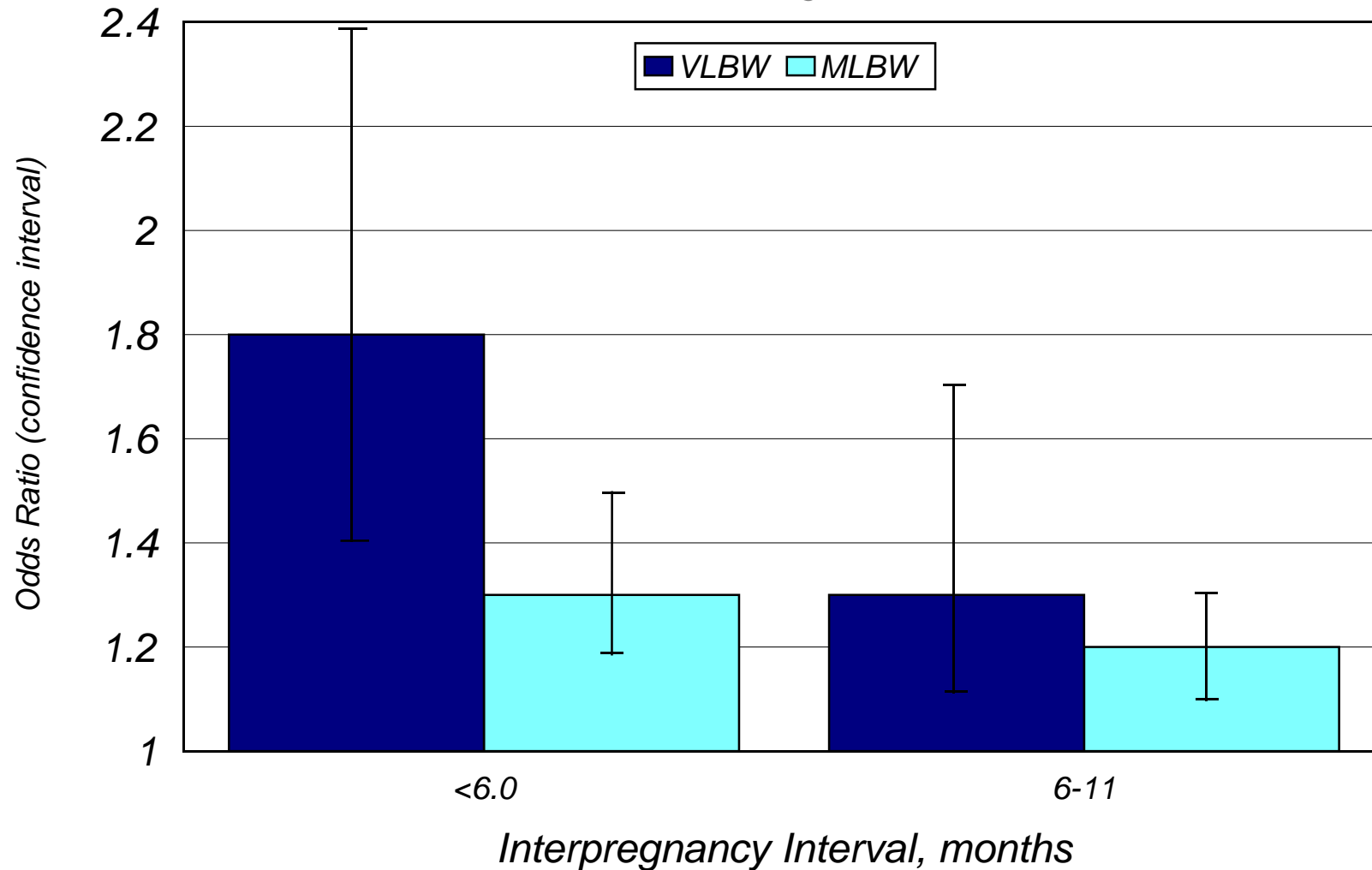
Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

Report: Short Interpregnancy intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005, [Table 6](#)

Figure 31

## Adjusted Odds Ratios with 95% Confidence Intervals For the Association of Short Interpregnancy Interval with Very Low Birth Weight and Moderately Low Birth Weight Births

Indiana, 2002-2005 Singleton Live Births



\*Note: Reference group: mothers with interpregnancy interval of 18-24 months; adjusted for age, education, marital status, parity, smoking status, and prenatal care.

Very low birth weight (VLBW) is under 1,500 grams and moderately low birth weight (MLBW) is 1,500-2,499 grams.

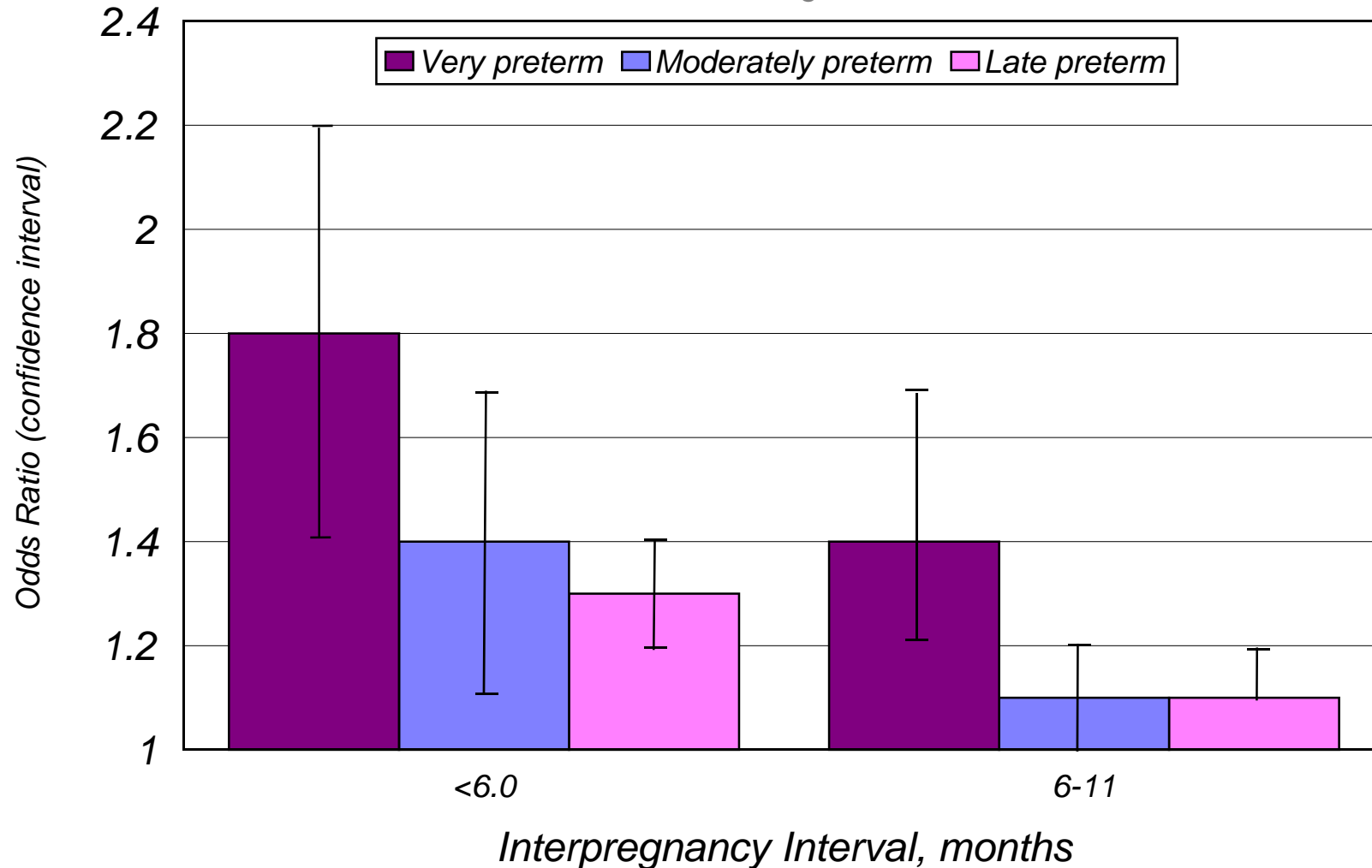
Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

Report: Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from Live Birth Data 1990-2005, [Table 6](#)

Figure 32

## Adjusted Odds Ratios with 95% Confidence Intervals For the Association of Short Interpregnancy Interval with Very Preterm, Moderately Preterm, and Late Preterm Births

Indiana, 2002-2005 Singleton Live Births



\*Note: Reference group: mothers with interpregnancy interval of 18-24 months; adjusted for age, education, marital status, parity, smoking status, and prenatal care.

Very preterm is under 32 weeks, moderately preterm is 32-33 weeks, and late preterm is 34-36 weeks of gestation.

Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services

Report: Short Interpregnancy intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005, [Table 6](#)

**Table A-1. Number of births according to Interpregnancy interval by race and Hispanic origin of mother:  
Indiana, 1990-2005 singleton live births**

Interpregnancy Interval (month)	1990 -1993	1994 -1997	1998 -2001	2002 -2005
<b>All races</b>				
All	186,469	178,874	182,387	189,806
<12	39,421	33,897	33,751	34,699
< 6	13,469	11,236	11,220	11,510
< 3	5,174	4,500	4,419	4,661
3-5	8,295	6,736	6,801	6,849
6 - 11	25,952	22,661	22,531	23,189
6 - 8	12,371	10,491	10,312	10,805
9 - 11	13,581	12,170	12,219	12,384
12 - 23	49,919	46,781	47,546	49,155
12 - 17	27,111	24,980	25,541	26,394
12 - 14	14,020	12,793	13,031	13,457
15 - 17	13,091	12,187	12,510	12,937
18 - 23	22,808	21,801	22,005	22,761
18 - 20	11,859	11,183	11,413	11,716
21 - 23	10,949	10,618	10,592	11,045
>= 24	97,129	98,196	101,090	105,952
24 - 59	66,017	67,729	67,672	71,104
60 - 119	24,443	24,020	27,174	27,522
>= 120	6,669	6,447	6,244	7,326
<b>Non-Hispanic white</b>				
All	158,624	150,712	148,393	148,511
<12	31,461	27,125	26,381	26,410
< 6	10,041	8,453	8,253	8,220
< 3	3,645	3,228	3,117	3,174
3-5	6,396	5,225	5,136	5,046
6 - 11	21,420	18,672	18,128	18,190
6 - 8	10,020	8,495	8,174	8,298
9 - 11	11,400	10,177	9,954	9,892
12 - 23	43,369	40,228	39,853	40,049
12 - 17	23,406	21,408	21,296	21,489
12 - 14	12,040	10,883	10,790	10,878
15 - 17	11,366	10,525	10,506	10,611
18 - 23	19,963	18,820	18,557	18,560
18 - 20	10,301	9,603	9,629	9,561
21 - 23	9,662	9,217	8,928	8,999
>= 24	83,794	83,359	82,159	82,052
24 - 59	57,775	58,064	55,698	56,156
60 - 119	20,610	20,040	21,455	20,425
>= 120	5,409	5,255	5,006	5,471

Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services  
Report: Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005.

**Table A-1. Number of births according to Interpregnancy interval by race and Hispanic origin of mother:  
Indiana, 1990-2005 singleton live births--Con.**

Interpregnancy Interval (mo)	1990 -1993	1994 -1997	1998 -2001	2002 -2005
<b>Non-Hispanic black</b>				
All	21,371	18,754	19,842	20,907
<12	6,414	4,702	4,599	4,628
< 6	2,789	1,960	1,890	1,932
< 3	1,250	894	841	881
3-5	1,539	1,066	1,049	1,051
6 - 11	3,625	2,742	2,709	2,696
6 - 8	1,905	1,408	1,346	1,403
9 - 11	1,720	1,334	1,363	1,293
12 - 23	4,918	4,241	4,336	4,567
12 - 17	2,783	2,290	2,456	2,484
12 - 14	1,506	1,212	1,311	1,319
15 - 17	1,277	1,078	1,145	1,165
18 - 23	2,135	1,951	1,880	2,083
18 - 20	1,165	1,038	972	1,062
21 - 23	970	913	908	1,021
>= 24	10,039	9,811	10,907	11,712
24 - 59	6,127	6,260	6,753	7,226
60 - 119	2,904	2,665	3,391	3,459
>= 120	1,008	886	763	1,027
<b>Hispanic</b>				
All	4,413	6,021	10,414	16,653
<12	1,122	1,458	2,143	3,034
< 6	493	602	883	1,148
< 3	220	285	394	515
3-5	273	317	489	633
6 - 11	629	856	1,260	1,886
6 - 8	316	415	595	905
9 - 11	313	441	665	981
12 - 23	1,097	1,438	2,402	3,622
12 - 17	631	794	1,289	1,906
12 - 14	320	439	676	1,020
15 - 17	311	355	613	886
18 - 23	466	644	1,113	1,716
18 - 20	260	343	581	889
21 - 23	206	301	532	827
>= 24	2,194	3,125	5,869	9,997
24 - 59	1,371	2,145	3,812	6,317
60 - 119	657	793	1,735	3,016
>= 120	166	187	322	664

**Table A-2. Number of births with selected maternal characteristics according to interpregnancy interval:  
Indiana, 2002-2005 singleton live births**

Maternal characteristics	Interpregnancy interval, month			
	< 6	6 - 11	12 - 17	18 - 23
All	11,510	23,189	26,394	22,761
Race and Hispanic origin				
Non-Hispanic white	8,220	18,190	21,489	18,560
Non-Hispanic black	1,932	2,696	2,484	2,083
Hispanic	1,148	1,886	1,906	1,716
Other	149	312	392	313
Unknown	61	105	123	89
Age, year				
<20	1,410	1,666	1,281	809
20-24	5,084	8,431	8,143	6,561
25-29	2,884	6,888	8,142	7,225
30-34	1,535	4,427	6,306	5,748
35+	595	1,774	2,522	2,417
Unknown	2	3	0	1
Education, year				
<12	4,071	6,503	6,174	4,634
=12	4,023	7,226	7,439	6,484
>12	3,338	9,333	12,640	11,528
Unknown	78	127	141	115
Marital status				
Married	6,139	15,452	19,299	16,743
Unmarried	5,369	7,732	7,093	6,016
Unknown	2	5	2	2
Parity				
Second + third	8,637	17,883	20,830	18,545
Fourth and higher	2,873	5,306	5,564	4,216
Unknown	0	0	0	0
Trimester prenatal care began				
First	7,099	16,526	20,460	18,397
Not first	4,156	6,312	5,638	4,109
Unknown	255	351	296	255
Adequacy of prenatal care				
Adequate or more	6,263	14,673	18,255	16,496
Intermediate	1,674	3,326	3,645	2,974
Inadequate or no care	3,176	4,593	3,968	2,858
Unknown	397	597	526	433
Smoking				
Yes	3,137	4,832	4,388	3,847
No	8,344	18,318	21,969	18,885
Unknown	29	39	37	29



**Table A-3. Number of births with short interpregnancy intervals by age and by race and Hispanic origin of mother: Indiana, 1990-2005 singleton live births**

Age of mother and interpregnancy interval	1990 -1993	1994 -1997	1998 -2001	2002 -2005
<b>All races</b>				
Under 20 years of age	10,245	8,711	7,821	6,438
< 6 mo	2,533	1,968	1,644	1,410
6 - 11 mo	3,055	2,466	2,023	1,666
20-24 years of age	50,261	46,578	48,314	49,076
< 6 mo	5,914	4,702	4,843	5,084
6 - 11 mo	9,874	8,008	8,210	8,431
25-29 years of age	62,206	55,586	57,323	59,713
< 6 mo	3,076	2,659	2,735	2,884
6 - 11 mo	7,460	6,415	6,396	6,888
30 years of age and older	63,390	67,964	68,909	74,568
< 6 mo	1,942	1,904	1,998	2,130
6 - 11 mo	5,548	5,768	5,901	6,201
<b>Non-Hispanic white</b>				
Under 20 years of age	6,679	5,902	5,100	4,064
< 6 mo	1,626	1,315	1,039	858
6 - 11 mo	2,028	1,707	1,369	1,113
20-24 years of age	40,661	36,980	36,626	35,910
< 6 mo	4,382	3,467	3,475	3,594
6 - 11 mo	7,948	6,369	6,287	6,301
25-29 years of age	54,767	48,013	47,220	46,769
< 6 mo	2,448	2,099	2,121	2,107
6 - 11 mo	6,491	5,515	5,321	5,524
30 years of age and older	56,465	59,787	59,429	61,759
< 6 mo	1,583	1,570	1,618	1,660
6 - 11 mo	4,941	5,078	5,150	5,250
<b>Non-Hispanic black</b>				
Under 20 years of age	3,164	2,277	1,942	1,474
< 6 mo	784	495	419	364
6 - 11 mo	910	620	468	319
20-24 years of age	7,969	6,999	7,718	7,782
< 6 mo	1,267	907	945	936
6 - 11 mo	1,612	1,177	1,291	1,286
25-29 years of age	5,454	4,788	5,531	6,171
< 6 mo	475	364	330	414
6 - 11 mo	714	568	583	654
30 years of age and older	4,773	4,686	4,650	5,479
< 6 mo	261	193	196	218
6 - 11 mo	387	377	367	436

**Table A-3. Number of births with short interpregnancy intervals by age and by race and Hispanic origin of mother: Indiana, 1990-2005 singleton live births--Con.**

Age of mother and interpregnancy interval	1990 -1993	1994 -1997	1998 -2001	2002 -2005
	<b>Hispanic</b>			
Under 20 years of age	334	453	671	808
< 6 mo	98	134	163	164
6 - 11 mo	98	123	159	213
20-24 years of age	1,284	2,017	3,306	4,759
< 6 mo	213	264	361	480
6 - 11 mo	245	368	513	732
25-29 years of age	1,330	1,772	3,449	5,767
< 6 mo	112	123	227	307
6 - 11 mo	160	208	346	571
30 years of age and older	1,461	1,778	2,987	5,318
< 6 mo	70	81	132	196
6 - 11 mo	125	156	242	370

**Table A-4. Number of births with short (less than 6 months) interpregnancy intervals by education and age, and by race and Hispanic origin of mother: Indiana, 1990-2005 singleton live births**

Age and education of mother	1990 -1993	1994 -1997	1998 -2001	2002 -2005
<b>All races</b>				
Under 20 years of age				
Inadequate education	5,462	4,457	4,118	3,486
Under 6 months	1,327	1,009	862	744
Adequate education	4,706	4,165	3,645	2,873
Under 6 months	1,188	940	776	649
20-24 years of age				
<12 years of education	16,645	14,608	16,151	17,741
Under 6 months	2,240	1,781	1,939	2,074
12 years of education	25,666	22,581	22,336	21,144
Under 6 months	2,803	2,110	2,101	2,123
>12 years of education	7,708	8,978	9,536	9,883
Under 6 months	836	776	778	858
25 years of age and older				
<12 years of education	14,176	12,850	14,812	18,576
Under 6 months	855	719	846	1,021
12 years of education	53,914	45,760	41,288	38,938
Under 6 months	2,178	1,646	1,486	1,511
>12 years of education	57,329	63,729	69,451	76,088
Under 6 months	1,960	2,146	2,372	2,450
<b>Non-Hispanic white</b>				
Under 20 years of age				
Inadequate education	4,172	3,345	2,865	2,296
Under 6 months	1,002	750	595	480
Adequate education	2,478	2,511	2,207	1,726
Under 6 months	618	555	441	368
20-24 years of age				
<12 years of education	13,623	11,414	11,642	11,910
Under 6 months	1,681	1,297	1,364	1,423
12 years of education	20,778	18,117	17,406	16,140
Under 6 months	2,061	1,569	1,531	1,535
>12 years of education	6,124	7,173	7,410	7,665
Under 6 months	622	586	570	621
25 years of age and older				
<12 years of education	11,775	10,145	10,225	10,586
Under 6 months	634	492	568	582
12 years of education	47,760	39,897	34,644	31,084
Under 6 months	1,759	1,322	1,148	1,136
>12 years of education	51,392	56,792	61,336	66,441
Under 6 months	1,628	1,817	2,004	2,028

Source: Indiana State Department of Health, Maternal and Children's Special Health Care Services  
 Report: Short Interpregnancy Intervals and the Risk of Adverse Birth Outcomes in Indiana: Statistics from live birth data 1990-2005.

**Table A-4. Number of births with short (less than 6 months) interpregnancy intervals by education and age, and by race and Hispanic origin of mother: Indiana, 1990-2005 singleton live births--Con.**

Interpregnancy interval, education, age, race, and Hispanic origin	1990 -1993	1994 -1997	1998 -2001	2002 -2005
<b>Non-Hispanic black</b>				
Under 20 years of age				
Inadequate education	1,054	783	744	587
Under 6 months	253	159	152	148
Adequate education	2,066	1,458	1,173	865
Under 6 months	519	329	265	212
20-24 years of age				
<12 years of education	2,341	2,059	2,395	2,604
Under 6 months	448	331	341	337
12 years of education	4,193	3,456	3,657	3,492
Under 6 months	629	427	439	413
>12 years of education	1,343	1,383	1,597	1,619
Under 6 months	174	134	160	176
25 years of age and older				
<12 years of education	1,440	1,229	1,334	1,704
Under 6 months	142	121	91	139
12 years of education	4,612	3,980	4,109	4,450
Under 6 months	332	245	209	228
>12 years of education	4,061	4,130	4,650	5,413
Under 6 months	251	185	224	259
<b>Hispanic</b>				
Under 20 years of age				
Inadequate education	197	289	448	553
Under 6 months	58	87	103	105
Adequate education	135	160	219	241
Under 6 months	40	46	59	56
20-24 years of age				
<12 years of education	567	983	1,934	3,039
Under 6 months	99	137	218	290
12 years of education	527	698	949	1,217
Under 6 months	80	82	98	138
>12 years of education	184	309	377	462
Under 6 months	33	42	35	49
25 years of age and older				
<12 years of education	808	1,272	2,993	6,026
Under 6 months	66	84	172	283
12 years of education	1,051	1,096	1,718	2,679
Under 6 months	61	47	94	115
>12 years of education	909	1,135	1,612	2,235
Under 6 months	54	67	86	101

**Table A-5. Number of births with adverse birth outcomes according to interpregnancy interval by race and Hispanic origin of mother : Indiana, 2002-2005 singleton live births**

Race and Hispanic origin and birth outcome	Interpregnancy interval, month			
	< 6	6 - 11	12 - 17	18 - 23
<b>All races</b>	11,510	23,189	26,394	22,761
Low birth weight	840	1,250	1,159	955
Very low birth weight	136	161	156	115
Moderately low birth weight	704	1,089	1,003	840
Preterm births	1,588	2,625	2,662	2,153
Very preterm	208	262	234	175
Moderately preterm	200	286	270	226
Late preterm	1,180	2,077	2,158	1,752
Small-for-gestatioanal age	1,210	1,962	1,899	1,522
<b>Non-Hispanic white</b>	8,220	18,190	21,489	18,560
Low birth weight	515	884	833	670
Very low birth weight	76	110	103	71
Moderately low birth weight	439	774	730	599
Preterm births	1,040	1,873	2,010	1,616
Very preterm	113	192	157	114
Moderately preterm	115	193	183	150
Late preterm	812	1,488	1,670	1,352
Small-for-gestatioanal age	788	1,378	1,379	1,115
<b>Non-Hispanic black</b>	1,932	2,696	2,484	2,083
Low birth weight	247	262	227	198
Very low birth weight	49	39	39	37
Moderately low birth weight	198	223	188	161
Preterm births	378	478	383	308
Very preterm	71	55	58	48
Moderately preterm	57	61	55	43
Late preterm	250	362	270	217
Small-for-gestatioanal age	308	403	336	261
<b>Hispanic</b>	1,148	1,886	1,906	1,716
Low birth weight	65	87	83	67
Very low birth weight	10	9	12	7
Moderately low birth weight	55	78	71	60
Preterm births	142	237	222	175
Very preterm	20	13	17	12
Moderately preterm	23	27	30	30
Late preterm	99	197	175	133
Small-for-gestatioanal age	97	138	141	114

Note: Low birth weight is under 2,500 grams; very low birth weight is under 1,500 grams; moderately low birth weight is 1,500-2,499 grams; preterm birth is under 37 completed weeks of gestation; very preterm birth is under 32 completed weeks of gestation; moderately preterm birth is 32-33 completed weeks of gestation; late preterm birth is 34-36 completed weeks of gestation; small-for-gestational age is birth weight below the 10th percentile for the infant's gestational age and sex.

# Technical Notes

## Computation of interpregnancy interval

The interpregnancy interval is defined as the interval between the last live birth and the conception of the reported birth and is computed as the interval between two consecutive deliveries minus the gestational age of the second infant. The interval was calculated in weeks and was converted to months (13 weeks=3 months). The intervals are presented in completed months, for example, from 3.0 to 5.99 months are presented as 3-5 months. Interpregnancy interval of less than 12 months is considered a short interpregnancy interval.

## Computation of percentages

In computation of percentages (also referred to as prevalence or rate) and percent distributions, births for which a particular characteristic is unknown were subtracted from the figures for total births that were used as denominators before percentages and percent distributions were computed. Percentages based on less than 20 births in the numerator are considered unstable and are not reported.

## Random variation and stability of rates

In this report, the number of singleton live births to multiparous mothers represents complete counts for those births in the State of Indiana for which the information on interpregnancy interval is available. Therefore, percentages or rates are not subject to sampling error. However, when rates are compared over time, between areas, or among various subgroups, the number of events and the corresponding rates are subject to random variation. That is, the rate that actually occurred may be considered as one of a large number of possible different outcomes (rates) that could have arisen under the same circumstances. As a result, rates in a given population may tend to fluctuate from year to year even when the health of that population is unchanged. The simplest method for addressing the issue of random variation is the computation of 95 percent confidence interval. This interval indicates that it has 95 percent probability of including the true rate.

Random variation in rates based on a relatively small number of events tends to be larger than that for rates based on more frequently occurring events. For this reason, in this report, rates based on fewer than 20 events are not reported. To deal with the stability problem, four years of data are combined to increase the number of events, reduce the effect of random variation, and improve the reliability of rates in various categories.

## Statistical analysis

Logistic regression analysis was used to examine the association of interpregnancy interval with low birth weight (less than 2,500 grams), preterm birth (less than 37 completed weeks of

gestation), and small-for-gestational age (birth weight below the 10<sup>th</sup> percentile for infant's gestational age and sex among singleton births). To control for the effect of potential confounders, multiple logistic regression was used to simultaneously control for the effect of mother's race, Hispanic origin, age, education, marital status, parity, smoking status, and prenatal care by using separate models for the three different adverse birth outcomes. Each model included the interpregnancy interval and the above 8 potential risk factors as categorical variables (1).

## **Birth-weight and gestational age edits**

Birth-weight and gestational age edits were performed according to National Center for Health Statistics (NCHS) guidelines (2). Birth weights below 227 grams and above 8,650 grams were considered as unknown. Birth weights within the acceptable range of 227 to 8,650 grams were checked for consistency with gestational age. Gestational age in completed weeks was calculated from the date of last normal menstrual period to the date of birth. The clinical estimate was used for less than three percent of the records in which the date of last menses was missing or when the computed gestational age was either out of the acceptable range of 17 to 47 weeks or inconsistent with the birth weight.

## **Age-appropriate education of mother**

In this report, mother's educational attainment is reported both as number of years of education regardless of mother's age (as reported on the birth certificate) and as an age-appropriate education for mothers under 20 years of age. A mother's education was considered inadequate or less than appropriate-for-age if she was over 18 years of age and had not completed high school or if she was younger and had less than appropriate number of years of education for her age. For example, for a 17-year-old mother, at least 11 years of education was needed to be considered age-appropriate. For teenage mothers, the age-appropriate education is presented to correct for the effect of mother's age on years of education.

## **Prenatal care utilization**

In addition to initiation of the prenatal care as a measure, different prenatal care indices have been developed as alternative measures based on the timing of the prenatal care, the number of prenatal visits, and the gestational age of the infant at birth. In this report, the Kotelchuck Adequacy of Prenatal Care Utilization (APNCU) Index is used (3). This Index includes the adequate plus care category for those women with unexpectedly large number of prenatal visits given the gestational age at delivery and the month prenatal care began.

The Kotelchuck Index does not assess the quality of the prenatal care, simply its utilization. The prenatal care utilization is considered inadequate if care is initiated after the fourth month of pregnancy regardless of the number of visits. Once prenatal care is initiated during the first four months of pregnancy, then the index is classified into inadequate, intermediate, adequate, or adequate plus if the ratio of actual-to-expected number of visits is less than 50 percent, 50-79 percent, 80-109 percent, or 110 percent and more, respectively. The adequate-plus category

mainly includes women who are considered at high risk and receive extra prenatal services and have a disproportionately high share of low birth weight infants compared to other categories (4). The prenatal care index is considered unknown for mothers who have missing information or inconsistent values on the initiation of prenatal care, the number of visits, or gestational age, and for mothers with duration of gestation below 20 weeks and above 44 weeks (considered unacceptable values according to Kotelchuck Index).

#### References:

1. Homer DW Jr, Lemeshow S. Applied logistic regression. New York: John Wiley, 1989.
2. National Center for Health Statistics, Centers for Disease Control and Prevention. *Instruction Manual. Part 12. Computer Edits for Natality Data, Effective 1996*. U.S. Department of Health and Human Services. 1995.
3. Kotelchuck M. *An evaluation of the Kessner Adequacy of Prenatal Care Index and a Proposed Adequacy of Prenatal Care Utilization Index*. Am. J. Public Health. 84:1414-1420. 1994.
4. Kotelchuck M. *Adequacy of prenatal care utilization index: Its US distribution and association with low birthweight*. Am. J. Public Health. 84:1486-1489. 1994.

#### Definition of Adverse Birth Outcomes

**Low birth weight:** Under 2,500 grams

**Very low birth weight:** Under 1,500 grams

**Moderately low birth weight:** 1,500-2,499 grams

**Preterm birth:** Under 37 completed weeks of gestation

**Very preterm birth:** Under 32 completed weeks of gestation

**Moderately preterm birth:** 32-33 completed weeks of gestation

**Late preterm birth:** 34-36 weeks of gestation

**Small-for-gestational age:** Birth weight below the 10th percentile for the infant's gestational age and sex