CHAPTER 5

ADEQUACY OF PRENATAL CARE

IMPORTANT TECHNICAL NOTE:

Change in Adequacy of Prenatal Care Indicator since *Massachusetts Births 2001*:
(Based on excerpts from "An Overview of the APNCU Index" by Milton Kotelchuck, Sept. 1994, available online at: http://www.mchlibrary.info/databases/HSNRCPDFs/Overview_APCUIndex.pdf accessed December 2003).

What is the APNCU Index, and why has it replaced the Kessner Index?
Beginning with last year's publication (*Massachusetts Births 2001*), adequacy of prenatal care is measured with the Adequacy of Prenatal Care Utilization (APNCU) Index instead of the Kessner Index, which has been used in previous *Advance Births* and *Massachusetts Births* publications. The APNCU Index was developed by Milton Kotelchuck, Ph.D. It is the standard used in Healthy People 2010 and by the majority of states. It improves upon the Kessner Index in various ways, the most important being the ability to distinguish between inadequate prenatal care due to the timing of initiation and inadequate care due to an insufficient number of prenatal care visits. [Please see the Technical Notes in the Appendix for more information on differences between the Kessner Index and the APNCU Index.]

What does the APNCU Index measure?
The APNCU Index characterizes prenatal care (PNC) utilization by measuring two distinct components of prenatal care -- adequacy of initiation and adequacy of received services (visits). Each of these components is measured as an independent index, and the APNCU Index is a summary of these 2 component indices. As with the Kessner Index, the APNCU Index does not assess quality of the prenatal care that is delivered, only its utilization.

Component Indices and Summary Index
The first component index is **"Adequacy of Initiation,"** which describes the adequacy of when prenatal care began during pregnancy. The assumption underlying this scale is that the earlier PNC begins the better. The month or trimester prenatal care begins is widely used as a measure to assess the adequacy of timing of initiation of PNC, since it accurately and succinctly describes when PNC begins. The APNCU Index uses this measure to determine the "adequacy of initiation."

The second component index, **"Adequacy of Received Services" (visits),** characterizes the adequacy of received PNC visits during the time period after prenatal care is begun until the delivery. This component attempts to characterize if the woman received the appropriate number of prenatal care visits for the time period in which she received PNC services. [The appropriate number of visits is based on recommendations of the American College of Obstetricians and Gynecologists for an uncomplicated pregnancy. For example, a woman beginning prenatal care during the first month of pregnancy who delivers during the 40th week of gestation (and has no complications with her pregnancy) should receive 14 visits].

The two component indices are measured independently from one another, and can be used as separate indices, since the policy and practice issues underlying whether women are beginning care early and whether they are receiving the recommended amount of visits may be quite distinct. However, because of the popularity and utility of using one overall adequacy of PNC index, **the two component indices are combined into a single summary index -- the "Adequacy of Prenatal Care Utilization (APNCU) Index."**

Index Categories
Both the two component indices and the summary index (APNCU Index) characterize PNC as one of five categories: **"adequate intensive," "adequate basic," "intermediate," "inadequate," or "unknown."** The category "adequate basic" refers to the minimum recommended level of care (for a pregnancy with no complications), while "adequate intensive" refers to a level of care exceeding recommended standards. **The sum of the "adequate basic" and "adequate intensive" categories is the total adequacy score.** In addition, the "inadequate" category can be subdivided to isolate those women who received no PNC. *[For definitions of categories, please see the Technical Notes in the Appendix.]*

[For more detail on the methodology of the APNCU Index, please call Center for Health Information, Statistics, Research & Evaluation at 617-988-3394].

Changes in Adequacy of Prenatal Care, 1996-2002

Adequacy of prenatal care as measured by the summary APNCU Index rose slightly by 2% from 1996 to 2002 in Massachusetts. In 1996, 83.3% of Massachusetts mothers received adequate prenatal care; in 2002, 84.7% received adequate prenatal care (Figure 13). Between 2001 and 2002, adequacy rates decreased slightly for white non-Hispanic mothers, and rose slightly for Asian mothers, Hispanic mothers and black non-Hispanic mothers. In 2002, white non-Hispanic women had the highest percentage of adequate prenatal care (87.1%), followed by Asians (81.8%), Hispanics (78.9%), and black non-Hispanics (74.8%).

Components of the Adequacy of Prenatal Care Utilization Index

In Table 17, the two component indices, initiation and received services (visits), as well as the summary APNCU Index, are described. In 2002, the total percentage of mothers receiving adequate prenatal care ("adequate total") was 84.7%, including 45.2% of mothers who received "adequate basic" prenatal care (they began care in months 1-4 of pregnancy and received 80-109% of the expected number of prenatal visits), and 39.5% of mothers who received "adequate intensive" care (they began care in months 1-4 of pregnancy and received at least 110% of expected number of visits). Approximately 7% of mothers received "intermediate" care (they began care in months 5 or 6 of pregnancy and received 50-70% of expected number of visits. Approximately 1 out of 12 mothers (7.9%) received inadequate prenatal care in Massachusetts in 2002.

In 2002, more than 9 out of 10 Massachusetts mothers (92.8%) had adequate initiation of PNC (Table 17). Half (50.7%) began care in the third or fourth month of pregnancy ("adequate basic" initiation) while 42.1% began care in the first or second month of pregnancy ("adequate intensive" initiation). The sum of these two groups (50.7% + 42.1%) equals the total adequacy score ("adequate total") of 92.8% on the adequacy of initiation index.

Almost half (46.6%) of mothers had 80-109% of the expected number of prenatal care visits ("adequate basic" visits) (Table 17). In addition, 44.2% of mothers had at least 110% of the expected number of prenatal care visits ("adequate intensive" visits). A total of 90.8% (46.6% + 44.2%) of mothers received an adequate number of prenatal care visits.

Adequacy of Prenatal Care Utilization by Selected Maternal and Infant Characteristics

Adequacy of prenatal care increased with both age and educational level of the mother. Almost 9 out of 10 women ages 30 and above received adequate prenatal care (87.6%); whereas, almost 1 in 4 women less than age 18 had inadequate prenatal care (22.9%) (Table 18). Only 69.6% of women ages 18 and younger received adequate prenatal care. Women with more education were more likely to receive adequate prenatal care: 90.5% of mothers with more than a college degree had adequate prenatal care while only 71.8% of mothers with less than a high school education had adequate prenatal care. White non-Hispanic and Asian mothers had the highest adequacy levels, 87.1% and 81.9% respectively. Black non-Hispanic mothers had the lowest adequacy levels (74.8%). Mothers who smoked during their pregnancies were over twice as likely to have inadequate prenatal care compared to non-smokers, 14.8% vs. 7.3%. Women who had multiple births were much more likely to receive adequate intensive services compared to mothers delivering only one child: 80.9% vs. 37.4%. This no doubt reflects the higher risk and potential complications for delivery of multiple births. Similarly, women who delivered preterm infants (less than 37 weeks of gestation) were much more likely to have adequate intensive prenatal care than women who delivered at full term (37-42 weeks): 75.8% vs. 36.2%.

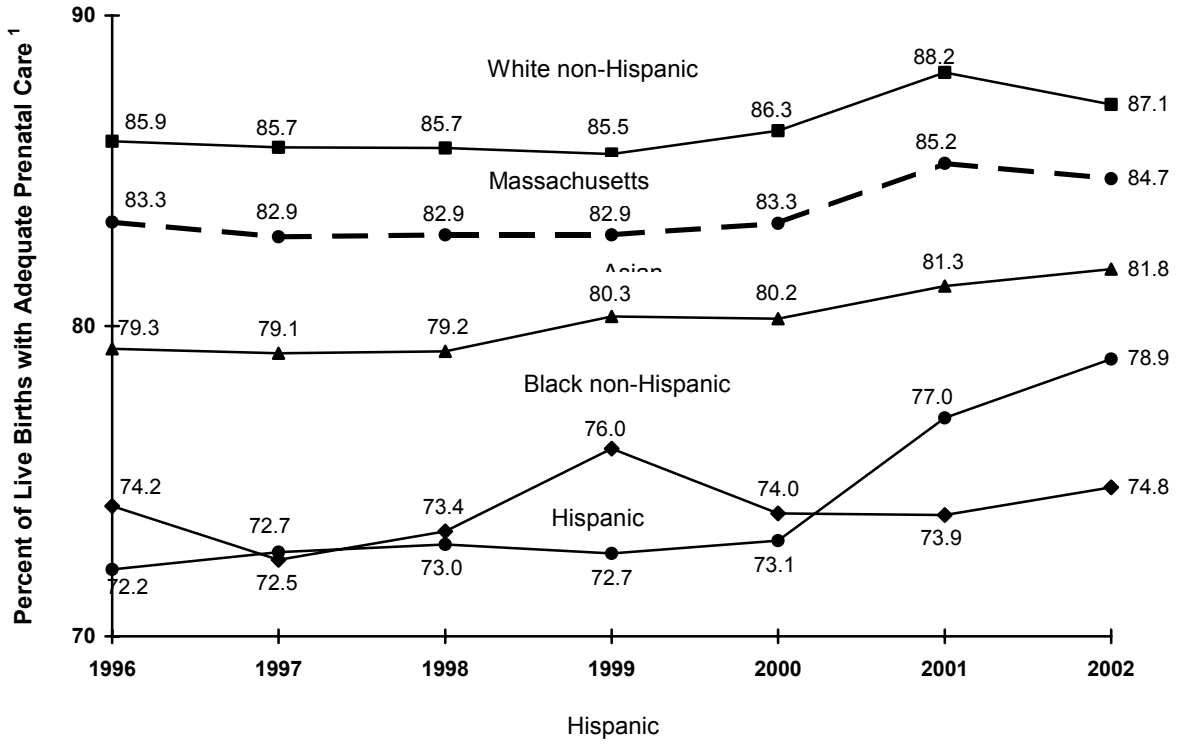
Adequacy of Initiation by Selected Maternal and Infant Characteristics

About 1 in 5 teenage mothers did not start prenatal care until their fifth month of pregnancy or had no prenatal care at all (Table 19) (This is the sum of intermediate and inadequate initiation, which equals 22% for women less than 18 years old and 18% for women age 18-19). Over 95% of mothers age 30 and above began prenatal care in their first four months of pregnancy (as reflected by their adequate total scores in Table 19). White non-Hispanic mothers were more likely to have adequate prenatal care initiation (95.0%) than black non-Hispanic mothers (84.0%), Hispanic women (87.2%), and Asian women (89.9%). Mothers who smoked were over twice as likely to have inadequate prenatal care initiation compared to non-smoking mothers (5.3% vs. 2.3%). Mothers who delivered very low birthweight infants (birthweight less than 1,500 grams) were more likely to enter prenatal care in their first or second month of pregnancy ("adequate intensive") than women who delivered heavier infants.

Adequacy of Received Services (Visits) by Selected Maternal and Infant Characteristics

Older and more-educated mothers had higher proportions of adequate PNC visits than did younger or less educated mothers (Table 20). One exception to this pattern is for women under the age of 18 who had the highest level of adequate intensive prenatal care visits. The proportion of adequate prenatal visits varied slightly by mother's birthplace; U.S.-born mothers had the highest proportion of adequate visits (91.1%), followed by non-U.S. born (90.3%), and mothers born in Puerto Rico or other U.S. territories (88.7%). More than 4 out of 5 women (83.9%) delivering multiple births had an adequate intensive number of visits (at least 110% of the expected number of prenatal care visits adjusted for the length of pregnancy) compared with 42.2% of women who gave birth to singletons. Women who delivered LBW infants were more likely to have adequate intensive services and also more likely to have inadequate services than women who delivered normal weight infants (2,500+ grams).

Figure 13. Trends in Adequacy of Prenatal Care[1] by Race and Hispanic Ethnicity, Massachusetts: 1996-2002



PLEASE NOTE THAT VERTICAL SCALE OF GRAPH REPRESENTS A SMALL INTERVAL FOR PURPOSES OF VISUAL REPRESENTATION.

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. Based on the Adequacy of Prenatal Care Utilization (APNCU) Index.

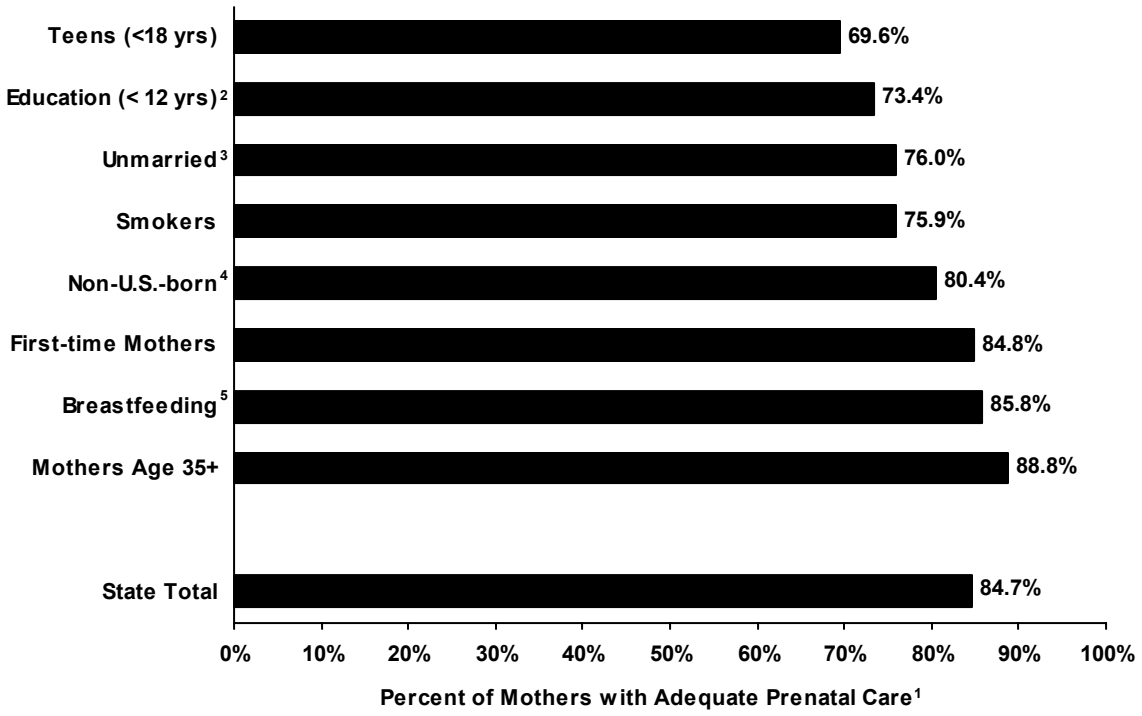
Table 17. Adequacy of Prenatal Care Utilization[1]: Summary and Component Indices, Massachusetts: 2002

	Adequate Total[2]		Adequate Intensive[3]		Adequate Basic[3]		Intermediate[3]		Inadequate[3]		Unknown[3]
	n	%	n	%	n	%	n	%	n	%	n
Summary Index[4]											
Adequacy of Prenatal Care Utilization	67,784	84.7	31,616	39.5	36,168	45.2	5,905	7.4	6,336	7.9	599
Component Indices[4]											
Adequacy of Initiation	74,257	92.8	33,719	42.1	40,538	50.7	3,752	4.7	2,016	2.5	599
Adequacy of Received Services (Visits)	72,675	90.8	35,373	44.2	37,302	46.6	6,453	8.1	897	1.1	599

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. Based on the Adequacy of Prenatal Care Utilization (APNCU) Index. 2. Adequate Total is the sum of Adequate Intensive and Adequate Basic categories. 3. For definitions of these categories, please see the Technical Notes in the Appendix. 4. For an explanation of the APNCU Index (summary index) and its component indices, please see the Technical Note at the beginning of this chapter.

Figure 14. Adequacy of Prenatal Care[1] for Selected Population Characteristics, Massachusetts: 2002



NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. Based on the Adequacy of Prenatal Care Utilization (APNCU) Index. 2. Women 20 years of age and older. 3. Marital status at time of birth. 4. Non-U.S.-born includes women born outside of the 50 U.S. states, District of Columbia, and U.S. territories (Puerto Rico, U.S. Virgin Islands, Guam). 5. Mother was or was intending to breastfeed at the time the birth certificate was completed.

Table 18. Adequacy of Prenatal Care[1] by Selected Characteristics, Massachusetts: 2002

	Adequate Total[2]		Adequate Intensive		Adequate Basic		Intermediate		Inadequate		Unknown
	n	%	n	%	n	%	n	%	n	%	n
State Total	**67,784**	**84.7%**	**31,616**	**39.5%**	**36,168**	**45.2%**	**5,905**	**7.4%**	**6,336**	**7.9%**	**599**
Age					**Maternal Demographics**						
<18	1,079	69.6%	562	36.2%	517	33.3%	117	7.5%	355	22.9%	20
18-19	2,260	72.5%	1,092	35.0%	1,168	37.5%	270	8.7%	587	18.8%	27
20-24	9,171	77.9%	4,341	36.9%	4,830	41.0%	1,018	8.6%	1,590	13.5%	101
25-29	15,435	84.1%	7,178	39.1%	8,257	45.0%	1,446	7.9%	1,462	8.0%	141
30-34	23,644	87.6%	10,611	39.3%	13,033	48.3%	1,950	7.2%	1,405	5.2%	164
35-39	13,356	89.0%	6,377	42.5%	6,979	46.5%	915	6.1%	736	4.9%	114
40+	2,839	87.9%	1,455	45.1%	1,384	42.9%	189	5.9%	201	6.2%	31
Educational Attainment											
< than High School	5,603	71.8%	2,862	36.7%	2,741	35.1%	710	9.1%	1,487	19.1%	87
High School	16,193	80.6%	8,051	40.1%	8,142	40.5%	1,629	8.1%	2,271	11.3%	158
Some college	15,513	85.6%	7,450	41.1%	8,063	44.5%	1,358	7.5%	1,256	6.9%	114
College	18,988	89.2%	8,426	39.6%	10,562	49.6%	1,430	6.7%	872	4.1%	121
More than college	11,387	90.5%	4,775	37.9%	6,612	52.5%	773	6.1%	428	3.4%	62
Race/Hispanic Ethnicity											
Hispanic	7,491	79.0%	3,757	39.6%	3,734	39.4%	708	7.5%	1,284	13.5%	60
White non-Hispanic	50,347	87.1%	23,226	40.2%	27,121	46.9%	4,208	7.3%	3,234	5.6%	347
Black non-Hispanic	4,370	74.8%	2,098	35.9%	2,272	38.9%	456	7.8%	1,013	17.3%	109
Asian	4,328	81.9%	1,977	37.4%	2,351	44.5%	388	7.3%	566	10.7%	18
Other	1,191	76.3%	529	33.9%	662	42.4%	138	8.8%	231	14.8%	16
Birthplace											
U.S. States/D.C.	51,063	86.3%	23,657	40.0%	27,406	46.3%	4,370	7.4%	3,760	6.4%	432
Puerto Rico/U.S. Terr.	1,627	78.9%	821	39.8%	806	39.1%	175	8.5%	261	12.7%	18
Non-U.S.-Born	15,024	80.4%	7,103	38.0%	7,921	42.4%	1,353	7.2%	2,310	12.4%	138
Parity[3]					**Pregnancy-Related Factors**						
1	29,443	84.8%	13,544	39.0%	15,899	45.8%	2,508	7.2%	2,761	8.0%	199
2-3	33,927	85.7%	15,862	40.1%	18,065	45.6%	2,914	7.4%	2,739	6.9%	232
4+	4,385	77.0%	2,196	38.6%	2,189	38.4%	478	8.4%	832	14.6%	49
Smoking[4]											
Yes	4,814	75.9%	2,513	39.6%	2,301	36.3%	590	9.3%	936	14.8%	55
No	62,881	85.5%	29,057	39.5%	33,824	46.0%	5,309	7.2%	5,387	7.3%	484
Plurality					**Birth Outcomes**						
Singleton	64,116	84.2%	28,461	37.4%	35,655	46.8%	5,811	7.6%	6,198	8.1%	548
Multiple birth	3,668	94.1%	3,155	80.9%	513	13.2%	94	2.4%	138	3.5%	51
Birthweight											
<500 g	96	84.2%	92	80.7%	4	3.5%	7	6.1%	11	9.6%	11
500-1,499 g	845	89.3%	761	80.4%	84	8.9%	23	2.4%	78	8.2%	38
1,499-2,499 g	4,246	86.7%	3,384	69.1%	862	17.6%	188	3.8%	461	9.4%	56
2,500-3,999 g	54,956	84.3%	24,572	37.7%	30,384	46.6%	4,957	7.6%	5,246	8.1%	335
4,000+ g	7,626	85.8%	2,795	31.4%	4,831	54.3%	729	8.2%	538	6.0%	50
Gestational Age											
<28 weeks	422	87.4%	388	80.3%	34	7.0%	15	3.1%	46	9.5%	29
<37 weeks	5,889	88.3%	5,057	75.8%	832	12.5%	248	3.7%	535	8.0%	123
37-42 weeks	61,733	84.4%	26,489	36.2%	35,244	48.2%	5,642	7.7%	5,769	7.9%	317

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.
1. Based on the Adequacy of Prenatal Care Utilization (APNCU) Index. See Glossary and Technical Notes in Appendix for definitions of Index and its categories. 2. Adequate Total is the sum of Adequate Intensive and Adequate Basic. 3. Parity is the number of live births including this birth. 4. Smoking during pregnancy is self-reported by the mother and should be interpreted with caution.

Table 19. Adequacy of Prenatal Care Initiation[1] by Selected Characteristics, Massachusetts: 2002

	Adequate Total[2]		Adequate Intensive		Adequate Basic		Intermediate		Inadequate		Unknown
	n	%	n	%	n	%	n	%	n	%	n
State Total	**74,257**	**92.8%**	**33,719**	**42.1%**	**40,538**	**50.7%**	**3,752**	**4.7%**	**2,016**	**2.5%**	**599**
Age	**Maternal Demographics**										
<18	1,213	78.2%	459	29.6%	754	48.6%	211	13.6%	127	8.2%	20
18-19	2,564	82.3%	981	31.5%	1,583	50.8%	391	12.5%	162	5.2%	27
20-24	10,297	87.4%	4,352	36.9%	5,945	50.5%	980	8.3%	502	4.3%	101
25-29	17,019	92.8%	7,904	43.1%	9,115	49.7%	864	4.7%	460	2.5%	141
30-34	25,771	95.5%	12,043	44.6%	13,728	50.8%	775	2.9%	453	1.7%	164
35-39	14,348	95.6%	6,523	43.5%	7,825	52.1%	414	2.8%	245	1.6%	114
40+	3,045	94.3%	1,457	45.1%	1,588	49.2%	117	3.6%	67	2.1%	31
Educational Attainment											
< than High School	6,397	82.0%	2,526	32.4%	3,871	49.6%	901	11.6%	502	6.4%	87
High School	18,003	89.6%	7,738	38.5%	10,265	51.1%	1,388	6.9%	702	3.5%	158
Some college	16,993	93.7%	7,590	41.9%	9,403	51.9%	742	4.1%	392	2.2%	114
College	20,541	96.5%	9,407	44.2%	11,134	52.3%	487	2.3%	262	1.2%	121
More than college	12,217	97.1%	6,418	51.0%	5,799	46.1%	223	1.8%	148	1.2%	62
Race/Hispanic Ethnicity											
Hispanic	8,269	87.2%	3,838	40.5%	4,431	46.7%	812	8.6%	402	4.2%	60
White non-Hispanic	54,924	95.0%	25,176	43.6%	29,748	51.5%	1,892	3.3%	973	1.7%	347
Black non-Hispanic	4,907	84.0%	2,214	37.9%	2,693	46.1%	540	9.2%	392	6.7%	109
Asian	4,748	89.9%	1,915	36.3%	2,833	53.6%	374	7.1%	160	3.0%	18
Other	1,345	86.2%	556	35.6%	789	50.6%	129	8.3%	86	5.5%	16
Birthplace											
U.S. States/D.C.	55,825	94.3%	25,595	43.2%	30,230	51.1%	2,264	3.8%	1,104	1.9%	432
Puerto Rico/U.S. Terr.	1,818	88.1%	822	39.8%	996	48.3%	170	8.2%	75	3.6%	18
Non-U.S.-Born	16,536	88.5%	7,260	38.9%	9,276	49.6%	1,316	7.0%	835	4.5%	138
Parity[3]	**Pregnancy-Related Factors**										
1	32,206	92.8%	14,702	42.4%	17,504	50.4%	1,626	4.7%	880	2.5%	199
2-3	37,100	93.7%	16,930	42.8%	20,170	51.0%	1,610	4.1%	870	2.2%	232
4+	4,917	86.3%	2,067	36.3%	2,850	50.0%	515	9.0%	263	4.6%	49
Smoking[4]											
Yes	5,461	86.1%	2,181	34.4%	3,280	51.7%	546	8.6%	333	5.3%	55
No	68,700	93.4%	31,496	42.8%	37,204	50.6%	3,200	4.3%	1,677	2.3%	484
Plurality	**Birth Outcomes**										
Singleton	70,490	92.6%	31,838	41.8%	38,652	50.8%	3,642	4.8%	1,993	2.6%	548
Multiple birth	3,767	96.6%	1,881	48.2%	1,886	48.4%	110	2.8%	23	0.6%	51
Birthweight											
<500 g	104	91.2%	52	45.6%	52	45.6%	3	2.6%	7	6.1%	11
500-1,499 g	875	92.5%	499	52.7%	376	39.7%	46	4.9%	25	2.6%	38
1,499-2,499 g	4,462	91.2%	2,089	42.7%	2,373	48.5%	303	6.2%	130	2.7%	56
2,500-3,999 g	60,381	92.7%	27,215	41.8%	33,166	50.9%	3,089	4.7%	1,689	2.6%	335
4,000+ g	8,419	94.7%	3,857	43.4%	4,562	51.3%	310	3.5%	164	1.8%	50
Gestational Age											
<28 weeks	441	91.3%	231	47.8%	210	43.5%	25	5.2%	17	3.5%	29
<37 weeks	6,172	92.5%	3,070	46.0%	3,102	46.5%	333	5.0%	167	2.5%	123
37-42 weeks	67,907	92.8%	30,589	41.8%	37,318	51.0%	3,402	4.7%	1,835	2.5%	317

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.
1. Based on the Adequacy of Initiation Index, a component index of the APNCU Index. See Glossary and Technical Notes in Appendix for definitions of Index and its categories. 2. Adequate Total is the sum of Adequate Intensive and Adequate Basic. 3. Parity is the number of live births including this birth.
4. Smoking during pregnancy is self-reported by the mother and should be interpreted with caution.

Table 20. Adequacy of Prenatal Care Visits[1] by Selected Characteristics, Massachusetts: 2002

	Adequate Total[2]		Adequate Intensive		Adequate Basic		Intermediate		Inadequate		Unknown
	n	%	n	%	n	%	n	%	n	%	n
State Total	**72,675**	**90.8%**	**35,373**	**44.2%**	**37,302**	**46.6%**	**6,453**	**8.1%**	**897**	**1.1%**	**599**
Age	**Maternal Demographics**										
<18	1,358	87.6%	780	50.3%	578	37.3%	152	9.8%	41	2.6%	20
18-19	2,730	87.6%	1,451	46.6%	1,279	41.0%	324	10.4%	63	2.0%	27
20-24	10,433	88.6%	5,282	44.8%	5,151	43.7%	1,154	9.8%	192	1.6%	101
25-29	16,548	90.2%	8,034	43.8%	8,514	46.4%	1,583	8.6%	212	1.2%	141
30-34	24,681	91.4%	11,421	42.3%	13,260	49.1%	2,077	7.7%	241	0.9%	164
35-39	13,929	92.8%	6,828	45.5%	7,101	47.3%	962	6.4%	116	0.8%	114
40+	2,996	92.8%	1,577	48.8%	1,419	43.9%	201	6.2%	32	1.0%	31
Educational Attainment											
< than High School	6,771	86.8%	3,738	47.9%	3,033	38.9%	862	11.1%	167	2.1%	87
High School	17,945	89.3%	9,377	46.7%	8,568	42.6%	1,829	9.1%	319	1.6%	158
Some college	16,503	91.0%	8,231	45.4%	8,272	45.6%	1,456	8.0%	168	0.9%	114
College	19,637	92.2%	8,940	42.0%	10,697	50.2%	1,493	7.0%	160	0.8%	121
More than college	11,708	93.0%	5,027	39.9%	6,681	53.1%	805	6.4%	75	0.6%	62
Race/Hispanic Ethnicity											
Hispanic	8,552	90.2%	4,569	48.2%	3,983	42.0%	811	8.6%	120	1.3%	60
White non-Hispanic	52,806	91.4%	25,151	43.5%	27,655	47.9%	4,463	7.7%	520	0.9%	347
Black non-Hispanic	5,113	87.6%	2,653	45.4%	2,460	42.1%	569	9.7%	157	2.7%	109
Asian	4,775	90.4%	2,312	43.8%	2,463	46.6%	444	8.4%	63	1.2%	18
Other	1,367	87.6%	657	42.1%	710	45.5%	159	10.2%	34	2.2%	16
Birthplace											
U.S. States/D.C.	53,899	91.1%	25,855	43.7%	28,044	47.4%	4,698	7.9%	596	1.0%	432
Puerto Rico/U.S. Terr.	1,829	88.7%	968	46.9%	861	41.7%	202	9.8%	32	1.6%	18
Non-U.S.-Born	16,873	90.3%	8,512	45.6%	8,361	44.7%	1,546	8.3%	268	1.4%	138
Parity[3]	**Pregnancy-Related Factors**										
1	31,624	91.1%	15,245	43.9%	16,379	47.2%	2,713	7.8%	375	1.1%	199
2-3	36,005	91.0%	17,437	44.1%	18,568	46.9%	3,171	8.0%	404	1.0%	232
4+	5,015	88.1%	2,677	47.0%	2,338	41.1%	564	9.9%	116	2.0%	49
Smoking[4]											
Yes	5,521	87.1%	3,042	48.0%	2,479	39.1%	680	10.7%	139	2.2%	55
No	67,058	91.1%	32,280	43.9%	34,778	47.3%	5,765	7.8%	754	1.0%	484
Plurality	**Birth Outcomes**										
Singleton	68,887	90.5%	32,102	42.2%	36,785	48.3%	6,354	8.3%	884	1.2%	548
Multiple birth	3,788	97.1%	3,271	83.9%	517	13.3%	99	2.5%	13	0.3%	51
Birthweight											
<500 g	99	86.8%	95	83.3%	4	3.5%	7	6.1%	8	7.0%	11
500-1,499 g	893	94.4%	803	84.9%	90	9.5%	25	2.6%	28	3.0%	38
1,499-2,499 g	4,601	94.0%	3,681	75.2%	920	18.8%	222	4.5%	72	1.5%	56
2,500-3,999 g	59,039	90.6%	27,676	42.5%	31,363	48.1%	5,412	8.3%	708	1.1%	335
4,000+ g	8,027	90.3%	3,105	34.9%	4,922	55.3%	786	8.8%	80	0.9%	50
Gestational Age											
<28 weeks	447	92.5%	410	84.9%	37	7.7%	15	3.1%	21	4.3%	29
<37 weeks	6,285	94.2%	5,402	81.0%	883	13.2%	277	4.2%	110	1.6%	123
37-42 weeks	66,210	90.5%	29,890	40.9%	36,320	49.7%	6,158	8.4%	776	1.1%	317

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.
1. Based on the Adequacy of Received Services (Visits) Index, a component index of the APNCU Index. See Glossary and Technical Notes in Appendix for definitions of Index and its categories. 2. Adequate Total is the sum of Adequate Intensive and Adequate Basic. 3. Parity is the number of live births including this birth. 4. Smoking during pregnancy is self-reported by the mother and should be interpreted with caution.

CHAPTER 6

PRENATAL CARE SOURCE OF PAYMENT

Prenatal Care Payment Source

In 2002, among all births to Massachusetts women, 70.5% were to mothers who had their prenatal care paid for by private sources (commercial indemnity plans, commercial managed care organizations (HMO, PPO/IPP/IPA, etc.), or other private insurance) (Figure 15). Public entitlement programs, including Commonhealth, Medicaid/MassHealth and Healthy Start (a Massachusetts-funded program), covered the prenatal care expenses for 28.5% of all births to Massachusetts women in 2002. This percentage has increased each year since 1996 (24.2%), increasing by 18% between 1996 and 2002. Finally, less than 1% of all births were to mothers who either paid for their prenatal care themselves (0.6%) or had their care paid for by other sources (0.5%).

Characteristics of Women Who Use Publicly Financed and Privately Insured Prenatal Care

Maternal and birth characteristics varied according to whether prenatal care was financed through public programs or through private insurance. Differences in characteristics between those served by public programs and those covered by private insurance may reflect different levels of risk rather than the quality of care received. Among women whose prenatal care was funded by Medicaid/MassHealth, 16.6% were under the age of 20. In contrast, only 1.7% of women whose prenatal care was privately insured was under age 20 (Table 21). Hispanic women had the highest proportion of mothers under the age of 20 among both, with publicly (20.5%) and privately (6.4%) funded prenatal care.

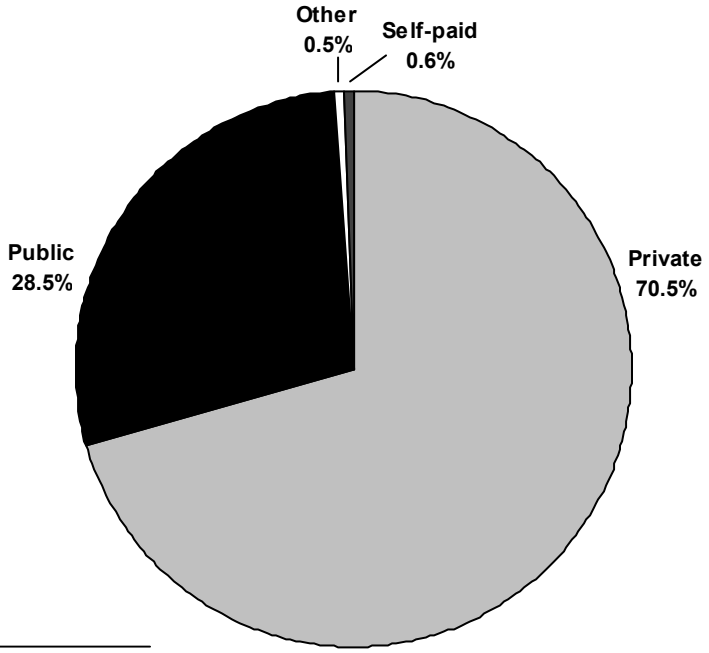
Overall, women whose prenatal care was publicly funded had a higher proportion of low birthweight (8.6%) than women whose prenatal care was privately insured (6.9%). However, this relationship between prenatal care payment source and low birthweight varied by race/ethnicity (Table 21). White non-Hispanic and Asian women with publicly financed prenatal care were more likely to have low birthweight compared to those with private insurance. However, among Hispanic and black non-Hispanic women, there was little difference in infants' low birthweight based on prenatal care insurance source. Hispanic women with private insurance were somewhat <u>more</u> likely to have low birthweight (8.3%) compared to those with publicly financed insurance (8.1%).

Women whose prenatal care was publicly financed were less likely to receive adequate prenatal care. This was true overall and within each race and ethnicity group. For example, 68.1% of black non-Hispanic women whose prenatal care was publicly financed received adequate prenatal care, while 86.8% of black non-Hispanic women with private insurance received adequate prenatal care (Table 21).

Overall, women with publicly funded prenatal care were less likely to deliver by Cesarean section (24.3%), compared to women with private insurance (29.7%). This was true overall and within each race and ethnicity group (Table 21). Asian women were the least likely to deliver by Cesarean section compared to all other racial and ethnicity groups. This was true among both Asian mothers with publicly funded prenatal care (17.9%) and privately insured (26.4%) prenatal care. By contrast, black non-Hispanic women were the most likely to deliver by Cesarean section among both mothers with publicly funded (27.2%) and privately insured (34.2%) prenatal care.

Women of all race and ethnicity groups whose prenatal care was publicly funded were less likely to report breastfeeding or the intent to breastfeed (67.4%) compared with women who had private insurance (79.7%). The lowest breastfeeding rates were found among white non-Hispanic (58.9%) and Asian (60.2%) women (Table 21).

Figure 15. Distribution of Prenatal Care Payment Source[1], Massachusetts: 2002



NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. Private: Commercial indemnity plan, commercial managed care (HMO, PPO, IPP, IPA, and other), or other private insurance. Public: Government programs including Commonhealth, Healthy Start, Medicaid/MassHealth, and Medicare (may also be HMO or managed care), or free care. Other: Worker's Compensation and other sources.

Table 21. Birth Characteristics by Source of Prenatal Care Payment, Race and Hispanic Ethnicity, Massachusetts: 2002

Race, Ethnicity, and Payment Source	Births[1]		Teen Births				Birthweight			
			<18 Years		<20 Years		Very Low[2]		Low[3]	
	n	%	n	%	n	%	n	%	N	%
STATE TOTAL[4]	**80,624**	**100.0**	**1,571**	**1.9**	**4,715**	**5.8**	**1,109**	**1.4**	**6,060**	**7.5**
Public	22,494	28.5	1,170	5.2	3,563	15.8	325	1.4	1,941	8.6
Medicaid[5]	18,562	23.5	1,026	5.5	3,087	16.6	279	1.5	1,640	8.8
Other Public[6]	3,932	5.0	144	3.7	476	12.1	46	1.2	301	7.7
Private[7]	55,678	70.5	346	0.6	974	1.7	692	1.2	3,827	6.9
White non-Hispanic	**58,136**	**100.0**	**598**	**1.0**	**2,167**	**3.7**	**666**	**1.1**	**3,952**	**6.8**
Public	10,268	18.1	376	3.7	1,465	14.3	105	1.0	772	7.5
Medicaid[5]	8,778	15.5	342	3.9	1,316	15.0	95	1.1	680	7.7
Other Public[6]	1,490	2.6	34	2.3	149	10.0	10	0.7	92	6.2
Private[7]	45,982	80.9	199	0.4	617	1.3	507	1.1	2,973	6.5
Black non-Hispanic	**5,948**	**100.0**	**229**	**3.9**	**630**	**10.6**	**182**	**3.1**	**747**	**12.6**
Public	3,460	59.2	165	4.8	481	13.9	82	2.4	429	12.4
Medicaid[5]	2,858	48.9	149	5.2	421	14.7	70	2.4	356	12.5
Other Public[6]	602	10.3	16	2.7	60	10.0	12	2.0	73	12.1
Private[7]	2,333	39.9	53	2.3	118	5.1	78	3.3	281	12.0
Hispanic	**9,543**	**100.0**	**607**	**6.4**	**1,557**	**16.3**	**162**	**1.7**	**792**	**8.3**
Public	6,524	68.7	521	8.0	1,335	20.5	102	1.6	531	8.1
Medicaid[5]	4,996	52.6	433	8.7	1,087	21.8	80	1.6	416	8.3
Other Public[6]	1,528	16.1	88	5.8	248	16.2	22	1.4	115	7.5
Private[7]	2,814	29.6	72	2.6	181	6.4	47	1.7	233	8.3
Asian	**5,300**	**100.0**	**80**	**1.5**	**206**	**3.9**	**76**	**1.4**	**424**	**8.0**
Public	1,370	26.0	65	4.7	162	11.8	22	1.6	128	9.3
Medicaid[5]	1,192	22.6	62	5.2	155	13.0	21	1.8	116	9.7
Other Public[6]	178	3.4	3	--[8]	7	3.9	1	--[8]	12	6.7
Private[7]	3,850	73.1	13	0.3	37	1.0	53	1.4	288	7.5
Other[9]	**1,576**	**100.0**	**56**	**3.6**	**151**	**9.6**	**22**	**1.4**	**137**	**8.7**
Public	863	56.0	43	5.0	120	13.9	14	1.6	80	9.3
Medicaid[5]	730	47.3	40	5.5	108	14.8	13	1.8	71	9.7
Other Public[6]	133	8.6	3	--[8]	12	9.0	1	--[8]	9	6.8
Private[7]	652	42.3	9	1.4	21	3.2	7	1.1	49	7.5

Table 21 (cont'd). Birth Characteristics by Source of Prenatal Care Payment, Race, and Hispanic Ethnicity, Massachusetts: 2002

Race, Ethnicity, and Payment Source	Prenatal Care: Adequate[10] n	Prenatal Care: Adequate[10] %	Prenatal Care: Began 1st Trimester n	Prenatal Care: Began 1st Trimester %	Cesarean Section n	Cesarean Section %	Breastfeeding[11] n	Breastfeeding[11] %
STATE TOTAL[4]	**67,784**	**84.7**	**67,457**	**84.2**	**22,553**	**28.1**	**60,266**	**76.1**
Public	16,711	74.9	15,861	70.9	5,458	24.3	15,135	67.4
Medicaid[5]	14,013	76.1	13,294	71.9	4,456	24.1	12,092	65.2
Other Public[6]	2,698	69.4	2,567	65.7	1,002	25.6	3,043	77.7
Private[7]	49,414	89.0	49,912	89.9	16,484	29.7	44,325	79.7
White non-Hispanic	**50,347**	**87.1**	**50,763**	**87.8**	**16,737**	**28.9**	**42,458**	**74.7**
Public	7,903	77.4	7,571	74.0	2,542	24.8	6,040	58.9
Medicaid[5]	6,796	77.8	6,510	74.4	2,117	24.2	4,917	56.1
Other Public[6]	1,107	74.6	1,061	71.4	425	28.6	1,123	75.7
Private[7]	41,042	89.5	41,763	91.0	13,690	29.8	35,913	78.2
Black non-Hispanic	**4,370**	**74.8**	**4,199**	**71.4**	**1,769**	**29.9**	**4,540**	**77.0**
Public	2,304	68.1	2,205	64.5	940	27.2	2,503	72.4
Medicaid[5]	1,988	71.0	1,896	67.1	755	26.5	2,065	72.3
Other Public[6]	316	54.2	309	52.4	185	30.8	438	72.9
Private[7]	2,012	86.8	1,939	83.5	794	34.2	1,969	84.5
Hispanic	**7,491**	**79.0**	**7,155**	**75.3**	**2,325**	**24.5**	**7,702**	**81.0**
Public	4,925	75.9	4,671	71.9	1,495	23.0	5,083	78.1
Medicaid[5]	3,842	77.3	3,654	73.4	1,178	23.7	3,847	77.1
Other Public[6]	1,083	71.4	1,017	66.7	317	20.8	1,236	81.2
Private[7]	2,447	87.1	2,366	84.1	794	28.2	2,471	87.8
Asian	**4,328**	**81.9**	**4,138**	**78.3**	**1,275**	**24.1**	**4,248**	**80.5**
Public	965	70.9	837	61.2	245	17.9	823	60.2
Medicaid[5]	851	71.8	735	61.8	206	17.3	689	57.9
Other Public[6]	114	64.8	102	57.6	39	22.0	134	75.7
Private[7]	3,317	86.3	3,258	84.8	1,014	26.4	3,375	87.7
Other[9]	**1,191**	**76.3**	**1,143**	**73.0**	**421**	**26.8**	**1,275**	**81.9**
Public	606	70.8	570	66.4	231	26.8	680	78.8
Medicaid[5]	529	72.7	493	67.5	196	26.9	568	77.8
Other Public[6]	77	60.2	77	59.7	35	26.5	112	84.2
Private[7]	555	85.5	542	83.5	176	27.0	563	86.5

NOTE: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated.

1. In the "Births" category, percentages are based on race/ethnicity totals (group column). For all other categories, percentages are based on Birth totals (row total) excluding unknowns for each characteristic. 2. Very low birthweight: less than 1,500 grams or 3.3 pounds. 3. Low Birthweight: less than 2,500 grams or 5.5 pounds. 4. Total births does not equal Public + Private. Other categories of prenatal care payment are also included in Total: Workers' Compensation, self-paid, and other. 5. Medicaid/MassHealth. 6. Other Public: Commonhealth, Healthy Start, Medicare, other government programs, and free care. 7. Private: commercial indemnity plans or commercial managed care org. (HMO, PPO, IPP, or IPA). 8. Calculations based on fewer than five events are excluded. 9. Other: Mothers who designated their race as American Indian or Other. 10. Based on the Adequacy of Prenatal Care Utilization (APNCU) Index. 11. Mother was intending to breastfeed at the time the birth certificate was completed.

CHAPTER 7

CESAREAN SECTION DELIVERIES BY HOSPITAL

In 2002, 81,699 births occurred in Massachusetts, a decrease of 14% since 1990 (Table 24). *(Please note: the percentages and rates provided in Tables 22, 23, 24, and 25 are based on occurrence births and differ from data presented elsewhere in this report, which are based on resident births. See Glossary for definitions of occurrence and resident births.)*

Cesarean Section[1] Delivery by Facility[2]

Cesarean section was the method of delivery for 28.2% of the live births occurring in Massachusetts ("occurrence births") in 2002 (Table 22), up 10% from the 2001 rate of 25.6% (data not shown). Since 1997, there has been a 42% increase in the percentage of Cesarean section deliveries in Massachusetts, from 19.8% in 1997 to 28.2% in 2002, after a steady decline in Cesarean sections from 1990 (22.5%) to 1997 (19.8%) (data not shown). Calculations are based on births with known method of delivery. Note: facility-specific highlights in this chapter focus on facilities with at least 40 births in the category of interest. Data for all facilities are provided in Tables 22 and 23.

In 2002, the following facilities had Cesarean section delivery rates at least 15% below or at least 15% above the state rate of 28.2% (Table 22):

- Eight facilities had rates below 24.0% (0.85 times the state rate): Berkshire Hospital, Mercy Medical Center, Tobey Hospital, Heywood Hospital, Cooley Dickinson Hospital, Holyoke Hospital, St. Luke's Hospital, and Charlton Memorial Hospital.

- Seven facilities had rates above 32.4% (1.15 times the state rate): Melrose-Wakefield Hospital, New England Medical Center Hospital, Newton Wellesley Hospital, Beth Israel Deaconess Medical Center, St. Elizabeth's Medical Center, Holy Family Hospital and Medical Center, and Martha's Vineyard Hospital.

Primary Cesarean Section Deliveries

The primary Cesarean section delivery rate is defined as the proportion of live births delivered by Cesarean section to mothers with no previous history of a Cesarean section. This rate was 20.5% statewide in 2002, up 9% from the 2001 rate of 18.8% (data not shown).

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[1] Percentages of delivery by method in Table 22 are calculated in following manner:
- Percentage of total Cesarean sections = (Total Cesarean Births / All Births) x 100.
- Percentage primary Cesarean sections = (Primary Cesarean Sections / (All Births - Repeat Cesarean Sections - VBACs)) x 100.
- Percentage repeat Cesarean sections = (Repeat Cesarean Sections / (Repeat Cesarean Sections + VBACs)) x 100.
- Percentage of vaginal birth after Cesarean section delivery, that is, VBACs = (VBAC deliveries / (Repeat Cesarean Sections + VBAC)) x 100. Please note: the sum of the percentages of repeat Cesarean section deliveries + VBACs = 100% of all deliveries of mothers with a prior Cesarean section.

[2] Facilities included in this chapter are medical units licensed by the Commonwealth for the care of women during pregnancy and childbirth. Listed also as licensed maternity facilities in Tables 22 and 23.

In 2002, the following facilities had primary Cesarean section delivery rates 15%below and above the state rate of 20.5% (Table 22):

- Eight facilities had this rate below 17.0% (0.85 times the state rate): Tobey Hospital, Berkshire Medical Center, Mercy Medical Center, Heywood Hospital, Cooley Dickinson Hospital, St. Luke's Hospital, Leominster Hospital, and Cape Cod Hospital, ranging from 12.3% for Tobey Hospital to 16.9% for Cape Cod Hospital.

- Five facilities had this rate above 24.0% (1.15 times the state rate): Cambridge Hospital, New England Medical Center Hospital, Beth Israel Deaconess Medical Center, St. Elizabeth's Medical Center, and Holy Family Hospital and Medical Center.

Repeat Cesarean Section Deliveries

The proportion of live births delivered by Cesarean section to mothers with a prior Cesarean section is known as the repeat Cesarean section delivery rate. This rate was 85.3% in 2002, up 6% from the 2001 rate of 80.8% (data not shown).

Repeat Cesarean section delivery rates were lowest at Saint Vincent Hospital (71.3%) and Cooley Dickinson Hospital (72.5%). Facilities with high rates of repeat Cesarean section deliveries include Winchester Hospital (97.5%), Metrowest Medical Center-Framingham Union Campus (99.6%) and Massachusetts General Hospital (100%) (Table 22).

Vaginal Birth after Cesarean Section (VBAC) Deliveries

The proportion of live births delivered vaginally to mothers with a prior Cesarean section is known as the vaginal birth after a Cesarean section (VBAC) delivery rate. In 2002, the VBAC rate was 14.7%, down 23% from the 2001 rate of 19.2% (data not shown). In 1996, the VBAC rate peaked, at 34.0% (trend data not shown), and it has been declining thereafter.

In 2002, only seven facilities had over 40 births delivered through VBAC. The VBAC delivery rate among these facilities ranged from 13.2% for UMass Memorial Medical Center-West Campus to 28.7% for Saint Vincent Hospital. The other five facilities with over 40 births delivered through VBAC were South Shore Hospital (14.7%), Beth Israel Deaconess Medical Center (16.0%), Beverly Hospital (21.0%), Brigham and Women's Hospital (23.0%), and Baystate Medical Center (24.2%).

Since the sum of the percentage of repeat Cesarean section deliveries and vaginal births after Cesareans (VBACs) equals 100% of all births to mothers with a prior Cesarean section, facilities with the lowest repeat Cesarean section delivery rates had the highest VBAC rates. In 2002, none of the maternity facilities had a VBAC rate over 30%, whereas, in the past there were some facilities with VBAC rates over 40% (one in 2001, two in 2000, four in 1999, and 13 in 1998).

Cesarean Section Deliveries for Singleton Births

Cesarean section was the method of delivery for 28.1% of singleton births to mothers who gave birth to their first child in a Massachusetts licensed maternity facility in 2002 (Table 23), up 9% from the 2001 rate of 25.8% (data not shown).

In 2002, the following facilities had cesarean section delivery rates for singleton births to mothers who gave birth to their first child 15% below and above the state rate of 28.1% (Table 22):

- Nine facilities had this rate below 23.9% (0.85 times the state rate): Berkshire Medical Center, Mercy Medical Center, Cooley Dickinson Hospital, St. Luke's Hospital, Lawrence General Hospital, Cape Cod Hospital, Leominster Hospital, Holyoke Hospital, and UMass Memorial Medical Center-West Campus.

- Ten facilities had this rate above 32.3% (1.15 times the state rate): Beth Israel Deaconess Medical Center, St. Elizabeth's Medical Center, Caritas Good Samaritan Medical Center, Metrowest Medical Center-Framingham Union Campus, Milford-Whitinsville Regional Hospital, Falmouth Hospital, Emerson Hospital, Newton Wellesley Hospital, Harrington Memorial Hospital, and Holy Family Hospital and Medical Center.

In 2002, cesarean section was the method of delivery for 8.7% of singleton births to mothers having their second or later birth who had no prior cesarean section, up 7% from the 2001 rate of 8.1% (data not shown). The following facilities had this rate 15% below and above the state rate of 8.7%:

- Four facilities had this rate below 7.4%: South Shore Hospital, Mount Auburn Hospital, Beverly Hospital, and St. Luke Hospital.

- Six facilities had this rate above 10.0%: Holy Family Hospital and Medical Center, Melrose-Wakefield Hospital, St. Elizabeth's Medical Center, UMass Memorial Medical Center-West Campus, New England Medical Center Hospital, and Boston Medical Center.

In 2002, Cesarean section was the method of delivery for 84.8% of singleton births to mothers having their second or later birth who had prior Cesarean sections, up 6% from the 2001 rate of 80.2% (data not shown). Saint Vincent Hospital (71.5%) and Cooley Dickinson Hospital had the lowest rates (72.5%). Winchester Hospital (97.4%), Metrowest Medical Center-Framingham Union Campus (99.6%), and Massachusetts General Hospital (100%) had the highest rates (Table 23).

Table 22. Cesarean Section Deliveries and Vaginal Births after Cesarean Section (VBACs) by Licensed Maternity Facility[1], All Births, Massachusetts: 2002

Facility	Occurrence Births[2]	Total C-Sections		Primary C-Section[2]		Repeat C-Section[2]		VBACs[2]	
		n	%[3,4]	n	%[3,5]	n	%[3,6]	n	%[7]
STATE TOTAL	**81,699**	**22,947**	**28.2**	**14,732**	**20.5**	**8,215**	**85.3**	**1,419**	**14.7**
Anna Jaques Hospital	935	225	24.1	138	16.7	87	79.1	23	20.9
Baystate Medical Center	4,380	1,181	27.6	777	20.7	404	75.8	129	24.2
Berkshire Medical Center	774	138	17.8	91	12.8	47	73.4	17	26.6
Beth Israel Deaconess Medical Center	4,947	1,690	34.2	1,127	26.4	563	84.0	107	16.0
Beverly Hospital	2,323	606	26.1	377	18.5	229	79.0	61	21.0
Boston Medical Center	2,006	552	27.5	373	20.7	179	88.2	24	11.8
Brigham and Women's Hospital	9,859	2,727	27.8	1,828	21.1	899	77.0	268	23.0
Brockton Hospital	1,135	309	27.2	183	18.5	126	85.1	22	14.9
Cambridge Hospital	923	293	31.7	197	24.2	96	87.3	14	12.7
Cape Cod Hospital	1,019	263	25.8	148	16.9	115	80.4	28	19.6
Caritas Good Samaritan Medical Center	1,083	341	31.5	219	23.2	122	89.1	15	10.9
Caritas Norwood Hospital	641	188	29.3	116	20.7	72	88.9	9	11.1
Charlton Memorial Hospital	1,651	395	23.9	278	18.4	117	81.3	27	18.8
Cooley Dickinson Hospital	872	185	21.2	119	15.3	66	72.5	25	27.5
Emerson Hospital	1,295	415	32.0	256	22.8	159	91.9	14	8.1
Fairview Hospital	163	46	28.2	27	18.8	19	100.0	0	0.0
Falmouth Hospital	635	195	30.7	132	23.6	63	84.0	12	16.0
Franklin Medical Center	451	111	24.6	73	18.2	38	76.0	12	24.0
Harrington Memorial Hospital	481	129	27.4	88	20.8	41	85.4	7	14.6
Heywood Hospital	583	122	20.9	81	15.3	41	74.5	14	25.5
Holy Family Hospital and Medical Center	1,458	519	35.6	362	28.2	157	90.2	17	9.8
Holyoke Hospital	559	125	22.4	87	17.0	38	79.2	10	20.8
Jordan Hospital	765	205	26.8	129	19.3	76	79.2	20	20.8
Lawrence General Hospital	1,581	453	28.7	227	17.0	226	92.2	19	7.8
Leominster Hospital	1,271	316	25.4	174	16.0	142	92.2	12	7.8
Lowell General Hospital	2,083	537	25.8	326	17.7	211	87.2	31	12.8
Martha's Vineyard Hospital	154	57	37.0	35	26.5	22	100.0	0	0.0
Mary Lane Hospital	164	47	28.7	24	17.6	23	82.1	5	17.9

Table 22 (cont'd). Cesarean Section Deliveries and Vaginal Births After Cesarean Section (VBACs) by Licensed Maternity Facility[1], All Births, Massachusetts: 2001

Facility	Occurrence Births[2]	Total C-Sections		Primary C-Section[2]		Repeat C-Section[2]		VBACs[2]	
		n	%[3,4]	n	%[3,5]	n	%[3,6]	n	%[7]
Massachusetts General Hospital	3,406	956	28.1	658	21.2	298	100.0	0	0.0
Melrose-Wakefield Hospital	1,793	584	32.6	344	22.5	240	91.6	22	8.4
Mercy Medical Center	1,310	262	20.0	170	14.2	92	83.6	18	16.4
Metrowest Medical Center-Framingham Union Campus	2,263	729	32.2	455	22.9	274	99.6	1	--[9]
Milford-Whitinsville Regional Hospital	980	292	29.8	208	23.6	84	86.6	13	13.4
Morton Hospital	626	180	28.9	110	20.4	70	84.3	13	15.7
Mount Auburn Hospital	1,699	441	26.0	293	19.4	148	80.0	37	20.0
Nantucket Cottage Hospital	85	17	20.0	10	13.0	7	87.5	1	--[9]
New England Medical Center Hospital	1,575	514	32.6	370	26.2	144	88.3	19	11.7
Newton Wellesley Hospital	3,211	1,061	33.1	653	23.5	408	93.6	28	6.4
North Adams Regional Hospital	276	67	24.3	36	14.8	31	93.9	2	--[9]
North Shore Medical Center - Salem Hospital	1,735	488	28.1	302	19.8	186	87.3	27	12.7
Saint Vincent Hospital	1,743	415	24.1	281	18.3	134	71.3	54	28.7
Saints Memorial Medical Ctr.	704	210	29.8	129	20.8	81	96.4	3	--[9]
South Shore Hospital	4,073	1,185	29.1	699	20.0	486	85.3	84	14.7
St. Elizabeth's Medical Center	1,510	534	35.4	348	26.8	186	88.2	25	11.8
St. Luke's Hospital	1,509	357	23.8	199	15.3	158	81.9	35	18.1
Sturdy Memorial Hospital	1,128	325	28.8	187	19.1	138	93.2	10	6.8
Tobey Hospital	502	104	20.8	54	12.3	50	80.6	12	19.4
UMass Memorial Medical Center-West Campus	4,383	1,156	26.4	808	20.3	348	86.8	53	13.2
Winchester Hospital	2,427	696	28.7	423	19.8	273	97.5	7	2.5

NOTES: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated. Hale Hospital closed to births on July 1, 2001. Name change: Mercy Hospital changed its name to Mercy Medical Center on January 16, 2001.

1. A licensed maternity facility is a medical unit licensed by the Commonwealth for the care of women during pregnancy and childbirth. 2. See Glossary for definitions of occurrence births, primary and repeat Cesarean sections, and VBACs. The percentages provided in this table are based on occurrence births, and may differ from data, which are based on resident births, presented elsewhere in this book. 3. The percentage of Cesarean births reported is not adjusted for risk factors such as mother's age, birthweight, or complications of labor and delivery, which would influence the number of procedures in a particular facility. Caution should be used when comparing unadjusted percentages. 4. Percentage of total Cesarean sections= (total Cesarean births/all births) x 100. 5. Percentage primary Cesarean sections=(primary Cesarean sections/all births-repeat Cesarean sections-VBACs) x 100. 6. Percentage repeat Cesarean sections= (repeat Cesarean sections/(repeat Cesarean sections + VBACs)) x100. 7. Percentage VBACs= (VBAC deliveries/(repeat Cesarean sections + VBAC)) x 100. 8. This percentage is based on less than 40 total births (in denominator) and should be interpreted with caution. 9. Calculations based on fewer than five events are excluded.

Table 23. Cesarean Section Deliveries for Singleton Births by Licensed Maternity Facility[1] and Number of Previous Births, Massachusetts: 2002

Facility	First Birth			Second or Later Birth without prior C-section			Second or Later Birth with prior C-section		
	Births[2]	C-section n	C-section %[3]	Births[2]	C-section n	C-section %[3]	Births[2]	C-section n	C-section %[3]
STATE TOTAL	**34,196**	**9,599**	**28.1**	**34,089**	**2,979**	**8.7**	**9,060**	**7,681**	**84.8**
Anna Jaques Hospital	390	104	26.7	405	22	5.4	107	84	78.5
Baystate Medical Center	1,638	446	27.2	1,859	174	9.4	494	370	74.9
Berkshire Medical Center	319	60	18.8	369	26	7.0	63	46	73.0
Beth Israel Deaconess Medical Center	2,075	675	32.5	1,814	180	9.9	604	504	83.4
Beverly Hospital	957	265	27.7	1,009	69	6.8	281	220	78.3
Boston Medical Center	875	232	26.5	870	116	13.3	195	171	87.7
Brigham and Women's Hospital	4,335	1,099	25.4	3,595	290	8.1	1,028	780	75.9
Brockton Hospital	479	133	27.8	484	41	8.5	138	116	84.1
Cambridge Hospital	503	157	31.2	299	33	11.0	108	94	87.0
Cape Cod Hospital	414	95	22.9	441	35	7.9	137	109	79.6
Caritas Good Samaritan Medical Center	427	143	33.5	475	44	9.3	135	120	88.9
Caritas Norwood Hospital	261	84	32.2	279	21	7.5	81	72	88.9
Charlton Memorial Hospital	692	175	25.3	767	63	8.2	144	117	81.3
Cooley Dickinson Hospital	386	84	21.8	369	19	5.1	91	66	72.5
Emerson Hospital	494	176	35.6	590	54	9.2	167	153	91.6
Fairview Hospital	92	22	23.9	52	5	9.6	19	19	100.0[4]
Falmouth Hospital	264	93	35.2	276	29	10.5	73	61	83.6
Franklin Medical Center	195	55	28.2	192	12	6.3	48	36	75.0[4]
Harrington Memorial Hospital	184	72	39.1	239	16	6.7	48	41	85.4
Heywood Hospital	236	64	27.1	280	13	4.6	55	41	74.5
Holy Family Hospital and Medical Center	628	260	41.4	610	64	10.5	169	152	89.9
Holyoke Hospital	249	58	23.3	255	27	10.6	47	37	78.7[4]
Jordan Hospital	306	89	29.1	344	30	8.7	94	75	79.8
Lawrence General Hospital	597	135	22.6	705	70	9.9	241	222	92.1
Leominster Hospital	443	102	23.0	606	45	7.4	148	138	93.2
Lowell General Hospital	804	197	24.5	981	85	8.7	233	202	86.7
Martha's Vineyard Hospital	74	26	35.1	56	7	12.5	22	22	100.0[4]
Mary Lane Hospital	60	14	23.3	76	10	13.2	28	23	82.1[4]

Table 23 (cont'd). Cesarean Section Deliveries for Singleton Births by Licensed Maternity Facility and Number of Previous Births, Massachusetts: 2002

Facility	First Birth			Second or Later Birth without prior C-section			Second or Later Birth with prior C-section		
	Births[2]	C-section		Births[2]	C-section		Births[2]	C-section	
		n	%[3]		n	%[3]		n	%[3]
Massachusetts General Hospital	1,612	443	27.5	1,325	131	9.9	246	246	100.0
Melrose-Wakefield Hospital	728	230	31.6	747	83	11.1	248	226	91.1
Mercy Medical Center	494	103	20.9	694	55	7.9	108	90	83.3
Metrowest Medical Center-Framingham Union Campus	1,018	343	33.7	896	70	7.8	264	263	99.6
Milford-Whitinsville Regional Hospital	427	147	34.4	421	38	9.0	97	84	86.6
Morton Hospital	280	81	28.9	253	25	9.9	83	70	84.3
Mount Auburn Hospital	796	231	29.0	686	46	6.7	183	146	79.8
Nantucket Cottage Hospital	33	5	15.2	44	5	11.4	8	7	87.5[4]
New England Medical Center Hospital	632	186	29.4	585	74	12.6	149	130	87.2
Newton Wellesley Hospital	1,285	465	36.2	1,359	113	8.3	409	381	93.2
North Adams Regional Hospital	128	31	24.2	111	4	--[5]	33	31	93.9[4]
North Shore Medical Center - Salem Hospital	740	210	28.4	713	53	7.4	202	175	86.6
Saint Vincent Hospital	697	181	26.0	771	61	7.9	179	128	71.5
Saints Memorial Medical Ctr.	337	90	26.7	268	27	10.1	83	80	96.4
South Shore Hospital	1,630	470	28.8	1,698	107	6.3	548	464	84.7
St. Elizabeth's Medical Center	653	212	32.5	550	68	12.4	196	171	87.2
St. Luke's Hospital	605	134	22.1	671	48	7.2	185	150	81.1
Sturdy Memorial Hospital	437	138	31.6	519	38	7.3	140	130	92.9
Tobey Hospital	198	35	17.7	230	13	5.7	56	44	78.6
UMass Memorial Medical Center-West Campus	1,917	456	23.8	1,849	232	12.5	367	316	86.1
Winchester Hospital	1,003	293	29.2	1,055	85	8.1	265	258	97.4

NOTES: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated. Hale Hospital closed to births on July 1, 2001. Name change: Mercy Hospital changed its name to Mercy Medical Center on January 16, 2001.

1. A licensed maternity facility is a medical unit licensed by the Commonwealth for the care of women during pregnancy and childbirth. 2. Occurrence births (See Glossary for definition.) 3. The percentage of Cesarean births reported is not adjusted for risk factors such as mother's age, birthweight, or complications of labor and delivery, which would influence the number of procedures in a particular facility. Caution should be used when comparing unadjusted percentages. 4. This percentage is based on less than 40 total births (in denominator) and should be interpreted with caution. 5. Calculations based on fewer than five events are excluded.

CHAPTER 8

BIRTHS BY HOSPITAL AND COMMUNITY

Low Birthweight Variation by Facility

In 2002, at least 10% of the births at seven hospitals were low birthweight. These hospitals were: New England Medical Center (25.8%), St. Elizabeth's Medical Center (13.4%), Baystate Medical Center (12.7%), Beth Israel Deaconess Medical Center (11.5%), Boston Medical Center (10.9%), Brigham and Women's Hospital (10.9%), and UMass Memorial Medical Center West Campus (10.5%) (Table 24).

Publicly Funded Delivery Variation by Facility

In seven hospitals, 50% or more of the deliveries were paid with public funds: Boston Medical Center (87.8%), Holyoke Hospital (64.9%), Cambridge Hospital (61.3%), Brockton Hospital (57.7%), Mercy Medical Center (56.5%), Lawrence General Hospital (55.4%), and St. Luke Hospital (52.2%) (Table 24). In four facilities, less than 10% of deliveries were paid with public funds: The Birthplace at Wellesley (0.0%), Newton Wellesley Hospital (1.9%), Emerson Hospital (3.9%), and Winchester Hospital (5.3%).

Prenatal Care Adequacy Variation by Facility

The facilities with the lowest reported rate of adequacy of prenatal care among mothers delivering in 2002 (i.e. less than 65%) were Tobey Hospital (45.9%), Boston Medical Center (52.3%), and Berkshire Medical Center (54.1%) (Table 24). Brigham and Women's Hospital, Beverly Hospital, and Metrowest Medical Center-Framingham Union Campus reported the highest rate of adequacy of prenatal care among their delivery mothers, all with over 94%.

Low Birthweight in the 30 Largest Massachusetts Cities and Towns

In 2002, among the 30 largest cities and towns in the Commonwealth, low birthweight rates were highest in Springfield (10.8%), Framingham (9.8%), Brockton (9.7%), Pittsfield (9.7%), Boston (9.5%), Brookline (9.3%), and Fall River (9.1%). These communities had low birthweight rates 20% higher than the statewide rate of 7.5% (numbers are shown in Table 25A) (rates are shown on Table 3A).

Table 24. Birth Characteristics by Licensed Maternity Facility[1], Massachusetts: 2002

Facility	Location	Occurrence Births[2] (n)	Low Birthweight[3] (%)	Public Payment for Delivery[4] (%)	Adequate Prenatal Care[5] (%)
STATE TOTAL[6]		**81,699**	**7.5**	**27.8**	**84.7**
Anna Jaques Hospital	Newburyport	935	4.1	18.4	91.5
Baystate Medical Center	Springfield	4,380	12.7	40.4	80.7
Berkshire Medical Center	Pittsfield	774	5.9	38.4	54.1
Beth Israel Deaconess Medical Center	Boston	4,947	11.5	16.6	93.3
Beverly Hospital	Beverly	2,323	5.5	28.1	93.7
Boston Medical Center	Boston	2,006	10.9	87.8	52.3
Brigham And Women's Hospital	Boston	9,859	10.9	19.3	95.3
Brockton Hospital	Brockton	1,135	7.4	57.7	79.3
Cambridge Birth Center	Cambridge	89	--[7]	33.7	77.5
Cambridge Hospital	Cambridge	923	3.0	61.3	72.9
Cape Cod Hospital	Barnstable	1,019	4.1	39.6	89.9
Caritas Good Samaritan Medical Center	Brockton	1,083	6.6	41.4	70.0
Caritas Norwood Hospital	Norwood	641	3.7	15.2	93.3
Charlton Memorial Hospital	Fall River	1,651	7.1	45.2	87.9
Cooley Dickinson Hospital	Northampton	872	2.9	24.9	92.0
Emerson Hospital	Concord	1,295	3.6	3.9	80.2
Fairview Hospital	Great Barrington	163	--[7]	42.9	81.0
Falmouth Hospital	Falmouth	635	4.4	30.9	85.2
Franklin Medical Center	Greenfield	451	4.7	41.6	84.3
Harrington Memorial Hospital	Southbridge	481	3.2	41.7	86.6
Heywood Memorial Hospital	Gardner	583	2.6	37.0	75.8
Holy Family Hospital And Medical Center	Methuen	1,458	4.7	19.9	86.7
Holyoke Hospital	Holyoke	559	4.3	64.9	80.0
Jordan Hospital	Plymouth	765	5.5	20.4	71.5
Lawrence General Hospital	Lawrence	1,581	6.3	55.4	90.9
Leominster Hospital	Leominster	1,271	3.1	40.7	85.7
Lowell General Hospital	Lowell	2,083	5.9	36.7	66.2
Martha's Vineyard Hospital	Oak Bluffs	154	--[7]	33.8	83.0

Table 24. (cont'd) Births Characteristics by Licensed Maternity Facility[1], Massachusetts: 2002

Facility	Location	Occurrence Births[2] (n)	Low Birthweight[3] (%)	Public Payment for Delivery[4] (%)	Adequate Prenatal Care[5] (%)
Mary Lane Hospital	Ware	164	--[7]	45.7	75.6
Massachusetts General Hospital	Boston	3,406	8.3	26.2	86.9
Melrose-Wakefield Hospital	Melrose	1,793	4.4	16.4	88.2
Mercy Medical Center	Springfield	1,310	4.2	56.5	80.5
Metrowest Medical Center-Framingham Union Campus	Framingham	2,263	5.9	20.8	93.5
Milford-Whitinsville Regional Hospital	Milford	980	3.2	18.7	90.7
Morton Hospital	Taunton	626	3.2	37.4	79.5
Mount Auburn Hospital	Cambridge	1,699	2.8	14.2	92.5
Nantucket Cottage Hospital	Nantucket	85	--[7]	43.5	76.5
New England Medical Center Hospital	Boston	1,575	25.8	32.4	89.7
Newton Wellesley Hospital	Newton	3,211	4.9	1.9	83.1
North Adams Regional Hospital	North Adams	276	4.3	48.0	85.5
North Shore Birth Center	Beverly	87	--[7]	13.8	83.9
North Shore Medical Center - Salem Hospital	Salem	1,735	6.1	33.7	74.7
Saint Vincent Hospital	Worcester	1,743	4.5	16.2	91.6
Saints Memorial Medical Ctr.	Lowell	704	4.0	35.5	82.3
South Shore Hospital	Weymouth	4,073	4.5	10.0	92.8
St. Elizabeth's Medical Center	Boston	1,510	13.4	17.2	88.3
St. Luke's Hospital	New Bedford	1,509	5.9	52.2	80.4
Sturdy Memorial Hospital	Attleboro	1,128	3.8	18.1	70.7
The Birthplace At Wellesley	Wellesley	94	--[7]	0.0	89.4
Tobey Hospital	Wareham	502	3.2	28.7	45.9
UMass Memorial Medical Center - West Campus	Worcester	4,383	10.5	29.1	73.8
Winchester Hospital	Winchester	2,427	5.1	5.3	86.9
All Other Hospitals		12	--[7]	12.5	55.6
Home Births, Enroute, Other		288	9.2	24.9	60.0

NOTES: All percentages are calculated based on only those births with known values for the characteristic(s) of interest, unless otherwise stated. Hale Hospital closed to births on July 1, 2001. Name change: Mercy Hospital changed its name to Mercy Medical Center on January 16, 2001. 1. A licensed maternity facility is a medical unit licensed by the Commonwealth for the care of women during pregnancy and childbirth. 2. See Glossary for definition of occurrence births. 3. Less than 2,500 grams (5.5 lbs.) 4. Public payment for delivery includes Medicaid/Masshealth, Commonhealth, Medicare, Healthy Start, other government programs, and free care. 5. Based on the APNCU Index. 6. The percentages provided in this row are based on occurrence births and may differ from data presented elsewhere in this book which are based on resident births. 7. Calculations based on values of 1-4 for medical characteristics of facilities with less than 200 births are suppressed based Guidelines for Release of Births Data, Bureau of Health Statistics, Research and Evaluation, Massachusetts Department of Public Health.

Table 25A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 2002

Community	Occurrence Births[2]	Resident Births[3]	Low Birthweight[4]	Teen Births (15-19 years)	Infant Deaths[5]	Neonatal Deaths[6]
STATE TOTAL	**81,699**	**80,624**	**6,060**	**4,642**	**395**	**299**
Abington	0	177	7	7	0	0
Acton	1	244	13	3	0	0
Acushnet	0	98	14	5	1	0
Adams	0	86	--[1]	10	0	0
Agawam	0	238	20	9	0	0
Alford	0	3	0	0	1	1
Amesbury	0	239	23	6	1	1
Amherst	5	192	7	10	2	0
Andover	1	349	12	2	0	0
Aquinnah (Gay Head)	0	3	0	0	0	0
Arlington	1	545	32	5	1	1
Ashburnham	0	61	8	0	0	0
Ashby	0	24	0	0	0	0
Ashfield	0	11	0	0	0	0
Ashland	1	288	18	8	0	0
Athol	0	118	5	15	0	0
Attleboro	1,131	641	46	32	1	1
Auburn	0	154	8	4	1	1
Avon	0	42	8	2	1	1
Ayer	0	105	--[1]	5	0	0
Barnstable	1,023	442	34	35	3	1
Barre	0	66	--[1]	7	0	0
Becket	0	22	--[1]	2	1	1
Bedford	0	148	14	0	1	1
Belchertown	2	178	11	0	0	0
Bellingham	2	255	16	8	1	1
Belmont	0	270	12	1	1	0
Berkley	0	88	5	3	1	1
Berlin	0	28	--[1]	0	1	1
Bernardston	0	22	0	0	0	0
Beverly	2,412	451	21	14	0	0
Billerica	3	553	34	14	1	0
Blackstone	0	124	11	8	0	0
Blandford	0	11	0	1	0	0
Bolton	0	72	--[1]	0	0	0
Boston	23,337	8,011	761	664	56	41
Bourne	1	252	15	17	0	0
Boxborough	0	59	--[1]	2	0	0
Boxford	0	87	5	0	0	0
Boylston	1	55	5	0	0	0
Braintree	2	437	39	11	2	2

Table 25A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 2002

Community	Occurrence Births[2]	Resident Births[3]	Low Birthweight[4]	Teen Births (15-19 years)	Infant Deaths[5]	Neonatal Deaths[6]
Brewster	0	63	--[1]	1	0	0
Bridgewater	1	266	18	4	1	1
Brimfield	0	34	--[1]	4	1	1
Brockton	2,221	1537	149	163	9	9
Brookfield	0	33	--[1]	0	0	0
Brookline	3	649	60	5	5	5
Buckland	1	9	0	0	0	0
Burlington	2	328	18	3	1	0
Cambridge	2,718	1,071	75	24	7	5
Canton	0	282	14	2	5	5
Carlisle	0	49	5	0	0	0
Carver	0	143	17	6	0	0
Charlemont	1	12	0	1	0	0
Charlton	0	153	6	3	0	0
Chatham	0	35	--[1]	2	0	0
Chelmsford	3	413	33	10	1	1
Chelsea	1	617	33	90	2	0
Cheshire	0	22	--[1]	2	0	0
Chester	1	14	--[1]	2	0	0
Chesterfield	1	14	0	0	0	0
Chicopee	0	639	55	60	3	3
Chilmark	0	7	0	1	0	0
Clarksburg	1	14	0	2	0	0
Clinton	4	181	12	6	0	0
Cohasset	0	88	--[1]	1	0	0
Colrain	0	15	--[1]	1	0	0
Concord	1,298	149	9	0	0	0
Conway	1	15	--[1]	0	0	0
Cummington	0	9	0	0	0	0
Dalton	0	41	0	6	0	0
Danvers	0	233	22	4	0	0
Dartmouth	0	265	13	8	1	1
Dedham	1	309	21	7	1	1
Deerfield	0	48	--[1]	1	0	0
Dennis	1	136	13	7	1	1
Dighton	1	61	--[1]	4	0	0
Douglas	0	128	11	7	3	2
Dover	1	67	--[1]	0	0	0
Dracut	2	369	22	9	1	1
Dudley	0	126	15	5	0	0
Dunstable	0	19	0	0	0	0
Duxbury	0	174	13	1	0	0
East Bridgewater	0	168	17	5	0	0
East Brookfield	0	16	0	0	0	0
East Longmeadow	0	134	9	3	0	0

Table 25A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 2002

Community	Occurrence Births[2]	Resident Births[3]	Low Birthweight[4]	Teen Births (15-19 years)	Infant Deaths[5]	Neonatal Deaths[6]
Eastham	0	32	0	0	0	0
Easthampton	0	170	16	8	1	1
Easton	0	250	21	3	1	0
Edgartown	0	48	--[1]	2	0	0
Egremont	0	5	0	0	0	0
Erving	0	11	--[1]	0	0	0
Essex	0	40	--[1]	1	0	0
Everett	0	507	42	30	0	0
Fairhaven	0	137	7	10	0	0
Fall River	1,653	1,190	108	158	8	8
Falmouth	637	289	19	24	3	2
Fitchburg	1	556	46	67	6	4
Florida	0	1	0	0	0	0
Foxborough	0	216	6	4	0	0
Framingham	2,265	939	92	41	5	3
Franklin	1	482	38	4	4	3
Freetown	1	102	12	3	0	0
Gardner	583	226	17	23	0	0
Georgetown	0	110	--[1]	0	0	0
Gill	0	13	--[1]	1	0	0
Gloucester	0	303	24	18	2	1
Goshen	0	12	0	0	0	0
Gosnold	0	0	0	0	0	0
Grafton	0	220	9	6	0	0
Granby	0	51	--[1]	3	0	0
Granville	0	13	0	0	0	0
Great Barrington	164	64	--[1]	3	1	1
Greenfield	452	165	10	19	0	0
Groton	1	116	11	1	1	0
Groveland	0	79	6	2	0	0
Hadley	1	30	--[1]	1	1	1
Halifax	0	84	--[1]	3	0	0
Hamilton	1	118	5	0	0	0
Hampden	0	46	--[1]	1	0	0
Hancock	0	9	0	0	0	0
Hanover	0	160	9	2	0	0
Hanson	0	122	7	2	0	0
Hardwick	0	25	--[1]	3	1	1
Harvard	0	46	--[1]	0	1	1
Harwich	1	99	--[1]	5	1	1
Hatfield	0	25	--[1]	0	0	0
Haverhill	1	848	71	67	9	8
Hawley	0	0	0	0	0	0
Heath	0	11	0	0	0	0
Hingham	0	273	17	2	1	1

Table 25A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 2002

Community	Occurrence Births[2]	Resident Births[3]	Low Birthweight[4]	Teen Births (15-19 years)	Infant Deaths[5]	Neonatal Deaths[6]
Hinsdale	0	20	--[1]	4	0	0
Holbrook	0	117	8	5	0	0
Holden	2	156	--[1]	4	0	0
Holland	0	25	0	2	0	0
Holliston	0	176	12	1	1	1
Holyoke	562	620	64	124	7	7
Hopedale	0	70	--[1]	2	0	0
Hopkinton	1	222	19	4	1	1
Hubbardston	0	55	--[1]	1	1	0
Hudson	1	237	16	7	2	1
Hull	0	129	--[1]	4	0	0
Huntington	1	31	--[1]	3	0	0
Ipswich	0	149	15	2	0	0
Kingston	0	155	6	2	0	0
Lakeville	0	149	8	4	0	0
Lancaster	0	76	--[1]	2	0	0
Lanesborough	0	24	--[1]	2	0	0
Lawrence	1,583	1,440	108	227	8	5
Lee	0	61	6	4	3	2
Leicester	0	101	--[1]	6	0	0
Lenox	0	32	0	0	0	0
Leominster	1,271	546	47	39	1	0
Leverett	1	13	--[1]	1	0	0
Lexington	1	225	17	1	1	1
Leyden	0	2	--[1]	0	0	0
Lincoln	3	100	--[1]	0	0	0
Littleton	0	124	--[1]	1	0	0
Longmeadow	0	188	18	0	2	2
Lowell	2,794	1,790	141	228	18	11
Ludlow	0	172	6	9	0	0
Lunenburg	0	93	5	2	0	0
Lynn	4	1,457	117	162	9	8
Lynnfield	0	113	--[1]	0	0	0
Malden	3	814	58	25	4	4
Manchester-by-the-Sea	0	49	--[1]	0	0	0
Mansfield	0	374	22	6	0	0
Marblehead	0	242	14	1	1	0
Marion	0	46	--[1]	2	0	0
Marlborough	2	566	52	28	4	4
Marshfield	0	358	19	7	0	0
Mashpee	0	145	15	5	1	1
Mattapoisett	0	44	--[1]	0	0	0
Maynard	2	169	12	3	0	0
Medfield	0	136	15	1	0	0
Medford	3	640	47	10	2	2

Table 25A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 2002

Community	Occurrence Births[2]	Resident Births[3]	Low Birthweight[4]	Teen Births (15-19 years)	Infant Deaths[5]	Neonatal Deaths[6]
Medway	0	175	11	0	1	1
Melrose	1,793	379	27	1	1	0
Mendon	0	62	--[1]	0	0	0
Merrimac	0	68	5	0	0	0
Methuen	1,458	584	50	26	2	2
Middleborough	1	274	19	16	2	2
Middlefield	0	6	0	0	0	0
Middleton	0	91	6	0	0	0
Milford	980	423	42	14	3	3
Millbury	1	151	7	6	2	1
Millis	1	111	7	1	0	0
Millville	0	40	--[1]	1	0	0
Milton	4	318	17	5	0	0
Monroe	0	2	0	0	0	0
Monson	0	98	9	4	1	1
Montague	2	92	7	13	0	0
Monterey	1	6	0	0	0	0
Montgomery	0	8	--[1]	0	0	0
Mount Washington	0	0	0	0	0	0
Nahant	0	33	6	1	0	0
Nantucket	87	137	12	4	2	1
Natick	4	528	34	1	1	1
Needham	1	343	17	1	0	0
New Ashford	0	5	0	0	0	0
New Bedford	1,514	1,321	102	175	10	4
New Braintree	0	8	0	0	0	0
New Marlborough	0	16	--[1]	2	0	0
New Salem	0	12	0	0	0	0
Newbury	0	92	12	2	0	0
Newburyport	936	234	15	7	4	3
Newton	3,216	822	56	9	3	3
Norfolk	1	138	10	1	0	0
North Adams	276	144	12	20	1	1
North Andover	0	328	11	3	1	1
North Attleboro	2	358	17	12	1	1
North Brookfield	0	53	--[1]	1	0	0
North Reading	0	167	16	4	1	0
Northampton	881	203	4	10	0	0
Northborough	1	169	10	2	0	0
Northbridge	0	215	16	12	1	1
Northfield	1	18	0	0	0	0
Norton	0	269	22	8	2	2
Norwell	0	135	7	1	1	1
Norwood	642	387	22	6	0	0
Oak Bluffs	156	64	6	2	0	0

Table 25A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 2002

Community	Occurrence Births[2]	Resident Births[3]	Low Birthweight[4]	Teen Births (15-19 years)	Infant Deaths[5]	Neonatal Deaths[6]
Oakham	0	15	0	0	0	0
Orange	0	88	9	12	0	0
Orleans	0	35	0	0	0	0
Otis	0	7	0	0	0	0
Oxford	1	158	9	7	1	1
Palmer	1	123	6	10	2	1
Paxton	0	32	--[1]	1	0	0
Peabody	2	514	46	10	1	0
Pelham	1	8	0	0	0	0
Pembroke	0	255	16	7	2	1
Pepperell	1	155	12	6	2	2
Peru	0	9	--[1]	1	0	0
Petersham	1	10	0	1	0	0
Phillipston	0	17	--[1]	3	0	0
Pittsfield	777	528	51	61	1	0
Plainfield	0	5	--[1]	1	0	0
Plainville	0	117	--[1]	4	2	2
Plymouth	771	715	58	22	2	1
Plympton	1	27	0	0	0	0
Princeton	0	31	--[1]	2	0	0
Provincetown	0	14	--[1]	2	0	0
Quincy	2	1,154	73	31	6	4
Randolph	0	418	51	16	3	2
Raynham	0	140	14	4	0	0
Reading	2	313	22	1	0	0
Rehoboth	1	104	9	0	1	1
Revere	2	649	50	51	2	2
Richmond	0	8	0	1	0	0
Rochester	0	52	--[1]	1	0	0
Rockland	0	248	12	6	0	0
Rockport	0	63	--[1]	2	0	0
Rowe	0	4	--[1]	0	0	0
Rowley	0	72	8	0	0	0
Royalston	0	6	0	1	0	0
Russell	2	19	0	1	1	0
Rutland	0	101	6	6	0	0
Salem	1,736	540	42	25	3	3
Salisbury	0	100	14	7	0	0
Sandisfield	0	6	0	2	0	0
Sandwich	0	184	5	3	1	1
Saugus	1	253	13	7	0	0
Savoy	0	7	--[1]	0	0	0
Scituate	1	219	21	0	0	0
Seekonk	0	140	--[1]	2	1	1
Sharon	0	181	15	1	0	0

Table 25A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 2002

Community	Occurrence Births[2]	Resident Births[3]	Low Birthweight[4]	Teen Births (15-19 years)	Infant Deaths[5]	Neonatal Deaths[6]
Sheffield	1	23	0	2	0	0
Shelburne	0	17	--[1]	1	0	0
Sherborn	0	49	0	0	0	0
Shirley	1	74	5	2	0	0
Shrewsbury	0	485	31	7	2	2
Shutesbury	0	14	0	1	0	0
Somerset	0	126	10	6	1	1
Somerville	2	905	69	50	1	1
South Hadley	0	156	5	5	3	3
Southampton	0	50	7	0	0	0
Southborough	1	133	9	1	0	0
Southbridge	482	231	19	28	4	3
Southwick	0	85	--[1]	3	1	0
Spencer	0	131	10	6	0	0
Springfield	5,700	2,357	255	423	23	16
Sterling	2	84	6	4	0	0
Stockbridge	0	15	0	1	0	0
Stoneham	0	258	26	2	0	0
Stoughton	3	320	20	9	0	0
Stow	0	73	--[1]	0	1	0
Sturbridge	1	98	--[1]	1	1	0
Sudbury	0	223	15	1	1	1
Sunderland	1	32	--[1]	0	0	0
Sutton	1	110	--[1]	3	0	0
Swampscott	0	167	7	2	0	0
Swansea	0	131	16	2	1	1
Taunton	626	752	57	57	6	5
Templeton	2	88	0	9	0	0
Tewksbury	1	373	25	6	0	0
Tisbury	1	48	6	1	0	0
Tolland	0	3	0	0	0	0
Topsfield	0	51	7	0	0	0
Townsend	0	99	--[1]	7	0	0
Truro	1	15	0	1	0	0
Tyngsborough	0	147	9	3	0	0
Tyringham	0	3	0	0	0	0
Upton	0	103	9	1	0	0
Uxbridge	0	179	7	5	0	0
Wakefield	0	348	19	4	1	1
Wales	0	16	0	0	0	0
Walpole	0	293	20	1	0	0
Waltham	4	672	47	24	4	4
Ware	164	129	15	10	2	1
Wareham	503	272	12	33	3	2
Warren	0	70	14	6	1	1

Table 25A. Birth Characteristics: Occurrence and Resident Births and Infant Deaths, Massachusetts Municipalities: 2002

Community	Occurrence Births[2]	Resident Births[3]	Low Birthweight[4]	Teen Births (15-19 years)	Infant Deaths[5]	Neonatal Deaths[6]
Warwick	0	5	0	1	0	0
Washington	0	4	0	1	0	0
Watertown	1	363	29	7	2	1
Wayland	0	143	13	1	0	0
Webster	1	215	24	22	0	0
Wellesley	94	346	22	0	0	0
Wellfleet	0	23	0	2	0	0
Wendell	0	7	--[1]	0	0	0
Wenham	0	38	--[1]	0	0	0
West Boylston	0	53	6	1	3	3
West Bridgewater	0	67	5	1	0	0
West Brookfield	0	40	--[1]	3	0	0
West Newbury	0	49	--[1]	0	0	0
West Springfield	1	339	27	12	3	2
West Stockbridge	0	13	0	0	0	0
West Tisbury	1	17	--[1]	0	0	0
Westborough	0	240	14	5	0	0
Westfield	2	458	33	28	0	0
Westford	2	273	28	3	0	0
Westhampton	0	15	--[1]	0	0	0
Westminster	0	78	6	3	1	1
Weston	0	106	--[1]	0	0	0
Westport	0	128	10	7	0	0
Westwood	0	175	9	1	0	0
Weymouth	4,075	702	55	21	2	2
Whately	0	15	--[1]	1	0	0
Whitman	1	208	20	8	1	1
Wilbraham	0	89	0	0	0	0
Williamsburg	0	20	0	1	0	0
Williamstown	0	35	6	0	0	0
Wilmington	0	302	22	3	1	1
Winchendon	0	138	6	13	0	0
Winchester	2,429	266	17	1	0	0
Windsor	1	7	0	0	0	0
Winthrop	0	179	5	4	0	0
Woburn	2	476	39	8	2	1
Worcester	6,148	2,617	197	226	23	16
Worthington	0	5	0	0	0	0
Wrentham	0	131	8	2	1	1
Yarmouth	0	202	13	11	0	0

1. Values of 1-4 for medical characteristics of communities with less than 200 births are suppressed based on Guidelines for Release of Birth Data, Bureau of Health Statistics, Research and Evaluation, Massachusetts Department of Public Health. 2. Births occurring in a geographical place (state, city/town) regardless of the residency of the mother. See Glossary for more details. 3. Births to mothers who report their usual place of residence as a particular geographical place (state, or city/town). See Glossary for more details. 4. Less than 2,500 grams (5.5 lbs.). 5. Death of a child whose age is less than one year. 6. Death of a child whose age is less than 28 days.

Table 25B. Birth Characteristics, Occurrence and Resident Births and Infant Deaths by County, Massachusetts: 2002

County Name	Occurrence Births[1]	Resident Births[2]			Deaths	
		Number	Low Birthweight[3]	Teen Births (15-19 years)	Infant[4]	Neonatal[5]
STATE TOTAL	**81,699**	**80,624**	**6,060**	**4,642**	**395**	**299**
Barnstable	1,664	1,966	122	115	10	7
Berkshire	1,221	1,240	94	126	8	6
Bristol	4,929	6,675	512	505	36	27
Dukes	158	187	14	6	0	0
Essex	8,135	9,584	701	598	41	32
Franklin	460	653	48	53	0	0
Hampden	6,269	5,729	513	696	44	33
Hampshire	1,056	1,309	77	52	9	6
Middlesex	16,563	18,773	1,355	608	74	53
Nantucket	87	137	12	4	2	1
Norfolk	4,833	8,389	592	150	34	30
Plymouth	3,500	6,457	470	309	22	19
Suffolk	23,340	9,456	849	809	60	43
Worcester	9,484	10,069	701	611	57	42

1. Births occurring in a geographical place (state, city/town) regardless of the residency of the mother. See Glossary for more details.
2. Births to mothers who report their usual place of residence as a particular geographical place (state, or city/town). See Glossary for more details. 3. Less than 2,500 grams (5.5 lbs.). 4. Death of a child whose age is less than one year. 5. Death of a child whose age is less than 28 days.

Table 25C. Birth Characteristics, Occurrence and Resident Births and Infant Deaths, Massachusetts Community Health Network Areas (CHNAs): 2002

Community Health Network Area	Occurrence Births[1]	Resident Births[2]			Deaths	
		Number	Low Birthweight[3]	Teen Births (15-19 years)	Infant[4]	Neonatal[5]
STATE TOTAL	**81,699**	**80,624**	**6,060**	**4,642**	**397**	**299**
Community Health Network of Berkshire County	1,221	1,240	94	126	8	6
Upper Valley Health Web (Franklin County)	461	804	55	73	0	0
Partnership for Health in Hampshire County (Northampton)	1,055	1,278	75	49	9	6
The Community Health Connection (Springfield)	5,704	3,751	350	467	33	22
Community Health Network of Southern Worcester County	485	1,399	106	88	8	6
Community Partners for Health (Milford)	984	2,366	170	65	13	11
Community Health Network of Greater Metro West (Framingham)	2,280	5,297	387	117	19	15
Community Wellness Coalition (Worcester)	6,152	4,024	271	261	31	23
Fitchburg/Gardner Community Health Network	1,866	3,147	218	208	15	10
Greater Lowell Community Health Network	2,805	3,937	292	273	21	13
Greater Lawrence Community Health Network	3,042	2,792	187	258	11	8
Greater Haverhill Community Health Network	937	1,978	165	91	14	12
Community Health Network North (Beverly/Gloucester)	2,413	1,262	79	37	2	1
North Shore Community Health Network	1,743	3,552	270	212	14	11
Greater Woburn/Concord/Littleton Community Health Network	3,736	2,470	163	22	6	4
North Suburban Health Alliance (Medford/Malden/Melrose)	1,801	3,426	257	77	9	7
Greater Cambridge/Somerville Community Health Network	2,722	3,154	217	87	12	8
West Suburban Health Network (Newton/Waltham)	3,317	2,840	177	42	8	8
Alliance for Community Health (Boston/Chelsea/Revere/Winthrop)	23,343	10,105	909	814	65	48
Blue Hills Community Health Alliance (Greater Quincy)	4,726	4,723	337	101	20	17
Four (For) Communities (Holyoke, Chicopee, Ludlow, Westfield)	566	1,934	162	226	10	10
Greater Brockton Community Health Network	2,226	3,152	273	207	13	12
South Shore Community Partners in Prevention (Plymouth)	772	2,441	161	58	4	2
Greater Attleboro-Taunton Health & Education Response	1,762	3,350	226	148	15	14
Partners for a Healthier Community (Fall River)	1,653	1,575	144	173	10	10
Greater New Bedford Health & Human Services Coalition	2,018	2,337	167	237	15	7
Cape and Islands Community Health Network	1,909	2,290	148	125	12	8

1. Births occurring in a geographical place (state, city/town) regardless of the residency of the mother. See Glossary for more details. 2. Births to mothers who report their usual place of residence as a particular geographical place (state, city/town). See Glossary for more details. 3. Less than 2,500 grams (5.5 lbs.). 4. Death of a child whose age is less than one year. 5. Death of a child whose age is less than 28 days.

APPENDIX

TECHNICAL NOTES

1. DATA AVAILABILITY

This publication and other Department of Public Health publications and materials can be accessed on the Internet at:

http://www.state.ma.us/dph/pubstats.htm

Detailed information on 2002 births in Massachusetts, as well as access to other Department of Public Health data, is available on the Department's free, Internet-accessible data warehouse, **MassCHIP**. To register as a user, visit the MassCHIP website at http://masschip.state.ma.us, or call 1-888-MASCHIP (within MA only) or (617) 988-3359.

2. DATA CAUTIONS

Limitations of small numbers:
Cells in some tables in this publication, and particularly those tables specific to the individual cities and towns, contain small numbers. Rates and proportions based on less than five observations are suppressed, and trends based upon small numbers should be interpreted cautiously.

Differences with previously published data
Numbers and rates in this publication may differ from those contained in previous reports because of updates of birth and death certificate files, or release of the most up-to-date population estimates for a given year (see Technical Note #4 for details on population files).

Self-reported data
Many items used in this publication, such as maternal smoking, education, and race/ethnicity are self-reported, and are subject to the usual limitations of this type of information.

3. CHANGES IN THE COLLECTION OF RACE AND ETHNICITY INFORMATION

Assignment of an Infant's Race/Ethnicity
Prior to 1989, the race/ethnicity of an infant was assigned by combining information on the race/ethnicity of the mother and the race/ethnicity of the father. Since 1989, Massachusetts has followed the recommendation of the National Center for Health Statistics of classifying births according to the self-reported race/ethnicity of the mother. Therefore, beginning in 1989, the race/ethnicity of an infant is identical to the self-reported race/ethnicity of the infant's mother.

Addition of Information on Hispanic Ethnicity
Beginning in 1986, an identifier for Hispanic ethnicity was added to the birth certificate; in 1989, an identifier for Hispanic ethnicity was added to the death certificate. Prior to these changes, most infants and mothers of Hispanic ethnicity were included with whites and it was not possible to accurately calculate Hispanic-specific rates of natality and mortality.

4. POPULATION ESTIMATES

The source of the 2000 population estimates for Massachusetts is the Massachusetts Department of Public Health (DPH) Race-Allocated Census 2000 Estimates (MRACE) file. This file is based upon the U.S. Census 2000 SF1 file (released June, 2001) for Massachusetts, which contains data on population and housing for the 351 towns, 14 counties, and the state overall.

The MRACE file was derived from the Census 2000 file by allocating persons who indicated “some other race” or multiple races to the conventional DPH race categories: “White”, “Black or African American”, “Asian,” “Native American,” and "Hispanic." In Census 2000, unlike previous censuses, respondents were able to classify themselves by Hispanic ethnicity and by single or multi-race categories, including “some other race.” In order to make the DPH population 2000 file consistent with previous years’ population files, the MRACE file maintains the prior mutually exclusive race and Hispanic categories.

Population-based rates between 1991 and 1999 in this publication were calculated as follows:

- 1991-1998: Massachusetts Institute for Social and Economic Research (MISER) Population Estimates;
- 1999: Massachusetts Dept. of Public Health 1999 Population Estimate, which is a linear interpolation between the preliminary DPH Population 2000 file and the MISER 1998 Population Estimate.

5. DEFINITION AND IDENTIFICATION OF PREGNANCY-ASSOCIATED AND MATERNAL DEATHS

There are various ways to categorize a woman who dies during pregnancy, childbirth, or in the postpartum period. Two components are included in every definition of maternal death: the timing of death in relation to the pregnancy and birth, and the causes of death. Two definitions are used in this report: maternal death and pregnancy-associated death. The traditional definition of maternal death can be found in the World Health Organization’s *International Classification of Diseases* (ICD). WHO defines maternal deaths as women who died during pregnancy or within 42 days of delivery from causes related to pregnancy, childbirth or its management. Deaths from accidental or incidental causes are excluded. The National Center for Health Statistics uses the WHO definition to conduct surveillance on maternal death in the US.

Maternal deaths are restricted to women whose underlying causes of death were coded with ICD-9 codes 630-676 (from 1990-1998), or with ICD-10 codes O00-O99 (1999 forward).

The definition of a pregnancy-associated death was developed in 1986 by the Maternal Mortality Study Group, which is jointly chaired by American College of Obstetrics and Gynecology (ACOG) and the Centers for Disease Control and Prevention (CDC). Pregnancy-associated deaths differ from maternal deaths in two fundamental ways: all deaths are included irrespective of cause, and deaths that occurred between 42 and 364 days after delivery also are included.

6. CHANGE IN MEASUREMENT OF ADEQUACY OF PRENATAL CARE

Beginning with last year’s publication (*Massachusetts Births 2001*), adequacy of prenatal care is being measured using a new method. The Adequacy of Prenatal Care Utilization (APNCU) Index, developed by Dr. Milton Kotelchuck, has replaced the Kessner Index, which has been used to date in the *Advanced Data Births* and *Massachusetts Births* series. The APNCU Index is the standard used in Healthy People 2010 and by the majority of states. It improves upon the Kessner Index in various ways, the most important being the ability to distinguish between inadequate prenatal care due to the timing of initiation and inadequate care due to insufficient prenatal care visits. The APNCU Index also improves upon the Kessner Index by correcting some of its principal faults. First, the APNCU Index more accurately assesses adequacy of visits for term pregnancies; the Kessner Index characterizes 9 or more visits as adequate, due to an early computer database limitation, which only allowed for a single-digit number to record prenatal care visits. Other faults of the Kessner Index include its bias towards measurement of adequacy of initiation of care, and its various computational algorithms due to inadequate initial documentation.

Table 1 of this report provides a comparison of data on adequacy of prenatal care from 1996-2002 as measured by these two separate indices. Below are the definitions for the APNCU Index categories and its two component indices (initiation and received services), and the definition of the Kessner Index categories. Also below is a short summary of the major differences in classification of adequacy of prenatal care using the Kessner Index and the APNCU Index.

Adequacy of Prenatal Care Utilization (APNCU) Index: Definition of Categories

Category	Month Prenatal Care Began	% of Expected[1] Prenatal Care Visits
Adequate Intensive	1, 2, 3, or 4	110% or more
Adequate Basic	1, 2, 3, or 4	80 – 109%
Intermediate	1, 2, 3, or 4	50 – 79%
Inadequate	Month 5 or later	Less than 50%
Unknown	Prenatal care information not recorded	

Component Indices of the APNCU Index: Definitions of Categories

Adequacy of Initiation Index

Category	Month Prenatal Care Began
Adequate Intensive	1 or 2
Adequate Basic	3 or 4
Intermediate	5 or 6
Inadequate	Month 7 or later, or no PNC
Unknown	Prenatal care initiation information not recorded

Adequacy of Received Services (Visits) Index

Category	% of Expected[1] Prenatal Care Visits
Adequate Intensive	110% or more
Adequate Basic	80 – 109%
Intermediate	50 – 79%
Inadequate	Less than 50%
Unknown	Information on prenatal care visits not recorded

Kessner Index of Adequacy of Prenatal Care: Definition of Categories

Category	Trimester Care Began	Number of Visits
Adequate	1	9 or more
Intermediate	1	5-8
	2	5 or more
Inadequate	1	1-4
	2	1-4
	3	1 or more
No prenatal care	--	0
Unknown	Unknown	Unknown

Summary of Major Differences in Categorization of Adequacy of Prenatal Care between the Kessner Index and the APNCU Index

The two different methods used in the Kessner Index and APNCU Index to calculate adequacy of prenatal care can result in differences in how each one classifies adequacy of prenatal care. These differences only occur under certain conditions, not in all cases (see "Explanation" column).

The Kessner Index classifies prenatal care as…	… but the APNCU Index classifies prenatal care as …	Explanation
Intermediate	Adequate Basic	This is primarily due to the fact that the APNCU Index allows for prenatal care in the 4th month of pregnancy to be considered adequate if the mother received 80-109% of expected visits, whereas the Kessner Index only allows for care begun in the first trimester (months 1-3) to be considered adequate.
Intermediate	Inadequate	This is primarily due to the fact that the APNCU categorizes any prenatal care beginning after month 4 as "inadequate" whereas the Kessner Index allows for care beginning in months 5 or 6 with 5 or more visits to be "intermediate."
Adequate	Intermediate	This is primarily due to the consideration of "expected" visits (based on when the mother initiated care and the length of gestation) using the APNCU Index, which bases expected visits on the ACOG recommendations,[1] which can be as high as 14 visits if a gestational period is 40 weeks, whereas the Kessner Index considers 9 visits sufficient in all cases.
Adequate	Adequate Intensive	The APNCU Index added an "Adequate Intensive" category, which is not used in the Kessner Index. This allows analysis of situations in which more than normal care is received (e.g. women with high risk conditions, pregnancy complications).

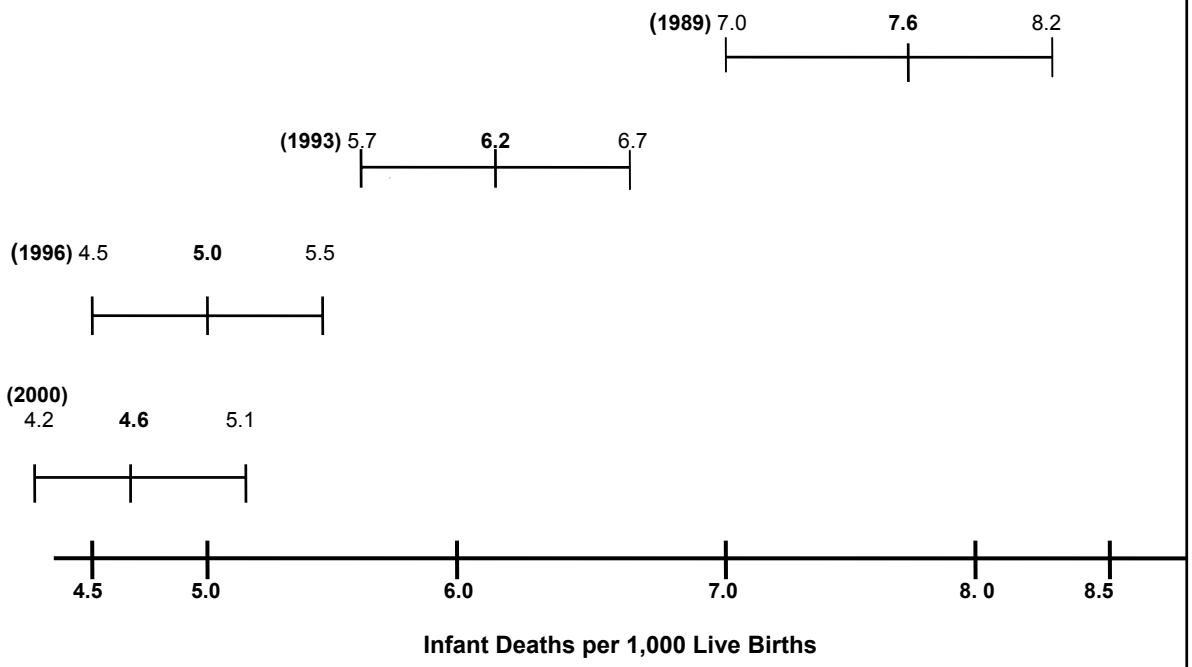
1. The number of "expected" visits is determined based on standards set by the American College of Obstetricians and Gynecologists (ACOG).

CONFIDENCE INTERVALS AND INFANT MORTALITY RATES

Beginning in the 1992 Advance Data: Births publication, 95% confidence intervals were added to the calculation of infant mortality rates (IMRs). The confidence interval (CI) provides a measure of stability of the IMR and a basis for comparing rates to determine if they are statistically different. Rates can be compared for the same group in different years, or for different groups in the same year. The width of the CI reflects the stability of the IMR. For example, a narrow CI reflects high stability, and a wide interval reflects low stability. If the CIs around two IMRs being compared do not overlap, the difference between the two rates is statistically significant. The following table and chart illustrate the concept of statistically significant differences using actual data from 1989, 1993, 1996, and 2000.

Comparison of Infant Mortality Rates and Confidence Intervals for Selected Years

Year	IMR (per 1,000 births)	95% Confidence Interval
1989	7.6	(7.0-8.2)
1993	6.2	(5.7-6.7)
1996	5.0	(4.5-5.5)
2000	4.6	(4.2-5.1)



The difference between the 1993 IMR and 1996 IMR is statistically significant -- the confidence intervals do not overlap. The same is true for the differences between the 1989 IMR and each annual IMR for 1993, 1996, and 2000. However, the difference between the 1996 and 2000 IMRs is not statistically significant, since their confidence intervals overlap.

95% Confidence Intervals for Infant Mortality Rates, by Race and Hispanic Ethnicity, Massachusetts: 1990-2002

	Total[1]		White non-Hispanic		Black non-Hispanic		Hispanic		Asian	
Year	n	Rate[2] (C.I).	n	Rate[2] (C.I).	n	Rate[2] (C.I).	n	Rate[2] (C.I).	n	Rate[2] (C.I).
1990	649	**7.0** (6.5, 7.5)	442	**6.1** (5.5, 6.7)	98	**13.7** (11.0, 16.4)	77	**9.1** (7.1, 11.1)	24	**7.0** (4.2, 10.0)
1991	577	**6.5** (6.0, 7.0)	381	**5.5** (4.9, 6.1)	101	**15.0** (12.1, 17.9)	80	**9.4** (7.3, 11.5)	14	**4.2** (2.0, 6.4)
1992	569	**6.5** (6.0, 7.0)	371	**5.5** (4.9, 6.1)	110	**16.4** (13.4, 19.4)	67	**7.9** (6.0, 9.8)	16	**4.9** (2.5, 7.3)
1993	523	**6.2** (5.7, 6.7)	346	**5.3** (4.7, 5.9)	84	**13.1** (10.3, 15.9)	77	**9.3** (7.2, 11.4)	13	**3.9** (1.8, 6.0)
1994	499	**6.0** (5.4, 6.5)	343	**5.3** (4.7, 5.9)	79	**12.6** (9.8, 15.4)	64	**7.6** (5.7, 9.4)	8	**2.4** (0.7, 4.0)
1995	419	**5.1** (4.6, 5.6)	275	**4.4** (3.8, 4.9)	65	**11.1** (8.4, 13.8)	58	**7.2** (5.3, 9.0)	19	**5.5** (3.0, 8.0)
1996	403	**5.0** (4.5, 5.5)	289	**4.7** (4.1, 5.2)	63	**11.4** (8.6, 14.2)	40	**5.1** (3.5, 6.7)	8	**2.2** (0.7, 3.7)
1997	425	**5.3** (4.8, 5.8)	294	**4.8** (4.2, 5.3)	64	**11.7** (8.8, 14.5)	55	**6.7** (4.9, 8.4)	10	**2.6** (1.0, 4.2)
1998	414	**5.1** (4.6, 5.6)	294	**4.6** (4.1, 5.2)	64	**10.6** (7.9, 13.3)	55	**6.7** (5.0, 8.4)	10	**2.7** (1.0, 4.3)
1999	418	**5.2** (4.7, 5.7)	285	**4.7** (4.2, 5.3)	72	**12.3** (9.5, 15.1)	49	**5.5** (4.0, 7.1)	8	**1.9** (0.6, 3.3)
2000	377	**4.6** (4.2, 5.1)	232	**3.8** (3.4, 4.3)	74	**12.8** (9.9, 15.7)	48	**5.2** (3.7, 6.6)	19	**4.1** (2.2, 5.9)
2001	407	**5.0** (4.5, 5.5)	245	**4.1** (3.6, 4.7)	71	**12.1** (9.3, 14.9)	69	**7.3** (5.6, 9.1)	15	**3.1** (1.6, 4.7)
2002	397	**4.9** (4.4, 5.4)	239	**4.1** (3.6, 4.6)	69	**11.6** (8.9, 14.3)	67	**7.0** (5.3, 8.7)	16	**3.0** (1.5, 4.5)

[1]Deaths of infants of unknown race are excluded except for the total calculation. For rate computations, births of infants of unknown race are allocated into the race categories according to the distribution of births of known race.
[2]Rates are expressed per 1,000 live births.

In 2002, the black non-Hispanic infant mortality rate was 11.6 deaths per 1,000 live births (95% CI: 8.9, 14.3), which was almost three times greater than the white non-Hispanic infant mortality rate of 4.1 (95% CI: 3.6, 4.6). The difference in these two rates was statistically significant. The rate of infant mortality for black non-Hispanics was also significantly elevated compared to both Hispanics (95% CI: 5.3, 8.7) and Asians (95% CI: 1.5, 4.5) in 2002.

DEFINITION OF RATES

Age-Specific Birth Rate

The number of children born to women in a specific age group divided by the population of women in that specific age group, multiplied by 1,000.

$$\text{Age-Specific Birth Rate} = \frac{\text{Number of births to females ages X to Y years}}{\text{Number of females ages X to Y years in the population}} \times 1{,}000$$

Birth Rate

(See Age-Specific Birth Rate, Crude Birth Rate, Fertility Rate, and Teen Birth Rate)

Cesarean Section Rates

$$\text{Total C-section rate} = \frac{\text{Number of C-section births}}{\text{Number of occurrence births}} \times 100$$

$$\text{Primary C-section rate} = \frac{\text{Number of primary C-section births}}{\text{[Number of occurrence births-(number of repeat C-section births+VBACs)]}} \times 100$$

$$\text{Repeat C-section rate} = \frac{\text{Number of repeat C-section births}}{\text{(Number of repeat C-section births+number of VBACs)}} \times 100$$

$$\text{VBAC rate} = \frac{\text{Number of VBACs}}{\text{(Number of repeat C-section births+number of VBACs)}} \times 100$$

Crude Birth Rate

$$\text{Crude Birth rate} = \frac{\text{Number of resident live births}}{\text{Total resident population}} \times 1{,}000$$

Fertility Rate (sometimes referred to as "Birth Rate")

$$\text{Fertility rate} = \frac{\text{Number of births to females ages 15-44 years}}{\text{Number of females ages 15-44 years in the population}} \times 1{,}000$$

Fetal Mortality Rate

$$\text{Fetal Mortality Rate} = \frac{\text{Number of fetal deaths}}{\text{Number of fetal deaths plus live births in the same year}} \times 1{,}000$$

Infant Mortality Rate (IMR)
The death rate among infants less than one year old, per 1,000 live births.

$$\text{Infant Mortality Rate} = \frac{\text{Number of resident deaths of infants less than one year old in a year}}{\text{Number of resident live births in the same year}} \times 1{,}000$$

Maternal Mortality Ratio (MMR)
The number of maternal deaths per 100,000 live occurrence births. The term "ratio" is used instead of "rate" in this report because the numerator includes some maternal deaths that were not related to live-born infants and thus were not included in the denominator.

$$\text{Maternal Mortality Ratio (MMR)} = \frac{\text{Number of maternal deaths}}{\text{Number of occurrence live births in the same year}} \times 100{,}000$$

Neonatal Mortality Rate (NMR)
The death rate among infants less than 28 days of age, per 1,000 live births.

$$\text{Neonatal Mortality Rate} = \frac{\text{Number of resident deaths of infants less than 28 days of age in a year}}{\text{Number of resident live births in the same year}} \times 1{,}000$$

Perinatal Mortality Rate

$$\text{Perinatal Mortality Rate} = \frac{\text{Number of fetal deaths from 28 weeks gestation plus infant deaths (less than 7 days old)}}{\text{Number of fetal deaths plus live births in the same year}} \times 1{,}000$$

Post Neonatal Mortality Rate
The death rate among infants 28 days of age to less than one year old, per 1,000 live births.

$$\text{Post Neonatal Mortality Rate} = \frac{\text{Number of resident deaths of infants 28 days of age to less than one year of age in a year}}{\text{Number of resident live births in the same year}} \times 1{,}000$$

Pregnancy-Associated Mortality Ratio (PAMR)

The number of pregnancy-associated deaths per 100,000 live occurrence births. The term "ratio" is used instead of rate in this report because the numerator includes some maternal deaths that were not related to live-born infants and thus were not included in the denominator.

$$\text{Pregnancy-Associated Mortality Ratio (PAMR)} = \frac{\text{Number of pregnancy-associated deaths}}{\text{Number of occurrence live births in the same year}} \times 100{,}000$$

Teen Birth Rate

$$\text{Teen birth rate} = \frac{\text{Number of births to females ages 15-19 years old}}{\text{Number of females ages 15-19 years old in the population}} \times 1{,}000$$

Total Rate of Change

Total rate of change between two numbers or rates is expressed as a percentage in this report (e.g. The Massachusetts birth rate decreased by 12% from 1990 to 1996.):

$$\frac{Pn - Po}{Po} \times 100$$

Where,

Pn = rate during later time period
Po = rate during earlier time period

Population Estimates for Massachusetts Communities, 2000

TOWN NAME	COUNTY	CHNA	POPULATION
Abington	Plymouth	22	14,605
Acton	Middlesex	15	20,331
Acushnet	Bristol	26	10,161
Adams	Berkshire	1	8,809
Agawam	Hampden	4	28,144
Alford	Berkshire	1	399
Amesbury	Essex	12	16,450
Amherst	Hampshire	3	34,874
Andover	Essex	11	31,247
Aquinnah (Gay Head)	Dukes	27	344
Arlington	Middlesex	17	42,389
Ashburnham	Worcester	9	5,546
Ashby	Middlesex	9	2,845
Ashfield	Franklin	2	1,800
Ashland	Middlesex	7	14,674
Athol	Worcester	2	11,299
Attleboro	Bristol	24	42,068
Auburn	Worcester	8	15,901
Avon	Norfolk	22	4,443
Ayer	Middlesex	9	7,287
Barnstable	Barnstable	27	47,821
Barre	Worcester	9	5,113
Becket	Berkshire	1	1,755
Bedford	Middlesex	15	12,595
Belchertown	Hampshire	3	12,968
Bellingham	Norfolk	6	15,314
Belmont	Middlesex	17	24,194
Berkley	Bristol	24	5,749
Berlin	Worcester	9	2,380
Bernardston	Franklin	2	2,155
Beverly	Essex	13	39,862
Billerica	Middlesex	10	38,981
Blackstone	Worcester	6	8,804
Blandford	Hampden	4	1,214
Bolton	Worcester	9	4,148
Boston	Suffolk	19	589,141
Bourne	Barnstable	27	18,721
Boxborough	Middlesex	15	4,868
Boxford	Essex	12	7,921
Boylston	Worcester	8	4,008
Braintree	Norfolk	20	33,828
Brewster	Barnstable	27	10,094
Bridgewater	Plymouth	22	25,185
Brimfield	Hampden	5	3,339
Brockton	Plymouth	22	94,304
Brookfield	Worcester	5	3,051
Brookline	Norfolk	19	57,107
Buckland	Franklin	2	1,991
Burlington	Middlesex	15	22,876
Cambridge	Middlesex	17	101,355
Canton	Norfolk	20	20,775
Carlisle	Middlesex	15	4,717
Carver	Plymouth	23	11,163
Charlemont	Franklin	2	1,358
Charlton	Worcester	5	11,263
Chatham	Barnstable	27	6,625
Chelmsford	Middlesex	10	33,858
Chelsea	Suffolk	19	35,080
Cheshire	Berkshire	1	3,401
Chester	Hampden	21	1,308
Chesterfield	Hampshire	3	1,201
Chicopee	Hampden	21	54,653
Chilmark	Dukes	27	843
Clarksburg	Berkshire	1	1,686
Clinton	Worcester	9	13,435
Cohasset	Norfolk	20	7,261
Colrain	Franklin	2	1,813

TOWN NAME	COUNTY	CHNA	POPULATION
Concord	Middlesex	15	16,993
Conway	Franklin	2	1,809
Cummington	Hampshire	3	978
Dalton	Berkshire	1	6,892
Danvers	Essex	14	25,212
Dartmouth	Bristol	26	30,666
Dedham	Norfolk	18	23,464
Deerfield	Franklin	2	4,750
Dennis	Barnstable	27	15,973
Dighton	Bristol	24	6,175
Douglas	Worcester	6	7,045
Dover	Norfolk	18	5,558
Dracut	Middlesex	10	28,562
Dudley	Worcester	5	10,036
Dunstable	Middlesex	10	2,829
Duxbury	Plymouth	23	14,248
East Bridgewater	Plymouth	22	12,974
East Brookfield	Worcester	5	2,097
East Longmeadow	Hampden	4	14,100
Eastham	Barnstable	27	5,453
Easthampton	Hampshire	3	15,994
Easton	Bristol	22	22,299
Edgartown	Dukes	27	3,779
Egremont	Berkshire	1	1,345
Erving	Franklin	2	1,467
Essex	Essex	13	3,267
Everett	Middlesex	16	38,037
Fairhaven	Bristol	26	16,159
Fall River	Bristol	25	91,938
Falmouth	Barnstable	27	32,660
Fitchburg	Worcester	9	39,102
Florida	Berkshire	1	676
Foxborough	Norfolk	7	16,246
Framingham	Middlesex	7	66,910
Franklin	Norfolk	6	29,560
Freetown	Bristol	26	8,472
Gardner	Worcester	9	20,770
Georgetown	Essex	12	7,377
Gill	Franklin	2	1,363
Gloucester	Essex	13	30,273
Goshen	Hampshire	3	921
Gosnold	Dukes	27	86
Grafton	Worcester	8	14,894
Granby	Hampshire	3	6,132
Granville	Hampden	4	1,521
Great Barrington	Berkshire	1	7,527
Greenfield	Franklin	2	18,168
Groton	Middlesex	9	9,547
Groveland	Essex	12	6,038
Hadley	Hampshire	3	4,793
Halifax	Plymouth	23	7,500
Hamilton	Essex	13	8,315
Hampden	Hampden	4	5,171
Hancock	Berkshire	1	721
Hanover	Plymouth	23	13,164
Hanson	Plymouth	23	9,495
Hardwick	Worcester	9	2,622
Harvard	Worcester	9	5,981
Harwich	Barnstable	27	12,386
Hatfield	Hampshire	3	3,249
Haverhill	Essex	12	58,969
Hawley	Franklin	2	336
Heath	Franklin	2	805
Hingham	Plymouth	20	19,882
Hinsdale	Berkshire	1	1,872
Holbrook	Norfolk	22	10,785
Holden	Worcester	8	15,621

Population Estimates for Massachusetts Communities, 2000, continued

TOWN NAME	COUNTY	CHNA	POPULATION
Holland	Hampden	5	2,407
Holliston	Middlesex	7	13,801
Holyoke	Hampden	21	39,838
Hopedale	Worcester	6	5,907
Hopkinton	Middlesex	7	13,346
Hubbardston	Worcester	9	3,909
Hudson	Middlesex	7	18,113
Hull	Plymouth	20	11,050
Huntington	Hampshire	21	2,174
Ipswich	Essex	13	12,987
Kingston	Plymouth	23	11,780
Lakeville	Plymouth	24	9,821
Lancaster	Worcester	9	7,380
Lanesborough	Berkshire	1	2,990
Lawrence	Essex	11	72,043
Lee	Berkshire	1	5,985
Leicester	Worcester	8	10,471
Lenox	Berkshire	1	5,077
Leominster	Worcester	9	41,303
Leverett	Franklin	2	1,663
Lexington	Middlesex	15	30,355
Leyden	Franklin	2	772
Lincoln	Middlesex	15	8,056
Littleton	Middlesex	15	8,184
Longmeadow	Hampden	4	15,633
Lowell	Middlesex	10	105,167
Ludlow	Hampden	21	21,209
Lunenburg	Worcester	9	9,401
Lynn	Essex	14	89,050
Lynnfield	Essex	14	11,542
Malden	Middlesex	16	56,340
Manchester	Essex	13	5,228
Mansfield	Bristol	24	22,414
Marblehead	Essex	14	20,377
Marion	Plymouth	26	5,123
Marlborough	Middlesex	7	36,255
Marshfield	Plymouth	23	24,324
Mashpee	Barnstable	27	12,946
Mattapoisett	Plymouth	26	6,268
Maynard	Middlesex	7	10,433
Medfield	Norfolk	7	12,273
Medford	Middlesex	16	55,765
Medway	Norfolk	6	12,448
Melrose	Middlesex	16	27,134
Mendon	Worcester	6	5,286
Merrimac	Essex	12	6,138
Methuen	Essex	11	43,789
Middleborough	Plymouth	24	19,941
Middlefield	Hampshire	3	542
Middleton	Essex	11	7,744
Milford	Worcester	6	26,799
Millbury	Worcester	8	12,784
Millis	Norfolk	7	7,902
Millville	Worcester	6	2,724
Milton	Norfolk	20	26,062
Monroe	Franklin	2	93
Monson	Hampden	4	8,359
Montague	Franklin	2	8,489
Monterey	Berkshire	1	934
Montgomery	Hampden	4	654
Mt. Washington	Berkshire	1	130
Nahant	Essex	14	3,632
Nantucket	Nantucket	27	9,520
Natick	Middlesex	7	32,170
Needham	Norfolk	18	28,911
New Ashford	Berkshire	1	247
New Bedford	Bristol	26	93,768
New Braintree	Worcester	9	927
New Marlborough	Berkshire	1	1,494
New Salem	Franklin	2	929
Newbury	Essex	12	6,717
Newburyport	Essex	12	17,189
Newton	Middlesex	18	83,829
Norfolk	Norfolk	7	10,460
North Adams	Berkshire	1	14,681
North Andover	Essex	11	27,202
North Attleboro	Bristol	24	27,143
North Brookfield	Worcester	5	4,683
North Reading	Middlesex	16	13,837
Northampton	Hampshire	3	28,978
Northborough	Worcester	7	14,013
Northbridge	Worcester	6	13,182
Northfield	Franklin	2	2,951
Norton	Bristol	24	18,036
Norwell	Plymouth	20	9,765
Norwood	Norfolk	20	28,587
Oak Bluffs	Dukes	27	3,713
Oakham	Worcester	9	1,673
Orange	Franklin	2	7,518
Orleans	Barnstable	27	6,341
Otis	Berkshire	1	1,365
Oxford	Worcester	5	13,352
Palmer	Hampden	4	12,497
Paxton	Worcester	8	4,386
Peabody	Essex	14	48,129
Pelham	Hampshire	3	1,403
Pembroke	Plymouth	23	16,927
Pepperell	Middlesex	9	11,142
Peru	Berkshire	1	821
Petersham	Worcester	2	1,180
Phillipston	Worcester	2	1,621
Pittsfield	Berkshire	1	45,793
Plainfield	Hampshire	3	589
Plainville	Norfolk	7	7,683
Plymouth	Plymouth	23	51,701
Plympton	Plymouth	23	2,637
Princeton	Worcester	9	3,353
Provincetown	Barnstable	27	3,431
Quincy	Norfolk	20	88,025
Randolph	Norfolk	20	30,963
Raynham	Bristol	24	11,739
Reading	Middlesex	16	23,708
Rehoboth	Bristol	24	10,172
Revere	Suffolk	19	47,283
Richmond	Berkshire	1	1,604
Rochester	Plymouth	26	4,581
Rockland	Plymouth	23	17,670
Rockport	Essex	13	7,767
Rowe	Franklin	2	351
Rowley	Essex	12	5,500
Royalston	Worcester	2	1,254
Russell	Hampden	4	1,657
Rutland	Worcester	9	6,353
Salem	Essex	14	40,407
Salisbury	Essex	12	7,827
Sandisfield	Berkshire	1	824
Sandwich	Barnstable	27	20,136
Saugus	Essex	14	26,078
Savoy	Berkshire	1	705
Scituate	Plymouth	20	17,863
Seekonk	Bristol	24	13,425
Sharon	Norfolk	20	17,408
Sheffield	Berkshire	1	3,335
Shelburne	Franklin	2	2,058
Sherborn	Middlesex	7	4,200
Shirley	Middlesex	9	6,373

Population Estimates for Massachusetts Communities, 2000, continued

TOWN NAME	COUNTY	CHNA	POPULATION
Shrewsbury	Worcester	8	31,640
Shutesbury	Franklin	2	1,810
Somerset	Bristol	25	18,234
Somerville	Middlesex	17	77,478
South Hadley	Hampshire	3	17,196
Southampton	Hampshire	3	5,387
Southborough	Worcester	7	8,781
Southbridge	Worcester	5	17,214
Southwick	Hampden	4	8,835
Spencer	Worcester	5	11,691
Springfield	Hampden	4	152,082
Sterling	Worcester	9	7,257
Stockbridge	Berkshire	1	2,276
Stoneham	Middlesex	16	22,219
Stoughton	Norfolk	22	27,149
Stow	Middlesex	7	5,902
Sturbridge	Worcester	5	7,837
Sudbury	Middlesex	7	16,841
Sunderland	Franklin	2	3,777
Sutton	Worcester	6	8,250
Swampscott	Essex	14	14,412
Swansea	Bristol	25	15,901
Taunton	Bristol	24	55,976
Templeton	Worcester	9	6,799
Tewksbury	Middlesex	10	28,851
Tisbury	Dukes	27	3,755
Tolland	Hampden	4	426
Topsfield	Essex	13	6,141
Townsend	Middlesex	9	9,198
Truro	Barnstable	27	2,087
Tyngsborough	Middlesex	10	11,081
Tyringham	Berkshire	1	350
Upton	Worcester	6	5,642
Uxbridge	Worcester	6	11,156
Wakefield	Middlesex	16	24,804
Wales	Hampden	5	1,737
Walpole	Norfolk	7	22,824
Waltham	Middlesex	18	59,226
Ware	Hampshire	3	9,707
Wareham	Plymouth	26	20,335
Warren	Worcester	5	4,776
Warwick	Franklin	2	750
Washington	Berkshire	1	544
Watertown	Middlesex	17	32,986
Wayland	Middlesex	7	13,100
Webster	Worcester	5	16,415
Wellesley	Norfolk	18	26,613
Wellfleet	Barnstable	27	2,749
Wendell	Franklin	2	986
Wenham	Essex	13	4,440
West Boylston	Worcester	8	7,481
West Bridgewater	Plymouth	22	6,634
West Brookfield	Worcester	5	3,804
West Newbury	Essex	12	4,149
West Springfield	Hampden	4	27,899
West Stockbridge	Berkshire	1	1,416
West Tisbury	Dukes	27	2,467
Westborough	Worcester	7	17,997
Westfield	Hampden	21	40,072
Westford	Middlesex	10	20,754
Westhampton	Hampshire	3	1,468
Westminster	Worcester	9	6,907
Weston	Middlesex	18	11,469
Westport	Bristol	25	14,183
Westwood	Norfolk	18	14,117
Weymouth	Norfolk	20	53,988
Whately	Franklin	2	1,573
Whitman	Plymouth	22	13,882
Wilbraham	Hampden	4	13,473
Williamsburg	Hampshire	3	2,427
Williamstown	Berkshire	1	8,424
Wilmington	Middlesex	15	21,363
Winchendon	Worcester	9	9,611
Winchester	Middlesex	15	20,810
Windsor	Berkshire	1	875
Winthrop	Suffolk	19	18,303
Woburn	Middlesex	15	37,258
Worcester	Worcester	8	172,648
Worthington	Hampshire	3	1,270
Wrentham	Norfolk	7	10,554
Yarmouth	Barnstable	27	24,807

1. Massachusetts Department of Public Health (DPH) Race-Allocated Census 2000 Estimates (MRACE), released January, 2002.

Population Estimates for Massachusetts Community Health Network Areas (CHNA) and Counties, 2000[1]

CHNA	POPULATION	COUNTY	POPULATION
1. Community Health Network of Berkshire County	134,953	Barnstable	222,230
2. Upper Valley Health Web (Franklin County)	86,889	Berkshire	134,953
3. Partnership for Health in Hampshire County (Northampton)	150,077	Bristol	534,678
4. The Community Health Connection (Springfield)	291,665	Dukes	14,987
5. Community Health Network of Southern Worcester County	113,702	Essex	723,419
6. Community Partners for Health (Milford)	152,117	Franklin	71,535
7. Community Health Network of Greater Metro West (Framingham)	374,478	Hampden	456,228
8 .Community Wellness Coalition (Worcester)	289,834	Hampshire	152,251
9. Fitchburg/Gardner Community Health Network	250,362	Middlesex	1,465,396
10. Greater Lowell Community Health Network	270,083	Nantucket	9,520
11. Greater Lawrence Community Health Network	182,025	Norfolk	650,308
12. Greater Haverhill Community Health Network	144,275	Plymouth	472,822
13. Community Health Network North (Beverly/Gloucester)	118,280	Suffolk	689,807
14. North Shore Community Health Network	278,839	Worcester	750,963
15. Greater Woburn/Concord/Littleton Community Health Network	208,406		
16. North Suburban Health Alliance (Medford/Malden/Melrose)	261,844	**STATE**	**6,349,097**
17. Greater Cambridge/Somerville Community Health Network	278,402		
18. West Suburban Health Network (Newton/Waltham)	253,187		
19. Alliance for Community Health (Boston/Chelsea/Revere/Winthrop)	746,914		
20. Blue Hills Community Health Alliance (Greater Quincy)	365,457		
21. Four (For) Communities (Holyoke, Chicopee, Ludlow, Westfield)	159,254		
22. Greater Brockton Community Health Network	232,260		
23. South Shore Community Partners in Prevention (Plymouth)	180,609		
24. Greater Attleboro-Taunton Health & Education Response	242,659		
25. Partners for a Healthier Community (Fall River)	140,256		
26. Greater New Bedford Health & Human Services Coalition	195,533		
27. Cape and Islands Community Health Network	246,737		

1. Massachusetts Department of Public Health (DPH) Race-Allocated Census 2000 Estimates (MRACE), released January, 2002.

GLOSSARY

Adequacy of Prenatal Care Utilization (APNCU) Index
The Adequacy of Prenatal Care Utilization Index, developed by Dr. Milton Kotelchuck, is the measure used in this publication to classify the adequacy of prenatal care received by Massachusetts resident mothers. (*Please note: beginning with last year's publication, the Kessner Index was used to measure adequacy of prenatal care; please see definition for Kessner Index below.*) The APNCU Index has five categories (adequate intensive, adequate basic, intermediate, inadequate, and unknown), based on the month of pregnancy in which prenatal care begins and the percent of expected prenatal care visits for the time period during which a woman receives prenatal care services. Please see Technical Notes for more details.

Birthweight
The weight of an infant recorded at the time of delivery. It may be recorded in either pounds/ounces or grams. If recorded in pounds/ounces, it is converted to grams for use in this report.

1 pound = 453.6 grams
1,000 grams = 2 pounds and 3 ounces

Birthweight Categories

Normal birthweight (NBW):	An infant's weight of 2,500 grams (approximately 5.5 pounds) or more recorded at birth.
Low birthweight (LBW):	An infant's weight of less than 2,500 grams (5.5 pounds) recorded at birth.
Very low birthweight (VLBW):	An infant's weight of less than 1,500 grams (3.3 pounds) recorded at birth.

Cesarean Section or C-Section
Primary: A mother's first Cesarean section delivery.
Repeat: A Cesarean delivery that has been preceded by at least one Cesarean delivery.

Community Health Network Areas (CHNAs)
The Department of Public Health, in collaboration with health service providers, coalition members, and interested citizens, has designated 27 areas for community health planning. It is the Department's intention to foster in each of these areas the development of Community Health Networks -- consortia of health care providers, human service agencies, schools, churches, youth, parents, elders, advocacy groups, and individual consumers -- to address the health needs of the community. These community coalitions will participate in monitoring outcomes and progress of strategies and responses to those health needs.

It is hoped the Networks will mobilize around key health issues impacting the community, promote prevention efforts, enhance access to care, provide opportunities for more collaboration among agencies, and create a client-centered, outcome-oriented health service delivery system. Community Health Networks will also promote efficiency in service delivery by working to reduce duplication and overlap, and by identifying gaps in service.

Community Health Network Areas (cont.)

A Community Health Network Area (CHNA) is defined as an aggregation of cities and towns. In the current publication, we have presented some data by CHNA. To determine which cities and towns make up a particular CHNA, the table on pages 128-130 provides the appropriate CHNA code for each city and town.

The data published in this volume reflect the definitions of CHNAs instituted in January 1997 and the corresponding CHNA names.

Confidence Intervals

The confidence interval (CI) for the infant mortality rate (IMR) is a range of values that has a 95% chance of including the underlying risk of an infant death. Observed rates are subject to statistical variation; even if the underlying risk of infant death is identical in two subpopulations, the observed IMRs for the subpopulations may differ because of random variation. The confidence interval describes the precision of observed IMR as an estimate of the underlying risk of infant death, with a wider interval indicating less certainty about this estimate. The width of the interval reflects the size of the subpopulation and the number of infant deaths; smaller subpopulations with fewer infant deaths lead to wider confidence intervals.

Ethnicity

See the section in the Technical Notes of the Appendix entitled: "Changes in the Collection of Race and Ethnicity Information."

Fetal Death

A stillbirth delivered, extracted or expulsed, at 20 weeks gestation or more and / or weighs 350 grams or more.

Healthy Start

A Massachusetts-funded program providing services and financing for prenatal care to low-income pregnant women who lack health insurance, but do not qualify for Medicaid.

Infant

A child whose age is less than one year (365 days).

Infant Death

Death of a child whose age is less than one year.

Kessner Index (Adequacy of Prenatal Care)
A measure of adequacy of prenatal care, used in *Advance Data: Births* and *Massachusetts Births* publications prior to 2001. The Kessner Index classifies prenatal care as one of 5 categories (adequate, intermediate, inadequate, no prenatal care, and unknown), based on the trimester in which prenatal care began and the number of prenatal visits. The classification adjusts for gestational age to allow for proper classification of premature births, and is as follows:

Category	Trimester Care Began	Number of Visits
Adequate	1	9 or more
Intermediate	1	5-8
	2	5 or more
Inadequate	1	1-4
	2	1-4
	3	1 or more
No prenatal care	--	0
Unknown	Unknown	Unknown

Live Birth
A live birth is any infant who breathes or shows any other evidence of life (such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles) after separation from the mother's uterus, regardless of the duration of gestation.

Low Birthweight (LBW)
See Birthweight Categories.

Maternal Death
The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration or site of the pregnancy, from any cause related to or aggravated by pregnancy or its management, but not from accidental or incidental causes.

Mother's Birthplace
In this publication, birth characteristics are presented according to mother's birthplace: those who were born in the 50 states and District of Columbia, or "U.S. States / D.C."; those who were born in Puerto Rico, the US Virgin Islands, and Guam, or "Puerto Rico/U.S. Territories"; and those who were born outside of the U.S. and Puerto Rico/U.S. territories, or "Non-U.S.-Born".

Neonatal
Infants under 28 days of age.

Neonatal Death
Death of a child whose age is less than 28 days.

Non-U.S.-Born Women
See Mother's Birthplace.

Occurrence Birth
A birth occurring in the Commonwealth of Massachusetts, regardless of the residency of the mother. For individual cities/towns, an occurrence birth represents any birth occurring in that city/town, regardless of the residence of the mother. See Resident Birth.

Parity
The total number of live infants ever born to a woman, including the current birth.

Perinatal
Referring to the time period immediately before and after birth.

Perinatal Death
Death to a fetus of 28 weeks gestation or older or a live-born infant less than 7 days old.

Plurality
The number of births to a woman produced in the same gestational period. A singleton is the birth of one infant; twins represent the births of two infants, etc.

Post Neonatal
A child whose age is at least 28 days, but less than one year.

Post Neonatal Death
Death of a child whose age is at least 28 days, but less than one year.

Prenatal Care Source of Payment
Categories used in this publication include:

Public = Government programs including Commonhealth, Healthy Start, Medicaid/MassHealth, and Medicare (may be HMO or managed care), or free care;
Private = Commercial indemnity plan, commercial managed care (HMO, PPO, IPP, IPA, and other), or other private insurance;
Other = Worker's Compensation and other sources;
Self-paid.

Pregnancy-Associated Death
The death of a woman while pregnant or within one year of termination of pregnancy, irrespective of cause.

Race
See the section in the Technical Notes in the Appendix entitled: "Changes in the Collection of Race and Ethnicity Information."

Resident Birth
The birth of an infant whose mother reports that her usual place of residence is in Massachusetts. In Massachusetts, a resident is a person with a permanent address in one of the 351 cities or towns. Vital statistics data may be presented in terms either of residence or occurrence. All data in this publication, except all data in Tables 22, 23, 24, and selected data in Table 25 are resident data. Resident data include all events that occur to residents of the Commonwealth, wherever they occur. Occurrence data include all events that occur within the state, whether to residents or nonresidents. There is an exchange agreement among the 50 states, District of Columbia, Puerto Rico, Virgin Islands, Guam, and Canada that provides for exchange of copies of birth and death records. These records are used for statistical purposes only, and allow each state or province to track the births and deaths of its residents.

Vaginal Birth After Cesarean (VBAC)
A vaginal delivery of an infant to a mother who has had at least one prior Cesarean section delivery.

Very Low Birthweight (VLBW) -- See Birthweight Categories.

Massachusetts Birth Certificate: 2002

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AS REQUIRED BY GEN. LAWS, CHAP. 66, SECT. 4

The Commonwealth of Massachusetts
DEPARTMENT OF PUBLIC HEALTH
REGISTRY OF VITAL RECORDS AND STATISTICS
STANDARD CERTIFICATE OF LIVE BIRTH

STATE USE ONLY

1. RECORD NUMBER

768283

1A. CERTIFICATE NUMBER (DPH USE ONLY)

2. FACILITY NUMBER

22A. SOCIAL SECURITY CARD

INITIALS

22B. RESIDENT COPY

INITIALS

1. OCCURRENCE

R-101 • 100M • 10-98

CHILD

3. PLACE OF BIRTH — 3C. CITY/TOWN — 3B. COUNTY — 3A. FACILITY NAME-IF NOT IN FACILITY, NUMBER AND STREET

3D. REGISTERED NUMBER

NAME — 4A. FIRST — 4B. MIDDLE — 4C. LAST

5. SEX — 6A. PLURALITY — 6B. BIRTH ORDER — 7. TIME — 8. DATE OF BIRTH (Month, Day, Year)

SAMPLE

CERTIFIER

9A. NAME — 9B. TITLE

9C. CERTIFIER TYPE — 9D. LICENSE NUMBER

9E. NUMBER AND STREET — 9F. CITY/TOWN — 9G. STATE — 9H. ZIP CODE

MOTHER

NAME — 10A. FIRST — 10B. MIDDLE — 10C. LAST — 10D. MAIDEN SURNAME

BIRTHPLACE — 11A. CITY/TOWN — 11B. STATE/COUNTRY — 12. DATE OF BIRTH (Month, Day, Year)

RESIDENCE (Do not use mailing address) — 13A. NUMBER AND STREET — 13B. CITY/TOWN — 13C. COUNTY — 13D. STATE — 13E. ZIP CODE

FATHER

NAME — 14A. FIRST — 14B. MIDDLE — 14C. LAST

BIRTHPLACE — 15A. CITY/TOWN — 15B. STATE/COUNTRY — 16. DATE OF BIRTH (Month, Day, Year)

INFORMANT

17A. I (WE) CERTIFY THAT THE PERSONAL INFORMATION APPEARING ABOVE IS TRUE AND CORRECT. — 17B. RELATIONSHIP TO CHILD

17C. DATE SIGNED (Month, Day, Year) — 17D. MAILING ADDRESS (If different from item # 13 above) — NUMBER AND STREET — CITY — STATE — ZIP CODE

CLERK

18. DATE OF RECORD (Month, Day, Year) — 19. SUPPLEMENT FILED (Month, Day, Year) — 20. CLERK/REGISTRAR

21. DPH USE ONLY

Massachusetts Births 2002 Evaluation Form

TO OUR READERS:
In an attempt to better serve our users, we are enclosing this evaluation form. Please take the time to complete this questionnaire and return it to the address at the bottom of the page. Thank you.

What tables and charts do you find most useful?
What tables and charts do you find least useful?
Are there other tables and charts that you would like added to this publication? If yes, please describe them in detail.
Do you have other comments or suggestions?
Name (optional): **Address:** **(For those who received the publication by mail)** Is the mailing label address correct? If not, please correct the address. Thank you.

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2 Boylston St, 6th floor, Boston, MA 02116

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