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CESAREAN DELIVERY: COMPARING NEW JERSEY HOSPITALS

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JUSTIFICATION AND PURPOSE

Cesarean delivery of live-born infants has been on the rise for a decade in New Jersey, and the elective and non-elective use of this surgical procedure has been controversial for much longer. Comparisons between hospitals can be useful for assessing clinical practice and informing individual choices, but such comparisons are not simple. This report provides the hospital data within a systematic and interpretable context.

It is important to recognize that the risk of a cesarean delivery varies considerably according to characteristics of the mother and the pregnancy. Not all hospitals serve the same mix of women, in demographic and medical terms. To allow meaningful comparisons among hospitals with varying medical contexts, this report includes analysis of cesarean rates in a number of common contexts, and a standardized or *risk-adjusted* overall measure. Details are given in the "Data and Methods" section below. This analysis methodology follows from a previous analysis of statewide data that has been validated by academic peer review (Denk et al., 2006, Surveillance of Cesarean Section Deliveries, New Jersey, 1999-2004. *Birth: Issues in Perinatal Care* 33 (3), 203–209).

The appropriate use of cesarean delivery, and the reasons for its rapid growth, are currently the subject of much research and debate. For various reasons, we caution against treating the data in this report as a definitive "report card." Nevertheless, the data and observations presented here are meant to capture our best understanding of the data, and the limitations of that understanding. The New Jersey Department of Health and Senior Services (DHSS) continues to encourage and support the array of quality assurance mechanisms that already exist to promote safe and beneficial cesarean delivery practice.

The best way to explore the risks and benefits of cesarean delivery and to plan for a delivery that meets the needs and preferences of parents is an informed, extensive and ongoing conversation between parents and obstetric practitioners. We encourage expectant parents to use

this report and other information available from a wide variety of sources as background for that conversation.

Other reports that investigate cesarean delivery and its consequences in New Jersey can be found at http://nj.gov/health/fhs/professional/mchepi.shtml.

SOME EXPLANATORY OBSERVATIONS

To make valid comparisons among hospitals, statistical measures should be clinically comparable, directly predictive, comprehensive and reliable.

- ✓ *Clinically comparable*: statistics are based on consistent pools of cases that are medically homogeneous, or reflect similarly mixed populations of patients.
- ✓ *Directly predictive*: for an average person in a category identifiable in advance, we can give a meaningful prospective expectation of the probability that a cesarean delivery will occur.
- ✓ *Comprehensive*: categories and outcomes should represent a very large proportion of all cases.
- ✓ *Reliable*: minimal data quality standards should be observed, and limitations should be explicitly identified.

The following observations illustrate the importance of these criteria.

Comparing cesarean delivery rates within specific medical categories is important in considering the choices and risks relevant to an individual mother. Even among "standard" delivery situations—a singleton pregnancy (not twins or higher multiples), full term (at least 37 weeks) and a head-down position at delivery—cesarean risks differ for first-time mothers (*nulliparas*), those with one or more previous vaginal deliveries (*multiparas, primary cesareans*), and those who have ever previously had a cesarean delivery (*multiparas, repeat cesareans*). Women delivering preterm singletons or multiple gestations experience still different risks. In 2006 and 2008, the average risks in each category were:

Presentation	*History*	*Average Cesarean Delivery Rate*	
		2006	*2008*
Standard: singleton, at least 37 weeks, head-down position	First live birth	34%	35%
	All prior deliveries vaginal	11%	11%
	Any prior cesarean delivery	91%	93%
All plural births	No prior cesarean delivery	81%	82%
Preterm singleton	No prior cesarean delivery	29%	32%

In 2006 these categories accounted for 94% of all births and 87% of all cesarean deliveries; in 2008 they accounted for 95% of births and 88% of cesareans.

The proportion of *all* births in a given hospital that are cesarean deliveries (*total cesarean delivery rate*) may vary in part because the mix of patients among the categories is different for that hospital. Comparing outcomes across hospitals with different patient mixes therefore tends to obscure differences in medical practice that might have been clearly observed with a pool of identical cases. For example, a hospital that disproportionately serves women who have many children at a younger age will likely experience a lower total rate. A statistical tool called *risk adjustment* corrects some patient-mix differences. In the data that follows, we found that standardizing each hospital's patient mix can raise its risk-adjusted *cesarean delivery index* by as much as eight percentage points, or lower it as much as four points, compared to that hospital's unadjusted rate.

Since the late 1990s, the number of cesarean deliveries without any trial of labor has been growing faster than those after a trial of labor. Whether a trial of labor occurs before a cesarean delivery is often an important indicator about medical factors associated with the pregnancy (although it does not always indicate the cesarean was planned). When the newborn is a singleton, full term and in a head down position, and the mother has not previously had a cesarean delivery, the majority of cesarean deliveries still come after a trial of labor. In other categories, such as multiple gestation (e.g., twins) and "breech" (feet first) presentations, the majority of cesarean deliveries are planned and performed before labor has begun.

In New Jersey, about one of every four cesareans to women at low pre-delivery risk of complications is a planned, no-labor "repeat" procedure. Throughout the last decade, the practice of attempting a vaginal birth after a previous cesarean (VBAC) has declined dramatically. Roughly half of attempted VBACs are successful. Hospitals vary in the proportion of women with previous cesareans who have planned repeats, and in VBAC success rates.

The *artificial induction of labor* has become increasingly prevalent as a means for controlling the date of delivery, for medical as well as other reasons. In general the incidence of cesarean delivery is higher after artificial induction of labor than after spontaneously initiated labor. The reasons for this are not entirely clear, and some women undergoing induction may have specific medical indications that justify the heightened risk. The American College of Obstetrics and Gynecology (ACOG) recommends against induction of labor before the 39th week of pregnancy is complete, to lower this risk and other risks of prematurity. Hospitals vary in their use of induction, the occurrence of induction before 39 weeks, and the cesarean rate after induction.

DATA AND METHODS

Data source.

New Jersey Electronic Birth Certificate files contain an abstract of the medical records for prenatal care, delivery and immediate post-partum and neonatal care. Data fields include method of delivery (including indication of trial of labor), induction of labor, prior cesarean delivery, reproductive history, maternal risk factors of pregnancy, labor and delivery complications, and other variables. Since the birth certificate files capture all births for the analysis period, the statistical tools predicated on sampling variability are not necessary.

The clinical categories used here are based on a similar typology developed by the British obstetric researcher Michael Robson (Robson, MS. Classification of cesarean sections. *Fetal and Maternal Medicine Review* 2001;12:23-29.). Three categories represent full term singleton deliveries with head down presentation (referred to as "standard" deliveries); they are distinguished by parity—*nulliparas*, i.e., women with no previous live births, versus *multiparas*, i.e., one or more prior live births, and include a separate category for those who have had a previous cesarean delivery.

Two major indications for cesarean delivery are preterm delivery and multiple gestation. In analyzing these two categories, we do not include mothers who have previously had a cesarean delivery. Their experience is about the same as standard deliveries with a previous cesarean. These represent fewer than one in five of these special delivery situations, and 2% of all deliveries in 2008.

Due to small numbers at the hospital level, we do not report on positions other than head-down, i.e., breech oblique and transverse presentations. In 2008, about 3% of births are presentations other than head-down.

Full-term is defined as 37 or more weeks of gestation. In this report, *preterm* includes only newborns delivered between 32 and 36 weeks of gestation. Preterm deliveries of even shorter gestation are a special case which would complicate the analysis here. Fewer than 1% of all births are excluded by this criterion.

Tables presented.

Table 1 presents the primary analysis of cesarean delivery rates, within categories for all births. Hospitals are grouped within the State's six Maternal and Child Health Consortia, and sorted by the cesarean index.

The *cesarean index* is standardized to represent what each hospital might experience if they all had the same composition of births. To calculate this index, we took the ratio of cesareans to births in each of the five categories, then formed a weighted average of those ratios using the statewide distribution of cases in the five categories. A small constant was added to represent births excluded from the five major categories.

The *total cesarean delivery rate* is the ratio of cesarean deliveries to all live births (32 weeks or more gestation). If the total rate is very different from the index, it means that the mix of cases at that hospital is very different from the state average. For example, if the index is higher than the unadjusted rate, it indicates that hospital's case mix was skewed toward categories with lower cesarean risk.

For category-specific rates, the denominator is the total number of births (32 weeks or more gestation) within the specified category. Rates are calculated separately for cesarean deliveries after a trial of labor and without trial of labor. Both rates use the same denominator, and could be added together for a total rate in the category. When there are fewer than 50 births at the hospital in a specific category, both rates are omitted.

Table 2 presents analysis of artificial induction of labor and VBAC. The same regional

groupings are used, and hospitals are again sorted by the overall index. Inductions are compiled separately for 36-38 weeks of gestation and 39 or more weeks. The *failed induction* rate refers to induced labors that end in cesarean delivery, only among gestations of 39 weeks or longer.

Repeat cesareans and VBACs are also restricted by duration of gestation. The rate of repeat cesarean without trial of labor includes only standard presentations (37 weeks or more). In theory, all other deliveries in this group are attempted VBACs. However, we restrict our analysis of VBAC attempts and failures (subsequent cesareans) to 39 or more weeks, since "attempts" before this time might have been planned cesareans, but labor began spontaneously before the scheduled date.

Table 3 presents a comparison over time. Total births, the cesarean index, and the unadjusted rate are calculated for 2006, 2007 and 2008 (i.e., since this report was first compiled). It is not clear how year-to-year trends for any hospital might be driven by chance, small variations in patient factors, or internal efforts to intentionally change cesarean delivery practice in response to public concern and emerging medical evidence.

It does appear that statewide the trend in cesarean delivery has begun to stabilize—the cesarean index grew from 0.383 to 0.386 to 0.389 through those three years. The relative increase of 1.6% is far below the 6% annual growth New Jersey experienced from 1999 through 2006.

Limitations of this report.

Additional caveats to the use of the data reported here include:

- There are many other medical factors which modify the risk of a cesarean delivery but are not available for analysis. Risk adjusted or detailed measures only describe the average risk within a subgroup.

- The electronic birth certificate does not have a field to identify "planned" cesareans. The indicator for trial of labor does not quite capture this. There are undoubtedly many cases where a medical emergency prompts an unplanned cesarean before the onset of labor. Conversely, a cesarean may be planned but labor begins spontaneously before the scheduled date. As noted, this latter case complicates our analysis of the VBAC success rate, especially for deliveries at 38 and 39 weeks.

- Decisions about cesarean delivery are principally made by obstetric practitioners, whether MDs, DOs or certified nurse midwives (CNMs). The relationship between each hospital and affiliated obstetric practices is governed by evolving professional and business models, and not necessarily uniform. Physicians and midwives are directly responsible for medical management and decision making in individual cases. In addition to providing physical facilities and nursing staff, the hospital has overall responsibility for record keeping, quality assurance and risk management, and a general stewardship obligation toward their community. Complicating this, individual obstetric practitioners and practices may be affiliated with more than one hospital, and may deliver any particular case at one hospital rather than another for medical reasons that affect comparisons. It is not feasible at this time to report on cesarean delivery rates for individual practitioners, for reasons, related to data quality and statistical validity.

- Certain complications have long been linked to cesarean delivery, such as postoperative infection. A companion report by The MCH Epidemiology Program systematically monitors

these complications at delivery and subsequent hospital readmissions. Improvements in obstetric care and the changing population of women utilizing cesarean delivery have dramatically reduced the incidence of many complications, by about the same magnitude for cesarean and vaginal deliveries. For example, the incidence of major postpartum infections after cesarean deliveries has declined by half in the last decade, but the risk is still five times higher than for vaginal delivery. This report is posted at //nj.gov/health/fhs/professional/documents/maternal_complications_following_cesarean.pdf.

Table 1. Cesarean Delivery Rates by Hospital and Obstetric Category, 2008
(Rates omitted when category has fewer than 50 births.)

	all births†			standard,* nullipara**		standard, multipara**		standard, prior C**		all multiple gestations†		all singleton preterm†	
	births	cesarean index	total cesarean delivery rate	No trial	Trial labor	No trial	Trial labor	No trial	Trial labor	No trial	Trial labor	No trial	Trial labor
Average, All Hospitals	107,468	0.360	0.378	9.4%	24.5%	5.7%	5.0%	88.2%	4.1%	67.9%	10.7%	22.8%	12.6%
Northern NJ MCH Consortium													
Englewood Hospital and Medical Center	2,152	0.302	0.309	6.5%	20.4%	2.3%	2.3%	86.5%	2.8%	57.3%	8.0%	30.4%	4.3%
Chilton Memorial Hospital	1,007	0.336	0.366	4.9%	27.8%	2.0%	2.6%	90.5%	3.9%	.	.	.	.
St. Mary's Hospital Passaic	1,199	0.338	0.368	8.2%	19.8%	4.6%	3.8%	96.4%	0.9%	.	.	.	.
St. Joseph's Regional Medical Center	3618	0.355	0.394	11.1%	20.3%	6.0%	3.7%	96.7%	0.6%	74.2%	6.0%	32.0%	6.9%
Columbus Hospital	192	0.359	0.318	9.8%	21.3%	4.3%	8.7%	.	.	.	.	.	.
The Valley Hospital	3,397	0.399	0.466	18.0%	24.4%	6.0%	5.3%	80.9%	14.8%	69.7%	14.5%	24.0%	13.5%
Holy Name Hospital	1,339	0.409	0.431	15.7%	23.3%	10.0%	5.8%	94.4%	2.0%	.	.	31.9%	15.9%
Saint Barnabas Medical Center	5,527	0.417	0.484	11.4%	32.1%	5.9%	6.6%	84.9%	13.0%	69.1%	28.3%	18.5%	21.7%
Gateway Northwest MCH Network													
JFK Medical Center	2,811	0.335	0.356	6.8%	24.1%	4.8%	4.2%	88.9%	5.1%	.	.	15.9%	9.3%
Morristown Memorial Hospital	3,933	0.346	0.405	7.3%	28.0%	2.6%	2.9%	85.5%	5.2%	78.5%	5.5%	25.4%	12.7%
Newton Memorial Hospital	702	0.346	0.328	8.2%	23.0%	4.7%	4.0%	92.3%	2.6%	.	.	.	.
Hackettstown Community Hospital	886	0.348	0.322	5.1%	26.9%	3.3%	3.0%	100.0%	0.0%	.	.	.	.
Trinitas Hospital	2,211	0.348	0.330	6.2%	26.2%	5.3%	7.3%	79.3%	6.6%	.	.	14.5%	13.6%
Newark Beth Israel Medical Center	3,739	0.353	0.370	6.8%	23.1%	5.0%	8.9%	92.8%	2.7%	47.3%	16.5%	16.1%	15.4%
Univeristy of Medicine & Dentistry of New Jersey - University Hospital	1,887	0.357	0.376	4.9%	32.9%	3.9%	8.5%	70.7%	7.8%	.	.	15.9%	16.4%
The Mountainside Hospital	726	0.376	0.398	8.8%	25.4%	8.3%	7.9%	84.1%	4.7%	.	.	.	.
Clara Maass Medical Center	1808	0.378	0.399	9.2%	27.1%	7.6%	3.9%	94.6%	1.4%	.	.	25.7%	12.4%
Overlook Hospital	2,456	0.380	0.424	13.9%	28.2%	4.1%	3.1%	95.6%	0.5%	65.4%	14.8%	17.7%	14.6%
Saint Clare's Hospital/Denville	1,656	0.388	0.415	9.4%	29.7%	6.2%	6.0%	93.3%	2.5%	61.8%	25.5%	15.5%	15.5%
Saint James Hospital	80	0.388	0.625	.	.	.	.	.	.	.	.	.	.
Hackensack University Medical Center	6,054	0.431	0.483	15.7%	29.5%	9.2%	6.7%	91.3%	2.2%	86.3%	5.5%	35.4%	13.0%
Hudson Perinatal Consortium													
Palisades Medical Center - New York Presbyterian Heathcare System	1,458	0.309	0.296	4.2%	19.4%	4.5%	4.1%	82.0%	5.5%	.	.	.	.
Liberty HealthCare System, Inc. - Jersey City Medical Center	1,478	0.380	0.427	5.5%	30.4%	5.0%	9.5%	89.8%	2.6%	.	.	20.2%	12.9%
Hoboken University Medical Center	1,524	0.403	0.432	9.5%	31.0%	5.5%	7.8%	91.9%	3.8%	.	.	32.2%	13.3%
Christ Hospital	1,224	0.441	0.475	11.9%	31.8%	10.9%	9.3%	94.3%	2.4%	.	.	35.1%	10.5%
Liberty HealthCare System, Inc. - Meadowlands Hospital Medical Center	809	0.499	0.566	14.2%	44.4%	13.1%	10.0%	94.0%	2.0%	.	.	.	.

* Standard = singleton, full term, head-down.
** Nullipara = no previous live births; multipara = 1+ previous live births, no previous cesarean; prior C = previous cesarean.
† Excludes gestations <32 weeks.

Table 1. Cesarean Delivery Rates by Hospital and Obstetric Category, 2008
(Rates omitted when category has fewer than 50 births.)

	all births†			standard,* nullipara**		standard, multipara**		standard, prior C**		all multiple gestations†		all singleton preterm†	
	births	cesarean index	total cesarean delivery rate	No trial	Trial labor	No trial	Trial labor	No trial	Trial labor	No trial	Trial labor	No trial	Trial labor
Average, All Hospitals	107,468	0.360	0.378	9.4%	24.5%	5.7%	5.0%	88.2%	4.1%	67.9%	10.7%	22.8%	12.6%
Central NJ MCH Consortium													
Muhlenberg Regional Medical Center	476	0.300	0.254	2.3%	14.0%	2.3%	6.1%	96.6%	3.4%	.	.	.	.
University Medical Center at Princeton	2,019	0.304	0.302	6.7%	20.2%	4.3%	2.0%	82.8%	7.0%	62.5%	5.0%	18.4%	6.6%
Capital Health System - Mercer Campus	2,392	0.311	0.324	14.8%	13.0%	6.9%	3.9%	74.2%	4.2%	64.8%	9.3%	21.2%	5.8%
Raritan Bay Medical Center	1,071	0.334	0.326	3.4%	22.6%	4.3%	6.2%	90.1%	4.3%	.	.	.	.
Robert Wood Johnson University Hospital	2,098	0.341	0.345	9.7%	20.7%	8.0%	4.0%	83.2%	7.0%	55.7%	11.4%	22.8%	8.2%
Somerset Medical Center	1,335	0.347	0.403	6.7%	29.4%	2.4%	3.9%	90.3%	4.4%	.	.	12.3%	9.2%
Saint Peter's University Hospital	6,198	0.359	0.395	9.7%	23.2%	5.2%	4.8%	86.4%	7.1%	75.2%	10.2%	23.7%	14.1%
RWJ University Hospital at Hamilton	1,415	0.368	0.370	12.8%	24.1%	6.1%	5.1%	84.1%	6.7%	.	.	16.4%	16.4%
Hunterdon Medical Center	1,236	0.372	0.422	13.6%	26.4%	6.2%	4.4%	82.0%	4.0%	.	.	.	.
Regional Perinatal Consortium of Monmouth & Ocean Counties													
Kimball Medical Center	1,844	0.283	0.235	7.0%	25.1%	1.0%	2.6%	51.8%	12.3%	.	.	17.5%	12.7%
Monmouth Medical Center	4,089	0.296	0.257	21.5%	4.5%	8.9%	0.7%	71.7%	1.3%	64.6%	4.3%	35.9%	1.0%
Meridian Hospitals Corporation - Medical Center of Ocean County	1,045	0.322	0.298	8.5%	20.0%	2.6%	1.9%	94.3%	0.7%	.	.	.	.
Southern Ocean County Hospital	342	0.381	0.345	11.7%	16.4%	11.5%	2.2%	98.0%	0.0%	.	.	.	.
Community Medical Center	1,441	0.398	0.451	11.0%	28.9%	6.7%	5.0%	92.4%	3.4%	.	.	28.3%	21.7%
Meridian Hospitals Corporation - Riverview Medical Center	1,463	0.403	0.452	17.4%	26.8%	6.1%	3.4%	93.8%	3.5%	.	.	25.5%	16.4%
Meridian Hospitals Corporation - Jersey Shore Medical Center	1,674	0.408	0.416	19.3%	15.2%	18.1%	4.5%	87.5%	1.7%	80.0%	8.0%	38.4%	7.2%
CentraState Healthcare System	1,874	0.424	0.487	12.0%	37.2%	3.8%	5.6%	96.3%	1.4%	97.0%	0.0%	26.7%	13.3%
Southern NJ Perinatal Cooperative													
South Jersey - Elmer	295	0.228	0.166	1.8%	3.6%	1.5%	0.8%	.	.	.	.	.	.
The Cooper Health System	2,250	0.288	0.292	8.0%	16.7%	4.9%	3.3%	77.8%	3.7%	52.2%	10.1%	16.8%	5.4%
Our Lady of Lourdes Medical Center	1,262	0.325	0.336	7.7%	22.1%	4.0%	3.2%	85.8%	3.0%	.	.	8.6%	22.4%
Underwood Memorial Hospital	1,026	0.327	0.309	5.8%	21.9%	3.7%	4.9%	90.4%	1.6%	.	.	17.7%	12.9%
South Jersey Regional Medical Center - Vineland	2,237	0.328	0.319	6.4%	18.4%	4.9%	5.4%	89.6%	6.5%	.	.	11.5%	16.5%
Cape Regional Medical Center	512	0.358	0.354	6.6%	26.9%	3.6%	7.3%	90.5%	1.4%	.	.	.	.
AtlantiCare Regional Medical Center	2,424	0.358	0.379	9.0%	25.9%	6.2%	5.3%	92.7%	2.4%	54.2%	6.8%	12.9%	12.9%
Shore Memorial Hospital	1351	0.359	0.396	5.4%	31.5%	3.8%	3.8%	93.7%	1.8%	.	.	14.0%	12.0%
The Memorial Hospital of Salem County, Inc.	372	0.369	0.358	8.0%	25.3%	6.5%	4.3%	100.0%	0.0%	.	.	.	.
Kennedy University Hospital - Washington Township	1,491	0.369	0.394	8.5%	29.2%	4.9%	6.2%	84.4%	4.9%	.	.	23.9%	10.2%
Lourdes Medical Center - Burlington	880	0.371	0.389	6.6%	31.7%	3.9%	3.6%	91.7%	3.3%	.	.	30.9%	10.9%
Virtua Memorial Hospital of Burlington County	2,153	0.387	0.426	10.9%	27.3%	5.4%	5.4%	93.8%	2.2%	72.5%	7.8%	36.1%	13.3%
Virtua West Jersey Hospital - Voorhees	5,183	0.412	0.434	10.0%	31.0%	6.4%	8.6%	78.9%	16.5%	70.1%	17.5%	24.0%	21.6%

* Standard = singleton, full term, head-down.
** Nullipara = no previous live births; multipara = 1+ previous live births, no previous cesarean; prior C = previous cesarean.
† Excludes gestations <32 weeks.

Table 2. Induction, Cesarean and VBAC Delivery Rates by Hospital, 2008
(Rates omitted when category has fewer than 50 births.)

	births	cesarean index	standard,* nullipara**			standard, multipara**			standard, prior C**		
			induction 36-38wks	induction 39+wks	failed induction	induction 36-38wks	induction 39+wks	failed induction	repeat C, No trial	VBAC failed	VBAC attempts
Average, All Hospitals	107,468	0.360	5.7%	21.4%	40.5%	6.5%	17.6%	8.1%	88.2%	34.0%	1,195
Northern NJ MCH Consortium											
Englewood Hospital and Medical Center	2,152	0.302	5.2%	32.6%	26.1%	9.3%	32.4%	3.4%	86.5%	28.6%	21
Chilton Memorial Hospital	1,007	0.336	6.5%	24.3%	37.1%	11.2%	24.9%	3.4%	90.5%	30.0%	10
St. Mary's Hospital Passaic	1,199	0.338	5.7%	23.9%	34.4%	6.3%	19.8%	4.2%	96.4%	20.0%	5
St. Joseph's Regional Medical Center	3618	0.355	6.9%	19.7%	35.7%	6.2%	14.3%	4.8%	96.7%	18.2%	11
Columbus Hospital	192	0.359	6.6%	13.1%	37.5%	5.4%	16.3%	6.7%	.	.	0
The Valley Hospital	3,397	0.399	6.8%	20.3%	37.8%	7.3%	24.0%	8.1%	80.9%	64.4%	45
Holy Name Hospital	1,339	0.409	2.8%	18.0%	49.5%	4.3%	16.5%	13.2%	94.4%	30.0%	10
Saint Barnabas Medical Center	5,527	0.417	5.1%	24.3%	50.1%	5.3%	18.1%	7.1%	84.9%	74.1%	54
Gateway Northwest MCH Network											
JFK Medical Center	2,811	0.335	8.0%	25.6%	36.1%	9.5%	19.2%	9.2%	88.9%	33.3%	15
Morristown Memorial Hospital	3,933	0.346	5.0%	28.9%	41.1%	5.6%	28.0%	3.6%	85.5%	39.1%	69
Newton Memorial Hospital	702	0.346	4.5%	24.2%	32.3%	5.4%	21.7%	6.7%	92.3%	33.3%	3
Hackettstown Community Hospital	886	0.348	2.3%	26.1%	50.0%	4.1%	21.1%	9.0%	100.0%	.	0
Trinitas Hospital	2,211	0.348	2.6%	10.6%	47.6%	1.7%	7.5%	15.7%	79.3%	30.6%	36
Newark Beth Israel Medical Center	3,739	0.353	6.5%	23.8%	39.6%	4.6%	17.2%	17.0%	92.8%	40.9%	22
Univeristy of Medicine & Dentistry of New Jersey - University Hospital	1,887	0.357	5.9%	14.7%	47.1%	3.3%	6.3%	20.5%	70.7%	18.9%	53
Clara Maass Medical Center	1,808	0.378	4.5%	16.5%	44.0%	4.5%	9.9%	9.4%	94.6%	42.9%	7
Overlook Hospital	2456	0.380	4.9%	24.9%	49.5%	6.7%	26.4%	6.4%	95.6%	14.3%	14
Saint Clare's Hospital/Denville	1,656	0.388	7.6%	32.2%	40.3%	7.7%	27.7%	7.1%	93.3%	45.5%	11
Saint James Hospital	80	0.388	.	.	.	.	.	.	.	.	.
Hackensack University Medical Center	6,054	0.431	7.7%	24.6%	49.5%	8.7%	19.0%	14.0%	91.3%	23.3%	43
Hudson Perinatal Consortium											
Palisades Medical Center - New York Presbyterian Heathcare System	1,458	0.309	5.3%	19.7%	33.6%	3.4%	13.9%	3.9%	82.0%	31.0%	29
Liberty HealthCare System, Inc. - Jersey City Medical Center	1,478	0.380	3.4%	19.2%	57.7%	2.5%	12.6%	21.3%	89.8%	40.0%	10
Hoboken University Medical Center	1,524	0.403	4.2%	15.7%	55.9%	4.4%	11.3%	16.9%	91.9%	45.5%	11
Christ Hospital	1,224	0.441	7.0%	14.9%	45.7%	5.5%	9.7%	12.2%	94.3%	75.0%	4
Liberty HealthCare System, Inc. - Meadowlands Hospital Medical Center	809	0.499	12.8%	27.7%	63.6%	16.6%	20.1%	13.0%	94.0%	20.0%	5

* Standard = singleton, full term, head-down.
** Nullipara = no previous live births; multipara = 1+ previous live births, no previous cesarean; prior C = previous cesarean. VBAC includes 39-41 wks only.
† Excludes gestations <32 weeks.

Table 2. Induction, Cesarean and VBAC Delivery Rates by Hospital, 2008
(Rates omitted when category has fewer than 50 births.)

	births	cesarean index	standard,* nullipara**			standard, multipara**			standard, prior C**		
			induction 36-38wks	induction 39+wks	failed induction	induction 36-38wks	induction 39+wks	failed induction	repeat C, No trial	VBAC failed	VBAC attempts
Average, All Hospitals	107,468	0.360	5.7%	21.4%	40.5%	6.5%	17.6%	8.1%	88.2%	34.0%	1,195
Central NJ MCH Consortium											
Muhlenberg Regional Medical Center	476	0.300	4.7%	28.5%	34.7%	3.8%	13.1%	10.7%	96.6%	100.0%	1
University Medical Center at Princeton	2,019	0.304	3.0%	11.2%	31.4%	3.2%	10.9%	4.7%	82.8%	34.3%	35
Capital Health System - Mercer Campus	2,392	0.311	10.1%	21.1%	23.8%	9.8%	19.8%	7.5%	74.2%	11.4%	44
Raritan Bay Medical Center	1,071	0.334	4.4%	18.7%	31.9%	3.4%	17.1%	10.7%	90.1%	33.3%	9
Robert Wood Johnson University Hospital	2,098	0.341	6.7%	13.4%	38.8%	4.3%	9.0%	11.3%	83.2%	29.2%	24
Somerset Medical Center	1,335	0.347	16.2%	35.0%	37.7%	21.9%	30.2%	7.2%	90.3%	38.9%	18
Saint Peter's University Hospital	6,198	0.359	6.8%	21.8%	40.2%	5.7%	19.8%	8.5%	86.4%	43.1%	58
RWJ University Hospital at Hamilton	1,415	0.368	5.6%	21.6%	39.1%	6.8%	23.0%	9.6%	84.1%	41.2%	17
Hunterdon Medical Center	1,236	0.372	6.0%	24.4%	43.3%	6.0%	31.0%	5.0%	82.0%	17.9%	28
Regional Perinatal Consortium of Monmouth & Ocean Counties											
Kimball Medical Center	1,844	0.283	4.0%	19.1%	47.8%	4.9%	12.2%	6.7%	51.8%	20.0%	90
Monmouth Medical Center	4,089	0.296	3.5%	12.2%	8.9%	6.5%	10.0%	2.0%	71.7%	4.7%	64
Meridian Hospitals Corporation - Medical Center of Ocean County	1,045	0.322	5.6%	25.1%	33.7%	10.3%	17.8%	2.7%	94.3%	0.0%	5
Southern Ocean County Hospital	342	0.381	2.3%	18.0%	34.8%	5.8%	14.4%	0.0%	98.0%	.	0
Community Medical Center	1,441	0.398	9.2%	28.4%	46.5%	8.9%	23.4%	5.6%	92.4%	50.0%	12
Meridian Hospitals Corporation - Riverview Medical Center	1,463	0.403	4.1%	23.1%	40.7%	7.4%	24.8%	6.2%	93.8%	62.5%	8
Meridian Hospitals Corporation - Jersey Shore Medical Center	1,674	0.408	3.3%	12.8%	37.8%	3.7%	8.7%	5.4%	87.5%	12.5%	16
CentraState Healthcare System	1,874	0.424	5.4%	21.7%	53.7%	7.7%	21.7%	9.1%	96.3%	14.3%	7
Southern Perinatal Cooperative											
South Jersey - Elmer	295	0.228	8.1%	30.6%	5.9%	10.7%	22.1%	3.4%	.	.	0
The Cooper Health System	2,250	0.288	5.2%	29.0%	29.0%	7.4%	17.8%	7.1%	77.8%	18.2%	44
Our Lady of Lourdes Medical Center	1,262	0.325	0.7%	4.2%	47.1%	0.8%	3.4%	0.0%	85.8%	20.0%	15
Underwood Memorial Hospital	1,026	0.327	4.7%	19.1%	43.5%	8.0%	18.0%	9.1%	90.4%	11.1%	9
South Jersey Regional Medical Center - Vineland	2,237	0.328	5.2%	15.5%	30.3%	4.6%	11.7%	2.8%	89.6%	43.8%	16
Cape Regional Medical Center	512	0.358	2.5%	34.0%	41.8%	6.2%	23.8%	6.5%	90.5%	0.0%	3
AtlantiCare Regional Medical Center	2,424	0.358	3.7%	19.6%	38.2%	3.7%	13.3%	13.6%	92.7%	35.3%	17
Shore Memorial Hospital	1351	0.359	5.6%	26.6%	55.0%	6.2%	21.7%	7.4%	93.7%	33.3%	12
The Memorial Hospital of Salem County, Inc.	372	0.369	6.0%	23.3%	31.4%	5.8%	14.4%	5.0%	100.0%	.	0
Kennedy University Hospital - Washington Township	1,491	0.369	6.1%	25.6%	47.4%	7.8%	24.9%	9.9%	84.4%	33.3%	30
Lourdes Medical Center - Burlington	880	0.371	5.5%	27.7%	54.7%	6.2%	22.8%	5.7%	91.7%	50.0%	8
Virtua Memorial Hospital of Burlington County	2,153	0.387	18.8%	17.5%	48.6%	20.5%	18.4%	10.6%	93.8%	42.9%	7
Virtua West Jersey Hospital - Voorhees	5,183	0.412	1.9%	10.4%	41.7%	1.5%	7.2%	13.4%	78.9%	74.5%	98

* Standard = singleton, full term, head-down.
** Nullipara = no previous live births; multipara = 1+ previous live births, no previous cesarean; prior C = previous cesarean. VBAC includes 39-41 wks only.
† Excludes gestations <32 weeks.

Table 3. Cesarean Delivery by Hospital, 2006-2008

			births			cesarean index			unadjusted rate		
		level	2006	2007	2008	2006	2007	2008	2006	2007	2008
All	Average, all hospitals		109,536	110,512	107,468	0.357	0.360	0.360	0.366	0.375	0.378
Northern NJ MCH Consortium	Englewood Hospital and Medical Center	4	2,136	2,115	2,152	0.324	0.329	0.302	0.347	0.336	0.309
	Chilton Memorial Hospital	3	1,138	1,014	1,007	0.362	0.351	0.336	0.381	0.369	0.366
	St. Mary's Hospital Passaic	2	1,372	1,445	1,199	0.348	0.334	0.338	0.360	0.345	0.368
	St. Joseph's Regional Medical Center	5	2799	3247	3618	0.413	0.382	0.355	0.451	0.417	0.394
	Columbus Hospital	3	895	842	192	0.388	0.379	0.359	0.382	0.373	0.318
	The Valley Hospital	4	3,127	3,230	3,397	0.374	0.387	0.399	0.433	0.454	0.466
	Holy Name Hospital	3	1,181	1,181	1,339	0.377	0.387	0.409	0.395	0.420	0.431
	Saint Barnabas Medical Center	5	6,308	5,945	5,527	0.405	0.417	0.417	0.451	0.485	0.484
Gateway Northwest MCH Network	JFK Medical Center	3	2,790	2,887	2,811	0.329	0.348	0.335	0.336	0.370	0.356
	Morristown Memorial Hospital	5	3,479	3,687	3,933	0.318	0.345	0.346	0.374	0.399	0.405
	Newton Memorial Hospital	3	792	688	702	0.328	0.335	0.346	0.312	0.318	0.328
	Hackettstown Community Hospital	2	789	861	886	0.334	0.335	0.348	0.292	0.292	0.322
	Trinitas Hospital	3	1,829	1,930	2,211	0.290	0.293	0.348	0.275	0.290	0.330
	Newark Beth Israel Medical Center	5	2,706	3,173	3,739	0.338	0.349	0.353	0.348	0.368	0.370
	Univeristy of Medicine & Dentistry of New Jersey - University Hospital	5	1,978	1,737	1,887	0.325	0.338	0.357	0.329	0.345	0.376
	Warren Hospital	2	399	352	147	0.457	0.469	0.375	0.451	0.466	0.367
	The Mountainside Hospital	3	794	782	726	0.384	0.359	0.376	0.380	0.387	0.398
	Clara Maass Medical Center	3	1,324	1,439	1,808	0.376	0.385	0.378	0.378	0.393	0.399
	Overlook Hospital	4	2,491	2,374	2,456	0.338	0.368	0.380	0.384	0.411	0.424
	Saint Clare's Hospital/Denville	3	1932	1775	1656	0.344	0.352	0.388	0.383	0.370	0.415
	Saint James Hospital	3	867	845	80	0.453	0.478	0.388	0.489	0.520	0.625
	Hackensack University Medical Center	5	4906	5720	6054	0.451	0.447	0.431	0.486	0.504	0.483
Hudson Perinatal Consortium	Palisades Medical Center - New York Presbyterian Heathcare System	3	1,459	1,466	1,458	0.320	0.342	0.309	0.293	0.327	0.296
	Liberty HealthCare System, Inc. - Jersey City Medical Center	5	1,802	1,542	1,478	0.355	0.339	0.380	0.386	0.350	0.427
	Hoboken University Medical Center	3	1,202	1,463	1,524	0.349	0.399	0.403	0.379	0.424	0.432
	Christ Hospital	2	1,229	1,193	1,224	0.400	0.432	0.441	0.413	0.462	0.475
	Liberty HealthCare System, Inc. - Meadowlands Hospital Medical Center	3	695	769	809	0.437	0.473	0.499	0.482	0.498	0.566

Table 3. Cesarean Delivery by Hospital, 2006-2008

			births			cesarean index			unadjusted rate		
		level	2006	2007	2008	2006	2007	2008	2006	2007	2008
All	Average, all hospitals		109,536	110,512	107,468	0.357	0.360	0.360	0.366	0.375	0.378
Central NJ MCH Consortium	Muhlenberg Regional Medical Center	3	1,110	1,054	476	0.273	0.267	0.300	0.228	0.203	0.254
	University Medical Center at Princeton	3	1,973	1,997	2,019	0.317	0.321	0.304	0.311	0.327	0.302
	Capital Health System - Mercer Campus	5	2,452	2,414	2,392	0.283	0.267	0.311	0.291	0.260	0.324
	Raritan Bay Medical Center	3	1,082	1,097	1,071	0.307	0.330	0.334	0.308	0.324	0.326
	Robert Wood Johnson University Hospital	5	2,052	2,327	2,098	0.333	0.345	0.341	0.374	0.361	0.345
	Somerset Medical Center	3	1,593	1,469	1,335	0.349	0.350	0.347	0.360	0.386	0.403
	Saint Peter's University Hospital	5	5,930	6,004	6,198	0.351	0.355	0.359	0.375	0.381	0.395
	RWJ University Hospital at Hamilton	3	1,452	1,359	1,415	0.343	0.347	0.368	0.324	0.353	0.370
	Hunterdon Medical Center	3	1,300	1,235	1,236	0.335	0.357	0.372	0.358	0.383	0.422
Regional Perinatal Consortium of Monmouth & Ocean Counties	Kimball Medical Center	3	1,689	1,829	1,844	0.254	0.269	0.283	0.205	0.225	0.235
	Monmouth Medical Center	5	3,928	4,048	4,089	0.316	0.295	0.296	0.279	0.268	0.257
	Meridian Hospitals Corporation - Medical Center of Ocean County	3	1,021	1,045	1,045	0.337	0.343	0.322	0.330	0.349	0.298
	Southern Ocean County Hospital	2	285	321	342	0.436	0.408	0.381	0.400	0.445	0.345
	Community Medical Center	3	1,739	1,744	1,441	0.353	0.397	0.398	0.382	0.430	0.451
	Meridian Hospitals Corporation - Riverview Medical Center	3	1,707	1,646	1,463	0.403	0.389	0.403	0.436	0.429	0.452
	Meridian Hospitals Corporation - Jersey Shore Medical Center	5	1,704	1,615	1,674	0.392	0.398	0.408	0.408	0.407	0.416
	CentraState Healthcare System	3	1,869	2,019	1,874	0.426	0.437	0.424	0.477	0.483	0.487
Southern NJ Perinatal Cooperative	South Jersey - Elmer	2	340	360	295	0.263	0.292	0.228	0.197	0.233	0.166
	The Cooper Health System	5	2,088	2,243	2,250	0.317	0.276	0.288	0.302	0.268	0.292
	Our Lady of Lourdes Medical Center	5	1,222	1,389	1,262	0.300	0.337	0.325	0.300	0.338	0.336
	Underwood Memorial Hospital	3	1,195	1,210	1,026	0.334	0.352	0.327	0.331	0.360	0.309
	South Jersey Regional Medical Center - Vineland	3	2,151	2,194	2,237	0.386	0.343	0.328	0.375	0.343	0.319
	Cape Regional Medical Center	3	508	562	512	0.356	0.353	0.358	0.341	0.349	0.354
	AtlantiCare Regional Medical Center	4	2,335	2,341	2,424	0.400	0.351	0.358	0.415	0.361	0.379
	Shore Memorial Hospital	3	1347	1469	1351	0.369	0.371	0.359	0.380	0.400	0.396
	The Memorial Hospital of Salem County, Inc.	2	402	375	372	0.379	0.325	0.369	0.348	0.315	0.358
	Kennedy University Hospital - Washington Township	4	1,339	1,576	1,491	0.399	0.367	0.369	0.403	0.384	0.394
	Lourdes Medical Center - Burlington	3	968	953	880	0.340	0.344	0.371	0.360	0.360	0.389
	Virtua Memorial Hospital of Burlington County	3	2,220	2,276	2,153	0.352	0.378	0.387	0.393	0.411	0.426
	Virtua West Jersey Hospital - Voorhees	4	5,306	5,173	5,183	0.390	0.392	0.412	0.420	0.425	0.434