NJMMR

MATERNAL MORTALITY in NEW JERSEY 2002–2005

Findings of the New Jersey Maternal Mortality Review

Maternal Mortality in New Jersey

2002–2005

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James P. Thompson, MD
1935 - 2010

DEDICATION

This report is dedicated in memoriam to James P. Thompson, MD, Chair, New Jersey Statewide Maternal Mortality Review Committee, in recognition for his dedication to his long commitment to ensuring the health and wellbeing of the women of New Jersey.

Dr. Thompson was instrumental in the review of maternal deaths since the 1970s and chaired the Review Committee since 1977. His vision of taking the Committee from a medical model to a multidisciplinary team was realized in 1999 in collaboration with the New Jersey Department of Health and Senior Services. Under his leadership, the Review Team was recognized nationally by the American College of Obstetricians and Gynecologists and the Health Resources and Services Administration as a model program and resource for other states.

Despite his retirement from active practice, he remained devoted to the review process. The progress made toward improving maternal and infant health directly corresponds to his work.

The New Jersey Maternal Mortality Review Team, the Department of Health and Senior Services, the American College of Obstetricians and Gynecologists will forever be in debt to his leadership in improving women's health.

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Section One: Introduction

The work of the New Jersey Maternal Mortality review team is part of a longstanding commitment among healthcare professionals and other concerned citizens to reduce and prevent the number of deaths related to pregnancy and childbearing among New Jersey residents. This commitment dates back to 1932, when the Medical Society of New Jersey established one of the first maternal mortality reviews in the United States; part of a response to growing concern at the local, state, and national levels over the country's high maternal mortality rate (Marmol, Scriggins, & Vollman, 1969).

To prevent and reduce what was generally agreed to be an excessive number of maternal deaths in New Jersey, (a total of 351 maternal deaths were reported by the New Jersey Department of Health in 1932) members of the New Jersey Medical Society began a formal process to look beyond the basic information provided on a death certificate for the medical and nonmedical causes of maternal death (for a more detailed history, see Callaghan & Berg, 2002).

Over the next forty years, increased recognition of maternal death as a public health issue (Marmol et al., 1969) fostered collaboration between the Medical Society of New Jersey and the New Jersey Department of Health and Senior Services. This collaboration expanded both the membership and scope of the Medical Society's review committee, known today as the New Jersey Maternal Mortality Review.

By the close of the 20th century, following a nationwide trend, the number of maternal deaths had dropped dramatically across New Jersey, with only 12 maternal deaths reported in the year 2000 by the New Jersey Department of Health and Senior Services (Baron Duffy, 2003). By this time, like New Jersey, most states had formed maternal mortality review committees (Marmol et al., 1969; Callaghan & Berg, 2002).

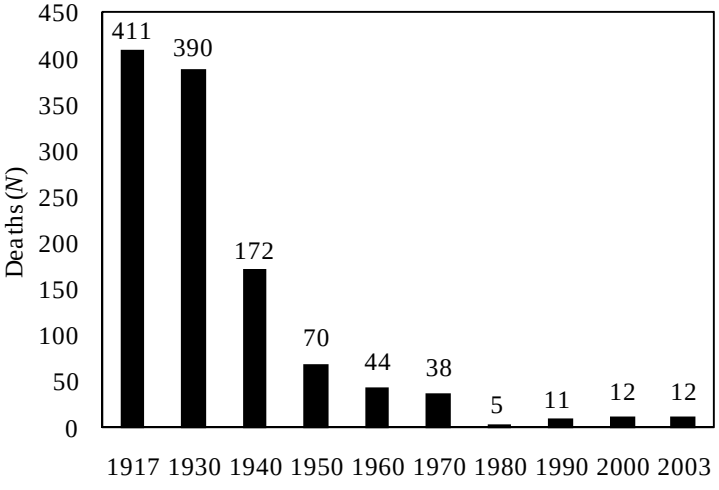
While the tremendous reduction in U.S. maternal mortality rates is primarily attributed to the contribution of technological advances in medicine, some experts have suggested that maternal mortality review may also play a role (Callaghan & Berg, 2002). However, direct measures of the contribution of maternal mortality review to maternal mortality rates have yet to be developed, pointing to a need for further research in this area.

Table 1. Maternal Mortality Rates (per 100,000 births) New Jersey, 1917–2003

Year	Maternal Deaths *N*	Births *N*	Maternal Mortality Rate New Jersey	Maternal Mortality Rate U.S.
1917	411	73,309	560.6	661.7
1930	390	68,282	571.2	673.2
1940	172	59,328	289.9	376.0
1950	70	97,734	71.6	83.3
1960	44	132,594	33.2	37.1
1970	38	120,168	31.6	21.5
1980	5	96,438	5.2	9.2
1990	11	122,979	8.9	8.2
2000	12	115,542	10.4	9.8
2003	12	116,823	10.3	12.1

Data Source: Fulcomer & Sass, 2006; Baron Duffy, 2003.

Figure 1. Maternal Deaths in New Jersey, 1917–2003



Data Source: Fulcomer & Sass, 2006; Baron Duffy, 2003.

In spite of the improvement in maternal mortality rates across the United States, maternal death remains a key issue on the public health agenda, as evidenced by the Department of Health and Human Services' *Healthy People 2010* national goal to reduce the maternal mortality rate to 3.3 deaths per 100,000 births (2000). Public concern over maternal mortality persists for two main reasons: first, it is generally agreed that maternal deaths are underreported (Centers for Disease Control and Prevention [CDC], 1998). For example, the CDC estimates the number of maternal deaths attributable to pregnancy and its complications to be 1.3 to 3.0 times the number reported in vital statistics records (CDC, 1998). In New Jersey, this issue is addressed by the use of an expanded maternal mortality identification surveillance system that links maternal death certificates with birth and fetal death certificates issued in the year prior to the woman's death. Since the implementation of this system, the number of deaths attributed to pregnancy identified through expanded surveillance has been 1.4 to 3.5 times greater than the vital records death certificate alone, as shown in Table 2.[1]

A second reason for public concern over maternal mortality is the persistence of racial disparities observed in maternal deaths (Hoyert, 2007). For example, in 2003 the U.S. maternal mortality rate was 8.7 among the White population versus 30.5 among the Black population (2007). A similar pattern was observed in New Jersey, where the maternal mortality rate was 9.7 among the White population versus 30.5 among the Black population (Ferraro, 2002). Eliminating social disparities in maternal mortality and other health indicators is a primary goal of *Healthy People 2010* (U.S. Department of Health and Human Services 2000), and related state initiatives, including *Healthy New Jersey 2010* (New Jersey Department of Health and Senior Services, 2001).

Table 2. Maternal Mortality Surveillance New Jersey, 1999–2004

		Maternal Deaths			
		Death Certificate		Mortality Review with Enhanced Identification	
	Births				
Year	*N*	*N*	Rate	*N*	Rate
1999	113,810	4	3.5	14	12.3
2000	115,542	12	10.4	17	14.7
2001	115,769	9	7.8	20	17.3
2002	114,642	7	6.1	16	14.0
2003	116,823	12	10.3	18	15.4
2004	113,652	24	21.1	13	11.4
Total	690,238	68	9.9	98	14.2

Source: Fulcomer & Sass, 2006; Baron Duffy, 2003, 2004.

This report presents the most recent findings and recommendations of the New Jersey Maternal Mortality Review for the years 2002 to 2005. Section Two provides an overview of the review process, Section Three presents the findings of the Case Review Team, and Section Four provides a discussion of the findings with the Review Team's recommendations.

[1] According to *New Jersey Health Statistics, 2004* (Baron Duffy, 2004), a recent revision to the information collected on the death certificate may have contributed to the recently observed reversal of this pattern:

> Prior to 2004, the death certificate had the following question: 'If female, was she pregnant at death, or any time 90 days prior to death?' In 2004, the pregnancy item was expanded to five categories: Not pregnant within past year, Pregnant at time of death, Not pregnant but pregnant within 42 days of death, Not pregnant but pregnant 43 days to 1 year before death, and Unknown if pregnant within the past year. Responses to the pregnancy item affect the determination of the underlying cause of death and the changes in the item on the certificate greatly increased the number of maternal deaths in 2004. In prior years, the number of maternal deaths fluctuated between 4 and 14. In 2004, the number was 24. Further study will be needed to determine if this is a true increase or a data artifact.

Section Two: The Review Process

The New Jersey Maternal Mortality Review (NJMMR) process is consistent with model presented by Berg et al. (2001) for the Centers for Disease Control and Prevention. The model describes a four-step review process that includes: 1) Identification of maternal deaths, 2) Review of maternal deaths, 3) Analysis and interpretation, and, 4) Action. This section presents an overview of each of the four steps as they relate to the New Jersey Maternal Mortality review process:

1) Identification of Maternal Deaths

Based on the definition developed by the American College of Obstetricians and Gynecologists and Centers for Disease Control Maternal Mortality Study Group (see Berg et al., 2001 and Hoyert, 2007 for discussion of definitions), the NJMMR defines maternal death as "the death of a woman while pregnant or within 1 year of termination of pregnancy, irrespective of cause. [1]

The NJMMR relies on multiple data sources to locate cases of maternal death for review, including death certificates, labor and delivery records, hospital discharge records and other sources. Sources can include:

- Direct reporting of a maternal death by a hospital, medical examiner or other personnel to the New Jersey Department of Health and Senior services;
- The death certificate indicates that the woman was pregnant within one year (12months) prior to her death (New Jersey's death certificate includes a check box);
- A linkage of death certificates, live birth and fetal death records, and the hospital discharge file using a probabilistic methodology conducted by the New Jersey Department of Health and Senior Services Maternal and Child Health MCH Epidemiology Program.[2]

2) Review of Maternal Deaths

After the final list of maternal deaths is produced, information on the medical and non-medical factors that led to the deaths is collected by a nurse abstractor (for details see Ferraro, 2002). Abstractors use a standardized data abstraction tool. Information is collected on over 300 variables. Data are obtained from all sources including death certificates, autopsy reports, hospitalization records, medical examiner reports, prenatal care records, emergency room and outpatient visit reports and law enforcement reports.

A file is created for each case which includes the summary of the case abstraction; recommendations and systems review sheet, and any other received documents pertaining to the case. All files are kept in accordance to program policy at the State offices and are treated in accordance with CDC public health surveillance guidelines.

All cases are reviewed by the Maternal Mortality Case Review Team. Team members represent a diversity of specialties and professions, including health departments, clinical medicine, social work, clergy, and community groups. If the Case Review Team determines a need for additional expertise, consulting professionals are invited to provide this information on a case by case basis.

During review, each case is individually assessed for the medical and non-medical factors that led to the death, especially the factors that were preventable. Through consensus, the Case Review Team assigns one of three possible categories to each case, based on the maternal death's relation to pregnancy:

1. *Pregnancy-related*: the death of a woman while pregnant or within 1 year of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by her pregnancy or its

[1] For the purposes of this report, *termination of pregnancy* refers to a live birth, stillbirth, miscarriage, or abortion.

[2] Cases identified through probabilistic methodology are further screened by verifying demographic information with the birthing hospital. In cases where the probabilistic match fails to resolve a case, a final determination is made by the review committee through consensus. (S. Schwarz & R. D'Oria, personal communication, 2009)

management, but not from accidental or incidental causes.

2. *Non-pregnancy-related:* the death of a woman while pregnant or within 1 year of termination of pregnancy, due to a cause unrelated to pregnancy.
3. *Undetermined:* consensus not reached by the Case Review Team (Berg et al., 2001).

The primary focus of the Case Review Team is to identify systems related issues. Recommendations for systems improvement are maintained, tallied and ultimately shared with healthcare professionals and the public through the Maternal Mortality report, and presentations at professional association meetings such as the American Congress of Obstetricians and Gynecologists (ACOG) and Association of Women's Health Obstetric and Neonatal Nurses (AWHONN). Team recommendations are also used for program planning at the Department of Health and Senior Services.

3) Analysis and Interpretation

Analysis of the maternal mortality data follows the guidelines of Berg et al. (2001) and includes the use of descriptive statistics to examine maternal demographic characteristics such as age, race and ethnicity; as well as health care characteristics such as prenatal care and insurance status. In addition, maternal mortality rates are calculated to examine the risk of maternal death among various groups.

4) Action

The Case Review Team also uses the case summary data to develop recommendations to address specific areas of concern. Findings have been used for quality improvements at the regional and state levels. For example, the Case Review Team recognized that depressive disorders contributed to the deaths of pregnant and/or postpartum women. This led to the Governor's formation of a Postpartum Depression (PPD) Task Force. The active support of all involved, including the Governor's office, the Task Force, and the review team led to New Jersey's Postpartum Depression initiative (also known to the public as the Speak Up When You're Down Campaign). The PPD initiative resulted in a consumer and professional awareness campaign on perinatal mood disorders, and legislation that mandates postpartum screening for signs and symptoms of postpartum depression. Since this initiative began in 2005, over $9 million has been allocated for education, screening, and awareness activities statewide.

The following section presents findings from the New Jersey Maternal Mortality Review for the years 2002 through 2005.

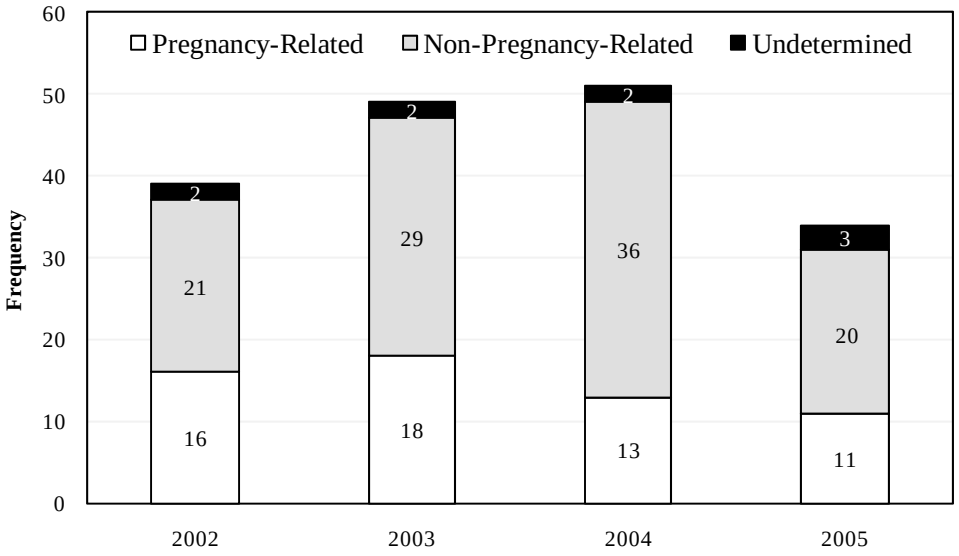
Section Three: Findings

Sample Characteristics

Relation to Pregnancy

The New Jersey Maternal Mortality Case Review Team identified 173 maternal deaths that occurred between the years 2002 and 2005: 39 cases in 2002, 49 cases in 2003, 51 cases in 2004, and 34 cases in 2005.

Maternal Deaths by Year and Relation to Pregnancy: New Jersey, 2002–2005 (*N*=173)



Of the total 173 cases, the Review Team determined that 58 (33.5%) deaths were related to pregnancy and 106 (61.3%) deaths were non-pregnancy-related. There were 9 (5.2%) cases for which the Case Review Team was unable to determine whether or not the death was related to pregnancy.

Maternal Deaths by Year and Relation to Pregnancy: New Jersey: 2002–2005

		Relation to Pregnancy					
	Total	Pregnancy-Related		Non-Pregnancy-Related		Undetermined	
Year	*n*	*n*	%	*n*	%	*n*	%
2002	39	16	41.0[2]	21	53.8	2	[1]
2003	49	18	36.7[2]	29	59.2	2	[1]
2004	51	13	25.5[2]	36	70.6	2	[1]
2005	34	11	32.4[2]	20	58.8	3	[1]
Total	173	58	33.5	106	61.3	9	5.2[2]

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable percentage (Rudolph, 2004).
[2] Percentages and rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).

Maternal Age at Death

Across the total 173 maternal deaths from 2002 to 2005, the distribution by age group was as follows: from 30 to 34 years n=46 (26.6%), from 25 to 29 years n=37 (21.4%), from 20 to 24 years n=36 (20.8%), from 35 to 39 years n=27 (15.6%), 40 years and older n=14 (8.1%), and less than 20 years n=10 (5.8%).

Of the 58 pregnancy-related deaths, the distribution by age group was as follows: from 30 to 34 years n=16 (27.6%), from 20 to 24 years n=13 (22.4%), from 25 to 29 years n=12 (20.7%), from 35 to 39 years n=10 (17.2%), 40 years and older n=5 (8.6%), and less than 20 years n=2.

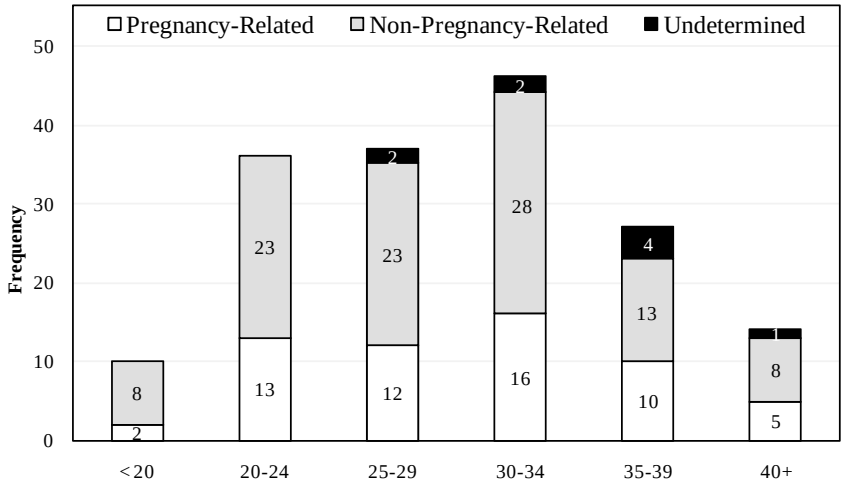
Among the 106 non-pregnancy-related deaths, the distribution by age group was as follows: from 30 to 34 years n=28 (26.4%), from 20 to 24 years n=23 (21.7%), from 25 to 29 years n=23 (21.7%), from 35 to 39 years n=13 (12.4%), 40 years and older n=8 (7.5%), and less than 20 years n=8 (7.5%).

Of the total 173 cases reviewed from 2002 to 2005, the mean age at death was 29.5 years. The youngest age at death was 16 years and the oldest was 46 years.

Among pregnancy-related deaths, the mean age at death was 29.7 years.

Among non-pregnancy-related deaths, the mean age at death was 28.9 years.

Maternal Deaths by Age and Relation to Pregnancy
New Jersey, 2002–2005 (*N*=173)



Maternal Deaths by Age and Relation to Pregnancy
New Jersey, 2002–2005

	Total		Relation to Pregnancy					
			Pregnancy-Related		Non-Pregnancy-Related		Undetermined	
Age Group	*n*	%	*n*	%	*n*	%	*n*	%
< 20	10	5.8[2]	2	[1]	8	7.5[2]	0	0.0
20–24	36	20.8	13	22.4[2]	23	21.7	0	0.0
25–29	37	21.4	12	20.7[2]	23	21.7	2	[1]
30–34	46	26.6	16	27.6[2]	28	26.4	2	[1]
35–39	27	15.6	10	17.2[2]	13	12.4[2]	4	[1]
40+	14	8.1[2]	5	8.6[2]	8	7.5[2]	1	[1]
Unknown	3	[1]	0	0.0	3	[1]	0	0.0
Total	173	100.0	58	100.0	106	100.0	9	100.0[2]

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable percentage (Rudolph, 2004).
[2] Percentages and rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).

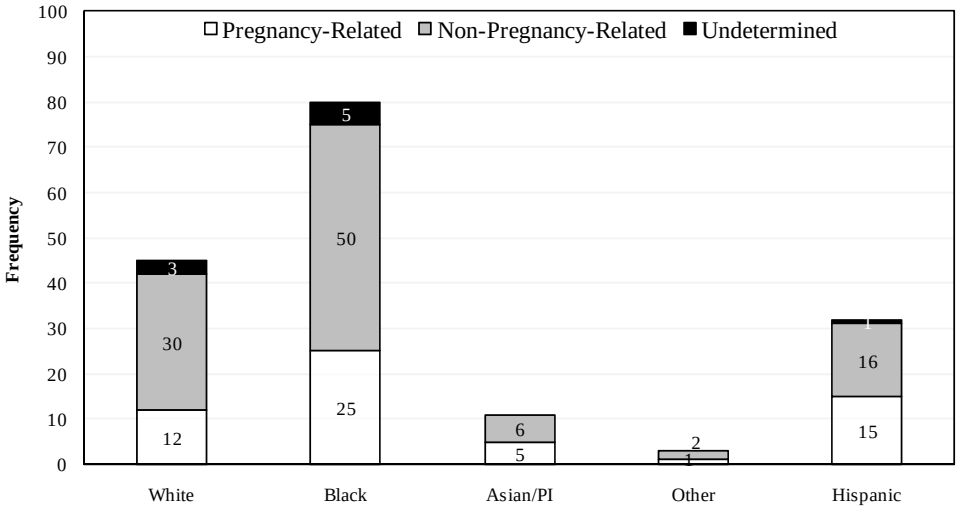
Maternal Deaths by Mean Age at Death and Relation to Pregnancy
New Jersey, 2002–2005

Relation to Pregnancy	*n*	Minimum Age	Maximum Age	Mean Age	SD
Pregnancy-Related	58	17	44	29.7	6.3
Non-Pregnancy-Related	106	16	46	28.9	7.0
Undetermined	9	28	43	35.0	4.9
Total	173	16	46	29.5	6.8

Race and Ethnicity

Across the total 173 maternal deaths from 2002 to 2005, the distribution by race/ethnicity was as follows: Black n=80 (46.2%), White n=45 (26.0%),
Hispanic n=32 (18.5%), and Asian/Pacific Islander n=11 (6.4%).

Maternal Deaths by Race/Ethnicity: New Jersey, 2002–2005 (*N*=173)



Data for White, Black, Asian/PI, and Other do not include Hispanics. Hispanic ethnicity includes persons of any race.

Of the 58 pregnancy-related deaths, the distribution by race/ethnicity was as follows: Black n=25 (43.1%), Hispanic n=15 (25.9%), White n=12 (20.7%), and Asian/Pacific Islander n=5 (8.6%).

Of the 106 non-pregnancy-related deaths, the distribution by race/ethnicity was as follows: Black n=50 (47.2%), White n=30 (28.3%), Hispanic n=16 (15.1%), and Asian/Pacific Islander n=6 (5.7%).

See Appendix for tabular presentation of race/ethnicity data by year.

Maternal Deaths by Relationship to Pregnancy and Race/Ethnicity New Jersey, 2002–2005 (*N*=173)

	Total		Relation to Pregnancy					
			Pregnancy-Related		Non-Pregnancy-Related		Undetermined	
Race/Ethnicity	*n*	%	*n*	%	*n*	%	*n*	%
White	45	26.0	12	20.7[2]	30	28.3	3	[1]
Black	80	46.2	25	43.1	50	47.2	5	55.6[2]
Asian/PI	11	6.4[2]	5	8.6[2]	6	5.7[2]	0	0.0
Other	3	[1]	1	[1]	2	[1]	0	0.0
Hispanic	32	18.5	15	25.9[2]	16	15.1[2]	1	[1]
Not Stated	2	[1]	0	0.0	2	[1]	0	0.0
Total	173	100.0	58	100.0	106	100.0	9	100.0[2]

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable percentage (Rudolph, 2004). [2] Percentages and rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).
Data for White, Black, Other, and Asian/PI do not include Hispanics. Hispanic ethnicity includes persons of any race.

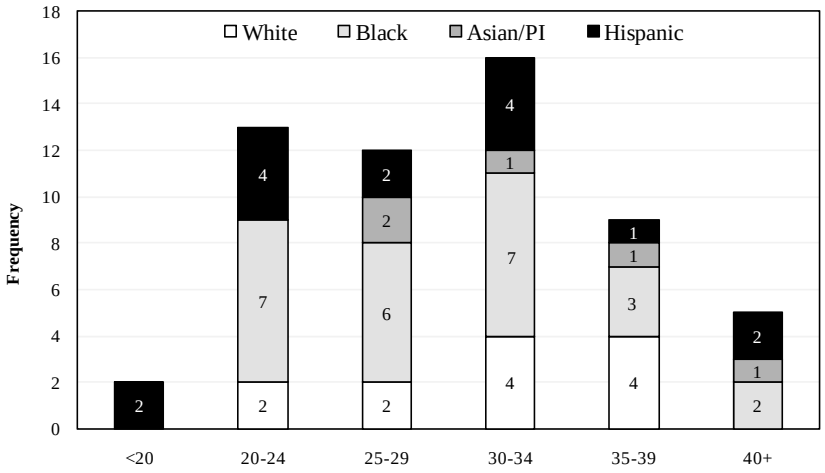
Maternal Deaths by Age, Race and Ethnicity

Compared to other race and ethnic groups, Black women represented the largest number of maternal deaths that occurred between the ages of 20 and 34 for both pregnancy-related and non-pregnancy-related deaths.

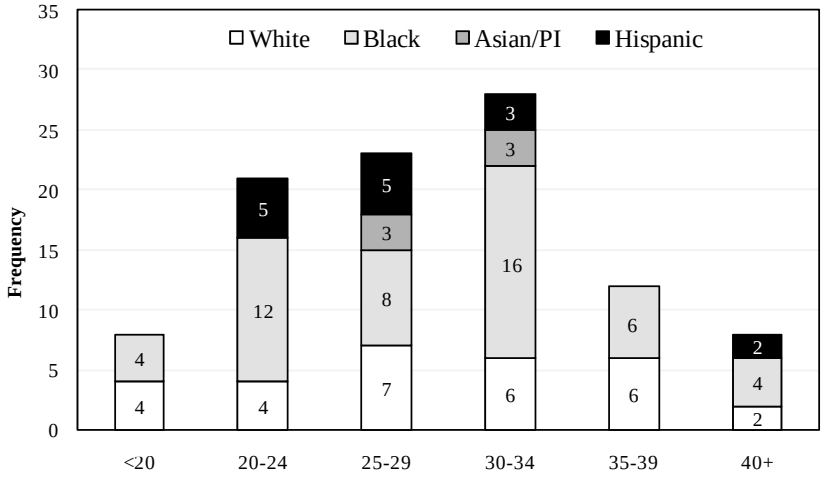
Among pregnancy-related deaths, the distribution by race/ethnicity and age group was as follows: less than 20 years: Hispanic n=2; from 20 to 24 years: Black n=7, Hispanic n=4, White n=2; from 25 to 29 years: Black n=6, Hispanic n=2, White n=2; from 30 to 34 years: Black n=7, Hispanic n=4, White n=4, Asian/Pacific Islander n=1; from 35 to 39 years: White n=4, Black n=3, Hispanic n=1, Asian/Pacific Islander n=1, Other n=1; 40 years and older: Black n=2, Hispanic n=2, Asian/Pacific Islander n=1.

Among non-pregnancy-related deaths, the distribution by race/ethnicity and age group was as follows: less than 20 years: Black n=4, White n=4; from 20 to 24 years: Black n=12, Hispanic n=5, White n=4; from 25 to 29 years: Black n=8, White n=7, Hispanic n=5, Asian/Pacific Islander n=3; from 30 to 34 years: Black n=16, White n=6, Hispanic n=3, Asian/Pacific Islander n=1; from 35 to 39 years: Black n=6, White n=6, Other n=1; 40 years and older: Black n=4, White n=2, Hispanic n=2.

Pregnancy-Related Deaths by Race/Ethnicity and Age: New Jersey, 2002–2005 (*N*=58)



Non-Pregnancy-Related Deaths by Race/Ethnicity and Age: New Jersey, 2002–2005 (*N*=106)



Maternal Deaths by Relation to Pregnancy, Race/Ethnicity and Age: New Jersey, 2002–2005 (*N*=173)

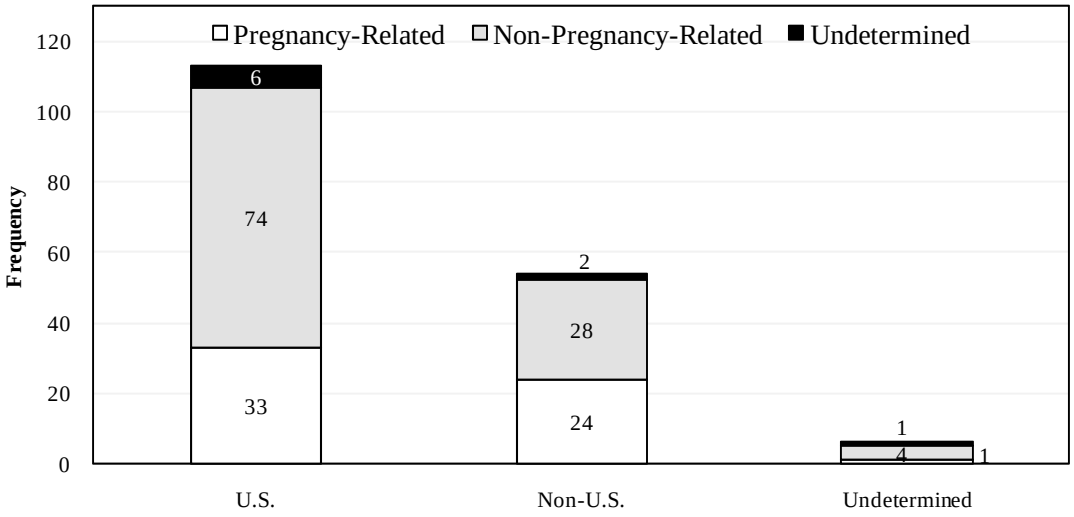
			< 20	20–24	25–29	30–34	35–39	40+	Unknown
		Total	*n*	*n*	*n*	*n*	*n*	*n*	*n*
Pregnancy-Related	White	12	0	2	2	4	4	0	0
	Black	25	0	7	6	7	3	2	0
	Asian/PI	5	0	0	2	1	1	1	0
	Other	1	0	0	0	0	1	0	0
	Hispanic	15	2	4	2	4	1	2	0
	Total Related	**58**	**2**	**13**	**12**	**16**	**10**	**5**	**0**
Non-Pregnancy-Related	White	30	4	4	7	6	6	2	1
	Black	50	4	12	8	16	6	4	0
	Asian/PI	6	0	0	3	3	0	0	0
	Other	2	0	1	0	0	1	0	0
	Hispanic	16	0	5	5	3	0	2	1
	Not Stated	2	0	1	0	0	0	0	1
	Total Not Related	**106**	**8**	**23**	**23**	**28**	**13**	**8**	**3**
Undetermined	White	3	0	0	1	1	1	0	0
	Black	5	0	0	0	1	3	1	0
	Hispanic	1	0	0	1	0	0	0	0
	Total Undetermined	**9**	**0**	**0**	**2**	**2**	**4**	**1**	**0**
	Total All Groups	**173**	**10**	**36**	**37**	**46**	**27**	**14**	**3**

Data for White, Black, Other, and Asian/PI do not include Hispanics. Hispanic ethnicity includes persons of any race.

Nativity

Across the total 173 maternal deaths,
113 (65.3%) occurred to U.S.-born women and
54 (31.2%) occurred to non-U.S.-born women
The country of origin was unknown in 6 cases.

Maternal Deaths by Nativity and Relation to Pregnancy: New Jersey, 2002–2005 (*N*=173)



Of the 58 pregnancy-related deaths, 33 (56.9%) occurred to U.S.-born women and 24 (41.4%) occurred to non-U.S.-born women.

Of the 106 non-pregnancy-related deaths,
74 (69.8%) occurred to U.S.-born women and
28 (26.4%) occurred to non-U.S.-born women.

Maternal Deaths by Nativity and Relation to Pregnancy: New Jersey, 2002–2005 (*N*=173)

	Total		Relation to Pregnancy					
			Pregnancy-Related		Non-Pregnancy-Related		Undetermined	
Nativity	*n*	%	*n*	%	v	%	v	%
U.S.	113	65.3	33	56.9	74	69.8	6	66.7[2]
Non-U.S.	54	31.2	24	41.4	28	26.4	2	[1]
Unknown	6	3.5[2]	1	[1]	4	[1]	1	[1]
Total	173	100.0	58	100.0	106	100.0	9	100.0[2]

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable percentage (Rudolph, 2004). [2] Percentages and rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).

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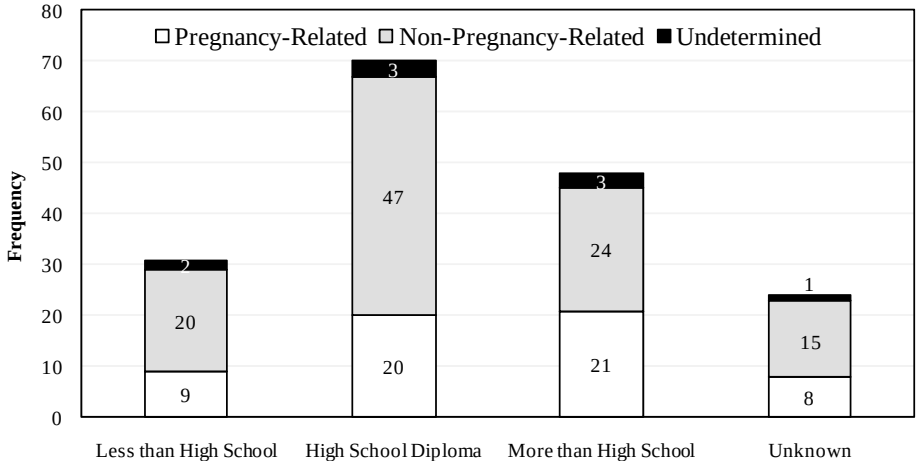
Educational Attainment

The distribution by educational attainment across the total 173 maternal deaths was as follows: high school n=70 (40.5%), more than high school n=48 (27.7%), and less than high school n=31 (17.9%).

Maternal Deaths by Educational Attainment and Relation to Pregnancy
New Jersey, 2002–2005 (*N*=173)



Of the 58 pregnancy-related deaths, the distribution by educational attainment was as follows: more than high school n=21 (36.2%), high school n=20 (34.5%), and less than high school n=9 (15.5%).

Of the 106 non-pregnancy-related deaths, the distribution by educational attainment was as follows: high school n=47 (44.3%), more than high school n=24 (22.6%), and less than high school n=20 (18.9%).

Maternal Deaths by Educational Attainment and Relation to Pregnancy: New Jersey, 2002–2005 (*N*=173)

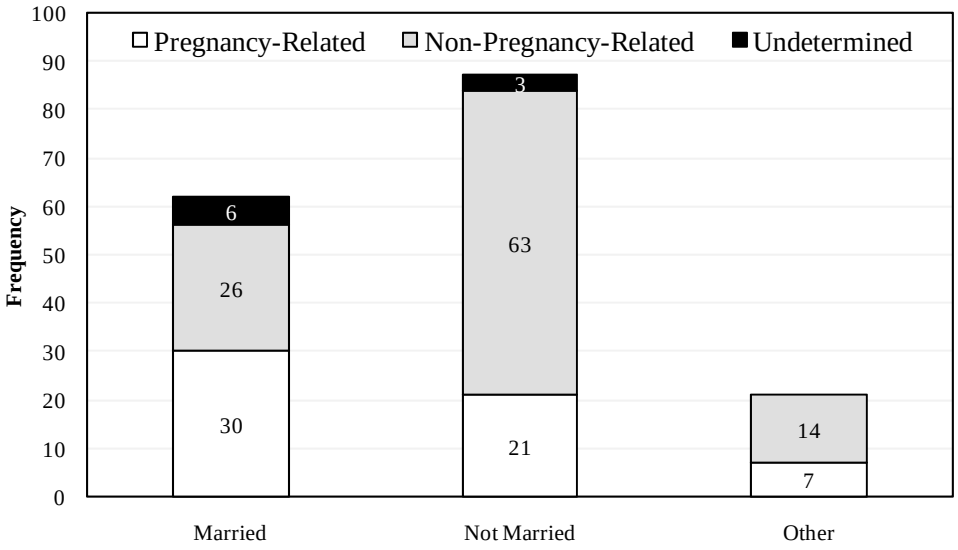
	Total		Relation to Pregnancy					
			Pregnancy-Related		Non-Pregnancy-Related		Undetermined	
Educational Attainment	*n*	%	*n*	%	*n*	%	*n*	%
Less than High School	31	17.9	9	15.5[2]	20	18.9	2	[1]
High School	70	40.5	20	34.5	47	44.3	3	[1]
More than High School	48	27.7	21	36.2	24	22.6	3	[1]
Unknown	24	13.9	8	13.8[2]	15	14.2[2]	1	[1]
Total	173	100.0	58	100.0	106	100.0	9	100.0[2]

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable percentage (Rudolph, 2004). [2] Percentages and rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).

Marital Status

Across the total 173 maternal deaths, 87 were to women who were not married (50.3%) and 62 deaths were to women who were married (35.8%). In 21 (12.1%) cases, marital status was coded as "other" (i.e. separated or living as married).

Maternal Deaths by Marital Status and Relation to Pregnancy: New Jersey, 2002–2005 (*N*=173)



Among the 58 pregnancy-related deaths, 30 (51.7%) were to women who were married and 21 (36.2%) were to women who were not married.

Among the 106 non-pregnancy-related deaths, 26 (24.5%) were to women who were married and 63 (59.4%) were to women who were not married.

Maternal Deaths by Marital Status and Relationship to Pregnancy: New Jersey, 2002–2005 (*N*=173)

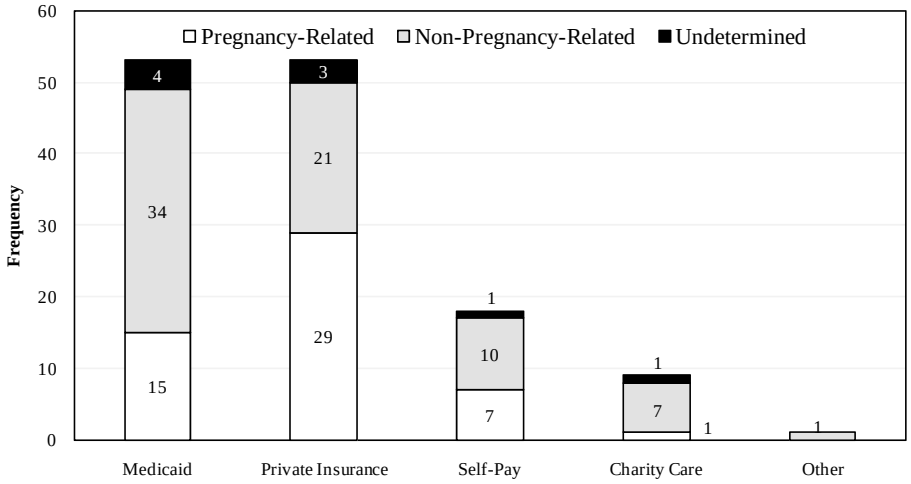
	Total		Pregnancy-Related		Non-Pregnancy-Related		Undetermined	
Marital Status	*n*	%	*n*	%	*n*	%	*n*	%
Married	62	35.8	30	51.7	26	24.5	6	66.7[2]
Not Married	87	50.3	21	36.2	63	59.4	3	[1]
Other[3]	21	12.1	7	12.1[2]	14	13.2[2]	0	0.0
Unknown	3	[1]	0	0.0	3	[1]	0	0.0
Total	173	100.0	58	100.0	106	100.0	9	100.0[2]

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable percentage (Rudolph, 2004). [2] Percentages and rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).[3]Other includes separated and living as married.

Insurance Status

Across the total 173 maternal deaths, 53 (30.6%) received Medicaid, 53 (30.6%) had private insurance, 18 (10.4%) were self-pay, and 9 (5.2%) received charity care.

Maternal Deaths by Insurance Status and Relation to Pregnancy: New Jersey, 2002–2005 (*N*=173)



Of the 58 pregnancy-related deaths, 29 (50.0%) had private insurance, 15 (25.9%) received Medicaid, and 7 (12.1%) were self-pay.

Of the 106 non-pregnancy-related deaths, 34 (32.1%) received Medicaid, 21 (19.8%) had private insurance, 10 were self-pay (9.4%), and 7 received charity care (6.6%).

Maternal Deaths by Insurance Status and Relation to Pregnancy: New Jersey, 2002–2005 (*N*=173)

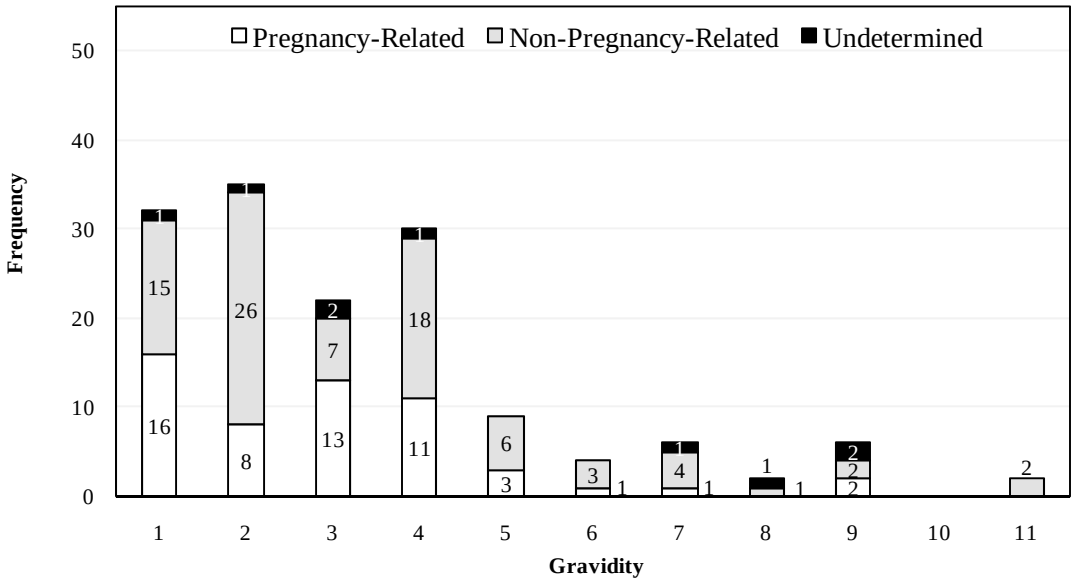
	Total		Pregnancy-Related		Non-Pregnancy-Related		Undetermined	
Insurance	*n*	%	*n*	%	*n*	%	*n*	%
Medicaid	53	30.6	15	25.9[2]	34	32.1	4	[1]
Private Insurance	53	30.6	29	50.0	21	19.8	3	[1]
Self-Pay	18	10.4[2]	7	12.1[2]	10	9.4[2]	1	[1]
Charity Care	9	5.2[2]	1	[1]	7	6.6[2]	1	[1]
Other	1	[1]	0	0.0	1	[1]	0	0.0
Unknown	39	22.5	6	10.3[2]	33	31.1	0	0.0
Total	173	100.0	58	100.0	106	100.0	9	[1]

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable percentage (Rudolph, 2004). [2] Percentages and rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).

Gravidity

Of the total 173 maternal deaths, the distribution by gravidity (i.e. number of pregnancies) was as follows: gravida 1 n=32 (18.5%), gravida 2 n=35 (20.2%), gravida 3 n=22 (12.7%), gravida 4 n=30 (17.3%), gravida 5 n=9 (5.2%), gravida 6 n=4, gravida 7 n=6 (3.5%), gravida 8 (n=2), gravida 9 n=6 (3.5%), and gravida 11 n=2. Gravidity was unknown in 25 cases.

Maternal Deaths by Gravidity and Relation to Pregnancy: New Jersey, 2002–2005 (*N*=173)



Of the 58 pregnancy-related deaths, the distribution by gravidity was as follows: gravida 1 n=16 *(*27.6%), gravida 2 n=8 (13.8%), gravida 3 n=13 (22.4%), gravida 4 n=11 (19.0%), gravida 5 n=3, gravida 6 n=1, gravida 7 n=1, and gravida 9 n=2. Gravidity was unknown in 3 cases.

Of the 106 non-pregnancy-related deaths, the percentage distribution by gravidity was as follows: gravida 1 n=15 *(*14.2%), gravida 2 n=26 (24.5%), gravida 3 n=7 (6.6%), gravida 4 n=18 (17.0%), gravida 5 n=6 (5.7%), gravida 6 n=3, gravida 7 n=4, gravida 8 n=1, gravida 9 n=2, and gravida 11 n=2. Gravidity was unknown in 22 cases.

Maternal Deaths by Gravidity and Relation to Pregnancy: New Jersey, 2002–2005

	Total		Relation to Pregnancy					
			Pregnancy-Related		Non-Pregnancy-Related		Undetermined	
Gravida	*n*	%	*n*	%	*n*	%	*n*	%
1	32	18.5	16	27.6[2]	15	14.2[2]	1	[1]
2	35	20.2	8	13.8[2]	26	24.5	1	[1]
3	22	12.7	13	22.4[2]	7	6.6[2]	2	[1]
4	30	17.3	11	19.0[2]	18	17.0[2]	1	[1]
5	9	5.2[2]	3	[1]	6	5.7[2]	0	0.0
6	4	[1]	1	[1]	3	[1]	0	0.0
7	6	3.5[2]	1	[1]	4	[1]	1	[1]
8	2	[1]	0	0.0	1	[1]	1	[1]
9	6	3.5[2]	2	[1]	2	[1]	2	[1]
10	0	0.0	0	0.0	0	0.0	0	0.0
11	2	[1]	0	0.0	2	[1]	0	0.0
Unknown	25	14.4	3	[1]	22	20.8	0	[1]
Total	173	100.0	58	100.0	106	100.0	9	100.0[2]

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable percentage (Rudolph, 2004). [2] Percentages and rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).

Month of Death

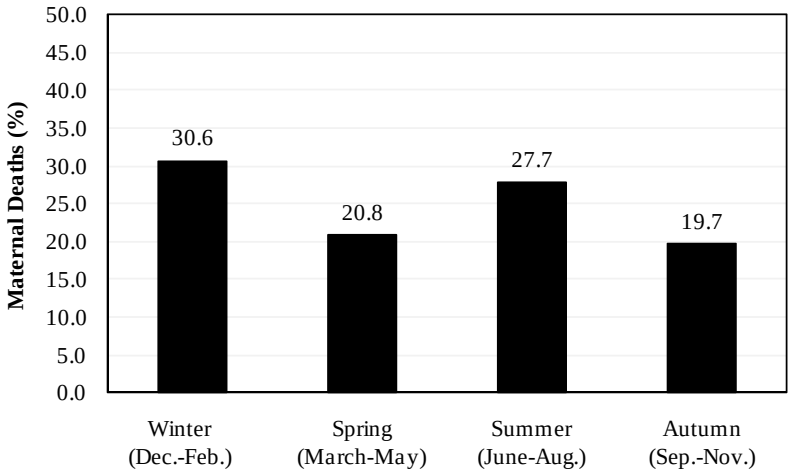
Across the total 173 maternal deaths, 30.6% (n=53) occurred during the winter months, 27.7% (n=48) occurred during summer, 20.8% (n=36) occurred during spring, and 19.7% (n=34) occurred during autumn.

The greatest number of maternal deaths occurred in January (n=20) and July (n=20), while the fewest occurred in April, August, September and October (n=11 deaths in each month).

The greatest number of pregnancy-related deaths occurred in March (n=7), while the fewest occurred in August (n=3) and September (n=3).

The greatest number of non-pregnancy-related deaths occurred in July (n=15), while the fewest deaths occurred in January (n=13), February (n=13) and June (n=12).

Maternal Deaths by Season: New Jersey, 2002–2005 (*N*=173)

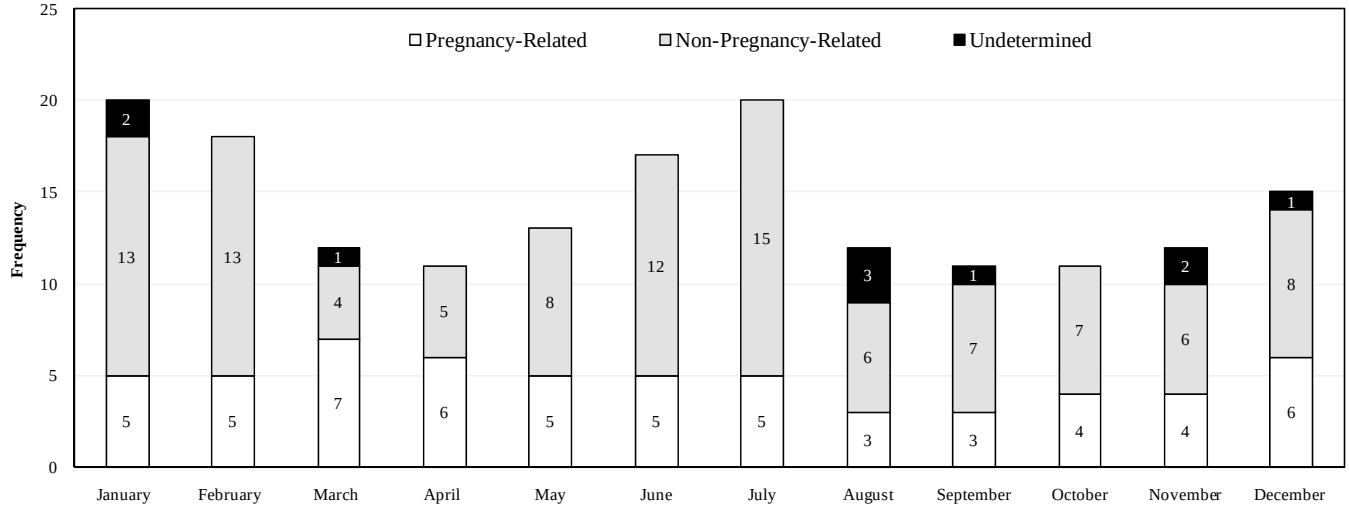


Maternal Deaths by Month of Death and Relation to Pregnancy: New Jersey, 2002–2005 (*N*=173)

	Total		Relation to Pregnancy					
			Pregnancy-Related		Non-Pregnancy-Related		Undetermined	
Month	*n*	%	*n*	%	*n*	%	*n*	%
January	20	11.6	5	8.6[2]	13	12.3[2]	2	[1]
February	18	10.3[2]	5	8.6[2]	13	12.3[2]	0	0.0
March	12	6.9[2]	7	12.1[2]	4	[1]	1	[1]
April	11	6.4[2]	6	10.3[2]	5	4.7[2]	0	0.0
May	13	7.5[2]	5	8.6[2]	8	7.5[2]	0	0.0
June	17	9.8[2]	5	8.6[2]	12	11.3[2]	0	0.0
July	20	11.5	5	8.6[2]	15	14.2[2]	0	0.0
August	11	6.4[2]	3	[1]	6	5.7[2]	2	[1]
September	11	6.4[2]	3	[1]	7	6.6[2]	1	[1]
October	11	6.4[2]	4	[1]	7	6.6[2]	0	0.0
November	12	6.9[2]	4	[1]	6	5.7[2]	2	[1]
December	15	8.6[2]	6	10.3[2]	8	7.5[2]	1	[1]
Unknown	2	[1]	0	0.0	2	[1]	0	0.0
Total	173	100.0	58	100.0	106	100.0	9	100.0

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable percentage (Rudolph, 2004). [2] Percentages and rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).

Maternal Deaths by Month of Death and Relation to Pregnancy: New Jersey, 2002–2005 (*N*=173)



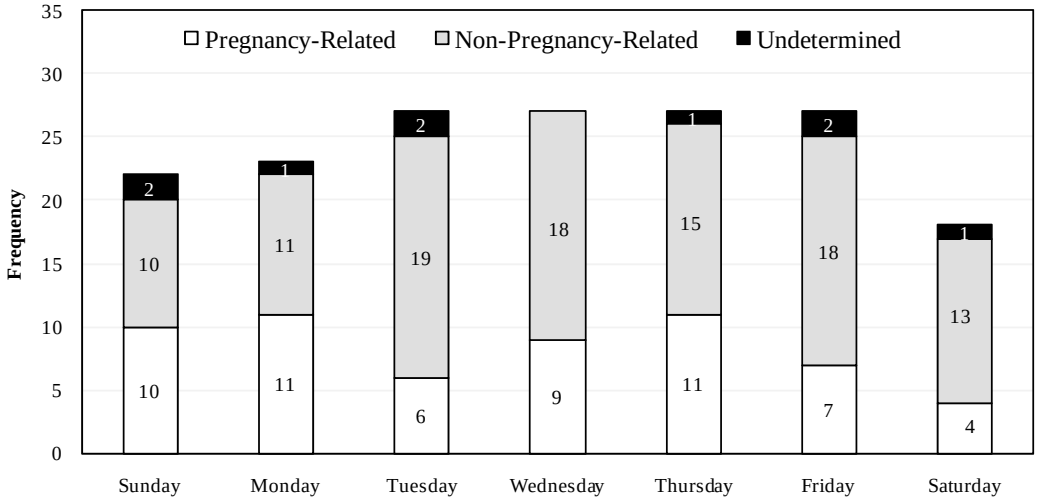
Day of Death

Across the total 173 maternal deaths, the distribution by day of death was as follows: Monday n=23 (13.3%), Tuesday n=27 (15.6%), Wednesday n=27 (15.6%), Thursday n=27 (15.6%) and Friday n=27 (15.6%), Saturday n=18 (10.4%), and Sunday n=22 (12.7%). Thus, most maternal deaths occurred with equal frequency on Tuesdays, Wednesdays, Thursdays, and Fridays, and were least common on Saturdays.

For pregnancy-related deaths, the distribution by day of death was as follows: Monday n=11 (19.0%), Tuesday n=6 (10.3%), Wednesday n=9 (15.5%), Thursday n=11 (19.0%), Friday n=7 (12.1%), Saturday n=4, and Sunday n=10 (17.2%). Thus, deaths were most common on Mondays and Thursdays, and least common on Saturdays.

For non-pregnancy-related deaths, the distribution by day of death was as follows: Monday n=10 (9.4%), Tuesday n=19 (17.9%), Wednesday n=18 (17.0%), Thursday n=15 (14.2%), Friday n=18 (17.0%), Saturday n=13 (12.3%), and Sunday n=10 (9.4%). Thus, deaths were most common on Tuesdays, Wednesdays, and Fridays, and least common on Mondays and Sundays.

Maternal Deaths by Day of Week and Relation to Pregnancy: New Jersey, 2002–2005 (*N*=173)



Maternal Deaths by Day of Death and Relation to Pregnancy: New Jersey, 2002–2005 (*N*=173)

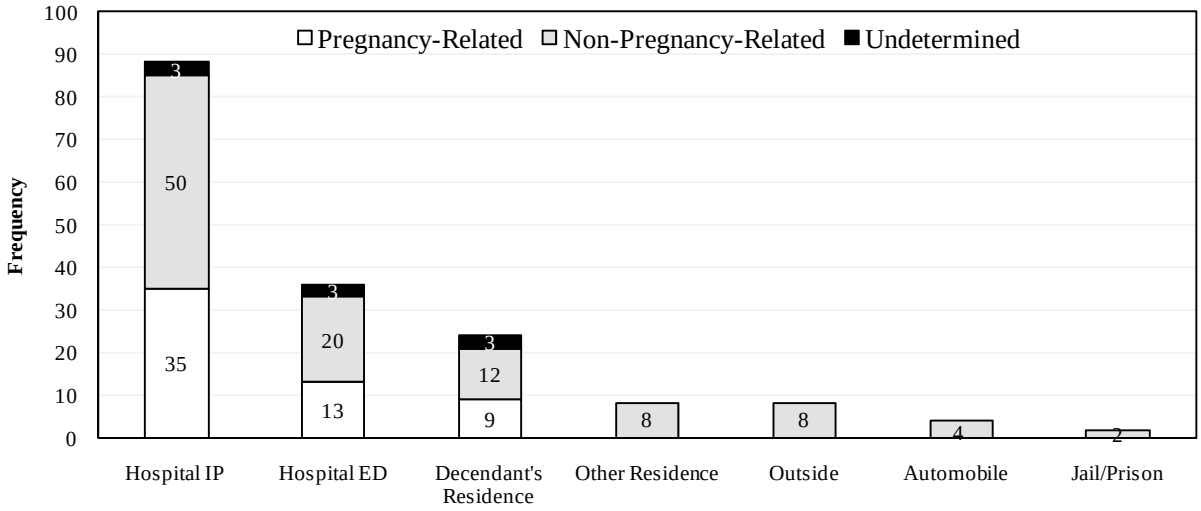
	Total		Relation to Pregnancy					
			Pregnancy-Related		Non-Pregnancy-Related		Undetermined	
Day of Death	*n*	%	*n*	%	*n*	%	*n*	%
Sunday	22	12.7	10	17.2[2]	10	9.4[2]	2	[1]
Monday	23	13.3	11	19.0[2]	11	10.4[2]	1	[1]
Tuesday	27	15.6	6	10.3[2]	19	17.9[2]	2	[1]
Wednesday	27	15.6	9	15.5[2]	18	17.0[2]	0	0.0
Thursday	27	15.6	11	19.0[2]	15	14.2[2]	1	[1]
Friday	27	15.6	7	12.1[2]	18	17.0[2]	2	[1]
Saturday	18	10.4[2]	4	[1]	13	12.3[2]	1	[1]
Unknown	2	[1]	0	0.0	2	[1]	0	0.0
Total	173	100.0	58	100.0	106	100.0	9	100.0[2]

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable percentage (Rudolph, 2004). [2] Percentages and rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).

Place of Death

Of the total 173 maternal deaths, 88 (50.9%) occurred in a hospital inpatient facility, 36 (20.8%) occurred in an emergency department and 24 (13.9%) occurred in the decedent's residence. Other places of death included: other residence (n=8), outside (n=8), automobile (n=4), and jail/ prison (n=2).

Maternal Deaths by Place of Death and Relationship to Pregnancy: New Jersey, 2002–2005 (*N*=173)



Of the 58 pregnancy-related deaths, 35 (60.3%) occurred in a hospital inpatient facility, 13 (22.4%) occurred in an emergency department, and 9 (15.5%) occurred at the decedent's residence.

Of the 106 non-pregnancy-related deaths, 50 (47.2%) occurred in a hospital inpatient facility, 20 (18.9%) occurred in an emergency department, and 12 (11.3%) occurred in the decedent's residence. Other places of death included: other residence (n=8), outside (n=8), automobile (n=4), and jail/prison (n=2).

Maternal Deaths by Place of Death and Relationship to Pregnancy: New Jersey, 2002–2005 (N=173)

	Total		_Pregnancy-Related		Non-Pregnancy-Related		Undetermined	
Place of Death	*n*	%	*n*	%	*n*	%	*n*	%
Hospital IP	88	50.9	35	60.3	50	47.2	3	[1]
Hospital ED	36	20.8	13	22.4[2]	20	18.9	3	[1]
Decedant's Residence	24	13.9	9	15.5[2]	12	11.3[2]	3	[1]
Other Residence	8	4.6[2]	0	0.0	8	7.5[2]	0	0.0
Outside	8	4.6[2]	0	0.0	8	7.5[2]	0	0.0
Automobile	4	[1]	0	0.0	4	[1]	0	0.0
Jail/Prison	2	[1]	0	0.0	2	[1]	0	0.0
Unknown	3	[1]	1	[1]	2	[1]	0	0.0
Total	173	100.0	58	100.0	106	100.0	9	100.0

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable percentage (Rudolph, 2004). [2] Percentages and rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).

Interval from Delivery to Date of Death

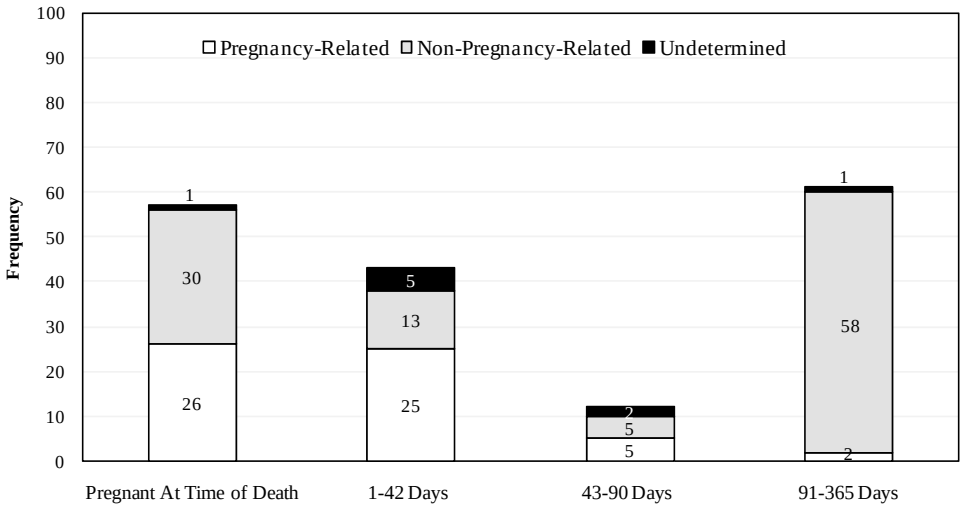
Interval from delivery to date of death refers to the length of time (in days) between the date of delivery and the date of death.

Across the total 173 maternal deaths, 61 (35.3%) occurred between 91 and 365 days postpartum, 57 (32.9%) occurred during pregnancy, 43 (24.9%) occurred between 1 and 42 days postpartum, and 12 (6.9%) occurred between 43 and 90 days postpartum.

Of the 58 pregnancy-related deaths, 26 (44.8%) were pregnant at the time of death, 25 (43.1%) occurred between 1 and 42 days postpartum, 5 (8.6%) occurred between 43 and 90 days postpartum, and 2 occurred between 91 and 365 days postpartum.

Of the 106 non-pregnancy-related deaths, 58 (54.7%) occurred between 91 and 365 days postpartum 30 (28.3%) were pregnant at the time of death, 13 (12.3%) occurred between 1 and 42 days postpartum, and 5 (4.7%) occurred between 43 and 90 days postpartum.

Maternal Deaths by Interval and Relation to Pregnancy: New Jersey, 2002–2005 (*N*=173)



Maternal Deaths by Interval from Pregnancy to Death and Relation to Pregnancy
New Jersey, 2002–2005 (*N*=173)

	Total		Relation to Pregnancy					
			Pregnancy-Related		Non-Pregnancy-Related		Undetermined	
Interval	*n*	%	*n*	%	*n*	%	*n*	%
Pregnant At Death	57	32.9	26	44.8	30	28.3	1	[1]
1–42 Days Postpartum	43	24.9	25	43.1	13	12.3[2]	5	55.6[2]
43–90 Days Postpartum	12	6.9[2]	5	8.6[2]	5	4.7[2]	2	[1]
91–365 Days Postpartum	61	35.3	2	[1]	58	54.7	1	[1]
Total	173	100.0	58	100.0	106	100.0	9	100.0[2]

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable percentage (Rudolph, 2004). [2] Percentages and rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).

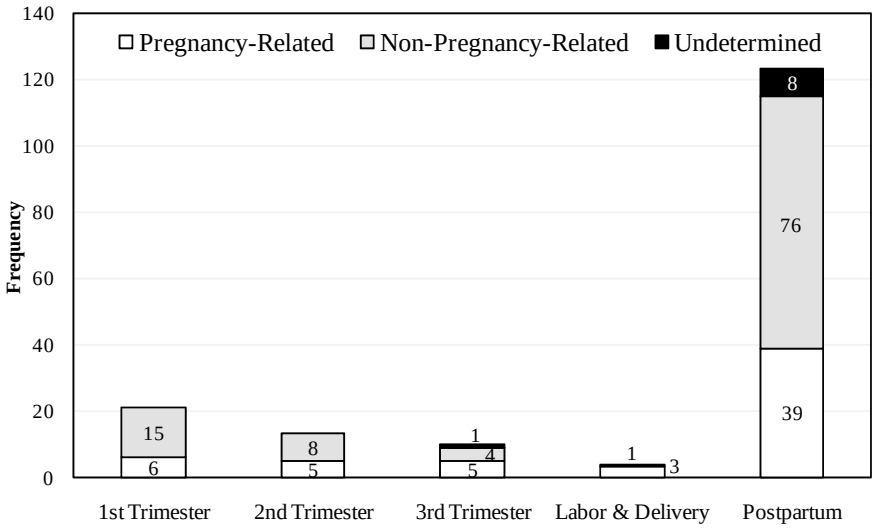
Stage of Pregnancy at Death

Of the total 173 maternal deaths, the distribution by stage of pregnancy at death was as follows: postpartum period n=123 (71%), first trimester n=21 (12.1%), second trimester n=13 (7.5%), third trimester n=10 (5.8%), labor and delivery n=4.

Of the 58 pregnancy-related deaths, the distribution by stage of pregnancy at death was as follows: postpartum period n=39 (67.2%), first trimester n=6 (10.3%), second trimester n=5 (8.6%), third trimester n=5 (8.6%), and labor and delivery n=3.

Of the 106 non-pregnancy-related deaths, distribution by stage of pregnancy at death was as follows: postpartum period n=76 (71.7%), first trimester n=15 (14.2%), second trimester n=8 (7.5%), third trimester n=4, labor and delivery n=1.

Maternal Deaths by Stage of Pregnancy at Death and Relation to Pregnancy New Jersey, 2002–2005 (*N*=173)



Maternal Deaths by Stage of Pregnancy at Death and Relation to Pregnancy: New Jersey, 2002–2005

	Total		Relation to Pregnancy					
			Pregnancy-Related		Non-Pregnancy-Related		Undetermined	
Stage of Pregnancy	*n*	%	*n*	%	*n*	%	*n*	%
1st Trimester	21	12.1	6	10.3[2]	15	14.2[2]	0	0.0
2nd Trimester	13	7.5[2]	5	8.6[2]	8	7.5[2]	0	0.0
3rd Trimester	10	5.8[2]	5	8.6[2]	4	[1]	1	[1]
Labor & Delivery	4	[1]	3	[1]	1	[1]	0	0.0
Postpartum	123	71.1	39	67.2	76	71.7	8	88.9
Unknown	2	[1]	0	0.0	2	[1]	0	0.0
Total	173	100.0	58	100.0	106	100.0	9	100.0

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable percentage (Rudolph, 2004). [2] Percentages and rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).

Delivery Characteristics

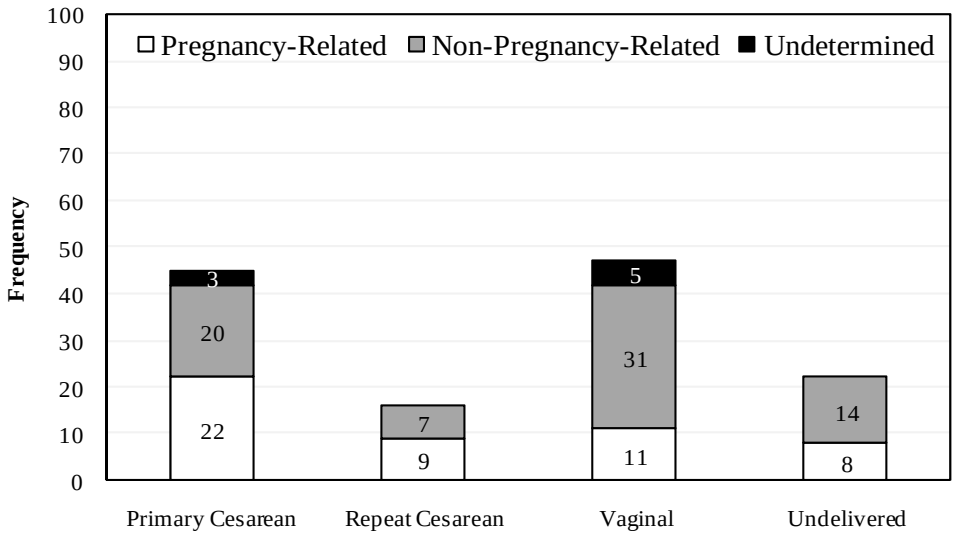
For the total 173 maternal deaths, the distribution by type of delivery was as follows: vaginal n=47 (27.2%), primary cesarean n=45 (26.0%), and repeat cesarean n=16 (9.2%). No delivery occurred in 22 cases (12.7%).

Of the 45 primary cesarean deliveries, 8 (4.6%) were planned and 37 (21.4%) were unplanned. Of the 16 repeat cesarean deliveries, 11 (6.4%) were planned and 5 (2.9%).were unplanned.

Pregnancy-Related Deaths
Of the 58 pregnancy-related deaths, the distribution by type of delivery was as follows: primary cesarean n=22 (37.9%), repeat cesarean n=9 (15.5%), and vaginal n=11 (19.0%). No delivery occurred in 8 cases (13.8%).

Of the 22 primary cesarean deliveries, 3 were planned and 19 were unplanned. Of the 9 repeat cesarean deliveries, 7 were planned and 2 were unplanned.

Maternal Deaths by Type of Delivery and Relation to Pregnancy: New Jersey, 2002–2005



Non-Pregnancy-Related Deaths
For the 106 non-pregnancy-related deaths, the distribution by type of delivery was as follows: vaginal n=31 (29.2%), primary cesarean n=20 (18.9%), and repeat cesarean n=7 (6.7%). No delivery occurred in 14 cases (13.2%).

Of the 22 deliveries by primary cesarean, 5 were planned and 15 were unplanned. Of the 7 repeat cesarean deliveries, 4 were planned and 3 were unplanned.

Maternal Deaths by Type of Delivery and Relation to Pregnancy: New Jersey, 2002–2005

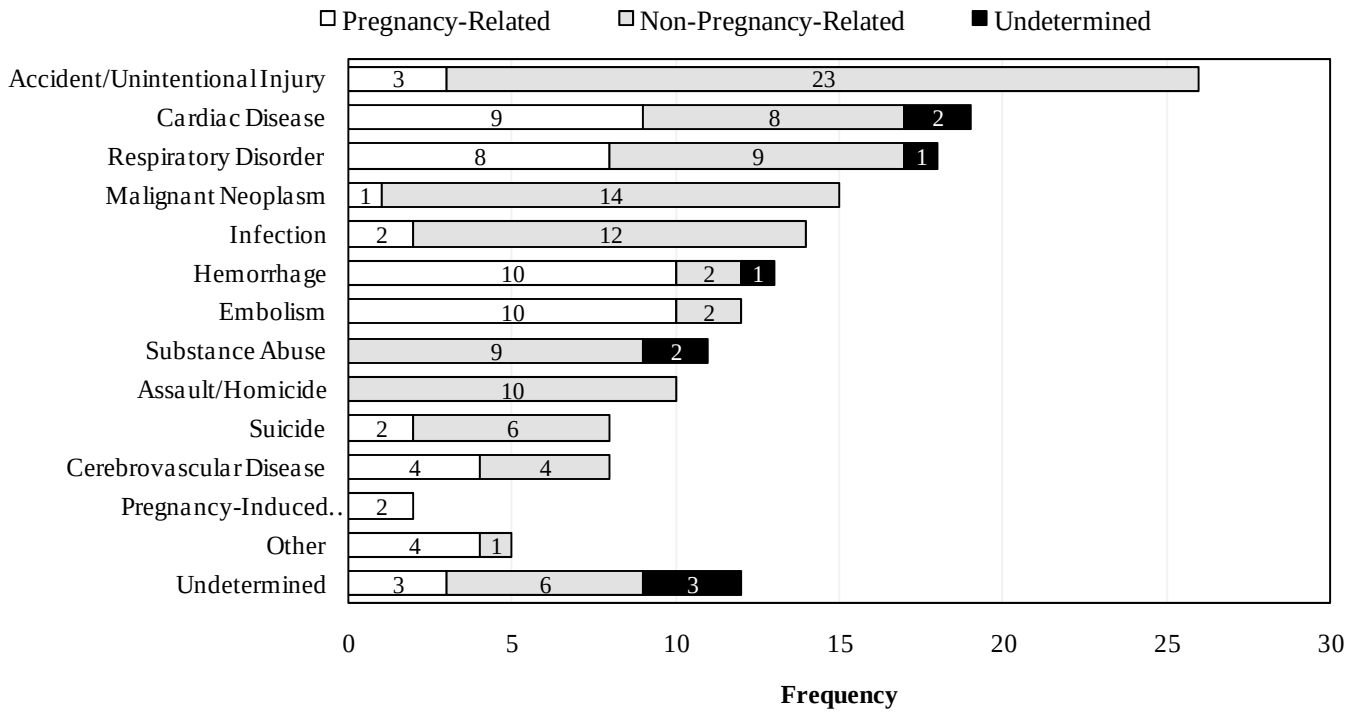
	Total		Relation to Pregnancy					
			Pregnancy-Related		Non-Pregnancy-Related		Undetermined	
Type of Delivery	*n*	%	*n*	%	*n*	%	*n*	%
Primary Cesarean Section (total)	45	26.0	22	37.9	20	18.9	3	[1]
Planned	8	4.6[2]	3	[1]	5	4.7[2]	0	0.0
Unplanned	37	21.4	19	32.8[2]	15	14.2[2]	3	[1]
Repeat C-Section (total)	16	9.2[2]	9	15.5[2]	7	6.7[2]	0	0.0
Planned	11	6.4[2]	7	12.1[2]	4	[1]	0	0.0
Unplanned	5	2.9[2]	2	[1]	3	[1]	0	0.0
Undelivered	22	12.7	8	13.8[2]	14	13.2[2]	0	0.0
Vaginal/Vaginal Assist	47	27.2	11	19.0[2]	31	29.2	5	55.6[2]
Unknown	43	24.9	8	13.8[2]	34	32.1	1	[1]
Total	173	100.0	58	100.0	106	100.0	9	100.0[2]

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable percentage (Rudolph, 2004). [2] Percentages and rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).

Cause of Death

Across the total 173 maternal deaths, the most frequent cause of death was accident/unintentional injury (n=26), followed by cardiac disease (n=19), respiratory disorder (n=18), malignant neoplasm (n=15), infection (n=14), hemorrhage (n=13), embolism (n=12), substance abuse (n=11), assault (n=10), suicide (n=8), cerebrovascular disease (n=8), and pregnancy-induced hypertension (n=2). In 12 cases, the cause of death was undetermined.

Maternal Deaths by Cause of Death and Relation to Pregnancy: New Jersey, 2002–2005 (*N*=173)



Of the 58 pregnancy-related deaths, the most frequent causes of death were hemorrhage (n=10) and embolism (n=10), followed by cardiac disease (n=9), respiratory disorder (n=8), cerebrovascular disease (n=4), accident/unintentional injury (n=3), infection (n=2), suicide (n=2), pregnancy-induced hypertension (n=2), and malignant neoplasm (n=1).

Of the 106 non-pregnancy-related deaths, the most frequent cause of death was accident/unintentional injury (n=23), followed by malignant neoplasm (n=14), infection (n=12), assault (n=10), substance abuse (n=9), respiratory disorder (n=9), cardiac disease (n=8), suicide (n=6), cerebrovascular disease (n=4), hemorrhage (n=2), and embolism (n=2). See Appendix for tabular presentation of these data.

Cause of Death by Race and Ethnicity

Pregnancy-Related Deaths

Of the 58 pregnancy-related deaths, differences were observed in the leading cause of death by race and ethnicity.

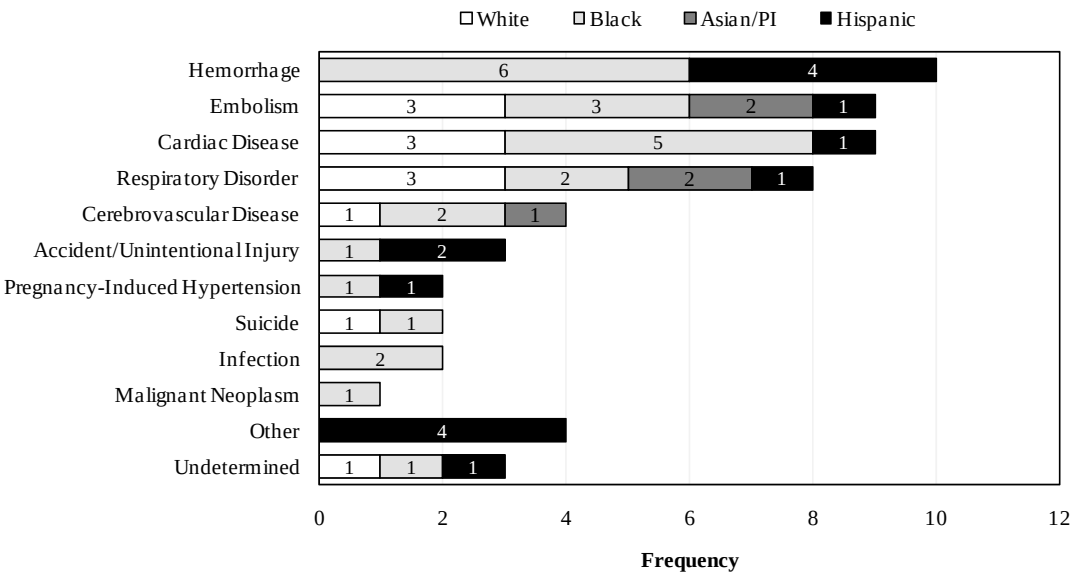
Among Black maternal deaths, the three leading causes of death were hemorrhage (n=6), cardiac disease (n=5), and embolism (n=3).

Among Hispanic maternal deaths, the three leading causes of death were hemorrhage (n=4), other causes (n=4), and accidents (n=2).

Among White maternal deaths, the three leading causes of death were embolism (n=3), cardiac disease (n=3), and respiratory disorder (n=3).

Of the 5 Asian/Pacific Islander maternal deaths, 2 were attributed to embolism, 2 were attributed to respiratory disorder and 1 was attributed to cerebrovascular disease.

Pregnancy-Related Deaths by Cause of Death and Race/Ethnicity: New Jersey, 2002–2005 (*N*=58)



Pregnancy-Related Deaths by Cause of Death and Race/Ethnicity: New Jersey, 2002–2005 (*N*=58)

Cause of Death	Total	White *n*	Black *n*	Asian/PI *n*	Other *n*	Hispanic *n*
Hemorrhage	10	0	6	0	0	4
Embolism	10	3	3	2	0	1
Cardiac Disease	9	3	5	0	0	1
Respiratory Disorder	8	3	2	2	0	1
Cerebrovascular Disease	4	1	2	1	0	0
Accident/Unintentional Injury	3	0	1	0	0	2
Infection	2	0	2	0	0	0
Suicide	2	1	1	0	0	0
Pregnancy-Induced Hypertension	2	0	1	0	1	1
Malignant Neoplasm	1	0	1	0	0	0
Other	4	0	0	0	0	4
Undetermined	3	1	1	0	0	1
Total	58	12	25	5	1	15

Data for White, Black, Other, and Asian/PI do not include Hispanics. Hispanic ethnicity includes persons of any race.

Non-Pregnancy-Related Deaths

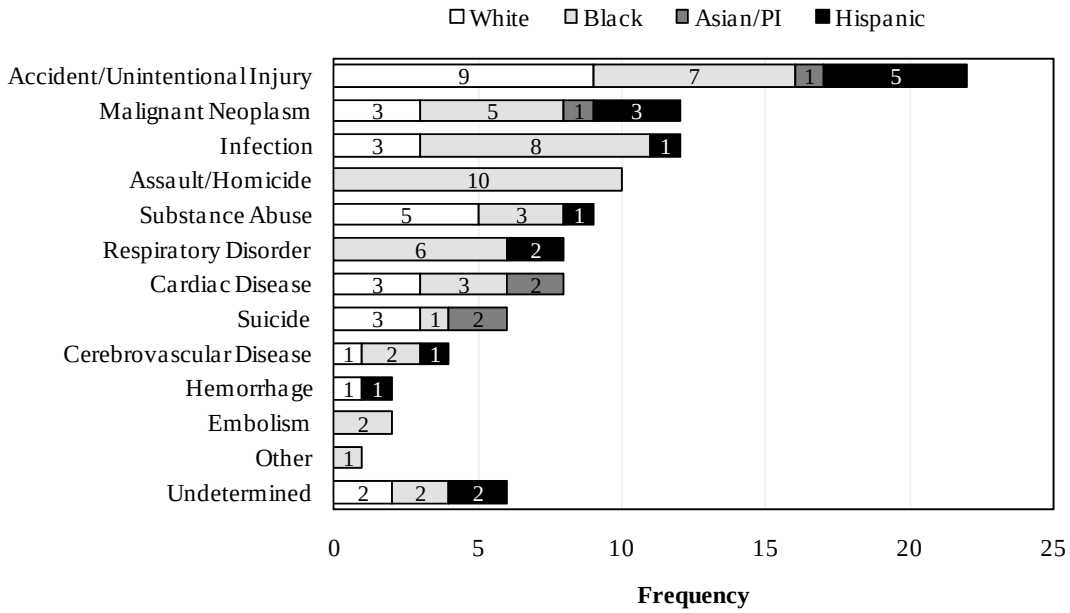
Of the 106 non- pregnancy-related deaths, differences were observed in the leading cause of death by race and ethnicity.

Among Black maternal deaths, the three leading causes of death were assault/ homicide (n=10), infection (n=8), and accident/unintentional injury (n=7).

Among White maternal deaths, the two leading causes of death were accident/ unintentional injury (n=9), and substance abuse (n=5). The remaining cases were evenly distributed among malignant neoplasm (n=3), infection (n=3), cardiac disease (n=3), and suicide (n=3).

Among Hispanic maternal deaths, the three leading causes of death were accident/unintentional injury (n=5), malignant neoplasm (n=3) and respiratory disorder (n=2).

Non-Pregnancy-Related Deaths by Cause of Death and Race/Ethnicity: New Jersey, 2002–2005 (*N*=106)



Of the 6 Asian/Pacific Islander maternal deaths, 2 were attributed to cardiac disease, 2 were attributed to suicide, 1 was attributed to accident/unintentional injury and 1 was attributed to malignant neoplasm.

Non-Pregnancy-Related Deaths by Cause of Death and Race/Ethnicity: New Jersey, 2002–2005 (*N*=106)

Cause of Death	Total	White *n*	Black *n*	Asian/PI *n*	Other *n*	Hispanic *n*
Accident/Unintentional Injury	23	9	7	1	1	5
Malignant Neoplasm	14	3	5	1	2	3
Infection	12	3	8	0	0	1
Assault/Homicide	10	0	10	0	0	0
Substance Abuse	9	5	3	0	0	1
Cardiac Disease	8	3	3	2	0	0
Respiratory Disorder	8	0	6	0	0	2
Suicide	6	3	1	2	0	0
Cerebrovascular Disease	4	1	2	0	0	1
Embolism	2	0	2	0	0	0
Hemorrhage	2	1	0	0	0	1
Other	1	0	1	0	0	0
Undetermined	7	2	2	0	1	2
Total	106	30	50	6	4	16

Data for White, Black, Other, and Asian/PI do not include Hispanics. Hispanic ethnicity includes persons of any race.

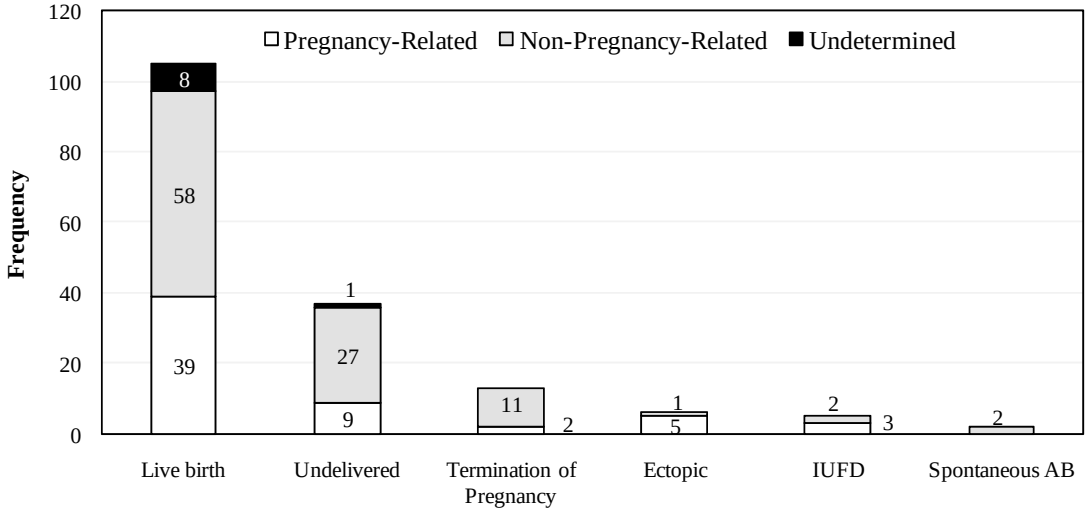
Pregnancy Outcome

Across the total 173 maternal deaths, the distribution of pregnancy outcomes was as follows: live birth n=106 (60.7%) undelivered n=37 (21.4%), termination n=13 (7.5%), ectopic pregnancy n=6 (3.5%), IUFD n=5 (2.9%), and spontaneous abortion (n=2). The pregnancy outcome was unknown in 5 cases.

Of the 58 pregnancy-related deaths, the distribution of pregnancy outcomes was as follows: live birth n=39 (67.2%), undelivered n=9 (15.5%), ectopic n=5 (8.6%), IUFD (n=3), and termination (n=2).

Of the 106 non-pregnancy-related deaths, the distribution of pregnancy outcomes was as follows: live birth n=58 (54.7%) undelivered n=27 (25.5%) termination n=11 (10.4%), IUFD (n=2), and spontaneous abortion (n=2). The pregnancy outcome was unknown in 5 cases.

Maternal Deaths by Pregnancy Outcome and Relation to Pregnancy: New Jersey, 2002–2005



Maternal Deaths by Pregnancy Outcome and Relation to Pregnancy: New Jersey, 2002–2005

	Total		Pregnancy-Related		Non-Pregnancy-Related		Undetermined	
Pregnancy Outcome	*n*	%	*n*	%	*n*	%	*n*	%
Live birth	105	60.7	39	67.2	58	54.7	8	88.9[2]
Undelivered	37	21.4	9	15.5[2]	27	25.5	1	[1]
Termination of Pregnancy	13	7.5[2]	2	[1]	11	10.4[2]	0	0.0
Ectopic	6	3.5[2]	5	8.6[2]	1	[1]	0	0.0
IUFD	5	2.9[2]	3	[1]	2	[1]	0	0.0
Spontaneous AB	2	[1]	0	0.0	2	[1]	0	0.0
Unknown	5	2.9[2]	0	0.0	5	4.7[2]	0	0.0
Total	173	100.0	58	100.0	106	100.0	9	100.0[2]

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable percentage (Rudolph, 2004). [2] Percentages and rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).

Pregnancy Outcome and Cause of Death

A live birth was the most frequent outcome for both pregnancy-related (n=39) and non-pregnancy-related (n=58) deaths.

In pregnancy-related deaths that resulted in a live birth, the most frequent causes of death were cardiac disease (n=9), respiratory disorder (n=6), hemorrhage (n=5), and embolism (n=5).

In non-pregnancy-related deaths that resulted in a live birth, the most frequent causes of death were accident (n=12), malignant neoplasm (n=8), respiratory disorder (n=8), and infection (n=6).

Pregnancy-Related Deaths by Cause of Death and Outcome of Pregnancy
New Jersey, 2002–2005 (*N*=58)

		Pregnancy Outcome				
Cause of Death	Total	Live Birth *n*	IUFD/ SAB *n*	Ectopic *n*	Termination *n*	Undelivered *n*
Hemorrhage	10	5	0	4	0	1
Embolism	10	5	0	0	3	3
Cardiac Disease	9	9	0	0	0	0
Respiratory Disorder	8	6	0	0	0	1
Cerebrovascular Disease	4	3	1	0	0	0
Accidents	3	3	0	0	0	0
Pregnancy-Induced Hypertension	2	2	0	0	0	0
Infection	2	1	0	0	0	1
Suicide	2	2	0	0	0	0
Malignant Neoplasm	1	0	0	1	0	0
Other	4	2	0	0	0	2
Undetermined	3	1	1	0	0	1
Total	58	39	2	5	3	9

Non-Pregnancy-Related Deaths by Cause of Death and Pregnancy Outcome
New Jersey, 2002–2005 (*N*=106)

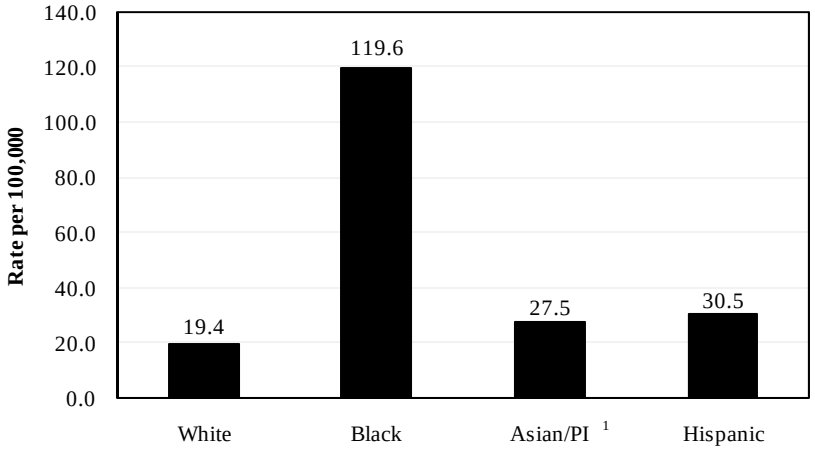
		Pregnancy Outcome					
Cause of Death	Total	Live Birth *n*	IUFD/ SAB *n*	Ectopic *n*	Termination *n*	Undelivered *n*	Unknown *n*
Accident	23	12	1	0	2	7	1
Malignant Neoplasm	14	8	0	0	3	2	1
Infection	12	6	1	0	2	2	1
Assault/Homicide	10	5	0	0	1	4	0
Respiratory Disorder	9	8	0	0	0	1	0
Substance Abuse	9	5	0	0	1	2	1
Cardiac Disease	8	4	1	0	1	2	0
Suicide	6	3	1	0	0	2	0
Cerebrovascular Disease	4	2	0	0	0	2	0
Hemorrhage	2	2	0	0	0	0	0
Embolism	2	1	0	0	0	1	0
Other	1	0	0	0	0	1	0
Undetermined	6	2	0	1	1	1	1
Total	106	58	4	1	11	27	5

Maternal Mortality Rate

Race/Ethnicity

From 2002 to 2005, the maternal mortality Rate (per 100,000 births) by race/ethnicity was as follows: Black 119.6, Hispanic 30.5, Asian/Pacific Islander 27.5, and White 19.4. Compared to the White population, the risk of a maternal death was 6.2 times greater for the Black population, 1.6 times greater for the Hispanic population, and 1.4 times greater for the Asian/Pacific Islander population.

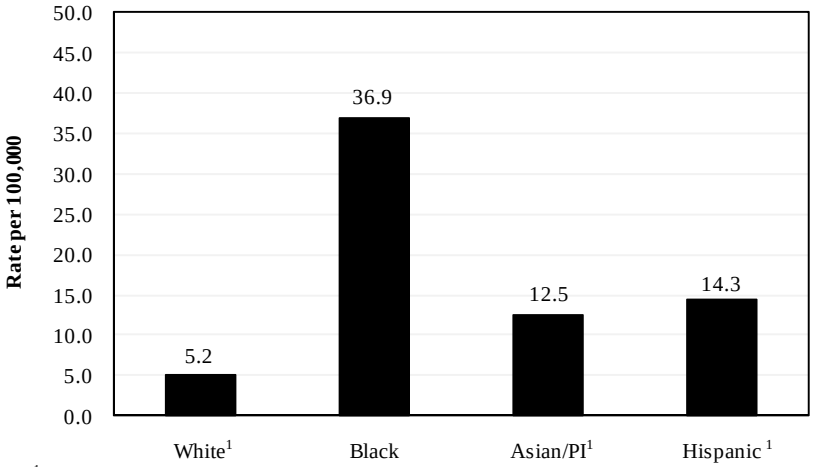
Maternal Mortality Rate (per 100,000 births) by Race/Ethnicity: 2002–2005



[1]Rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (see Rudolph, 2004). Data for White, Black and Asian/PI do not include Hispanics. Hispanic ethnicity includes persons of any race. Birth data: New Jersey Department of Health Senior Services, NJSHAD Query System.

From 2002 to 2005, the pregnancy-related maternal mortality Rate by race/ethnicity was as follows: Black 36.9, Hispanic 14.3, and White 5.2. The Asian/Pacific Islander maternal mortality Rate was not calculated due to small numbers (see Rudolph, 2004). Compared to the White population, the risk of a pregnancy-related maternal death was 7 times greater for the Black population, and nearly 3 times greater for the Hispanic population.

Pregnancy-Related Mortality Rate (per 100,000 births) by Race/Ethnicity: 2002–2005

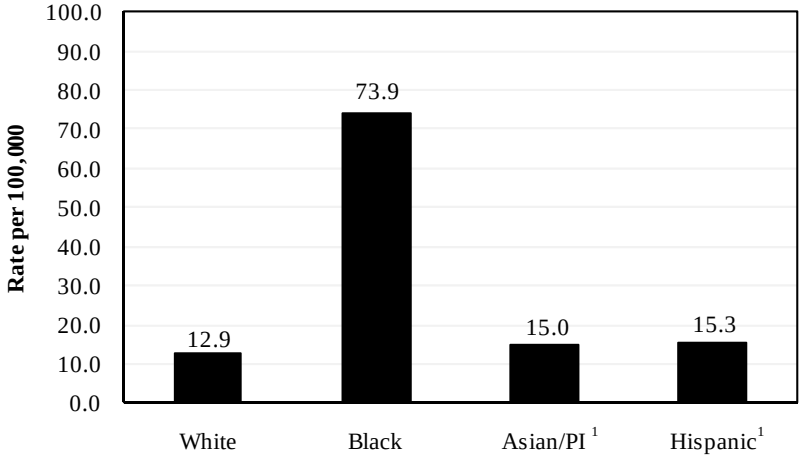


[1]Rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (see Rudolph, 2004). Data for White, Black and Asian/PI do not include Hispanics. Hispanic ethnicity includes persons of any race. Birth data: New Jersey Department of Health Senior Services, NJSHAD Query System.

From 2002 to 2005, the non-pregnancy related maternal mortality rate by race/ethnicity was as follows: Black 73.9, Hispanic 15.3, Asian/ Pacific Islander 15.0, and White 12.9. Compared to the White population, the risk of a non-pregnancy-related maternal death was 5.7 times greater for the Black population and 1.2 times higher for the Hispanic population.

The information presented here is descriptive only and does not account for differences in socioeconomic status and other factors that may influence the observed differences.

Non-Pregnancy-Related Mortality Rate (per 100,000 births) by Race/Ethnicity: 2002–2005



[1]Rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (see Rudolph, 2004). Data for White, Black and Asian/PI do not include Hispanics. Hispanic ethnicity includes persons of any race. Birth data: New Jersey Department of Health Senior Services, NJSHAD Query System.

Maternal Mortality Rate (per 100,000 births) by Race/Ethnicity: New Jersey, 2002–2005

Race/Ethnicity	Number of Deaths	Number of Births	Mortality Rate	Relative Risk
White	45	231,765	19.4	Reference Group
Black	81	67,700	119.6	6.2
Asian/PI	11	39,932	27.5[2]	1.4[2]
Other	4	15,368	[1]	[1]
Hispanic	32	104,795	30.5	1.6
Total	173	459,560	37.4	2.0

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable rate (Rudolph, 2004). [2] Rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).
Birth data: New Jersey Department of Health and Senior Services, NJSHAD Query System.
Data for White, Black, Asian/PI, and Other do not include Hispanics. Hispanic ethnicity includes persons of any race.

Pregnancy-Related Mortality Rate (per 100,000 births) by Race/Ethnicity: New Jersey, 2002–2005

Race/Ethnicity	Number of Deaths	Number of Births	Mortality Rate	Relative Risk
White	12	231,765	5.2[2]	Reference Group
Black	25	67,700	36.9	7.1
Asian/PI	5	39,932	12.5[2]	2.4[2]
Other	1	15,368	[1]	[1]
Hispanic	15	104,795	14.3[2]	2.8[2]
Total	58	459,560	12.6	2.4

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable rate (Rudolph, 2004). [2] Rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).
Birth data: New Jersey Department of Health and Senior Services, NJSHAD Query System.
Data for White, Black, Asian/PI, and Other do not include Hispanics. Hispanic ethnicity includes persons of any race.

Non-Pregnancy-Related Mortality Rate (per 100,000 births) by Race/Ethnicity: New Jersey, 2002–2005

Race/Ethnicity	Number of Deaths	Number of Births	Mortality Rate	Relative Risk
White	30	231,765	12.9	Reference Group
Black	50	67,700	73.9	5.7
Asian/PI	6	39,932	15.0[2]	1.2[2]
Other	4	15,368	[1]	[1]
Hispanic	16	104,795	15.3[2]	1.2[2]
Total	106	459,560	23.1	1.8

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable rate (Rudolph, 2004). [2] Rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).
Birth data: New Jersey Department of Health and Senior Services, NJSHAD Query System.
Data for White, Black, Asian/PI, and Other do not include Hispanics. Hispanic ethnicity includes persons of any race.

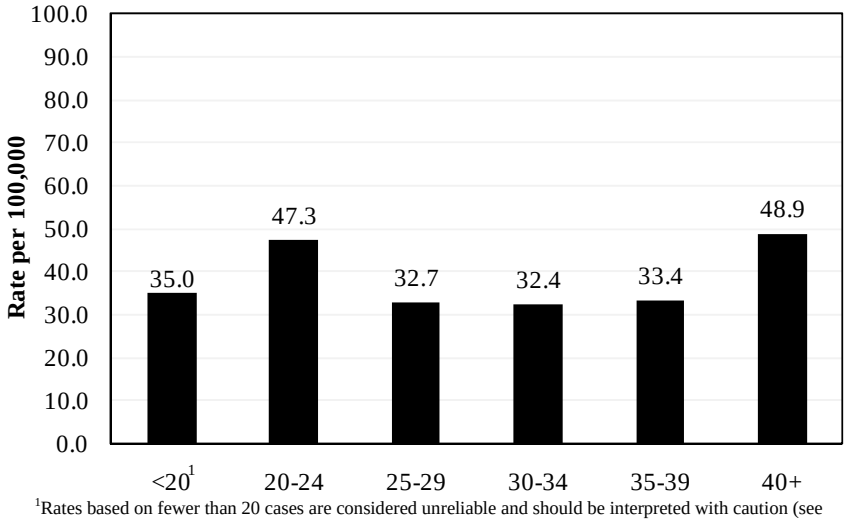
Age

For all maternal deaths from 2002–2005, the maternal mortality rate by age group was as follows: 48.9 (deaths per 100,000 births) for 40 years and older, followed by 47.3 for 20 to 24 years, 35.0 for less than 20 years, 33.4 for 35 to 39 years, 32.7 for 25 to 29 years, and 32.4 for 30 to 34 years. Compared to women from 30 to 34 years of age, the risk of a maternal death for other age groups was 1.5 times greater for 40 years and older, and 1.5 times greater for 20 to 24 years. For the remaining age groups, the relative risk of a maternal death was similar: 1.1 for less than 20 years, 1.0 for 25 to 29 years, and 1.0 for 35 to 39 years.

Among pregnancy-related deaths, the maternal mortality rate by age group was 17.5 (deaths per 100,000 births) for 40 years and older, 17.1 for 20 to 24 years, 12.4 for 35 to 39 years, 11.3 for 30 to 34 years, and 10.6 for 25 to 29 years. Compared to women from 25 to 29 years of age, the risk of a maternal death for other age groups was 1.6 times greater for 40 years and older, 1.6 times greater for 20 to 24 years, 1.2 times greater for 35 to 39 years, and 1.1 times greater for 30 to 34 years.

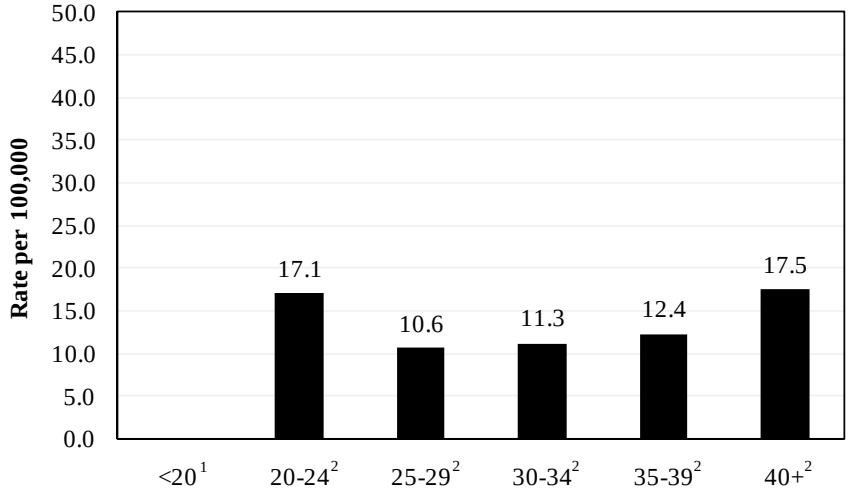
Among non-pregnancy-related deaths, the maternal mortality rate by age group was 30.2 (deaths per 100,000 births) for 20 to 24 years, 28.0 for less than 20 years, 28.0 for 40 years and older, 20.3 for 25 to 29 years, 19.7 for 30 to 34 years, and 16.1 for 35 to 39 years. Compared to women from 35 to 39 years of age, the risk of a maternal death for other age groups was nearly two times greater for 20 to 24 years, 1.7 times greater for less than 20 years, 1.7 times greater for 40 years and older, 1.3 times greater for 25 to 29 years, and 1.2 times greater for 30 to 34 years.

Maternal Mortality Rate (per 100,000 births) by Age: New Jersey, 2002–2005



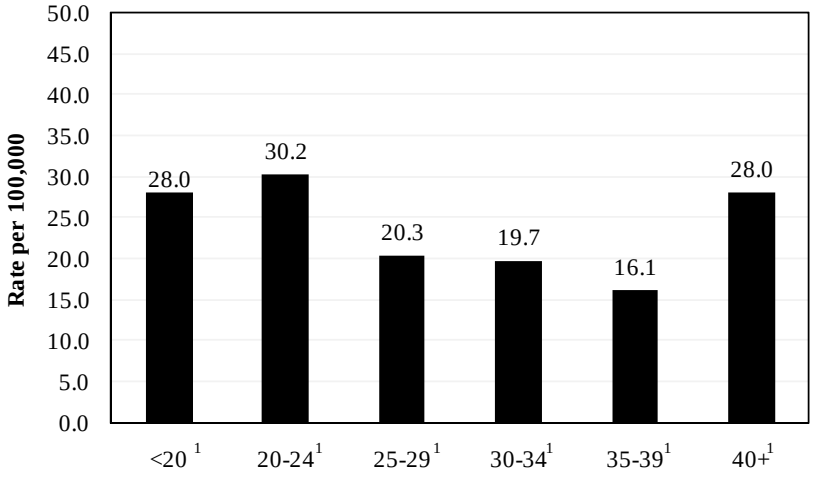
[1]Rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (see Rudolph, 2004). Birth data: New Jersey Department of Health and Senior Services, NJSHAD Query System.

Pregnancy-Related Mortality Rate (per 100,000 births) by Age: New Jersey, 2002–2005



[1]Cell count too small to calculate a reliable percentage. [2]Rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (see Rudolph, 2004).
Birth data: New Jersey Department of Health and Senior Services, NJSHAD Query System.

Non-Pregnancy-Related Mortality Rate (per 100,000 births) by Age: New Jersey, 2002–2005



[1]Rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (see Rudolph, 2004). Birth data: New Jersey Department of Health and Senior Services, NJSHAD Query System.

Maternal Mortality Rate (per 100,000 births) by Age: New Jersey, 2002–2005

Age Group (Years)	Number of Deaths	Number of Births	Mortality Rate	Relative Risk
< 20	10	28,585	35.0[1]	1.1[1]
20–24	36	76,186	47.3	1.5
25–29	37	113,057	32.7	1.0
30–34	46	142,146	32.4	Reference Group
35–39	27	80,919	33.4	1.0
40+	14	28,608	48.9[1]	1.5[1]
Unknown	3	59		
Total	173	469,560	36.8	0.8

[1] Rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).[2] Cell counts with less than 5 cases are considered too small to calculate a reliable rate (Rudolph, 2004).
Birth data: New Jersey Department of Health and Senior Services, NJSHAD Query System.

Pregnancy-Related Mortality Rate (per 100,000 births) by Age: New Jersey, 2002–2005

Age Group (Years)	Number of Deaths	Number of Births	Mortality Rate	Relative Risk
< 20	2	28,585	[1]	[1]
20–24	13	76,186	17.1[2]	1.6[2]
25–29	12	113,057	10.6[2]	Reference Group
30–34	16	142,146	11.3[2]	1.1[2]
35–39	10	80,919	12.4[2]	1.2[2]
40+	5	28,608	17.5[2]	1.6[2]
Unknown	0	59		
Total	58	469,560	2.4	1.2

[1] Cell counts with less than 5 cases are considered too small to calculate a reliable rate (Rudolph, 2004). [2] Rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).
Birth data: New Jersey Department of Health and Senior Services, NJSHAD Query System.

Non-Pregnancy-Related Mortality Rate (per 100,000 births) by Age: New Jersey, 2002–2005

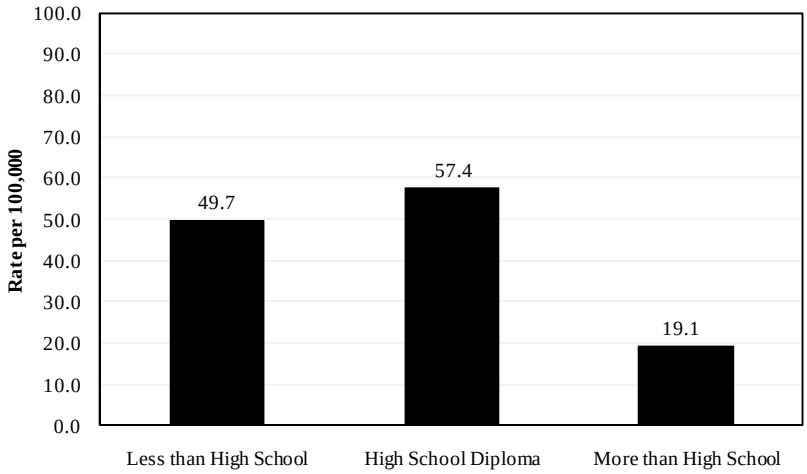
Age Group (Years)	Number of Deaths	Number of Births	Mortality Rate	Relative Risk
< 20	8	28,585	28.0[1]	1.7[1]
20–24	23	76,186	30.2	1.9
25–29	23	113,057	20.3	1.3
30–34	28	142,146	19.7	1.2
35–39	13	80,919	16.1[1]	Reference Group[1]
40+	8	28,608	28.0[1]	1.7[1]
Unknown	3	59		
Total	106	469,560	12.4	1.8

[1] Rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).[2] Cell counts with less than 5 cases are considered too small to calculate a reliable rate (Rudolph, 2004).
Birth data: New Jersey Department of Health and Senior Services, NJSHAD Query System.

Educational Attainment

For all maternal deaths from 2002 to 2005, the risk of a maternal death decreased with higher levels of education. The maternal mortality rate (per 100,000 births) by educational attainment was as follows: more than high school 19.1, high school 57.4, and less than a high school 49.7. Compared to women with more than high school, the risk of a pregnancy-related maternal death was 3.0 times greater for women with high school, and 2.6 times greater for women with less than high school education.

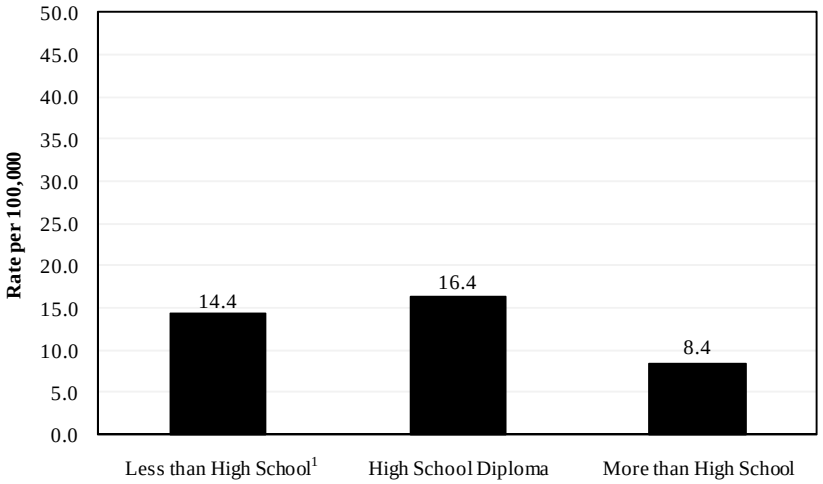
Maternal Mortality Rate (per 100,000 births) by Educational Attainment: New Jersey, 2002–2005



Birth data: New Jersey Department of Health and Senior Services, NJSHAD Query System.

Among pregnancy-related maternal deaths from 2002 to 2005, the maternal mortality rate by educational attainment was as follows: more than high school 8.4, high school 16.4, and less than high school 14.4. Compared to women with more than high school, the risk of a maternal death was 2.0 times greater for women with high school, and 1.7 times greater for women with less than high school education.

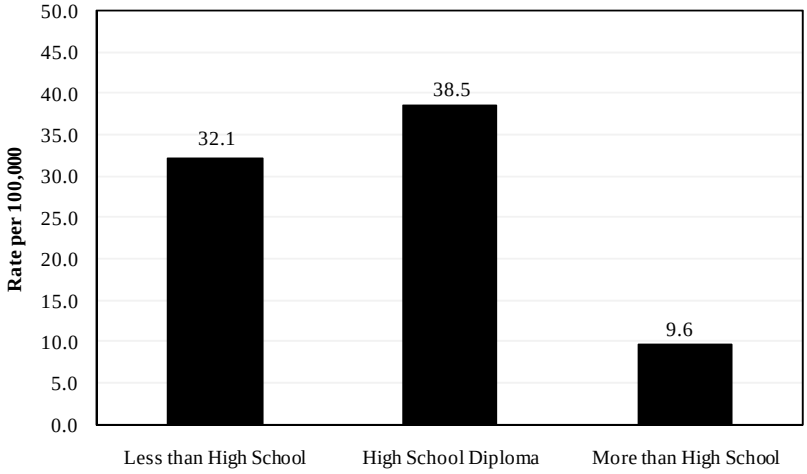
Pregnancy-Related Mortality Rate (per 100,000 births) by Educational Attainment: New Jersey: 2002–2005



[1]Rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (see Rudolph, 2004). Birth data: New Jersey Department of Health and Senior Services, NJSHAD Query System.

Among non-pregnancy-related maternal deaths from 2002 to 2005, the maternal mortality rate by educational attainment was as follows: more than high school 8.4 high school 16.4, and less than high school 14.4. Compared to women with more than high school, the risk of a maternal death was 2.0 times greater for women with high school, and 1.7 times greater for women with less than high school education.

Non-Pregnancy-Related Mortality Rate (per 100,000 births) by Educational Attainment: New Jersey, 2002–2005



Birth data: New Jersey Department of Health and Senior Services, NJSHAD Query System.

Maternal Mortality Rate (per 100,000 births) by Educational Attainment: New Jersey, 2002–2005

Educational Attainment	Number of Deaths	Number of Births	Mortality Rate	Relative Risk
Less than High School	31	62,357	49.7	2.6
High School	70	122,040	57.4	3.0
More than High School	48	251,229	19.1	Reference
Unknown	25	23,934		
Total	174	459,560	37.9	2.0

Birth data: New Jersey Department of Health and Senior Services, NJSHAD Query System.

Pregnancy-Related Mortality Rate (per 100,000 births) by Educational Attainment: New Jersey, 2002–2005

Education	Number of Deaths	Number of Births	Mortality Rate	Relative Risk
Less than High School	9	62,357	14.4[1]	1.7[1]
High School	20	122,040	16.4	2.0
More than High School	21	251,229	8.4	Reference
Unknown	8	23,934		
Total	58	459,560	12.6	1.5

[1] Rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution (Rudolph, 2004).
Birth data: New Jersey Department of Health and Senior Services, NJSHAD Query System.

Non-Pregnancy-Related Mortality Rate (per 100,00 births) by Educational Attainment: New Jersey, 2002–2005

Education	Number of Deaths	Number of Births	Mortality Rate	Relative Risk
Less than High School	20	62,357	32.1	3.4
High School	47	122,040	38.5	4.0
More than High School	24	251,229	9.6	Reference
Unknown	15	23,934		
Total	106	459,560	23.1	2.4

Birth data: New Jersey Department of Health and Senior Services, NJSHAD Query System.

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Section Four: Identified Issues and Proposed Strategies

This section presents nine issues and recommendations proposed by the New Jersey Maternal Mortality Review Team, based on the team's assessment of cases from 2002 to 2005.

1. Evaluation of women in the emergency room.

Review Team Recommendations:

a. In a situation where life saving measures are warranted, treatment should not be withheld due to pregnancy.

b. Routine pregnancy testing should be completed for all women of childbearing age who come into the emergency room seeking treatment.

c. If the emergency room is aware that a pregnant woman is en route to the hospital, every effort should be made to have an obstetrician available in the emergency room when the patient arrives.

d. Emergency Medical Services to develop training specific to pregnant women to be included in their annual education.

2. Availability of a complete prenatal record.

Review Team Recommendations:

a. As per New Jersey State regulations, the entire prenatal record needs to be available on the inpatient record during the intrapartum stay.

b. The New Jersey Department of Health and Senior Services hospital licensing to review compliance with this regulation during onsite visits as part of medical record audits.

3. Screening for postpartum depression.

Review Team Recommendations:

a. Women who have experienced a termination of pregnancy; either elective or spontaneous need to be assessed for postpartum depression, as part of the regulation requiring screening of all women who deliver in New Jersey hospitals.

b. Maternal and Child Health Consortia to provide additional training to health care professionals for screening for postpartum depression.

4. Treatment of pregnant woman who are incarcerated.

Review Team Recommendations:

a. Programs need to be established within the prison system to treat pregnant women who are experiencing drug withdrawal during their incarceration.

b. A system to link prenatal services between the prison system and the community for pregnant woman who are released from jail. Department of Health and Senior Services staff to raise issue with Juvenile Justice Commission and Department of Corrections.

5. Management of postpartum patients in the Medical Intensive Care Unit (MICU).

Review Team Recommendations:

a. In many institutions, once a pregnant woman is delivered, should she need medical/intensive care, her primary physician becomes medically focused rather than obstetrically focused. Her obstetrician must continue to be an active partner in her care, despite any changes in her condition.

b. Topic for annual meetings of the New Jersey Chapter, American College of Obstetricians and Gynecologists, the New Jersey Obstetrical and Gynecological Society and the New Jersey Society of Maternal Fetal Medicine.

c. Need for continued obstetrical involvement for pregnant women under the care of medical and or surgical services.

6. Woman with chronic diseases.

Maternal Mortality Review Team Recommendations:

a. Women of childbearing age who have a chronic illness and/or who are receiving cancer treatment need to be counseled regarding pregnancy.

b. All women need early and comprehensive prenatal care.

7. Medical examiner follow-up.

Maternal Mortality Review Team Recommendations:

a. Standardized questions relating to pregnancy should be in place when completing a Report of Investigation by Medical Examiner (RIME) for pregnant women.

b. Maternal Mortality Review Team to develop questions to be shared with county medical examiners regarding pregnancy history in the deceased.

8. Accurate completion of death certificate.

Maternal Mortality Review Team Recommendations:

a. Education for health care professionals regarding importance of identifying the appropriate pregnancy check box on the death certificate.

b. Department of Health and Senior Services and (Center for Health Statistics) to send a letter to all appropriate people and organizations/facilities on the proper completion of the death certificate.

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APPENDIX

Maternal Deaths by Relation to Pregnancy, Race/Ethnicity and Year
New Jersey, 2002–2005 (*N*=173)

	Total 2002–2005	2002 *n*	2003 *n*	2004 *n*	2005 *n*
Pregnancy-Related					
White	12	2	4	3	3
Black	25	7	7	4	7
Asian/Pacific Islander	5	2	2	1	0
Other	1	0	0	1	0
Hispanic	15	5	5	4	1
Total Pregnancy-Related	**58**	**16**	**18**	**13**	**11**
Not Pregnancy-Related					
White	30	7	7	10	6
Black	50	10	15	20	5
Asian/Pacific Islander	6	1	1	1	3
Other	2	0	1	0	1
Hispanic	16	2	5	5	4
Not Stated	2	1	0	0	1
Total Not-Related	**106**	**21**	**29**	**36**	**20**
Undetermined					
White	3	1	1	1	0
Black	5	1	0	1	3
Hispanic	1	0	1	0	0
Total Undetermined	**9**	**2**	**2**	**2**	**3**

Data for White, Black, Asian/PI, and Other do not include Hispanics. Hispanic ethnicity includes persons

Maternal Deaths by Cause of Death and Relation to Pregnancy: New Jersey, 2002–2005 (N=173)

	Total		Relation to Pregnancy					
			Related		Not Related		Undetermined	
Cause of Death	*n*	%	*n*	%	*n*	%	*n*	%
Accident/Unintentional Injury	26	14.9	3	[1]	23	21.7	0	0.0
Cardiac Disease	19	10.9[2]	9	15.5[2]	8	7.5[2]	2	[1]
Respiratory Disorder	18	10.3[2]	8	13.8[2]	9	8.5[2]	1	[1]
Malignant Neoplasm	15	9.2[2]	1	[1]	14	13.2[2]	0	[1]
Infection	14	8.0[2]	2	[1]	12	11.3[2]	0	0.0
Hemorrhage	13	7.5[2]	10	17.2[2]	2	[1]	1	[1]
Embolism	12	6.9[2]	10	17.2[2]	2	[1]	0	0.0
Substance Abuse	11	6.4[2]	0	0.0	9	8.5[2]	2	[1]
Assault/Homicide	10	5.8[2]	0	0.0	10	9.4[2]	0	0.0
Suicide	8	4.6[2]	2	[1]	6	5.7[2]	0	0.0
Cerebrovascular Disease	8	4.6[2]	4	[1]	4	[1]	0	0.0
Pregnancy-Induced Hypertension	2	[1]	2	[1]	0	0.0	0	0.0
Other	5	2.9[2]	4	[1]	1	[1]	0	0.0
Undetermined	12	6.9[2]	3	[1]	6	5.7[2]	3	[1]
Total	173	100.0	58	100.0	106	100.0	9	100.0

[1] Number too small to calculate a reliable percentage. [2] Percentages and rates based on fewer than 20 cases are considered unreliable and should be interpreted with caution.


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