

Appendix

Maternal Mortality in Texas: A Comparison of Maternal Mortality Rate Change Using Different Methods

Year	MATERNAL DEATHS WITHIN 42 DAYS FOLLOWING END OF PREGNANCY												MATERNAL DEATHS WITHIN AND BEYOND 1 YEAR FOLLOWING END OF PREGNANCY			
	METHOD 1 MacDorman et al. (2016), Fig. 4 Trendline-Estimated Rates for 2011 and 2014				METHOD 2 CDC, National Center for Health Statistics				METHOD 3 Texas Department of State Health Services (TDSHS)				METHOD 4 Texas Department of State Health Services (TDSHS)			
	Deaths (CDC Wonder)	Live births (CDC Wonder)	Maternal Mortality Rate (per 100,000 live births)	Percent Change	Deaths (CDC Wonder)	Live births (CDC Wonder)	Maternal Mortality Rate (per 100,000 live births)	Percent Change	Death File (TDSHS, CHS)	Birth File (TDSHS, CHS)	Maternal Mortality Rate (per 100,000 live births)	Percent Change	Death File (TDSHS, CHS)	Birth File (TDSHS, CHS)	Maternal Mortality Rate (per 100,000 live births)	Percent Change
	2010	72	386,118	18.6		72	386,118	18.6		72	385,746	18.7		95	385,746	24.6
2011	114	377,445	33.0	+77%	114	377,445	30.2	+62%	100	377,274	26.5	+42%	116	377,274	30.7	+25%
2012	148	382,727	38.7		148	382,727	38.7		110	382,438	28.8		121	382,438	31.6	
2013	140	387,340	36.1		140	387,340	36.1		126	387,110	32.5		153	387,110	39.5	
2014	135	399,766	35.8	-1%	135	399,766	33.8	-7%	126	399,482	31.5	-3%	139	399,482	34.8	-12%

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Percent Change = (Later Rate - Earlier Rate)/Earlier Rate x 100

METHOD 1: Using data from CDC Wonder, compares **estimated MMRs based on a trendline** for a later year to an actual MMR for an earlier year, yielding a percent change in MMR within **42 days** following the end of pregnancy (as determined by ICD-10 codes A34, O00-O95, O98-O99) among Texas residents. The maternal death count in CDC Wonder could include: a) Texas residents whose death did not occur in Texas, which might not have been reported to TDSHS; and/or b) initial cause of death as pregnancy-related but is later updated by TDSHS not to be pregnancy-related or vice versa.

METHOD 2: Using data from CDC Wonder, compares an **actual** MMR for a later year to an actual MMR for an earlier year, yielding a percent change in MMR within **42 days** following the end of pregnancy (as determined by ICD-10 codes A34, O00-O95, O98-O99) among Texas residents. The maternal death count in CDC Wonder could include: a) Texas residents whose death did not occur in Texas, which might not have been reported to TDSHS; and/or b) initial cause of death as pregnancy-related but is later updated by TDSHS not to be pregnancy-related or vice versa.

METHOD 3: Using data from CHS at TDSHS, compares an **actual** MMR for a later year to an actual MMR for an earlier year, yielding a percent change in MMR within **42 days** following the end of pregnancy (as determined by ICD-10 codes A34, O00-O95, O98-O99) among Texas residents.

METHOD 4: Using data from CHS at TDSHS, compares an **actual** MMR for a later year to an actual MMR for an earlier year, yielding a percent change in MMR **within and beyond 1 year** following the end of pregnancy (as determined by ICD-10 codes O00-O95, O98-O99, and O96 and O97, but excluding A34) among Texas residents.

- **The Maternal Mortality Rate (MMR) in Texas increased from 2010 to 2011.**
- **However, the percent change or the magnitude of the increase in MMR from 2010 to 2011 in Texas differs depending on the method used to compute it:**
 - **METHOD 1** by MacDorman et al. (2016) uses counts of live births and maternal deaths among Texas residents from the CDC Wonder system, that occur within 42 days following the end of pregnancy, if one or more of these codes from the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) are present on the death certificate: A34, O00-O95, O98-O99. The maternal death count in CDC Wonder could include: a) Texas residents whose death did not occur in Texas, which might not have been reported to TDSHS; and/or b) initial cause of death as pregnancy-related but is later updated by TDSHS not to be pregnancy-related or vice versa. This maternal death count is then used to compute the MMR each year, except for years 2011 and 2014, for which METHOD 1 instead uses trendline-estimated MMRs (these MMRs are based on a linear trendline calculated using actual MMRs from 2011 through 2014, and assumes there is a linear relationship between MMR and calendar year). METHOD 1 then compares the *trendline-estimated* MMR for 2011 (33.0 maternal deaths per 100,000 live births) to an actual MMR for 2010 (18.6 maternal deaths per 100,000 live births), yielding a **77% increase** in MMR within 42 days following the end of pregnancy among Texas residents.
 - **METHOD 2** by the CDC is identical to METHOD 1, except that METHOD 2 compares an *actual* MMR for 2011 (30.2 maternal deaths per 100,000 live births) to an actual MMR for 2010 (18.6 maternal deaths per 100,000 live births), yielding a **62% increase** in MMR within 42 days following the end of pregnancy among Texas residents.
 - **METHOD 3** by TDSHS uses counts of live births and maternal deaths among Texas residents from its Center for Health Statistics, that occur within 42 days following the end of pregnancy, if one or more of these codes from ICD-10 are present on the death certificate: A34, O00-O95, O98-O99. METHOD 3 then compares an *actual* MMR for 2011 (26.5 maternal deaths per 100,000 live births) compared to an actual MMR for 2010 (18.7 maternal deaths per 100,000 live births), yielding a **42% increase** in MMR within 42 days following the end of pregnancy among Texas residents.
 - **METHOD 4**, also by TDSHS, uses counts of live births and maternal deaths among Texas residents from its Center for Health Statistics, that occur within and beyond 1 year following the end of pregnancy if one or more of these (natural death) ICD-10 codes are present on the death certificate: O00-O95, O98-O99, and O96 (*obstetric cause of death occurring more than 42 days but less than one year after delivery*) and O97 (*death from sequelae of direct/indirect obstetric cause occurring 1 year or more after delivery*), but excluding A34 (*obstetric tetanus*). METHOD 4 then compares an *actual* MMR for 2011 (30.7 maternal deaths per 100,000 live births) to an actual MMR for 2010 (24.6 maternal deaths per 100,000 live births), yielding a **25% increase** in MMR *within and beyond 1 year* following the end of pregnancy among Texas residents.
- **The MMR in Texas decreased from 2013 to 2014.**
- **Like the increase, the percent change or the magnitude of the decrease in MMR from 2013 to 2014 in Texas differs depending on the method used to compute it:**
 - **METHOD 1** by MacDorman et al. (2016) compares the *trendline-estimated* MMR for 2014 (35.8 maternal deaths per 100,000 live births) to an actual MMR for 2013 (36.1 maternal deaths per 100,000 live births), yielding a **1% decrease** in MMR within 42 days following the end of pregnancy among Texas residents.
 - **METHOD 2** by the CDC compares an *actual* MMR for 2014 (33.8 maternal deaths per 100,000 live births) to an actual MMR for 2013 (36.1 maternal deaths per 100,000 live births), yielding a **7% decrease** in MMR within 42 days following the end of pregnancy among Texas residents.
 - **METHOD 3** by TDSHS compares an *actual* MMR for 2014 (31.5 maternal deaths per 100,000 live births) to an actual MMR for 2013 (32.5 maternal deaths per 100,000 live births), yielding a **3% decrease** in MMR within 42 days following the end of pregnancy among Texas residents.
 - **METHOD 4**, also by TDSHS, compares an *actual* MMR for 2014 (34.8 maternal deaths per 100,000 live births) to an actual MMR for 2013 (39.5 maternal deaths per 100,000 live births), yielding a **12% decrease** in MMR *within and beyond 1 year* following the end of pregnancy among Texas residents.