

Maternal Mortality Guatemala 2000-2020

Internationally comparable MMR estimates by the Maternal Mortality Inter-Agency Group (MMEIG): WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division

Table 1: Estimates

Year	MMR ^{a*†}	PM ^{b*†}	HIV-related indirect deaths [†]	Live births ^c (Thousands)	Maternal deaths [†]
2000	152 [145, 158]	0.11 [0.1, 0.11]	3	406	616
2005	149 [142, 156]	0.1 [0.09, 0.1]	5	400	597
2010	123 [118, 130]	0.09 [0.08, 0.09]	2	401	494
2015	107 [101, 113]	0.07 [0.07, 0.08]	1	414	443
2020	96 [85, 106]	0.06 [0.05, 0.06]	2	379	362

^a Maternal mortality ratio (MMR) defined as maternal deaths per 100,000 live births for women of reproductive age (15-49 years).

^b Proportion maternal (PM) defined as the proportion of all-cause deaths for women of reproductive age (15-49 years) that are due to maternal causes.

^c UN Population Division, Department of Economic and Social Affairs. World Population Prospects. New York; 2022.

^{*} The uncertainty intervals (UI) for all estimates refer to the 80% uncertainty intervals (10th and 90th percentiles of the posterior distributions). This was chosen as opposed to the more standard 95% intervals because of the substantial uncertainty inherent in maternal mortality outcomes.

[†] Figures presented in the table are estimates based on national data, such as surveys or administrative records, or other sources, produced by the international agency when country data for some year(s) is not available, when multiple sources exist, or when there are data quality issues.

Table 2: Estimates

Period	Annual rate reduction [*]	Percent change in MMR [*]
2000, 2020	2.33 [1.76, 2.95]	37.25 [29.63, 44.56]
2010, 2020	2.54 [1.48, 3.94]	22.43 [13.72, 32.57]

^{*} Figures presented in the table are estimates based on national data, such as surveys or administrative records, or other sources, produced by the international agency when country data for some year(s) is not available, when multiple sources exist, or when there are data quality issues.

Data from civil registration vital statistics system (CRVS)

Table 3: Data from civil registration vital statistics system (CRVS)

Study period [*]	Maternal deaths ^a	Female deaths ^b	CRVS adjustment factor ^{c†}	Sensitivity ^{d†}	Specificity ^{e†}	Completeness ^{f†}	Usability ^g	Maternal deaths not included ^h
[1986, 1987)	338	4977	2.603776	0.3826287	0.9997469	87.70044	0.7328470	NA
[1987, 1988)	326	4979	2.603662	0.3826287	0.9997469	87.04545	0.7323847	NA
[1988, 1989)	319	4900	2.603635	0.3826287	0.9997469	84.61406	0.7433706	NA
[1990, 1991)	325	5253	2.493998	0.3996074	0.9997809	85.98789	0.7680081	NA
[1991, 1992)	349	5766	2.410994	0.4133355	0.9997719	92.82035	0.7739909	NA
[1992, 1993)	392	6189	2.310860	0.4312402	0.9997647	97.60290	0.7944896	NA
[1993, 1994)	359	5988	2.247841	0.4433744	0.9997689	93.43111	0.7761744	NA
[1994, 1995)	371	6113	2.160896	0.4611789	0.9997721	95.75501	0.7956661	NA
[1995, 1996)	357	5055	2.090335	0.4767743	0.9997721	79.92095	0.7964647	NA
[1999, 2000)	311	5101	1.938942	0.5139991	0.9997842	89.44415	0.8380764	NA
[2001, 2002)	277	5320	1.747992	0.5702319	0.9997910	93.49736	0.8253413	NA
[2002, 2003)	279	5440	1.740240	0.5728145	0.9997958	94.10137	0.8448601	NA
[2003, 2004)	287	5296	1.734049	0.5748633	0.9997970	90.19074	0.8584840	NA
[2004, 2005)	294	5405	1.743167	0.5715934	0.9997819	90.84034	0.8504274	NA
[2005, 2006)	353	5754	1.715981	0.5807789	0.9997917	91.81427	0.8695163	NA
[2006, 2007)	296	5659	1.676185	0.5945160	0.9997940	95.02939	0.8916434	NA
[2008, 2009)	326	5389	1.614989	0.6173400	0.9998090	92.41983	0.9273344	NA
[2009, 2010)	337	5741	1.548943	0.6435328	0.9998031	99.67014	0.9077286	NA
[2010, 2011)	352	5741	1.503176	0.6633044	0.9998166	99.61825	0.9206780	NA
[2011, 2012)	310	5586	1.467096	0.6796790	0.9998213	97.21545	0.9243786	NA
[2012, 2013)	350	5654	1.422721	0.7008740	0.9998182	97.63426	0.9260673	NA
[2014, 2015)	298	5806	1.390304	0.7169973	0.9998180	98.00810	0.9496403	NA
[2015, 2016)	311	6139	1.390214	0.7169973	0.9998180	100.00000	0.9171010	NA
[2016, 2017)	309	6186	1.390090	0.7169973	0.9998180	100.00000	0.9138377	NA
[2017, 2018)	273	6150	1.389529	0.7169973	0.9998180	100.00000	0.9157724	NA
[2018, 2019)	288	6245	1.389455	0.7169973	0.9998180	100.00000	0.9037630	NA
[2019, 2020)	243	6497	1.389380	0.7169973	0.9998180	100.00000	0.9016469	NA

[2020, 2021)	259	6781	1.388744	0.7169973	0.9998180	100.00000	0.9003097	NA
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^a Maternal deaths from CRVS defined as ICD10 codes O00-O95; O98-O99 Pregnancy, childbirth and the puerperium and A34 Obstetrical tetanus. Late maternal deaths (O96) and those deaths due to sequelae of obstetric complications (O97) are excluded for the purposes of international comparison. WHO. International statistical classification of diseases and related health problems. Geneva; 2010.

^b Female deaths 15-49 from the Civil Registration and Vital Statistics System (CRVS).

^c CRVS adjustment factor = adjustment factor to account for the difference between CRVS-reported PM and true PM.

^d Sensitivity = proportion of correctly classified maternal deaths out of all true maternal deaths.

^e Specificity = proportion of correctly classified non-maternal deaths out of all true non-maternal deaths.

^f Completeness = percentage of registered deaths of females of reproductive age.

^g Usability = percentage of deaths that is estimated to be recorded with a well-defined code; completeness proportion*(1-proportion ill-defined)*100.

^h Did not meet inclusion criteria due to: 1) low completeness and usability, or 2) other specialized studies are used. Please see next section of the profile for details.

^{*} Kindly note the interpretation of notation: for a period [a,b) the observation starts on date a and ends before date b; thus a period covering 1st January 2000 through 31st December 2000 is denoted [2000,2001).

[†] Peterson E, Chou D, Moller A-B, Gemmill A, Say L, Alkema L. Estimating maternal mortality using data from national civil registration vital statistics systems: A Bayesian hierarchical bivariate random walk model to estimate sensitivity and specificity of reporting. arXiv:190908578 [stat] [Internet]. 2019 Sep 18 [cited 2021 Aug 11]; Available from: <http://arxiv.org/abs/1909.08578>.

Excluded data from CRVS

Table 4: Excluded data from CRVS

Study period [*]	Completeness ^a	Usability ^b	Reason for exclusion
[1989, 1990)	82.17973	75.40574	CRVS overlaps with specialized study
[1996, 1997)	77.31256	78.05540	CRVS overlaps with specialized study
[1997, 1998)	86.91511	77.25938	CRVS overlaps with specialized study
[1998, 1999)	91.38165	80.99377	CRVS overlaps with specialized study
[2000, 2001)	98.37542	83.09316	CRVS overlaps with specialized study
[2007, 2008)	94.45104	90.87045	CRVS overlaps with specialized study
[2013, 2014)	98.15353	93.20988	CRVS overlaps with specialized study

^a Completeness = percentage of registered deaths of females of reproductive age.

^b Usability = percentage of deaths that is estimated to be recorded with a well-defined code; completeness proportion*(1-proportion ill-defined)*100.

* Kindly note the interpretation of notation: for a period [a,b) the observation starts on date a and ends before date b; thus a period covering 1st January 2000 through 31st December 2000 is denoted [2000,2001).

Data from other sources

Table 5: Data from other sources

Study period [*]	Source	Source type	Maternal deaths ^a	Preganancy-related deaths ^b	Female deaths, 15-49	Maternal PM ^c	Pregnancy-related PM ^{d†}	MMR per 100,000 lb ^e	Adjusted MMR per 100,000 lb	F+ ^{f†}	F- ^{g†}	U+ ^{h†}
[1985.54, 1990.54)	DHS 1995	Miscellaneous	NA	NA	NA	NA	0.0615857	105.0000	101.1275	NA	NA	NA
[1989, 1990)	Maternal mortality 1996 - 1998	Specialized study	748	NA	4856	0.1540362	NA	258.5796	258.5796	NA	NA	NA
[1990.54, 1995.54)	DHS 1995	Miscellaneous	NA	NA	NA	NA	0.1119804	190.0000	182.9054	NA	NA	NA
[1996, 1997)	Maternal mortality 1996 - 1998	Specialized study	666	NA	4764	0.1397985	NA	219.7547	219.7547	NA	NA	NA
[1997, 1998)	Maternal mortality 1996 - 1998	Specialized study	648	NA	5201	0.1245914	NA	188.2715	188.2715	NA	NA	NA
[1998, 1999)	Maternal mortality 1996 - 1998	Specialized study	707	NA	5397	0.1309987	NA	192.9372	192.9372	NA	NA	NA
[2000, 2001)	Maternal mortality 2000	Specialized study	595	NA	5571	0.1068031	NA	148.9719	148.9719	NA	NA	NA
[2007, 2008)	Maternal mortality 2013	Specialized study	537	NA	5893	0.0911251	NA	134.2500	134.2500	NA	NA	NA
[2008.52, 2015.52)	DHS 2014 - 2015	Survey	NA	NA	NA	NA	0.1153103	165.8935	159.1245	NA	NA	NA
[2013, 2014)	Maternal mortality 2013	Specialized study	452	NA	5849	0.0772782	NA	111.0565	111.0565	NA	NA	NA
[2016, 2017)	Surveillance 2016 - 2017	Miscellaneous	462	NA	NA	0.0751220	NA	109.0619	119.9681	NA	NA	NA
[2017, 2018)	Surveillance 2016 - 2017	Miscellaneous	447	NA	NA	0.0722599	NA	107.4604	118.2064	NA	NA	NA

^a Maternal deaths defined according to the ICD-10.

^b Pregnancy-related deaths defined according to ICD-10.

^c Maternal PM is calculated when deaths are defined as maternal.

^d Pregnancy-related PM is calculated when reported deaths are defined as pregnancy related deaths.

^e The MMR in this column is calculated from the PM.

^f False positive: true non-maternal death which may be incorrectly labeled as a maternal death.

^g False negative: maternal death which may be incorrectly classified as a non-maternal death.

^h Maternal deaths not registered in the CRVS.

^{*} Kindly note the interpretation of notation: for a period [a,b) the observation starts on date a and ends before date b; thus a period covering 1st January 2000 through 31st December 2000 is denoted [2000,2001).

[†] Calculated from studies which undertake specialized analyses of routine reporting of maternal deaths.

[‡] Survey data has been adjusted by 1.1 for underreporting and standardized by age when obtained using the direct sisterhood method.

Data from studies excluded in regression

No data excluded

Predictor variables used in the model

Table 6: Predictor variables used in the model

Year	GDP ^{a*} (Per capita, PPP)	GFR ^b (Per 1000 women ages 15-49)	SBA ^c (%)
2000	6470	150	41
2005	6857	130	46
2010	7412	110	55
2015	8065	100	67
2020	8600	80	74

^a WHO, MMEIG. Gross domestic product (GDP) per capita measured in purchasing power parity (PPP) equivalent dollars using 2017 as the baseline year were taken from World Bank's World Development Indicators (WDI) database, and in instances supplemented by unofficial estimates derived by MMEIG using growth rates in United Nations GDP data and/or previous MMEIG GDP estimates. Geneva; 2021.

^b General fertility rate (GFR) from UN Population Division, Department of Economic and Social Affairs. World Population Prospects. New York; 2022.

^c Skilled Birth Attendant (SBA) from WHO, UNICEF joint SBA database. Geneva; 2022. In some instances, supplemented with unofficial estimates derived by MMEIG. Annual series were estimated by fitting a multilevel time series (AR1) model with region- and country-specific intercepts and slopes.

* A 5-year moving average was calculated.

Estimates

(Input data) The following adjustments were applied to maternal deaths depending on the source type:

1. An age-standardization was applied to population based surveys that obtained data from the direct sisterhood method.
2. An upward adjustment of 10% was applied to all input data that were not obtained from CRVS or specialized studies, to account for underreporting.

(Model adjusted data) The following model adjustments were applied to maternal deaths depending on the source type and the definition of reported deaths

1. A model adjustment derived from BMis was applied to maternal deaths obtained from CRVS.
2. A model adjustment was applied to observations of pregnancy-related deaths to remove accidental/incidental (non-maternal) deaths from the count.

