

## Maternal Mortality Peru 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 <sup>a*†</sup>	PM <sup>b*†</sup>	HIV-related indirect deaths <sup>†</sup>	Live births <sup>c</sup> (Thousands)	Maternal deaths <sup>†</sup>
2000	113 [101, 126]	0.06 [0.05, 0.07]	5	633	717
2005	97 [94, 101]	0.06 [0.05, 0.06]	3	631	615
2010	76 [74, 79]	0.04 [0.04, 0.05]	1	618	472
2015	65 [62, 68]	0.04 [0.04, 0.04]	0	578	376
2020	69 [59, 80]	0.06 [0.05, 0.07]	0	593	406

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

<sup>b</sup> 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.

<sup>c</sup> 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	2.5 [1.59, 3.43]	39.38 [27.24, 49.61]
2010, 2020	1.06 [-0.44, 2.68]	10.08 [-4.5, 23.51]

\* 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)

No data available

## Excluded data from CRVS

Table 3: Excluded data from CRVS

Study period*	Completeness <sup>a</sup>	Usability <sup>b</sup>	Reason for exclusion
[1986, 1987)	72.21487	45.78702	Usability < 60%
[1987, 1988)	66.69063	43.64658	Usability < 60%
[1988, 1989)	63.33708	45.08985	Usability < 60%
[1989, 1990)	68.07417	42.42928	Usability < 60%
[1990, 1991)	53.85579	39.94086	Usability < 60%
[1991, 1992)	46.36804	36.80721	Usability < 60%
[1992, 1993)	55.47825	36.82565	Usability < 60%
[1994, 1995)	51.40941	36.01840	Usability < 60%
[1995, 1996)	52.13908	40.80588	Usability < 60%
[1996, 1997)	53.96461	42.33862	Usability < 60%
[1997, 1998)	53.00279	41.79673	Usability < 60%
[1998, 1999)	53.53050	44.62920	Usability < 60%
[1999, 2000)	55.27712	46.69205	Usability < 60%
[2000, 2001)	54.18357	48.54369	Usability < 60%
[2001, 2002)	52.61929	53.74785	Usability < 60%
[2002, 2003)	55.01192	54.42685	CRVS overlaps with specialized study
[2003, 2004)	58.89736	55.51013	CRVS overlaps with specialized study
[2004, 2005)	59.79372	56.40579	CRVS overlaps with specialized study
[2005, 2006)	59.64673	57.48004	CRVS overlaps with specialized study
[2006, 2007)	54.67277	56.99971	CRVS overlaps with specialized study
[2007, 2008)	54.33064	57.01384	CRVS overlaps with specialized study
[2008, 2009)	59.28678	57.15060	CRVS overlaps with specialized study
[2009, 2010)	59.31080	58.55781	CRVS overlaps with specialized study
[2010, 2011)	60.76455	59.51800	CRVS overlaps with specialized study
[2011, 2012)	60.46103	59.46731	CRVS overlaps with specialized study
[2012, 2013)	59.80166	59.28814	CRVS overlaps with specialized study
[2013, 2014)	59.39394	59.16101	CRVS overlaps with specialized study
[2014, 2015)	57.83183	58.94771	CRVS overlaps with specialized study
[2015, 2016)	59.64763	60.54201	CRVS overlaps with specialized study
[2016, 2017)	58.80914	61.72144	CRVS overlaps with specialized study
[2017, 2018)	68.95787	61.86306	CRVS overlaps with specialized study

Table 3: Excluded data from CRVS (*continued*)

Study period <sup>*</sup>	Completeness <sup>a</sup>	Usability <sup>b</sup>	Reason for exclusion
[2018, 2019)	72.43583	65.46596	CRVS overlaps with specialized study

<sup>a</sup> Completeness = percentage of registered deaths of females of reproductive age.

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

<sup>\*</sup> 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 4: Data from other sources

Study period*	Source	Source type	Maternal deaths <sup>a</sup>	Preganancy-related deaths <sup>b</sup>	Female deaths, 15-49	Maternal PM <sup>c</sup>	Pregnancy-related PM <sup>d†</sup>	MMR per 100,000 lb <sup>e</sup>	Adjusted MMR per 100,000 lb	F+ <sup>f†</sup>	F- <sup>g†</sup>	U+ <sup>h†</sup>
[1989.76, 1996.76)	DHS 1996	Survey	NA	NA	NA	NA	0.1759854	322.54560	280.81408	NA	NA	NA
[1993.72, 2000.72)	DHS 2000	Survey	NA	NA	NA	NA	0.1335798	267.38455	232.29744	NA	NA	NA
[1996.92, 2003.92)	DHS 2003 - 2006	Survey	NA	NA	NA	NA	0.1398511	268.00669	232.80959	NA	NA	NA
[2002, 2003)	Country consultation [Peru], 2022	Specialized study	581	NA	11323	0.0513115	NA	94.31818	94.31818	NA	NA	NA
[2002, 2003)	La mortalidad materna en el Perú 2002 - 2011	Miscellaneous	734	NA	NA	0.0643582	NA	118.30000	130.13000	NA	NA	NA
[2002.45, 2009.45)	DHS 2009	Survey	NA	NA	NA	NA	0.0752112	131.97003	114.34696	NA	NA	NA
[2003, 2004)	Country consultation [Peru], 2022	Specialized study	610	NA	11155	0.0546840	NA	99.02597	99.02597	NA	NA	NA
[2003, 2004)	La mortalidad materna en el Perú 2002 - 2011	Miscellaneous	766	NA	NA	0.0683647	NA	123.80000	136.18000	NA	NA	NA
[2003.45, 2010.45)	DHS 2010	Survey	NA	NA	NA	NA	0.0250688	43.57478	37.26547	NA	NA	NA
[2004, 2005)	Country consultation [Peru], 2022	Specialized study	668	NA	11053	0.0604361	NA	107.05128	107.05128	NA	NA	NA
[2004, 2005)	La mortalidad materna en el Perú 2002 - 2011	Miscellaneous	746	NA	NA	0.0681980	NA	120.80000	132.88000	NA	NA	NA
[2004.17, 2011.17)	DHS 2011	Survey	NA	NA	NA	NA	0.1368290	236.36370	205.80211	NA	NA	NA
[2005, 2006)	Country consultation [Peru], 2022	Specialized study	618	NA	10983	0.0562688	NA	97.93978	97.93978	NA	NA	NA
[2005, 2006)	La mortalidad materna en el Perú 2002 - 2011	Miscellaneous	703	NA	NA	0.0655532	NA	114.10000	125.51000	NA	NA	NA
[2006, 2007)	Country consultation [Peru], 2022	Specialized study	554	NA	10925	0.0507094	NA	87.24409	87.24409	NA	NA	NA
[2006, 2007)	La mortalidad materna en el Perú 2002 - 2011	Miscellaneous	706	NA	NA	0.0667840	NA	114.90000	126.39000	NA	NA	NA

Table 4: Data from other sources (*continued*)

Study period*	Source	Source type	Maternal deaths <sup>a</sup>	Preganancy-related deaths <sup>b</sup>	Female deaths, 15-49	Maternal PM <sup>c</sup>	Pregnancy-related PM <sup>d†</sup>	MMR per 100,000 lb <sup>e</sup>	Adjusted MMR per 100,000 lb	F+ <sup>f†</sup>	F- <sup>g†</sup>	U+ <sup>h†</sup>
[2007, 2008)	Country consultation [Peru], 2022	Specialized study	542	NA	11003	0.0492593	NA	85.62401	85.62401	NA	NA	NA
[2007, 2008)	La mortalidad materna en el Perú 2002 - 2011	Miscellaneous	676	NA	NA	0.0635704	NA	110.50000	121.55000	NA	NA	NA
[2008, 2009)	Country consultation [Peru], 2022	Specialized study	530	NA	10768	0.0492199	NA	84.66454	84.66454	NA	NA	NA
[2008, 2009)	La mortalidad materna en el Perú 2002 - 2011	Miscellaneous	656	NA	NA	0.0627279	NA	107.90000	118.69000	NA	NA	NA
[2009, 2010)	Country consultation [Peru], 2022	Specialized study	497	NA	10708	0.0464139	NA	79.64744	79.64744	NA	NA	NA
[2009, 2010)	La mortalidad materna en el Perú 2002 - 2011	Miscellaneous	580	NA	NA	0.0560015	NA	96.10000	105.71000	NA	NA	NA
[2010, 2011)	Country consultation [Peru], 2022	Specialized study	460	NA	10516	0.0437429	NA	74.43366	74.43366	NA	NA	NA
[2010, 2011)	La mortalidad materna en el Perú 2002 - 2011	Miscellaneous	574	NA	NA	0.0563581	NA	95.90000	105.49000	NA	NA	NA
[2011, 2012)	Country consultation [Peru], 2022	Specialized study	458	NA	10238	0.0447353	NA	74.71452	74.71452	NA	NA	NA
[2011, 2012)	La mortalidad materna en el Perú 2002 - 2011	Miscellaneous	550	NA	NA	0.0555041	NA	92.70000	101.97000	NA	NA	NA
[2012, 2013)	Country consultation [Peru], 2022	Specialized study	431	NA	9983	0.0431734	NA	71.47595	71.47595	NA	NA	NA
[2013, 2014)	Country consultation [Peru], 2022	Specialized study	396	NA	9735	0.0406780	NA	66.77909	66.77909	NA	NA	NA
[2014, 2015)	Country consultation [Peru], 2022	Specialized study	401	NA	9538	0.0420424	NA	68.54701	68.54701	NA	NA	NA
[2015, 2016)	Country consultation [Peru], 2022	Specialized study	414	NA	9422	0.0439397	NA	71.62630	71.62630	NA	NA	NA
[2016, 2017)	Country consultation [Peru], 2022	Specialized study	328	NA	9405	0.0348751	NA	57.04348	57.04348	NA	NA	NA

Table 4: Data from other sources (*continued*)

Study period*	Source	Source type	Maternal deaths <sup>a</sup>	Pregnancy-related deaths <sup>b</sup>	Female deaths, 15-49	Maternal PM <sup>c</sup>	Pregnancy-related PM <sup>d,‡</sup>	MMR per 100,000 lb <sup>e</sup>	Adjusted MMR per 100,000 lb	F+ <sup>f†</sup>	F- <sup>g†</sup>	U+ <sup>h†</sup>
[2017, 2018)	Country consultation [Peru], 2022	Specialized study	374	NA	9471	0.0394890	NA	64.93056	64.93056	NA	NA	NA
[2018, 2019)	Country consultation [Peru], 2022	Specialized study	357	NA	9545	0.0374018	NA	61.55172	61.55172	NA	NA	NA
[2019, 2020)	Country consultation [Peru], 2022	Specialized study	310	NA	9733	0.0318504	NA	52.45347	52.45347	NA	NA	NA
[2020, 2021)	Country consultation [Peru], 2022	Specialized study	451	NA	10730	0.0689919	NA	76.05396	76.05396	NA	NA	NA

<sup>a</sup> Maternal deaths defined according to the ICD-10.

<sup>b</sup> Pregnancy-related deaths defined according to ICD-10.

<sup>c</sup> Maternal PM is calculated when deaths are defined as maternal.

<sup>d</sup> Pregnancy-related PM is calculated when reported deaths are defined as pregnancy related deaths.

<sup>e</sup> The MMR in this column is calculated from the PM.

<sup>f</sup> False positive: true non-maternal death which may be incorrectly labeled as a maternal death.

<sup>g</sup> False negative: maternal death which may be incorrectly classified as a non-maternal death.

<sup>h</sup> 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

Table 5: Data from studies excluded in regression

Study period*	Source	Source type	Reason for exclusion
[1984.75, 1991.75)	DHS 1991 - 1992	Survey	Start date before 1985

\* 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).

## Predictor variables used in the model

Table 6: Predictor variables used in the model

Year	GDP <sup>a*</sup> (Per capita, PPP)	GFR <sup>b</sup> (Per 1000 women ages 15-49)	SBA <sup>c</sup> (%)
2000	6431	90	68
2005	7633	80	81
2010	10114	80	89
2015	12124	70	94
2020	12394	70	96

<sup>a</sup> 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.

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

<sup>c</sup> 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.

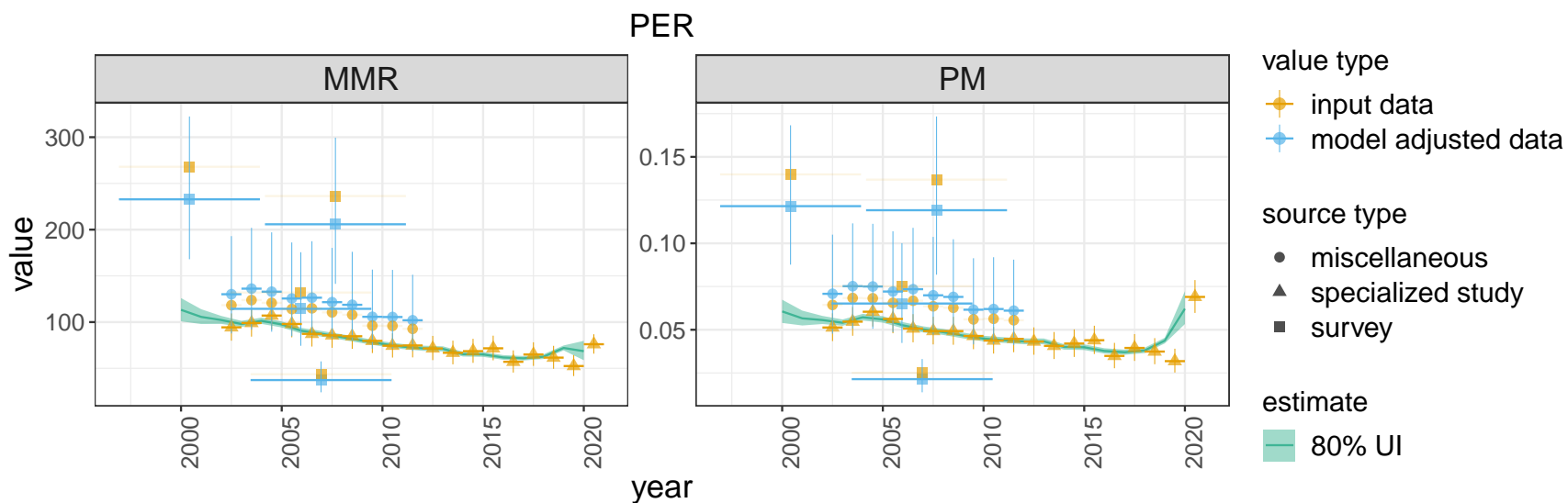
## Estimates

(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.



## Crisis years

The criteria for crisis-years are described below.

- 1) a year in which (a) there are at least 10 deaths attributable to mortality shocks among women of reproductive age (i.e. 15–49 years) and (b) these deaths constitute at least 10% of the total number of deaths to women aged 15–49 in that respective country-year (12) and in addition (c) in the five-year period surrounding the year, there are at most two additional crisis years; and
- 2) a year identified by the United Nations Inter-Agency Group for Child Mortality Estimation (UN IGME) as a crisis year for the estimation of child mortality (this includes crises in potentially longer periods, i.e. for recent ongoing crises).

Table 7: Crisis years

Year	Crisis deaths <sup>a</sup> women ages 15-49
2020	4193

<sup>a</sup> UN Population Division, Department of Economic and Social Affairs. World Population Prospects. New York; 2022.