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**Full Title:** “Stillbirth rates in 20 countries of Latin America: an ecological study”

**Authors:** Veronica Pingray<sup>1</sup>, Fernando Althabe<sup>1</sup>, Paula Vazquez<sup>1</sup>, Malena Correa<sup>1, 2</sup>, Mónica Pajuelo<sup>3</sup>, José M Belizán<sup>1</sup>

<sup>1</sup>Institute for Clinical Effectiveness and Health Policy (IECS-CONICET), Department of Maternal and Child’s Health. Buenos Aires, Argentina.

<sup>2</sup>Tulane School of Public Health and Tropical Medicine, Department of Global Community Health & Behavioural Sciences. New Orleans, Louisiana, USA

<sup>3</sup>International Health Department Johns Hopkins School of Public Health. Baltimore, Maryland, USA

**Corresponding author:**

Veronica Pingray, MPH

Address: Institute for Clinical Effectiveness and Health Policy (IECS).Dr. Emilio Ravnani 2024. (1414). Buenos Aires, Argentina.

**Telephone number:** (+54-11) 4777-8767

**E-mail:** vpingray@iecs.com.ar

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**Running title:** Stillbirth rates in Latin America

## **ABSTRACT**

### **Objective**

To describe country-level stillbirth rates and their change over time in Latin America, and to measure the association of stillbirth rates with socioeconomic and health coverage indicators in the region.

### **Design**

Ecological study.

### **Setting**

20 countries of Latin America.

### **Population or Sample**

Aggregated data from pregnant women with countries as units of analysis.

### **Methods**

We used stillbirth estimates, and socioeconomic and health care coverage indicators reported from 2006 to 2016 from UNICEF, United Nations Development Programme and World Bank

datasets. We calculated Spearman's correlation coefficients between stillbirths rates and socioeconomic and health coverage indicators.

### **Main Outcome Measure**

National estimates of stillbirth rates in each country.

### **Results**

The estimated stillbirth rate for Latin America for 2015 was 8.1 per 1000 births (range 3.1-24.9). Seven Latin America countries had rates higher than 10 stillbirths per 1000 births. The average annual reduction rate for the region was 2% (range 0.1-3.8%), with the majority of Latin America countries ranging between 1.5 and 2.5%. National stillbirth rates were correlated to: women's schooling ( $r_s=-0.7910$ ), gross domestic product per capita ( $r_s=-0.8226$ ), fertility rate ( $r_s=0.6055$ ), urban population ( $r_s=-0.6316$ ) and deliveries at health facilities ( $r_s=-0.6454$ ).

### **Conclusions**

Country-level estimated stillbirth rates in Latin America varied widely in 2015. The trend and magnitude of reduction in stillbirth rates between 2000 and 2015 was similar to the world average. Socioeconomic and health coverage indicators were correlated to stillbirth rates in Latin America.

## **Funding**

This study did not receive any specific funding.

## **Keywords**

Stillbirth; Latin America; Socioeconomic factors; Access to health care.

## **Tweetable abstract**

Stillbirth rates decreased in Latin America, but remain relatively high, with wide variations among countries.

## **Abbreviations**

GDP: Gross domestic product per capita in United States dollars

HIC: High income country

LMIC: Low and middle income country

MDG: Millennium Development Goals

MICS: Multiple Indicators Cluster Survey

NGO: Non-governmental Organizations

UNDP: United Nations Development Program

WHO: World Health Organization

SBRs: Stillbirth rates

NMRs: Neonatal Mortality rates

CVRS System: Civil Registration and Vital Statistics Systems

HMIS: National Health Management Information Systems

DHS: Demographic and Health Surveys

RHS: Reproductive Health Surveys

## MAIN TEXT

### Introduction

Within Latin America there are an estimated 91 000 stillbirths each year, with an estimated rate of 8.2 stillbirths per 1000 births (95% CI 7.5-9.2).<sup>1</sup> The overall estimated risk of stillbirth in Latin America is twice that of high-income settings.<sup>2</sup> Data capture of stillbirth figures has improved somewhat recently, with double the number of countries having information on stillbirth rates in 2000-2010, as compared to 1990-2000. <sup>1</sup>

Latin America is a region with some distinct local characteristics related to economy, society and health care. Over the last decade, most economies in Latin America have displayed growth and economic stability. Two decades earlier, many Latin American countries began social sector reforms to alleviate poverty, provide financial risk protection and improve health outcomes. In particular, reforms in the health care system focused on expansion of universal health coverage. However, wide socioeconomic and health inequalities persist, and poverty still remains high<sup>3,4</sup> Today, Latin America is still recognized as the most unequal region in the world, and 24 percent of the population (142 million people) was shown to be living in poverty in 2013<sup>5</sup> Children, adolescents and women remain the most vulnerable population in the region.<sup>6,7</sup>

Taking into account Latin American characteristics, our article will focus on the description of such distinct characteristics—mainly those that could be associated with stillbirths such as health coverage and socioeconomic characteristics; it will describe the frequency of stillbirths

at country-level, their change over time, and will measure the association of stillbirth with socioeconomic and health coverage indicators in the region.

### **Design and Methods**

This is an observational ecological study that reports stillbirth estimates for Latin America using aggregated data from pregnant women, with countries as units of analysis. We included data from all Spanish, Portuguese, and French-speaking countries in Latin America, given that these countries share similar socioeconomic, cultural and political characteristics, and they have been independent administrations for the last two centuries. English and Dutch-speaking Caribbean countries were not included since they are very different from the included countries in terms of size, culture and political administration. Many of them are overseas departments or dependents of high-income countries. Guyana and Suriname were also excluded since they have become independent more recently, but still have economic and political ties to English and Dutch Caribbean countries. We analysed data from all eligible countries in Latin America (N=20).

For the purpose of this study we used the country-level stillbirth estimates and average annual reduction (ARR) calculated by Blencowe et al (see Appendix S1).<sup>1</sup> Pooled regional stillbirth rate, absolute number of stillbirths and ARR were calculated by the authors so that only selected countries were included. Stillbirth was defined as a baby born with no signs of life at 28 weeks gestation or more. The source of the estimates varied according to the type and quality of data on stillbirths in each country. The data included for calculating the stillbirth estimations were classified a priori by Blencowe et al. into categories based on data type and quality<sup>1</sup>. Data classification systems classified as category 1 had high-quality, national routine information systems. National data systems in this category fulfil three characteristics.

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First: their Civil Registration and Vital Statistics systems (CRVS) were established before 2000, and have the ability to record high-quality information about maternal and neonatal outcomes. Second: the ratio of SBR (adjusted to 28 week definition) to national estimated NMR was greater than 0.5 for all years. Third: the country had a female child mortality capture of more than 85%, considered as a marker of CRVS system strength for capture of child outcomes). Data systems classified as category 2 had lower-quality national routine information systems that did not meet all of the above criteria. Category 3 data classification systems used nationally-representative retrospective household surveys, while those in category 4 used sub-national population-based data sources (prospective population-based studies or health-facility-based data) with minimum bias (covering >90% of births in the population). Finally, category 5 systems relied on sub-national population-based data (e.g., other health-facility-based data) with possible sources of bias. For countries with high-quality vital registration data, country's own reported rates were adjusted when necessary to fit the  $\geq 28$  week definition. For countries lower quality vital registration, data for stillbirth rates (SBRs) or nationally representative retrospective household surveys, SRBs were adjusted with a regression model.

Nationally representative socioeconomic and health care coverage indicators were selected from a conceptual framework based on plausible covariates published in the literature, and its data availability for all Latin America countries. Many indicators are core issues of the Countdown to 2030 initiative, the WHO global movement to improve maternal, newborn, and child survival.<sup>8</sup> These core issues include contraceptive use, and antenatal, delivery, postnatal and child health care. These indicators are monitored and analysed by the WHO to track country progress towards achieving the Millennium Development Goals (MDGs). We selected indicators of the Countdown to 2030 and their sources so that a standardized criterion and similar data quality were obtained for all Latin America countries. The sources of in-

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formation for these indicators were UNDP datasets, Multiple Indicators Cluster Surveys (MICS) and Demographic and Health Survey Program (DHS) from UNICEF, and World Bank datasets, with data reported for 2006 to 2016 (Table S1).<sup>9</sup> To describe legal termination of pregnancy status in Latin America countries, we reviewed the legislation of each country as well as government and NGO's reproductive rights published reports (see Table S1). Information about Gini index was not available for Cuba.

This study involved data that were publicly available. Stillbirth data –absolute numbers, rates and ARR- were available in the Blencowe et al. main publication and appendices. Datasets with socioeconomic and health service coverage indicators were also publicly available. This study did not receive any specific funding.

### Statistical analysis

We described country-level estimated stillbirth rates, absolute numbers of stillbirths, and average annual rate of reduction (ARR) over time for all Latin American countries from 2000 to 2015. Regional ARR including the selected countries was calculated with the formula:  $(\text{rate in the end line year} / \text{rate in baseline year})^{1 / (\text{end line year} - \text{baseline year})}$ , minus 1) per 100. Socioeconomic and health care coverage indicators assessed in this study were reported with means and standard deviations or medians and ranges for variables with Gaussian distribution or non-Gaussian distribution respectively.

To measure the correlation between stillbirth rate and socioeconomic and health care coverage indicators, we calculated Spearman's rank correlation coefficients. Countries were the units of analysis. The statistical analyses and graphs were done using STATA software (14th version).

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## Results

### Characteristics of the Latin American Region

Table 1 summarizes socioeconomic, health care coverage, and health indicators for 20 Latin American countries reported for the period 2006-2016. Concerning the socioeconomic dimension, countries show a median Gini index of 48.8 (range: 41.6-60.1). The median GDP (gross domestic product) per capita (current USD) for the region is 6336.8 (range: 818.3-15573.9), with the majority of countries classified as middle-income countries (17/20). There are two high-income countries (Chile and Uruguay) with 19 times the GDP of the poorest country in the region, and one low income country (Haiti). The mean number of years of schooling for women is 8.1, with a range of 3.9 for Haiti, corresponding to an area of UNDP low human development, to 11.5 for Cuba, corresponding to an area of UNDP very high human development.<sup>10</sup> Fertility rates (number of live births per 1000 women between the ages of 15 and 44 years) vary from 1.6 children in Cuba to 3.2 children in Guatemala, with a median of 2.1 for the region.

In regards to health care coverage, 96.8% (range: 84.2-100.0%) and 88.7% (range: 57.2-97.8%) of pregnant women presented at least one and at least four antenatal care visits, respectively. 97.2 % of all births were delivered in healthcare facilities (range: 35.9-99.9%). Regionally, the caesarean section rates were high: median: 31.3%; range (5.5-58.1%). Contraceptive prevalence (any method for women ages 15-49) has a median of 73%, and varies among countries with the following range: 34.5-80.4%.

The median maternal mortality ratio (MMR) per 100 000 live births reported for the region in 2015 was 67, and varied widely among countries. The highest ratios were observed in Haiti, Bolivia and Nicaragua (359, 206 and 150 maternal deaths per 100 000 live births, respectively), where MMR is ten times higher than those Latin American countries with low MMR.

The lowest MMRs were observed in Uruguay, Chile and Costa Rica (15, 22 and 25 maternal deaths per 100 000 live births, respectively). The median neonatal mortality rate (per 1000 live births) for the region was 7.7 in 2015. The inter-country variation in neonatal mortality rates and the proportion of low birth weight followed similar patterns, with the lowest frequency in Cuba (2.3 neonatal deaths per 1000 live births and 5.2% of low birth weight) and Chile (5.9 neonatal deaths per 1000 live births and 4.9% of low birth weight); and the highest in Haiti (23 neonatal deaths per 1000 and 25.4% of low birth rate). Haiti presented four times the risk of neonatal death and low birth weight compared to Cuba. Among all neonatal deaths in the region, 22.4% occurred due to birth defects.

We gathered updated data concerning the legal status of termination of pregnancy in Latin America. Legal termination of pregnancy is completely banned under any circumstances in El Salvador, Honduras, Nicaragua and Dominican Republic. Likewise, it was banned in Chile until July 2017, when Congress passed a law that contemplates pregnancy termination under three circumstances: when continuing the pregnancy threatens the mother's life, due to severe congenital malformations, and in cases of rape. In 14 out of 19 countries, legal termination of pregnancy is permitted in case of rape and in situations that pregnancy threatens the mother's life, but is legally prohibited for termination of pregnancies with congenital disorders. There are three countries in the region where termination of pregnancy is legal under any circumstances before 14 weeks of gestational age (Cuba, Uruguay and Colombia), and two that present specific restrictions: Mexico, where termination of pregnancy is only legal in Mexico City; and Brazil, where it is only legal for pregnancies with a confirmed diagnosis of severe malformation (not compatible with extra uterine life).

## Country level stillbirth rates and their change over time

Table 2 reports estimated  $\geq 28$  week stillbirth, maternal and neonatal mortality rates for 2015, and ARR between 2000 and 2015 for 20 Latin American countries. Of the 20 countries analysed countries, 5 presented the highest category (category 1) of an a priori determined 5-categories SBRs type/quality data classification system. These countries estimates (Argentina, Chile, Costa Rica and Cuba) were based on country data and adjusted to fulfil the 28 gestational weeks stillbirth definition. Although Uruguayan vital statistics are of high quality overall, stillbirth reporting is not disaggregated by gestational age. Consequently, Uruguay stillbirth estimates were modelled rather than adjusted by gestational age. Other 14 countries estimates were based on vital registration country data with lower quality or nationally representative retrospective household surveys data (categories 2 and 3 of the SBRs type/quality data classification system). For these countries, estimates were based on country data but adjusted using the regression model described in Appendix S1. Haiti did not present usable data, therefore a prediction model was applied to obtain the SBR estimates. For the majority of countries, SBR estimates were based on countries own data (national routine data or nationally representative surveys), but required adjustment due to variability in stillbirths' gestational age definition or data quality.

It was estimated that 89 248 stillbirths occurred in the selected countries of Latin America for 2015. The estimated stillbirth rate for the region was 8.1 per 1000 births (95%CI 7.5-9.2). Yet, the regional rate obscures a wide country variation. The highest stillbirth rate was estimated for Haiti (24.9 per 1000 births), and the lowest for Chile (with a 3.1 stillbirth rate). Only two countries presented rates less than 5 (Chile and Argentina); eleven countries presented rates between 5 and 10 (Peru, Brazil, Colombia, Ecuador, Nicaragua, Mexico, Venezuela, Costa Rica, Uruguay, Cuba and Panama); and seven had rates higher than 10 stillbirths per every 1000 births (Haiti, Paraguay, Bolivia, Honduras, El Salvador, Dominican Republic) (Table 2).

An average annual reduction rate (ARR) of 2.1% (range: 0.1-3.8%) was reported for the selected countries between 2000 and 2015. Cuba presented the highest ARR (3.8), followed by Argentina (3.1) and Peru (2.8). For the majority of Latin America countries (n=14) ARR ranged between 1.5-2.5%. The countries with the lowest ARR were Costa Rica (0.1), Haiti (0.9) and Dominican Republic (1.2) (Table 2).

When comparing the mortality rates among the countries of the region, it is observed that those with higher burden of stillbirths also present a higher risk of maternal and neonatal mortality.

### **Indicators associated with stillbirth rate**

Table 3 shows correlations between stillbirth rates and selected socioeconomic and health coverage indicators in the same 20 Latin American countries. A negative and strong correlation between stillbirths and women mean years of schooling ( $rS= -0.7910$ ), as well as stillbirths and GDP per capita ( $rS= -0.8226$ ) was observed (Figure 1). Two other socioeconomic indicators showed a moderate correlation with stillbirth rates: fertility rate ( $rS= 0.6055$ ), and the proportion of urban population ( $rS= -0.6316$ ). There was no correlation between SBRs and Gini index ( $rS=0.312$ ).

Regarding health coverage indicators, proportion of deliveries performed in health facilities was negative and moderately correlated with stillbirth rate ( $rS= -0.6454$ ); and there was no correlation between stillbirth rates and the proportion of women with at least one antenatal care visit ( $rS= -0.3567$ ), and at least four antenatal care visits ( $rS= -0.1105$ ).

## **Discussion**

### **Main findings**

The estimated stillbirth rate for Latin America for 2015 was 8.1 per 1000 births, with a wide variation among countries: an 8-fold difference was observed between the countries with the highest stillbirth rates compared to the one with the lowest. The average annual reduction rate for the region was 2%. Each countries showed a reduction of stillbirth rate over time, and low variability was observed.

When we evaluated the association of stillbirths rates and socioeconomic and coverage indicators, gross domestic product per capita and women's schooling showed the strongest association, followed proportion of urban population, fertility rate and deliveries at health facilities.

### **Strengths and limitations**

This study has the limitations related to ecological analyses: inferences at the individual level should not be made in order to avoid the ecological fallacy. Still, our findings for Latin America countries are consistent with individual level population-based studies carried out in low and middle-income countries.<sup>11-13</sup> Another limitation is related to quality data used for stillbirths estimates. Given that most stillbirths occur in countries without adequate vital registration<sup>2</sup>, there is huge variation in data availability, which might have an impact on the quality of stillbirth estimates<sup>1</sup>. Stillbirth rates based on national vital registration would be the best source of information to study stillbirth frequency and trend; however, it is not yet possible for our region due to lack of systematic reporting of stillbirths. Today, stillbirth estimations -although the calculations could contain statistical errors and affect the accuracy of the measurements- are still the most appropriate method for comparing inter-country rates in Latin America. We used correlation to denote the association between two quantitative variables, but theoretical models suggests that more than one independent variable might be associated to stillbirth rates. Multiple regression should be applied to adjust the association by po-

tential confounders and to better explain associated factors. Finally, although data on the proportion of non-macerated stillbirths is relevant for targeted prevention strategies, no country-specific data are available.

The main strength of this study is that the ecological design analysis is the most appropriate research design to assess the correlation of stillbirth with the indicators analysed at the aggregate level.<sup>14,15</sup>

### **Interpretation**

The estimated stillbirth rate in Latin America was lower than the worldwide estimate of 18.4 per 1 000 births, but double high-income setting rate of 3.4. High-income countries in Latin America have a similar stillbirth estimate compared to developed regions (3.7 vs. 3.4 respectively). In addition, stillbirth estimates for Haiti -- the only country in Latin America classified as low-income by the World Bank -- are similar to those of the Sub-Saharan Africa region (24.9 vs 28.7 respectively). In contrast, the pooled stillbirth rate for middle-income countries in Latin America is lower (7.8 per 1000 births) than those reported for other regions of the world with a high percentage of middle-income countries (12.2 in the South-eastern Asia Region and 14.5 in North Africa and Middle East).<sup>1</sup>

Latin America showed high levels of inter-country variation within its countries, similarly to Southern and South-Eastern Asia<sup>1</sup>. All the other regions of the world showed less variability within their countries.<sup>1 1</sup>. In regards to stillbirth rate change over time, Latin America showed a similar annual rate of reduction to the worldwide estimate (2.1% and 2.0% respectively). Since all regions of the world showed a decrease in their rates<sup>1</sup>, factors at a global macro level (for example, advance of scientific knowledge) might be influencing the stillbirth rate trend more than specific factors applied in each region.

Countries with high stillbirth rates in Latin America presented high neonatal mortality rates too. However, comparisons between stillbirth and neonatal mortality rates should be interpreted with an eye to intercountry variation in data quality (i.e., underreporting of fetal deaths, neonatal deaths misclassified as stillbirth due to diverse quality in resuscitation procedures).<sup>16,17</sup>

We reviewed whether the estimations described in our study were consistent with previously published stillbirth rates for Latin American region. The UNDP/UNFPA/WHO/World Bank Special Programme of Research, performed a systematic review of stillbirth prevalence including articles from 1997 to 2002.<sup>18</sup> The pooled stillbirth rate for Central and South America was 8.2 and 13.4 per 1 000 births respectively. Two studies reported rates of 17.6 between 1985 and 1997 for 18 countries of Latin America, and 4.0 for 2009-2012, including 11 countries.<sup>19,20</sup> Because sampling and stillbirth definition of these studies differ from ours we could not assess their consistency with our estimated stillbirth rate for Latin America<sup>19,20</sup>. In regards to stillbirth trend over time, previous publications from Latin American countries had also described rate reductions over time.<sup>11,21</sup> Consistent with other published results, we found associations between stillbirth rates and maternal education, gross domestic income, fertility rate, urban/rural populations and the proportion of hospital-based deliveries.<sup>1,12,22-25</sup> Unexpectedly, we did not find an association with antenatal care indicators. This may be because antenatal care (measured as “at least one” or “four visits”) could be an insufficient intervention for women with high-risk pregnancies who are more likely to have a stillbirth. This result could also be influenced by poor quality of antenatal care.

This analysis was limited to those factors with data reported for most countries, and with low data quality variability. We attempted to measure the association of stillbirth rates and maternal syphilis prevalence.<sup>15</sup> However, since reported syphilis prevalence is closely related to access to the screening test<sup>26</sup>, the obtained results did not seem to be plausible. We also tried

to collect data on the country-level prevalence of congenital anomalies, in order to explore its relationship with stillbirth rates, but data were only reported for nine countries in Latin America.<sup>27,28</sup> Other important maternal factors that have not been measured and could influence the rate of stillbirth are chronic and infectious diseases, preeclampsia/eclampsia, diabetes, toxoplasmosis, maternal cigarette smoking and obesity.

### **Conclusion**

Stillbirth rates varies widely in the region, and it has a declining tendency with similar speed to the tendency observed worldwide. The factors that are associated to stillbirth rates in Latin America are predominantly socioeconomic, and related to access to hospital-based deliveries.

Improvements in the systematic reporting of stillbirth indicators are needed to monitor the magnitude, variability, trends and causes of stillbirth in the region. Systematic reporting of stillbirth in routine information systems and the implementation of the WHO guidelines perinatal mortality audit and classification in the region could contribute to bringing stillbirth out of the shadows, and putting it on the agenda of global health programmatic and policy priorities. Given the stillbirth, infant and maternal mortality rates in Latin American countries, improvement of prenatal care -through high-quality antenatal and intrapartum care- would represent a quadruple return on investments, preventing stillbirths, maternal and neonatal deaths, as presented in the Lancet Ending Preventable Stillbirth Series.<sup>29</sup>

The scarce number of publications in our region suggests that investment in stillbirth research is needed, and leadership would also be required to reverse stillbirths' invisibility. More specifically, further research on these dimensions is needed to better explain this phenomenon in Latin American countries: stillbirth rates association with the newly recommended eight-visit



antenatal care, with the burden of chronic and infectious diseases, with prevalence of congenital malformation, and with the legal status of termination of pregnancies, as well as factors associated to stillbirth rates trends.

#### **DISCLOSURE OF INTEREST**

All authors declare that there are no financial, personal, political, intellectual or religious conflicts of interest. Completed disclosure of interest forms are available to view online as supporting information.

#### **CONTRIBUTION TO AUTHORSHIP**

VP, FA, JMB, PV and MC conceived and designed the study. VP, PV, MC coordinated and performed the data collection. MP analysed the data. VP, FA, JMB, PV, MC and MP interpreted the data. VP, PPV and MC drafted the manuscript in collaboration with FA, MP and JMB. All authors have approved the final version to be published.

#### **ETHICS APPROVAL**

For this type of study, formal consent is not required, since this study involved publicly available information, and did not involve individually identifiable data.

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#### **LIST OF FIGURES AND TABLES**

Table 1: Selected socioeconomic, health care coverage and health indicators for Latin America, 2006-2015

Table 2: Estimated stillbirth numbers, rates and 95% confidence intervals for 2015, and annual rate of reduction for the period 2000-2015 and each Latin American country

Table 3: Correlation between stillbirth rate and socioeconomic and health care coverage indicators in 20 countries of Latin America

Figure 1: Correlation between stillbirth rate (per 1000 births) and Gross Domestic Product per capita in USD (GDP)

Table 1: Selected socioeconomic, health care coverage and health indicators for Latin America, 2006-2016.

Indicator	Median (Range) (N=20)	n/N
<b><i>Socioeconomic</i></b>		
Gini Index <sup>a</sup>	48.8 (41.6-60.1)	
GDP per capita (current US\$)	6336.8 (818.3-15573.9)	
Women mean years of schooling	8.1 (3.9-11.5)	
Fertility rate, total (births per woman)	2.3 (1.6-3.2)	
% urban population	76.6 (51.6-95.3)	
<b><i>Access to Health Care</i></b>		
Contraceptive prevalence, any methods (% of women ages 15-49)	73.5 (34.5-80.4)	
% women with $\geq 1$ antenatal consultation	96.8 (84.2-100.0)	
% women with $\geq 4$ antenatal consultation	88.7 (57.2-97.8)	
% births attended by skilled health staff	96.0 (37.3-99.8)	
% births delivered in a health facility	97.2 (35.9-99.9)	
Caesarean section rate (per 100 births)	31.3 (5.5-58.1)	
<b><i>Maternal and Perinatal Health</i></b>		
Maternal mortality ratio (per 100 000 live births)	66 (15.0-359.0)	
Prevalence of maternal syphilis (per 1 000 live births)	0.6 (0.1-3.9)	
Neonatal mortality rate (per 1 000 live births)	8.9 (2.3-25.4)	
% Low birth weight	8.4 (5.2-23.0)	
Proportional neonatal mortality due to birth defects	22.4 (8.0-39.5)	
Stillbirth rate (per 1 000 births)	8.1 (3.1-24.9)	
<b><i>Legal status of termination of pregnancies with congenital anomalies</i></b>		
Not permitted		15/20
Permitted		5/20
No restrictions		3/5
Only severe congenital anomalies		1/5
Only in the Capital City		1/5

<sup>a</sup> Cuba was not included in this analyses because data was not available

Table 2: Estimated stillbirth numbers, rates and 95% confidence intervals for 2015, and annual rate of reduction for the period 2000-2015 and each Latin American country

Stillbirths						Maternal Mor-	Neonatal	
Country	Estimated stillbirth rate (2015)	95% CI <sup>a</sup> (2015)	Number of stillbirths (2015)	Number of Live Births (2015)	Average Annual reduction <sup>b</sup> (2000-2015)	Source of estimates <sup>c</sup>	Ratio <sup>d</sup> (2015)	Rate <sup>e</sup> (2015)
Haiti	24.9	24.3-25.5	6580	263 930	0.9	Modelled Estimate	359	25.4
Paraguay	13.4	12.8-14.0	1832	136 800	2.2	Modelled Estimate	132	10.9
Bolivia	12.9	12.4-13.3	3209	249 290	2.1	Modelled Estimate	206	19.6
Honduras	12.6	12.0-13.1	2074	164 550	2.3	Modelled Estimate	129	11
El Salvador	12.2	11.5-12.9	1286	105 870	2.3	Modelled Estimate	54	8.3
Guatemala	11.9	11.6-12.3	5362	449 080	2.3	Modelled Estimate	88	13.4
Dominican Republic	11.1	10.6-11.5	2426	219 300	1.2	Modelled Estimate	92	21.5
Peru	9.0	8.7-9.2	5623	628 020	2.8	Modelled Estimate	68	8.2
Brazil	8.6	8.5-8.7	27808	3 241 740	2.3	Modelled Estimate	44	8.9
Colombia	8.1	7.9-8.3	6089	753 860	2.0	Modelled Estimate	64	8.5
Ecuador	7.7	7.4-8.0	2531	329 370	2.3	Modelled Estimate	64	10.8
Nicaragua	7.4	7.0-8.0	895	120 280	2.5	Modelled Estimate	150	9.8
Venezuela	7.1	6.9-7.3	4308	604 250	1.5	Modelled Estimate	95	8.8
Uruguay	6.6	5.9-7.4	318	48 460	1.7	Modelled Estimate	15	5.1
Cuba	6.2	5.7-6.7	726	117 990	3.8	Adjusted National Data	39	2.6
Panama	6.1	5.5-6.7	464	75 520	2.3	Modelled Estimate	94	9.6

Costa Rica	6.0	5.4-6.6	409	68 280	0.1	Adjusted National Data	25	6.2
Mexico	5.5	5.4-5.6	13093	2 383 920	1.6	Modelled Estimate	38	7
Argentina	4.6	4.4-4.7	3499	764 940	3.1	Adjusted National Data	52	6.3
Chile	3.1	2.9-3.3	716	234 270	1.6	Adjusted National Data	22	4.9
Total	8.1	7.5-9.2	89248	11120410	2.1	---	104.5	9.4

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<sup>a</sup>95% confidence interval

<sup>b</sup> Rate in the endline year/Rate in baseline year, raised to the power of 1/ endline year-baseline year, minus x 100

<sup>c</sup> The source of estimates for Argentina, Chile, Costa Rica and Cuba was national data adjusted to 28 week definition. For the rest of the countries, the estimates were modelled due to lower quality data or lack of availability of stillbirth's gestational age definition.

<sup>d</sup> Neonatal mortality rates per 1,000 live births estimates for 2015 developed by the UN Inter-agency Group for Child Mortality Estimation

<sup>e</sup> Maternal mortality ratios per 100 000 live births estimates for 2015 generated by the UN Inter-agency Group for Child Mortality Estimation

Table 3: Correlation between stillbirth rate and socioeconomic and health care coverage indicators in 20 countries of Latin America

Indicators	Spearman coefficient (n=20)	p-value
<b><i>Socioeconomic</i></b>		
GINI Index	0.3115	0.194
Women mean years of schooling	-0.791	<0.001
Gross domestic product per capita	-0.8226	<0.001
Fertility rate, total	0.6055	0.005
Population, urban (%)	-0.6316	0.003
<b><i>Health care coverage</i></b>		
Delivery in health facility	-0.6454	0.002
At least one antenatal care visit	-0.3567	0.123
At least four antenatal care visit	-0.1105	0.652



