

Tackling Health Inequities in Chile: Maternal, Newborn, Infant, and Child Mortality Between 1990 and 2004

Rogelio Gonzalez, MD, Jennifer Harris Requejo, PhD, MHS, Jyh Kae Nien, MD, Mario Merialdi, MD, PhD, MPH, Flavia Bustreo, MD, MPH, and Ana Pilar Betran, MD, PhD, for the Chile Maternal, Newborn, and Child Health Writing Group

Despite Latin America's overall declines in mortality and gains in life expectancy over the past few decades, inequity remains a leading health problem.¹⁻⁷ Data from the region on maternal, newborn, infant, and child health show better outcomes among women with higher socioeconomic status.^{8,9} Available evidence on the coverage rates of maternal and child health initiatives similarly shows a regressive distribution of services, with the wealthiest groups disproportionately benefiting from the introduction of new programs.^{2,10-13} Although maternal and child health inequities are prevalent throughout Latin America, their extent differs, with some countries making strides in their reduction in recent years.⁸

Studies examining the success of some Latin American countries (e.g., Chile, Costa Rica, Cuba) in narrowing the gaps between the richest and poorest population groups attribute much of this success to improvements in women's access to education and increases in the coverage of public health measures.^{2,3,14-16} Findings indicate that significant reductions in maternal and child health inequities in Latin American countries can be achieved under diverse political and economic conditions. Other countries in the region (e.g., Mexico, Colombia) have introduced health reforms to ensure that typically underserved groups are better targeted.^{2,17} These efforts are further proof that maternal and child health inequities in Latin America are not immutable.

Chile has been heralded for its achievements in improving maternal and child health.^{3,7} We analyzed the declining trends in maternal and child mortality in Chile between 1990 and 2004 and the variances in mortality trends across district quintiles of socioeconomic status to determine whether and how these inequities changed. We explored reasons for the downward mortality trends and changes in the mortality differentials between district quintiles, such as national-level interventions and changes in key demographic indicators known to influence pregnancy outcomes.

Objectives. We analyzed trends in maternal, newborn, and child mortality in Chile between 1990 and 2004, after the introduction of national interventions and reforms, and examined associations between trends and interventions.

Methods. Data were provided by the Chilean Ministry of Health on all pregnancies between 1990 and 2004 (approximately 4 000 000). We calculated yearly maternal mortality ratios, stillbirth rates, and mortality rates for neonates, infants (aged > 28 days and < 1 year), and children aged 1 to 4 years. We also calculated these statistics by 5-year intervals for Chile's poorest to richest district quintiles.

Results. During the study period, the maternal mortality ratio decreased from 42.1 to 18.5 per 100 000 live births. The mortality rate for neonates decreased from 9.0 to 5.7 per 1000 births, for infants from 7.8 to 3.1 per 1000 births, and for young children from 3.1 to 1.7 per 1000 live births. The stillbirth rate declined from 6.0 to 5.0 per 1000 births. Disparities in these mortality statistics between the poorest and richest district quintiles also decreased, with the largest mortality reductions in the poorest quintile.

Conclusions. During a period of socioeconomic development and health sector reforms, Chile experienced significant mortality and inequity reductions. (*Am J Public Health.* 2009;99:1220-1226. doi:10.2105/AJPH.2008.143578)

Our goal was to document Chile's declining maternal, newborn and child mortality trends during 1990 to 2004 and explore possible associations between these trends, health sector reforms, and improvements in the socioeconomic status of mothers. We expected to confirm overall declines in mortality and persistent inequities. Given the growing global interest in combating health disparities, our assessment of maternal and child mortality indicators in Chile—the first for this country—is an important first step toward identifying both coverage gaps across the continuum of care¹⁸ and successful strategies in reducing inequities. Our findings may inform efforts in other countries to implement integrated maternal and children's health service packages and to achieve Millennium Development Goals 4 and 5 (reducing child mortality and improving maternal health, respectively).¹⁹

METHODS

We obtained mortality data and demographic information on women who delivered

(age, education, parity, skilled attendance at delivery, marital status) from a national registry maintained by the Department of Statistics, Ministry of Health; the National Statistics Institute; and the National Civil Registry and Identification Service. We obtained descriptive information from the same database on the approximately 250 000 yearly deliveries (multiple births, gender, preterm births, low birth weight) and causes of maternal death (coded in accordance with the *International Classification of Diseases and Related Health Problems, Ninth Revision*²⁰; the 10th revision²¹ was applied beginning in 1999).

Chile's vital registration system is ranked as complete with good attribution of cause of death according to UN classifications (> 90% of deaths registered).^{22,23} The Pan American Health Organization recently stated that the vital statistics are the most reliable element in Chile's health information system, with coverage approximating 99%, and that 98.9% of deaths are medically certified, with only 2.8% coded as ill defined.⁴ Despite the robustness of Chile's vital registration system since 1990, regional

variation in the quality of vital statistics has been reported, with poor attribution of cause of death ranging from 1.5% to 13.7% in 2003.^{24,25}

The Chilean Ministry of Health provided information on national-level interventions introduced during the study period. These included efforts to improve general, newborn, infant and child, maternal, and adolescent health.

Statistical Analysis

The maternal mortality ratio (MMR) and the rates of stillbirth and neonatal, infant (aged >28 days but <1 year), and child (aged 1–4 years) mortality were calculated for each year from 1990 to 2004; the χ^2 test was used to test for trends. For our equity analysis, we computed mortality statistics for Chile's 5 poorest to richest district quintiles for each 5-year interval (1990–1994, 1995–1999, and 2000–2004). We compared the absolute differences in the mortality statistics between the first and fifth district quintiles in each 5-year interval to determine whether differences between them decreased.

We also compared rate ratios derived from the mortality statistics in the first and fifth district quintiles for the beginning and ending 5-year intervals. Ratio scales are the most appropriate measures for determining changes in inequity patterns because they account for baseline mortality levels. Ratio scales are often used in epidemiological research.¹¹

District Quintile Distribution

We used the district income–ranking tool formulated from the human development index and published by the United Nations to develop the district quintile distribution.^{26–28} The tool explains the steps involved in and rationale behind ranking districts according to income.

We first obtained average household income data for each of Chile's 341 administrative districts from the 2003 Chilean National Characterization Socio-Economic Survey.²⁹ We then ranked the districts from 1 to 341 by income. Next we stratified these districts into 5 groups (with approximately the same number of districts) with nonoverlapping income ranges. We then calculated the average household income and range for each quintile.

RESULTS

The data in Table 1 describe Chile's 5 district quintiles, including population size in 2003, household income per capita in 2003, and number of live births (1990–2004). The poorest 69 districts fell into the first quintile and the 65 wealthiest districts into the fifth quintile. The first district quintile contained the smallest population (5.3%) and lowest number of live births (5.1%); the fifth district quintile contained the largest population (44.9%) and the most live births (43.4%). The majority of Chile's 2003 population and live births for the entire study period were concentrated in the higher quintiles.

Live Births and Maternal Characteristics

A total of 3 902 698 live births occurred in Chile during 1990 to 2004. Of these, 51.2% (1 998 181) of the newborns were male and 48.8% (1 904 517) were female, 5.3% (208 765) had low birth weight (<2500 g), and 5.7% (222 529) were preterm (births before 37 full weeks of gestation). The rate of multiple pregnancies, 0.8%, was consistent throughout the observed period, and the mean maternal age was 26.7 years. The total number of live births per year decreased from 292 145 in 1990 to 230 352 in 2004, an overall reduction of 21%. Chile's natality rate also declined from 23.3 to 15.0 live births per 1000 people (derived from midyear population).

Only live births for which complete maternal demographic information was available were included in our mortality statistics. Missing information on educational attainment (0.3% of records per year on average) slightly

reduced the annual and total live birth figures reported in Tables 1 and 2.

The median and 95th percentile of maternal age tended to increase over the examined period (26 to 27 years and 37 to 38 years, respectively); the lowest fifth percentile remained stable at 17 years. The percentages of women who were primiparas (40%) and who received skilled delivery care (98%) were consistent throughout the study period. The percentage of married women decreased from 65.7% in 1990 to 44.1% in 2004.

The percentage of women with a high school or higher education level increased over the study period; the greatest increase was among women with vocational training after high school or a university-level education (9.5% to 21.1%). The percentage of women with an elementary-level or no education dropped from 37% to 21% and 0.9% to 0.2%, respectively. Stratification of maternal mortality by educational status showed that women with higher education levels had lower mortality.

Mortality

Table 2 shows the number of live births and maternal, fetal, neonatal, infant, and children's deaths and presents the MMR, stillbirth rate, and neonatal, infant, and child mortality rates per year from 1990 to 2004. The numbers of both births and deaths steadily decreased. Table 2 and Figure 1 also show declining trends during the study period: the MMR dropped 56% (from 42.1 to 18.5 per 100 000 live births); the stillbirth rate, 10% (from 6.0 to 5.0 per 1000 total births); the neonatal mortality rate, 36% (from 9.0 to 5.7 per 1000 live births); the infant mortality rate, 62% (from 7.8 to 3.1 per 1000 live births); and the

TABLE 1—Characteristics of Chile's 5 District Quintiles: 1990–2004

District Quintile	No. Districts	1990–2004 Births, No. (%)	2003 Population, No. (%)	Income Per Capita, ^a Mean (Range)
First	69	200 373 (5.1)	810 517 (5.3)	100 (49–111)
Second	69	375 701 (9.6)	1 393 816 (9.1)	126 (118–147)
Third	69	472 820 (12.1)	1 791 085 (11.7)	153 (149–179)
Fourth	69	1 155 480 (29.7)	4 456 113 (29)	192 (190–230)
Fifth	65	1 689 444 (43.4)	6 891 327 (44.9)	371 (270–1767)
Total	341	3 893 818 (100)	15 342 858 (100)	187 (49–1767)

^aMean household income per capita monthly in 2003 US\$ equivalents. Range represents minimum and maximum values.

TABLE 2—Maternal, Fetal, Neonatal, Infant, and Child Deaths and Corresponding Maternal Mortality Ratio (MMR), and Rates, by Year: Chile, 1990–2004

Year	Live Births, No.	Maternal Deaths ^a		Stillbirths ^b		Neonatal Deaths ^c		Infant Deaths ^d		Child Deaths ^e	
		No.	MMR* (95% CI)	No.	Rate* (95% CI)	No.	Rate* (95% CI)	No.	Rate* (95% CI)	No.	Rate* (95% CI)
1990	292 143	123	42.10 (34.66, 49.54)	1753	6.00 (5.72, 6.28)	2631	9.01 (8.66, 9.35)	2268	7.76 (7.44, 8.08)	898	3.07 (2.87, 3.27)
1991	284 478	106	37.26 (30.17, 44.35)	1754	6.17 (5.88, 6.45)	2378	8.36 (8.02, 8.70)	1988	6.99 (6.68, 7.30)	823	2.89 (2.70, 3.09)
1992	279 096	91	32.61 (25.91, 39.30)	1639	5.87 (5.59, 6.16)	2274	8.15 (7.81, 8.48)	1909	6.84 (6.53, 7.15)	854	3.06 (2.85, 3.27)
1993	275 915	100	36.24 (29.14, 43.35)	1535	5.56 (5.28, 5.84)	2020	7.32 (7.00, 7.64)	1748	6.34 (6.04, 6.63)	723	2.62 (2.43, 2.81)
1994	267 655	73	27.27 (21.02, 33.53)	1306	4.88 (4.61, 5.14)	1971	7.36 (7.04, 7.69)	1457	5.44 (5.16, 5.72)	657	2.45 (2.27, 2.64)
1995	265 930	86	32.34 (25.50, 39.17)	1277	4.80 (4.54, 5.07)	1707	6.42 (6.11, 6.72)	1376	5.17 (4.90, 5.45)	756	2.84 (2.64, 3.05)
1996	264 791	64	24.17 (18.25, 30.09)	1244	4.70 (4.44, 4.96)	1755	6.63 (6.32, 6.94)	1319	4.98 (4.71, 5.25)	566	2.14 (1.96, 2.31)
1997	259 959	61	23.47 (17.58, 29.35)	1229	4.73 (4.46, 4.99)	1584	6.09 (5.79, 6.39)	1130	4.35 (4.09, 4.60)	529	2.03 (1.86, 2.21)
1998	257 102	55	21.39 (15.74, 27.05)	1160	4.51 (4.25, 4.77)	1624	6.32 (6.01, 6.62)	1160	4.51 (4.25, 4.77)	589	2.29 (2.11, 2.48)
1999	250 673	60	23.94 (17.88, 29.99)	1064	4.24 (3.99, 4.50)	1558	6.22 (5.91, 6.52)	1080	4.31 (4.05, 4.57)	461	1.84 (1.67, 2.01)
2000	248 889	49	19.69 (14.17, 25.20)	1113	4.47 (4.21, 4.73)	1467	5.89 (5.59, 6.20)	869	3.49 (3.26, 3.72)	441	1.77 (1.61, 1.94)
2001	246 116	45	18.28 (12.94, 23.63)	1245	5.06 (4.78, 5.34)	1290	5.24 (4.96, 5.53)	869	3.53 (3.30, 3.77)	491	1.99 (1.82, 2.17)
2002	238 973	42	17.58 (12.26, 22.89)	1132	4.74 (4.46, 5.01)	1249	5.23 (4.94, 5.52)	715	2.99 (2.77, 3.21)	449	1.88 (1.71, 2.05)
2003	234 484	33	14.07 (9.27, 18.88)	1416	6.04 (5.72, 6.35)	1219	5.20 (4.91, 5.49)	710	3.03 (2.81, 3.25)	396	1.69 (1.52, 1.86)
2004	227 614	42	18.45 (12.87, 24.03)	1143	5.02 (4.73, 5.31)	1288	5.66 (5.35, 5.97)	702	3.08 (2.86, 3.31)	387	1.70 (1.53, 1.87)
χ^2 for trend			87.6		69.3		716.8		1744.3		355.5

Note. CI = confidence interval.

^aMaternal deaths per 100 000 live births.

^bFetal deaths (>22 weeks' gestation or >500 g) per total births.

^cNeonatal deaths (\leq 28 days) per 1000 live births.

^dInfant deaths (>28 days and <1 year) per 1000 live births.

^eChild deaths (\geq 1 year and <5 years) per 1000 live births.

* $P < .001$.

child mortality rate, 45% (from 3.1 to 1.7 per 1000 live births).

To investigate whether the magnitude of the mortality levels and declining trends differed by income, we stratified the mortality indicators according to district quintiles by 5-year intervals and found that decreases were achieved across the mortality indicators in each of Chile's 5 district quintiles. The poorest quintile tended to experience the largest mortality decreases, resulting in a narrowing of Chile's maternal and child health equity gaps (Table 3).

We observed this equity trend when we examined the temporal trends in the absolute differences in the MMR, stillbirth rate, and neonatal, infant, and child mortality rates between the first and fifth district quintiles in the 5-year intervals: the gap in the MMR fell from 27.53 to 13.31 to 8.25 deaths per 100 000 live births; in the stillbirth rate, from 3.61 to 2.77 to 2.0 deaths per 1000 total births; in the neonatal mortality rate, from 3.16 to

2.22 to 0.99 deaths per 1000 live births; in the infant mortality rate, from 5.59 to 3.49 to 1.06 deaths per 1000 live births; and in the child mortality rate, from 3.26 to 2.11 to 1.29 deaths per 1000 live births.

Rate ratios derived from data from the first and fifth district quintiles for the beginning and ending 5-year intervals provided further evidence that inequity declined: the MMR ratio went from 1.91 to 1.48; the stillbirth rate ratio, from 1.71 to 1.43; the neonatal rate ratio, from 1.42 to 1.19; the infant mortality rate ratio, from 1.97 to 1.35; and the child mortality rate ratio, from 2.41 to 1.83. These findings showed that the infant and child mortality rates—the indicators furthest from the delivery period—experienced the largest reductions in the equity gap.

In 1990, there were 123 maternal deaths recorded in Chile, and in 2004, only 42. The differences in the cause-of-death distribution during these 2 years indicated that changes in the maternal mortality pattern took place.

Declines occurred in the percentages of deaths attributable to obstructed labor (18% and 5%, respectively), infection (11% and 2%), and abortion (20% and 7%). The percentage of deaths attributable to hypertensive disorders stayed constant at approximately 20%, and the percentage of deaths from indirect causes increased (11% and 36%). These findings are consistent with maternal mortality trends reported in other transitional countries.^{30,31}

DISCUSSION

We examined data on all live births (approximately 4 000 000) in Chile between 1990 and 2004 to assess changes in the MMR, the stillbirth rate, and the neonatal, infant, and child mortality rates. We observed statistically significant declining trends across these mortality indicators, with the greatest reductions in the infant and child mortality rates. That the largest declines were achieved in these 2 rates

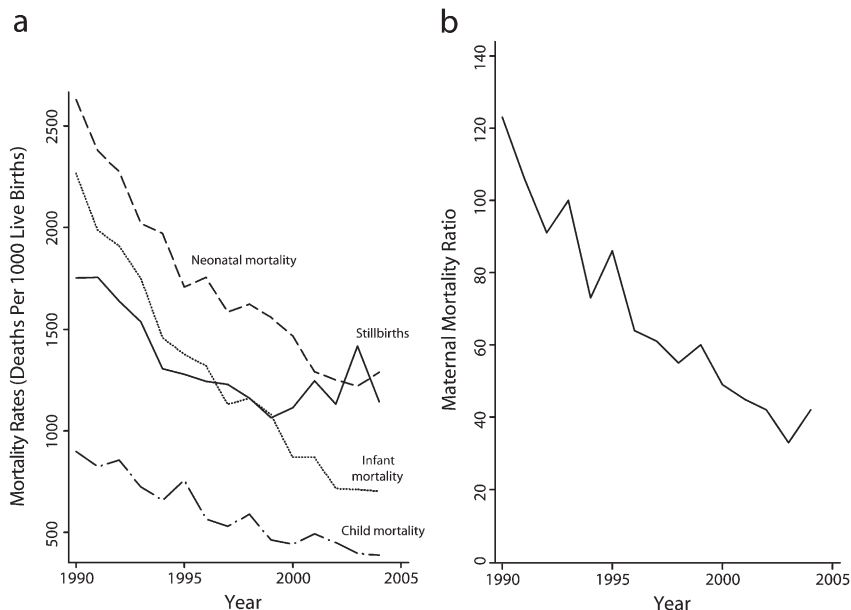


FIGURE 1—Trends in (a) rates of stillbirth and neonatal, infant, and child mortality and (b) maternal mortality ratio: Chile, 1990–2004.

is noteworthy because they are indicators of development and the wide-scale provision of basic services.²⁴ The stillbirth and neonatal mortality rates improved the least. This finding is consistent with other research showing that these 2 rates are slower than infant and child mortality rates to improve in countries undergoing transition.^{18,32–34}

We found overall declines across the maternal, newborn, and child mortality indicators in all 5 district quintiles, with the largest proportional decreases in the poorest quintile. The absolute numbers of deaths averted in the first quintile in relation to the total population further revealed that the survival gains made in the 5.3% of the population at the bottom of the country's socioeconomic structure substantially contributed to the maternal, newborn, and child mortality reductions achieved in Chile during 1990 to 2004. The deaths averted in the first quintile were responsible for 10% of maternal, 14% of fetal, 9% of neonatal, 11% of infant, and 14% of children's deaths averted in the entire country. These findings parallel research on developed and transitional countries showing that reversals in marginalization patterns can result in overall improvements in survival and reductions in health care inequities.^{1,18,35}

Socioeconomic Factors

The consistent increase in annual per capita income and decrease in the number of people living in poverty between 1990 and 2004 are evidence of Chile's sustained economic growth.^{4,33} Others have reported that income levels rose faster in lower socioeconomic groups during the 1990s, although substantial income gaps persist.^{4,31} The relationship between improvements in economic conditions and reductions in infant mortality in Chile has been observed in previous research.^{31,36,37} Our study indicates a similar relationship with maternal and child mortality.

Our data confirmed previous research showing a direct association between women's education levels and declining MMRs, suggesting that 1 factor contributing to Chile's MMR reductions is improvements in the educational status of women delivering.¹⁸ Other research on Chile has shown a correlation between maternal education and infant mortality.²⁴

National-Level Interventions

Several interventions targeting maternal and child health were introduced during 1990 to 2004 as part of a broad-scale initiative to reduce by 10% the differences in major health

outcomes between the lowest and highest socioeconomic quintiles by 2010.^{16,38,39}

General programs. At the beginning of the 1990s, the government introduced a package of measures to implement free primary health care (including antenatal care).^{36,40} Chile also launched the Chile Solidario System in 2002. This system, designed as a social protection program for families in extreme poverty, involves the delivery of assistance and skill-building opportunities. It has gradually incorporated all identified families and may eventually be expanded to ensure universal coverage of health services.^{41,42}

Chile is on track for meeting the Millennium Development Goal 7 water and sanitation targets, reporting that access to improved sources of drinking water was enjoyed by 90% of the total population in 1990 and 95% in 2004 and that improved sanitation facilities had reached 91% of citizens in 2004, up from 84% in 1990.⁴³ The percentage of the population with piped water increased from 84% to 92% between 1990 and 2006.⁴⁴

Newborn health. After 1991, the government made substantial investments in equipment and human resources for neonatal intensive care units. A policy for neonatal cardiopulmonary resuscitation was implemented in 1994, and a program to ensure universal access to surfactant was launched in 1998. Nutritional programs, such as the promotion of complementary feeding strategies for premature babies, were introduced, and Chile's flour fortification program, implemented in 2000, has been credited with significant reductions in the incidence of neural tube defects.⁴¹⁶

Infant and child health. In 1990, the government launched a program to address acute respiratory infections among children younger than 1 year, the leading cause of preventable childhood mortality in Chile. This initiative has been credited with reducing infant deaths attributed to acute respiratory infections from a high of 23.9 per 1000 live births in 1990 to 3.4 per 1000 live births in 2003.⁴⁵ Other new programs were breastfeeding promotion; incorporation in 1990 of a routine measles, mumps, and rubella vaccination into Chile's immunization program; and campaigns to prevent and treat enteric infections (hepatitis A, typhoid fever, and diarrhea).³⁸ According

TABLE 3—Maternal Mortality Ratio (MMR), Stillbirths, and Neonatal, Infant, and Child Mortality Rates, by 5-Year Intervals and District Socioeconomic Quintiles: Chile, 1990–2004

District Quintile	MMR ^a	Stillbirths ^b	Neonatal Deaths ^c	Infant Deaths ^d	Child Deaths ^e
1990–1994					
First	57.81	8.66	10.67	11.32	5.58
Second	43.86	7	9.46	8.55	3.78
Third	39.21	5.99	7.93	7.1	3.52
Fourth	33.67	5.55	7.94	6.44	2.44
Fifth	30.28	5.05	7.51	5.73	2.32
1995–1999					
First	35.21	6.72	8.08	7.59	4
Second	30.82	4.78	6.76	5.26	2.85
Third	36.94	5.44	6.86	4.85	2.73
Fourth	21.47	4.8	6.39	4.76	2.05
Fifth	21.9	3.95	5.86	4.1	1.89
2000–2004					
First	25.46	6.65	6.16	4.07	2.85
Second	22.06	5.26	5.44	3.26	2.24
Third	18.63	5.04	5.87	3.55	2.11
Fourth	15.14	5.34	5.56	3.29	1.75
Fifth	17.21	4.65	5.17	3.01	1.56

^aMaternal deaths per 100 000 live births.

^bFetal deaths (>22 weeks' gestation or >500 g) per total births.

^cNeonatal deaths (≤28 days) per 1000 live births.

^dInfant deaths (>28 days and <1 year) per 1000 live births.

^eChild deaths (≥1 year and <5 years) per 1000 live births.

to country and World Health Organization–UNICEF estimates, Chile maintained high coverage of its vaccine schedule during the study period (over 90% coverage for Bacillus Calmette–Guérin vaccine; first and third doses of diphtheria toxoid, tetanus toxoid, and pertussis vaccine; and measles-containing vaccine and from 1996 on, over 90% coverage for the third dose of polio vaccine).⁴⁶

Chile introduced a supplementary food program in the 1990s for pregnant women and children younger than 6 years. Data from the Ministry of Health indicates that the prevalence of malnutrition among children younger than 6 years has declined since this program's implementation, from 10% in 1990 to less than 3% in 2000. Given the synergistic relationship between malnutrition, infection, and mortality, the decrease in the prevalence of childhood malnutrition during the study period likely contributed to the reductions in the child mortality rate.

Maternal and adolescent health. In 1994, the government introduced the comprehensive Women's Health Program. Key components included strengthening reproductive health care in the areas of sex education, family planning, sexually transmitted disease prevention and treatment, and antenatal and delivery care. The program also expanded adolescent girls' access to antenatal care and counseling services.^{47,48} Guidelines for the clinical management of pregnancy and childbirth were also introduced, and progress toward reaching family planning goals (first incorporated into health programs in 1965), such as free distribution of contraceptives, steadily increased during the study period.^{35,49}

These interventions, and the increase in public health expenditure from 2.2% to 2.9% of gross domestic product between 1995 and 2002,^{16,50} demonstrate the government's commitment to reducing deaths among Chile's mothers and their children.

Limitations

Our study had several limitations. The stratification of Chile's population into district quintiles may have resulted in cases of non-differential misclassification bias. Each district quintile comprised a set of districts reporting a range of average household incomes. Thus, some districts were better off than others within the same district quintile, and some households were better off within each district; a percentage of these households would likely have been classified into different district quintiles by their income levels. Consequently, our analysis did not capture a portion of the maternal, newborn, and child mortality disparities in Chile.

Our data did not allow us to infer causality. However, socioeconomic improvements (general and specific to the women delivering) and health care interventions implemented at the national level likely contributed to the observed mortality trends.³⁶ Although interpretation of our results must be made with caution because of the aggregate nature of the data, our district quintile comparisons showed that the maternal, newborn, and child mortality gaps between the poorest and richest population strata decreased in Chile between 1990 and 2004.

Conclusions

Chile's experience suggests that substantial improvements in maternal, newborn, and children's survival are within the reach of low- and moderate-resource countries. The observed decreasing mortality trends suggest that increasing access to health care services among populations most in need can translate into significant reductions in maternal and child mortality. Our data also support the view that socioeconomic improvements are essential to realizing reductions in health care inequities and better maternal and child health outcomes. In addition, by tracking maternal, newborn, and child mortality statistics over time, we were able to determine differences in the rates of reduction, such as faster declines in the mortality indices furthest from the delivery period. This is an important first step in identifying existing gaps in service coverage along the continuum of care,³⁴ and suggests that Chile needs to invest greater resources in the period around childbirth,

when the risk of maternal and infant death is greatest.^{19,30}

Studies evaluating changes in the quality of care and equitable coverage of maternal and children's health interventions within and across the district quintiles are needed to determine the effect of health care reforms on Chile's declining maternal, newborn, and child mortality rates. Cost-benefit analyses of the government's interventions, investigation of progress toward maternal and children's health service integration, and examinations of the interaction between socioeconomic changes and public health policies and programs are also needed. In addition, studies examining temporal changes in the cause of death distribution in children younger than 5 years would enable a clearer assessment of the role of the health system in Chile's success in reducing stillbirth rates and neonatal, infant, and child mortality rates.

Studies are needed to evaluate the role of improvements in women's access to education and income-earning opportunities within and across the district quintiles in driving down Chile's maternal, newborn, and child mortality rates. This research would be particularly valuable because differing opinions exist about the effect of Chile's national voucher program and decentralization of the educational system on the equitable distribution of quality educational services. Lastly, the decline in the percentage of married mothers indicates that investigation into the relationship between Chile's changing marital and fertility patterns and maternal and child health is warranted.

In the context of the global effort to attain Millennium Development Goals 4 and 5 and reduce health inequities, it is crucial to disseminate experiences such as Chile's so that its achievements can be replicated elsewhere. To stay on track to achieve goals 4 and 5, Chile adopted a strategic plan in 2000 to decrease infant mortality to 7.5 per 1000 live births and maternal mortality to 12 per 100 000 live births by 2010.^{39,49} Our data, and President Michelle Bachelet's emphasis on maternal and child health, are indications that Chile has the potential to realize these objectives. Because Chile has also declared reducing health disparities a main goal of 2000 to 2010, these objectives may be reached in an equitable fashion. ■

About the Authors

Rogelio Gonzalez is with Pontificia Catholic University of Chile, Santiago, and the Division of Prevention and Control of Diseases, Chilean Ministry of Health, Santiago. At the time of the study, Jennifer Harris Requejo and Flavia Bustreo were with the Partnership for Maternal, Newborn, and Child Health, Geneva, Switzerland. Jyh Kae Nien is with the Center for Perinatal Diagnosis, Pontificia Catholic University of Chile, Santiago. Mario Meriardi and Ana Pilar Betran are with the Department of Reproductive Health and Research, World Health Organization, Geneva, Switzerland.

Requests for reprints should be sent to Rogelio Gonzalez, Ministerial adviser in Maternal and Perinatal Health, Department of Disease Prevention and Control, Ministry of Health, McIver 541, Santiago, Chile (e-mail: rogonzalez@minsal.gov.cl).

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Contributors

All authors designed the study, participated in the interpretation of the findings, and approved the final version of the article. R. Gonzalez, J.H. Requejo, J.K. Nien, and M. Meriardi analyzed the data and drafted the article. F. Bustreo and A.P. Betran reviewed and commented on drafts of the article.

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Other members of the Chile Maternal, Newborn, and Child Health Writing Group: Tobias Alfven, Karolinska Institute, Stockholm, Sweden; Lidia Amarales, Soledad Barria, Carlos Becerra, René Castro, Pedro Crocco, Ricardo Fabrega, Fernando Muñoz, Osvaldo Salgado, and Dolores Toha, Ministry of Health, Chile; Mario Carstens, Center for Perinatal Diagnosis, Pontificia Catholic University of Chile; Jeremy A. Lauer, Ornella Lincetto, Karin Stenberg, and Paul F. Van Look, World Health Organization, Geneva, Switzerland; and Ola D. Saugstad, Rikshospitalet University Hospital, University of Oslo, Norway.

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