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Exploratory analysis of preventable first day mortality in Colombia

M.C. Jaramillo-Mejía [a,b,*], D. Chernichovsky [c], J.D. Martínez-Blanco [d], J.J. Jiménez-Moleón [e]

[a] Department of Organizational Management, ICESI University, Cali, Colombia
[b] University of Granada, Spain
[c] School of Health and Welfare Professions, Yezreel Valley College, Israel
[d] Fundación Clínica Valle del Lili, Cali, Colombia
[e] Department of Preventive Medicine and Public Health, University of Granada, Instituto de Investigación Biosanitaria ibs. Granada, Servicio Andaluz de Salud/Universidad de Granada, CIBER de Epidemiología y Salud Pública (CIBERESP), Spain

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ABSTRACT

Objective: The goal of this study was to inform public health policy which can reduce Colombia's estimated infant mortality rate (IMR), 17.78 deaths for 1000 live births (2011), by lowering preventable first day mortality (PFDM).

Study design: This study combined a time series analysis, using a linear regression method, for the period 2001–2012 with a cross-sectional analysis, using odds ratios and bi-variate methods, for the year 2012 to study first day mortality (FDM) and PFDM classified by biological, socio-economic, and medical correlates.

Methods: The study examined the trends for 2001–2012 in Colombia's infant mortality rate per 1000, and in the relative significance of PFDM by cause. It established the relative odds of PFDM for 2012 by major risk categories, defined by birthweight and gestational age, and within those by biological, sociodemographic risk factors or groups and by potential access to and use of care. Then, the study established the major causes of PFDM within major risk categories and groups.

Results: Between 2001 and 2012, the average annual rate of FDM declined by 6.30%, while overall infant mortality only declined by 4.20%. Yet, in 2012, 37.04% of FDM was preventable by using proper pregnancy control (7.00% of total preventable), proper care during childbirth (37.20%), and handling causes associated with late diagnosis and treatment (55.80%). PFDM is primarily a socio-economic phenomenon, even among normal weight and gestational age newborns, who account for 32.73% of PFDM due to improper management of pregnancy and delivery among lower socio-economic and outlying populations, specifically in rural areas and among members of the inferior subsidised social insurance regime.

Conclusion: From efficacy and probable cost effectiveness perspectives, intervention priority should be given to handling babies with normal gestation age and birthweight, and then to

* *Corresponding author*. Facultad de Ciencias Administrativas y Económicas, Universidad Icesi, Calle 18# 122–135 Pance, oficina # 1523, Cali, Colombia. Tel.: +57 2 555 23 34x8433, +57 3154898845.
E-mail address: mcjara@icesi.edu.co (M.C. Jaramillo-Mejía).
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babies with very low gestation age and birthweight. At the same time, more prenatal visits could lead to fewer very high-risk situations at the outset. In view of the Colombian regulation to the contrary, the use of foetal monitoring and echography methods by all general practitioners should be considered. They should be trained accordingly. Policies should focus on members of the underprovided subsidised health insurance regime, rural areas, young, low-educated and single mothers during pregnancy, mainly delivery.

Introduction

The infant mortality rate (IMR) in Latin America for 2010–2011 was estimated to be 15.70 deaths per 1000 live births (LBs). This rate varies across the subcontinent, ranging from 4.20 deaths per 1000 LB in Cuba to 59.0 deaths per 1000 LBs in Bolivia in 2012. This average is nearly three times that of the Canadian and US rates of 5.90 deaths per 1000 LBs for 2011–2013.[1,2] Colombia, with a population of about 47 million (2012) over an area of 1,141,748 km^2, had an estimated IMR of 17.78 deaths per 1000 LBs (2011). This average, which represents wide regional disparities within the country, makes Colombia's IMR fairly representative of Latin America.[3,4]

UNICEF et al. reported that 'about two-thirds of infant deaths occur in the first month or life; of those who die in the first month, about two-thirds die in the first week of life; of those who die in the first week, two-thirds die in the first 24 h of life'.[5,6] Colombia generally conforms to the UNICEF pattern with regard to the neonatal mortality rate (NMR) and early neonatal mortality rate, and is doing somewhat better with the first day mortality (FDM) share, which is 42.22% of the first week rate. However, the FDM in particular may be subject to a downward bias because some infant deaths, primarily close to the birth, may go unreported.[7]

General interrelated risk factors of FDM such as birthweight (BW), gestation age, baby boys, and mother's age, are known.[8,9] Yet, data and analyses about the relative contribution of these risk factors to FDM and its specific causes and, in this context, about the role of sociodemographic factors and medical care, are limited. Therefore, the purpose of this study was to address this information gap and thereby help guide public health policy regarding FDM at least in Colombia, by focussing on presumed cost effective interventions to prevent FDM. To this end, the paper had the following analytic objectives. First, to study the trends of infant and first day infant mortality (FDM) in Colombia for the period 2001–2012, to establish the relative significance of FDM over time. Second, to classify FDM by preventable, semi-preventable, and non-preventable causes, to identify potentially cost effective interventions. Third, to study the biological, socio-economic and medical correlates of preventable FDM (PFDM) and of its causes, to identify targets for cost-effective intervention.

Methods

This study combined (a) a time series analysis, using a linear regression, to study the evolution of FDM in Colombia from 2001 to 2012 with (b) a cross-sectional analysis using linear regressions and bi-variate techniques, to study the biological, socio-economic, and health care correlates of FDM and PFDM in Colombia for the year 2012.

Data

The data were drawn from Colombia's vital statistics registry for 2001–2012. They comprised 8,413,459 records of LBs and 29,233 records of FDM. The data, provided by the Departamento Administrativo Nacional de Estadísticas (DANE), included sociodemographic characteristics of mothers, number of prenatal visits, causes of death, and type of delivery.

These data were complemented with information from the Registro Especial de Prestadores de Servicios (REPS) of the Colombian Ministry of Health and Social Protection about availability of mother and infant beds per 1000 LBs in the municipality of residence, as well as the percentage of paediatric and infant intensive care beds in 2012.[10]

Setting

The Colombian health care system was established in 1993 by Law number 100 approved by the Congress of the Republic of Colombia.[11] It comprises two major public health insurance regimes: the Contributory Regime (CR), covering about 40% of the population in the formal economy, and the Subsidised Regime (SR), covering 53% of the population in the poorer, less formal, largely rural economy (2010–2011). During the study period, the CR members were entitled to a health care package supersior to that of the SR members.[12,13]

The official Colombian IMR in 2012 was 12.76 deaths per 1000 LBs.[14] In general, the official rate, which was fully consistent with the data used in this study, followed the UNICEF reported ratios.[6] Thus, 60.19% of IMR, 7.68 deaths per 1000 LBs, were in the first month of life (neonatal mortality rate), 66.93% of neonatal mortality rate, 5.14 deaths per 1000 LBs, were in the first week of life (early neonatal mortality rate) and, 42.22% of early neonatal mortality rate, 2.17 deaths per 1000 LBs, occurred in the first day of life. In the same year, average hospital and medical care coverage for childbirth was reported at about 95%, with an average of four prenatal control visits.[14,15] These averages represent, however, wide variations associated with regional and socio-economic disparities affecting access to care and infant mortality.[4]

Outcomes

The FDM was our main outcome, differentiated between preventable FDM, semi-preventable and non-preventable first