

# Temporal Trends in Mortality from Ischemic and Hemorrhagic Stroke in Mexico, 1980-2012

Copytzy Cruz, MSc,\* Julio César Campuzano-Rincón, MD, DSc,†  
 Juan Manuel Calleja-Castillo, MD, MSc,‡ Anaid Hernández-Álvarez, Psicol, MSc,†  
 María del Socorro Parra, DSc,§ Hortensia Moreno-Macias, DSc,|| and  
 Carlos Hernández-Girón, MD, DSc§

---

*Background:* Over the past decades, the decline in mortality from stroke has been more pronounced in high-income countries than in low- and middle-income countries. We evaluated changes in temporal stroke mortality trends in Mexico according to sex and type of stroke. *Methods:* We assessed stroke mortality from Mexico's National Health Information System for the period from 1980 to 2012. We analyzed age-adjusted mortality rates by sex, type of stroke, and age group. The annual percentage change and the average annual percentage change (AAPC) in the slopes of the age-adjusted mortality trends were determined using joinpoint regression models. *Results:* The age-adjusted mortality rates due to stroke decreased between 1980 and 2012, from 44.55 to 33.47 per 100,000 inhabitants, and the AAPC (95% confidence interval [CI]) was  $-9$  ( $-1.0$  to  $-7$ ). The AAPC for females was  $-1.1$  ( $-1.5$  to  $-0.7$ ) and that for males was  $-0.7$  ( $-0.9$  to  $-0.6$ ). People older than 65 years showed the highest mortality throughout the period. Between 1980 and 2012, the AAPC (95% CI) for ischemic stroke was  $-3.8$  ( $-4.8$  to  $-2.8$ ) and was  $-0.5$  ( $-0.8$  to  $-0.2$ ) for hemorrhagic stroke. For the same period, the AAPC for intracerebral hemorrhage (ICH) was  $-0.7$  ( $-1.6$  to  $0.2$ ) and that for subarachnoid hemorrhage (SAH) was  $1.6$  ( $0.4$ - $2.8$ ). *Conclusions:* The age-adjusted mortality rates of all strokes combined, ischemic stroke, hemorrhagic stroke, and ICH, decreased between 1980 and 2012 in Mexico. However, the increase in SAH mortality makes it necessary to explore the risk factors and clinical management of this type of stroke. **Key Words:** Stroke—mortality trends—epidemiology—Mexico.

© 2017 National Stroke Association. Published by Elsevier Inc. All rights reserved.

---

From the \*School of Public Health of Mexico, National Institute of Public Health of Mexico, Cuernavaca, Mexico; †Reproductive Health and Chronic Disease Division, Center for Population Health Research, National Institute of Public Health of Mexico, Cuernavaca, Mexico; ‡Stroke Clinic, National Institute of Neurology and Neurosurgery Manuel Velasco Suarez, México City, Mexico; §Chronic Disease Division, Center for Population Health Research, National Institute of Public Health of Mexico, Cuernavaca, Mexico; and ||Economy Department, Autonomous Metropolitan University-Iztapalapa, Mexico City, Mexico.

Received June 24, 2016; revision received August 22, 2016; accepted September 24, 2016.

Grant support: This study was partially financed by the National Council for Science and Technology (CO1-87366) (Consejo Nacional de Ciencia y Tecnología de México [CONACYT]).

Permissions: This study did not require an institutional review board approval or permissions because all mortality data were freely accessible in the public domain and were not associated with personal identifiers.

Address correspondence to Carlos Hernández-Girón, MD, DSc, Ave. Universidad 655, Cerrada Los Pinos y Caminera, Col. Santa María Ahuacatitlán, 62100 Cuernavaca, Mexico. E-mail: [chernand@insp.mx](mailto:chernand@insp.mx).

1052-3057/\$ - see front matter

© 2017 National Stroke Association. Published by Elsevier Inc. All rights reserved.

<http://dx.doi.org/10.1016/j.jstrokecerebrovasdis.2016.09.042>

## Introduction

Stroke is an important cause of mortality, disability, and dementia.<sup>1,2</sup>

According to the “Global Burden of Disease” study, between 1990 and 2010, the mortality due to stroke decreased worldwide; however, the pattern of decline in low- and middle-income countries was smaller than that in high-income countries (–20% vs –37%, respectively).<sup>2</sup>

In European countries such as Denmark and The Netherlands, the mortality from stroke declined between 1980 and 2005.<sup>3</sup> Similarly, the mortality rates due to stroke decreased in the United States, Canada, and Japan.<sup>4–6</sup>

The decline in stroke mortality trends in high-income countries has been attributed to improved prevention strategies and acute management.<sup>7–9</sup> Another reason cited for the decline is an effective control of risk factors such as hypertension, current smoking, abdominal obesity, diabetes mellitus, and physical inactivity.<sup>4,5,10</sup> In comparison, Mexico, which is a middle-income country, has experienced changes in its epidemiological and demographic profile over the past 3 decades, with a progressive increase in cardiovascular risk factors.<sup>11</sup>

In 2010, stroke was the fourth leading cause of death in Mexico.<sup>12</sup> Two previous studies have reported on the age-standardized stroke mortality rates in Mexico but focused only on all types of stroke. One study found that the stroke mortality in adults aged 35–74 years declined between 1968 and 1994 and that the annual percentage change (APC) was –1.2 for males and –1.8 for females.<sup>13</sup> Additionally, Rodríguez et al showed that stroke mortality decreased in the Americas between 1970 and 2000; however, the decline was less favorable in Latin American countries (e.g., in Mexico, the APC was –.56 in females and –.01 in males) than in the United States (where the APC was –1.23 for females and –1.03 for males).<sup>14</sup>

The aim of the present study was to evaluate the stroke mortality trends in Mexico from 1980 to 2012. We describe the results stratified by type of stroke, sex, and age group.

## Methods

### Population

The number of stroke-related deaths over the period from 1980 to 2012 was obtained from the Mexican death certificate database. This database is validated by the National Statistics and Geography Institute (Instituto Nacional de Estadística y Geografía) and is available through the National Health Information System (*Sistema Nacional de Información en Salud*) webpage.<sup>15</sup>

Deaths from stroke between 1980 and 1997 were identified as those that were registered with codes 430–438 from the ninth revision of the International Classification of Diseases (ICD)-9.<sup>16</sup> For the period 1998–2012, the ICD-10 codes I60.0–I69.8 were used.<sup>17</sup>

To analyze the stroke subtypes, ischemic stroke was coded as 433–434.91 and 435–435.9 (ICD-9) as well as I63–I63.9 and I65–I66.9 (ICD-10), and hemorrhagic stroke was coded as 430–432.9 (ICD-9) and I60–I60.9, I61, I62.1, and I62.9 (ICD-10).<sup>16,17</sup> Subarachnoid hemorrhage (SAH) was coded as 430 (ICD-9) and I60 (ICD-10), and intracerebral hemorrhage (ICH) was coded as 431–432.9 (ICD-9) and as I61, I62.1, I62.0, and I62.9 (ICD-10).<sup>16,17</sup>

Stroke mortality rates for each 5-year age group were computed for all strokes using the population midway through the year for each year under study as the denominator, determined according to the National Population Census (*Consejo Nacional de Población*).<sup>18</sup>

Age-adjusted mortality rates per 100,000 inhabitants during the 1980–2012 period were calculated using the direct method according to the World Health Organization standard population.<sup>19</sup>

The results were stratified and analyzed by sex, type of stroke (ischemic and hemorrhagic [SAH and ICH]) and age group (younger than 20 years of age, 20–44 years of age, 45–64 years of age, and 65 years of age or older).

In addition, the mortality rates were compared between all Mexican states by sex.

We also used joinpoint regression analysis to determine points where the linear slope of the stroke mortality trend changed significantly over the analysis period. We assumed that the age-adjusted mortality rates followed a Poisson distribution and defined a statistically significant change as one in which the 95% confidence interval did not cross the 0 value.<sup>20</sup> We determined the APC and the average annual percentage change (AAPC) for the 1980–2012 period.

Age-adjusted mortality rates were calculated using Stata 13.0 statistical software.<sup>21</sup> Joinpoints were analyzed with the Joinpoint software from the Surveillance Research Program of the U.S. National Cancer Institute, version 4.1.0.<sup>22</sup>

## Results

From 1980 to 2012, the Mexican Mortality System identified 770,838 stroke deaths, 53% of which occurred in females and 43.68% among adults aged 35–74 years. The states with the highest number of deaths throughout the period were Mexico City, Hidalgo, Estado de México, Morelos, Puebla, Querétaro, and Tlaxcala (254,321 deaths) (data not shown in tables).

The total number of deaths attributable to stroke in Mexico increased during the studied period, from 15,181 in 1980 to 31,902 in 2012. However, the age-adjusted mortality rates of all types of stroke decreased, from 44.55 to 33.47 deaths per 100,000 inhabitants, and the AAPC (95% confidence interval) was –.9 (–1.0 to –.7). The most substantial change occurred from 1997 to 2012, during which the AAPC was –1.8 (–2.0 to –1.5) (data not shown in tables).

Download English Version:

<https://daneshyari.com/en/article/5574253>

Download Persian Version:

<https://daneshyari.com/article/5574253>

[Daneshyari.com](https://daneshyari.com)