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The impact of the COVID-19 pandemic on mortality: life expectancy reduction and geographical disparities in Argentina

O impacto da pandemia de COVID-19 na mortalidade: redução da expectativa de vida e disparidades geográficas na Argentina

Sonia Alejandra Pou[I,II], Maria Del Pilar Diaz[I,II], Leandro Mariano Gonzalez[III]

ABSTRACT: ***Objective:*** To assess the impact of the COVID-19 pandemic on mortality in Argentina, considering temporal trends in life expectancy at birth and premature mortality rate during 2010-2020. ***Methods:*** Based on demographic projections, this ecological time-series study compares a "normal" versus a "COVID-19" mortality scenario for 2020 over a set of 11 Argentine provinces. Annual life expectancy at birth and age-standardized rates of premature mortality were estimated from 2010 to 2020. Joinpoint regression and multilevel models were used. ***Results:*** A potential reduction in life expectancy at birth (a gap between scenarios >1 year) was observed. A significant (negative) point of inflection in temporal trends was identified for the country and most of the provinces, under the COVID-19 mortality scenario. However, our findings reveal disparities between provinces in the estimated life expectancy reduction toward 2020 (values range from -0.63 to -1.85 year in females and up to -2.55 years in males). While men showed more accentuated declines in life expectancy at birth in 2020 (a national gap between scenarios of -1.47 year in men vs. -1.35 year in women), women experienced more unfavorable temporal trends of premature mortality. In the absence of COVID-19, an improvement in both indicators was estimated toward 2020 in both sexes, while a return to levels reported in the past was observed under the COVID-19 scenario. ***Conclusion:*** The COVID-19 pandemic might seriously affect the trends of mortality and exacerbate health disadvantages in Argentina. A temporal and contextual perspective of health inequities merits special attention in the COVID-19 research.

Keywords: SARS-CoV-2. Life expectancy. Premature mortality. Health status disparities. Demography. Latin America.

[I]Universidad Nacional de Córdoba, Facultad de Ciencias Médicas, Consejo Nacional de Investigaciones Científicas y Técnicas, Instituto de Investigaciones en Ciencias de la Salud – Provincia de Córdoba, Argentina.

[II]Universidad Nacional de Córdoba, Facultad de Ciencias Médicas, Escuela de Nutrición, Estadística y Bioestadística – Provincia de Córdoba, Argentina.

[III]Universidad Nacional de Córdoba, Facultad de Ciencias Sociales, Consejo Nacional de Investigaciones Científicas y Técnicas, Centro de Investigaciones y Estudios de la Cultura y Sociedad – Provincia de Córdoba, Argentina.

Corresponding author: Sonia Alejandra Pou. Mailing Address: Bv. De La Reforma, Ciudad Universitaria, CP 5016, Córdoba, Provincia de Córdoba, Argentina. E-mail: sonia.pou@unc.edu.ar; pousonia@hotmail.com

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RESUMO: ***Objetivo:*** Avaliar o impacto da pandemia de COVID-19 sobre a mortalidade na Argentina, considerando as tendências temporais da expectativa de vida ao nascer e a taxa de mortalidade prematura 2010–2020. ***Métodos:*** Com base em projeções demográficas, este estudo ecológico de séries temporais compara um cenário de mortalidade "normal" *versus* "COVID-19" para 2020 em 11 províncias argentinas. Foram calculadas a expectativa de vida ao nascer anual e taxas de mortalidade prematura padronizadas por idade (2010–2020). Utilizaram-se modelos de regressão *joinpoint* e multiníveis. ***Resultados:*** Observou-se redução da expectativa de vida ao nascer (lacuna entre cenários >1 ano). Foi identificado um ponto de inflexão significativo (negativo) nas tendências temporais para o país e a maioria das províncias no cenário COVID-19. Nossos resultados revelam disparidades entre as províncias na redução da expectativa de vida 2020 (valores de -0,63 a -1,85 ano nas mulheres e até -2,55 nos homens). Enquanto os homens mostraram declínios mais acentuados na expectativa de vida ao nascer em 2020 (lacuna nacional entre os cenários de -1,47 *vs*. -1,35 ano nas mulheres), as mulheres experimentaram tendências temporais mais desfavoráveis de mortalidade prematura. Na ausência do COVID-19, estimou-se melhoria de ambos os indicadores até 2020 em ambos os sexos, enquanto se observou retorno aos níveis reportados no passado no cenário COVID-19. ***Conclusão:*** A pandemia de COVID-19 pode afetar seriamente as tendências de mortalidade e agravar as desvantagens para a saúde na Argentina. Uma perspectiva temporal e contextual das iniquidades em saúde merece atenção especial na pesquisa em COVID-19.

Palavras-chave: SARS-CoV-2. Expectativa de vida. Mortalidade prematura. Desigualdade em saúde. Demografia. América Latina.

INTRODUCTION

The COVID-19 pandemic represents the major public health emergency of the 21st century. Argentina accumulates more than 5 million confirmed cases and 116,589 deaths from COVID-19 as of December 2, 2021. It has the sixth highest number of cumulative total deaths within the WHO Americas region[1].

Although classified as an upper-middle-income country, Argentina has strong sociodemographic heterogeneities and long-standing health inequalities, like in other Latin American countries. The pandemic started when Argentina was going through one of the leading macroeconomic crises of recent years. Some authors suggest that if the pandemic occurs in contexts of pre-existing socio-economic inequalities, underlying differential levels of population exposure and vulnerability to COVID-19 may exist and result in differential consequences of the disease[2,3]. However, the historical perspective of health disparities has been understudied in COVID-19 research.

The number of research studies focused on the impact of the pandemic on mortality is growing[4-10]. There has been an increasing interest in the comparison of all-cause mortality metrics before *versus* during the pandemic to estimate the impact of COVID-19 deaths on overall mortality or population longevity. If geographical differences are also accounted for, this analysis can provide an understanding of how the COVID-19 pandemic has determined or exacerbated health inequities between regions or social groups[11,12].

Life expectancy at birth (LEB) is a summary measure of overall mortality and an indicator, as a surrogate, of population health conditions and human development[8,13]. Beyond the prospect of future overall increases in longevity[14], emerging evidence alert that unfavorable changes in LEB trends may occur after the COVID-19 pandemic[4,5,8-10]. In Argentina, a preliminary study estimated that the pandemic could produce excess mortality in this population[15]. However, the mortality thresholds reached in 2020 have not yet been considered, nor have geographic disparities been completely understood.

Some evidence shows that even when total mortality declines, some social groups may experience an increase in premature mortality[16]. Thus, while changes in LEB reflect variations in the magnitude and direction of the overall mortality burden, monitoring premature mortality can provide insights into the way societies — and health systems — address preventable causes of early death[17,18].

The purpose of this study was to provide insight into the impact of COVID-19 on the life expectancy in 2020, considering historical trends (2010–2019) of two overall mortality indicators — LEB and age-standardized premature mortality rate — in Argentina. We hypothesize that the COVID-19 pandemic had a strong impact on the overall mortality of the Argentine population towards 2020, but existing regional differences in its magnitude. Specifically, we aimed to analyze the geographical disparities and the trends of both indicators, taking into account two mortality scenarios: one that would have been expected in the absence of COVID-19 and the other that considers the COVID-19 deaths occurred in 2020.

METHODS

STUDY DESIGN AND DATA

This ecological time-series study uses mortality data from an 11-year period (from 2010 to 2020) over a set of 11 Argentine provinces. Argentina is organized into 24 administrative units (provinces) arranged into five regions (Pampean, Northwest, Patagonia, Northeast, and Cuyo). Several provinces were extracted from each region, according to the relative contribution of each region to the national population (Supplementary Material Figure 1). Within each region, provinces having the highest crude mortality rates (CMR) due to COVID-19 (per 100,000 people) and a population size greater than 500,000 people were selected. The final selection ensures coverage of 93% of the total deaths from COVID-19 in 2020, accounting for 79% of the total Argentine population.

Data were extracted from three publicly available sources:

1. Annual vital statistics reports for 2010 to 2019 from the Ministry of Health;
2. The COVID-19 dataset by the National Department of Epidemiology and Health Situation Analysis; and
3. The 2010 National Census of the Population, Households and Housing by the National Institute of Statistics and Censuses (INDEC, Spanish acronym).

COVID-19 mortality data included 43,243 cumulative deaths from COVID-19 (98.6% laboratory confirmed cases, and 1.4% clinical-epidemiological criteria) occurred in Argentina in 2020 (database accessed on January 2, 2021). This ranges from March 7th, the onset of the pandemic in Argentina, to December 31st. To reduce information bias, COVID-19 deaths with unknown sex or age within each province were proportionally distributed by sex-and-age groups considering the observed structure of COVID-19 deaths by province. Based on this data and on our population projections for 2020, the crude mortality rate (CMR) due to COVID-19 per 100,000 people was estimated.

DEMOGRAPHIC METHODS AND MORTALITY SCENARIOS FOR 2020

LEBs were estimated using the annual population projected by the Component Method[19], a widely used demographic technique that takes into account the components of population change (births, deaths, and migration). We obtained population, total mortality, and LEB estimates by sexes and provinces from 2010 to 2020, using the latest available census data (2010) adjusted by census omission[20], as well as the national vital statistics 2010-2019 (birth count and deaths stratified by sex and age-group) as baseline information. DAPPS 3.2 software from the US Census Bureau was used.

Premature mortality was defined as the total deaths occurring at ages before 70 in men and 75 in women. Age-standardized rate (ASR) of premature mortality (per 100,000 people) by sex and calendar year was calculated by the direct method (national population as reference). Deaths count and population numbers required for rate estimation were obtained from the annual projections already mentioned.

Specifically, for the 2020 mortality calculations, we constructed two scenarios. In the first "normal mortality" scenario, estimations were based on the number of projected deaths (expected) for 2020 without COVID-19. In the second "COVID-19 mortality" scenario, both the expected all-cause deaths projected plus the COVID-19 deaths reported in 2020 were considered. This procedure relies on the hypothesis that the historical trend in the structure of cause-specific deaths has been maintained, except for the addition of COVID-19 deaths in 2020, which represent a net mortality excess for the Argentine population. Although this assumption is preliminary and is therefore susceptible to overestimation bias, we consider that the potential increases or decreases in overall mortality directly or indirectly associated with the COVID-19 pandemic (including that associated with co-morbidities or external causes) are not yet properly studied in Argentina; thus, we decided to not implement any data correction in that sense.

STATISTICAL ANALYSES

The absolute difference in the 2020 LEB between the two proposed scenarios (with or without the COVID-19 pandemic) was calculated; this gap (in LEB years) was illustrated as part of temporal graphs showing overlapping curves of LEB and premature mortality ASR. To improve the graphic representation of the mortality premature trends, a running-line least-squares smoothing was used.

Specifically for LEB, Joinpoint regression analysis[21] was performed to test whether changes in the trends were statistically significant. Models were fitted to LEB, providing estimates of the annual percent change (APC) and its 95% Confidence Interval (CI).

Finally, multilevel modeling was used to investigate the association between LEB and premature mortality rate, after adjustments for sex and taking into account the extra-variation due to time, by means of a random intercept. Normal and gamma models were tested and the one with the better model fit (Akaike Information Criterion) was selected.

The analyses were performed using Stata 14 and Joinpoint regression 4.6.0.0 software.

RESULTS

DEMOGRAPHIC CHARACTERIZATION OF POPULATIONS AND THE COVID-19 MORTALITY BURDEN

Supplementary Material Table 1 summarizes the demographic characteristics for the provinces by region in terms of population structure and mortality data. The Pampean region has the most populated provinces (with over 3 million people each, including Buenos Aires with more than 17 million), and the most aged population (elderly population ranging from 10.95 to 15.77%). Comparatively, provinces from the Northeast and Northwest regions have smaller populations and lower levels of aging population. Provinces from the Patagonia region are characterized by their lower population density and size (lower than 1 million people) and their relatively young population structure (% of elderly people below the national level).

A total of 43,243 deaths due to COVID-19 (CMR of 97 deaths per 100,000 population) were accumulated during 2020 in Argentina (43% women and 57% men) (Supplementary Material Table 1). The mortality burden related to COVID-19 was heterogeneous between provinces, with CMR ranging from 60 to 183 deaths/100,000 people. Noticeably, Buenos Aires and Ciudad Autónoma de Buenos Aires (CABA) concentrate about 64.5% of the total deaths from this cause in Argentina, in 2020. In addition, Río Negro and Neuquén (Patagonia), and Jujuy (Northwest region) showed values of over 110 deaths from COVID-19 per 100,000 (Supplementary Material Table 1).

TREND ANALYSIS OF LIFE EXPECTANCY AT BIRTH BY MORTALITY SCENARIOS

Results from the Joinpoint analysis (Table 1 and Table 2) reveal that the rising change expected in the LEB trend between 2010 and 2020 without the COVID-19 pandemic was statistically significant for the country (APC 0.21 in men and 0.09 in women for the 2010–2020 period). With some exceptions, under the COVID-19 scenario, a significant and negative

Table 1. Trends analysis of life expectancy at birth in the male population by mortality scenario: estimated annual percentage changes from Joinpoint analysis by provinces of Argentina, 2010–2020 period.

	Life expectancy at birth (years of life)			Trend under the COVID-19 scenario	
	2010	2020	2010–2020 APC	Joinpoint model*	
		Mortality scenario		Period	APC (95%CI)
Province		Normal/COVID-19	Normal/COVID-19		
Buenos Aires	71.80	73.05/71.33	0.19†/0.08	2010–2018 2018–2020	0.21† (0.18–0.24) -0.78† (-1.07–-0.49)
Córdoba	72.42	73.16/72.22	0.09†/0.03	2010–2018 2018–2020	0.09† (0.03–0.14) -0.34 (-0.84–0.17)
Santa Fe	71.29	72.52/71.48	0.17†/0.10*	2010–2020	0.10† (0.02–0.18)
CABA	74.04	76.15/73.97	0.28†/0.15	2010–2018 2018–2020	0.30† (0.25–0.34) -0.89† (-1.27–-0.50)
Mendoza	73.43	74.39/73.27	0.12†/0.06	2010–2018 2018–2020	0.16† (0.12–0.21) -0.67† (-1.09–-0.25)
Chaco	69.56	69.80/68.78	0.02/-0.05	2010–2020	-0.05 (-0.13–0.03)
Tucumán	72.06	71.52/69.92	-0.08†/-0.18†	2010–2018 2018–2020	-0.03† (-0.05–-0.01) -1.23† (-1.44–-1.02)
Salta	71.45	73.39/71.50	0.25†/0.13†	2010–2020	0.13† (0.00–0.27)
Jujuy	71.22	73.04/70.49	0.28†/0.12	2010–2018 2018–2020	0.33† (0.22–0.45) -1.33† (-2.40–-0.25)
Río Negro	72.96	74.27/72.28	0.16†/0.04	2010–2018 2018–2020	0.16† (0.11–0.21) -0.78† (-1.21–-0.34)
Neuquén	73.34	73.75/71.63	0.08†/-0.06	2010–2018 2018–2020	0.10† (0.01–0.20) -1.13† (-1.99–-0.27)
Argentina	72.18	73.65/72.18	0.21*/0.11	2010–2018 2018–2020	0.21† (0.19–0.23) -0.55† (-0.72–-0.39)

APC: annual percent change; CI: confidence interval; *the final selected model was the most suitable for trend description (Model Selection Method: BIC Criterion); †indicates that the annual percent change is significantly different from zero at the 0.05 significance level.

point of inflection was estimated for the country and most of the provinces at the end of the study period (overall, the 2018–2020 segment) for both sexes. Chaco was the only province that locates a significant inflection point in the LEB trend in 2012 under the COVID-19 mortality scenario, for the female group (Table 2).

Figure 1 illustrates the annual LEB estimations (from 2010 to 2020) and the gaps between the scenarios for the 2020 year. Without the COVID-19 deaths, LEB was expected to increase from 2010 to 2020 in most provinces and for both sexes but more clearly in males (Figure 1A).

Table 2. Trends analysis of life expectancy at birth in the female population by mortality scenario: estimated annual percentage changes from Joinpoint analysis by provinces of Argentina, 2010-2020 period.

	Life expectancy at birth (years of life)			Trend under the COVID-19 scenario	
	2010	2020	2010–2020 APC	Joinpoint model*	
		Mortality scenario		Period	APC (95%CI)
Province		Normal/COVID-19	Normal/COVID-19		
Buenos Aires	78.19	78.29/76.97	0.02†/-0.06	2010–2018 2018–2020	0.04† (0.01–0.07) -0.73† (-1.00–-0.46)
Córdoba	78.75	78.30/77.67	-0.09†/-0.12†	2010–2020	-0.12† (-0.17–-0.08)
Santa Fe	78.41	78.21/77.39	-0.04†/-0.09†	2010–2018 2018–2020	-0.04 (-0.08–0.01) -0.42† (-0.82–-0.03)
CABA	80.12	80.79/79.37	0.08†/0.003	2010–2018 2018–2020	0.10† (0.06–0.14) -0.69† (-1.04–-0.33)
Mendoza	79.00	79.82/79.02	0.06/0.02	2010–2020	0.02 (-0.05–0.09)
Chaco	76.61	76.58/75.74	-0.05/-0.10	2010–2012 2012–2020	0.54 (-0.73–1.82) -0.19† (-0.32–-0.05)
Tucumán	78.12	77.90/76.67	-0.05/-0.12†	2010–2018 2018–2020	-0.05 (-0.13–0.03) -0.58 (-1.28–0.12)
Salta	78.06	78.84/77.71	0.07†/0.01	2010–2020	0.01 (-0.07–0.08)
Jujuy	77.64	79.79/78.06	0.23†/0.13†	2010–2018 2018–2020	0.23† (0.11–0.36) -0.55 (-1.67–0.57)
Río Negro	80.07	80.30/78.45	0.01/-0.10	2010–2018 2018–2020	0.01 (-0.04–0.05) -0.82† (-1.22–-0.41)
Neuquén	79.90	80.53/78.91	0.07†/-0.02	2010–2018 2018–2020	0.09† (0.05–0.13) -0.73† (-1.09–-0.36)
Argentina	78.84	79.69/78.34	0.09†/0.01	2010–2018 2018–2020	0.08† (0.04–0.13) -0.50† (-0.92–-0.09)

APC: annual percent change; CI: confidence interval; *the final selected model was the most suitable for trend description (Model Selection Method: BIC Criterion); †indicates that the annual percent change is significantly different from zero at the 0.05 significance level.

While an overall reduction of LEBs was observed under the COVID-19 mortality scenario (compared to the normal scenario), the magnitude of the gap between the scenarios was differential by provinces and greater in men than in women. The observed gaps indicate that the greatest (negative) impact of the COVID-19 pandemic during 2020 occurred in provinces with heterogeneous demographic characteristics (Jujuy, CABA, and Neuquén in both sexes, and Río Negro in women) (Figure 1 and Supplementary Material Table 1). Of particular interest is the case of Chaco. Although this province showed one of the lowest gaps of

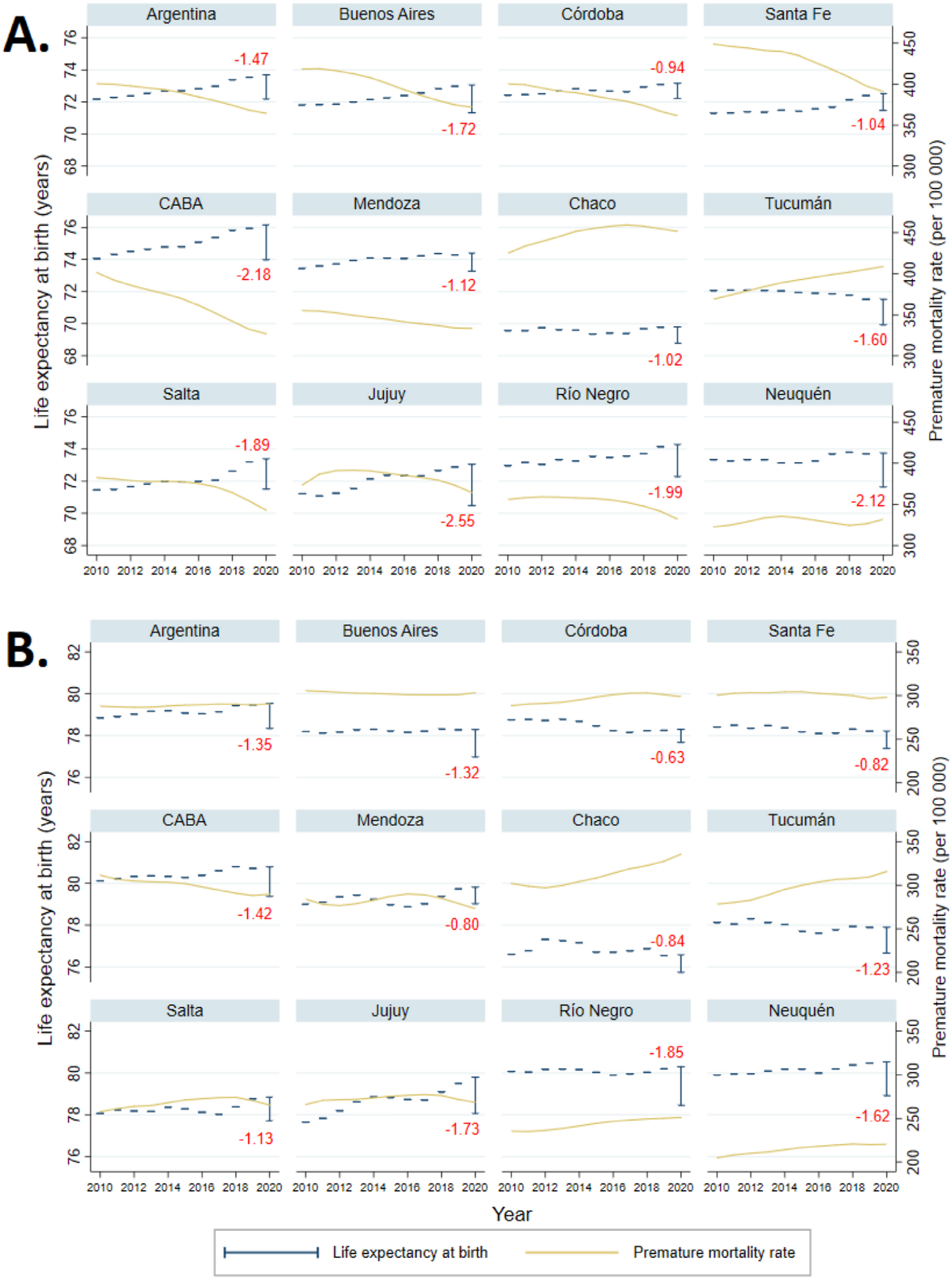

Figure 1. Temporal trends in the life expectancy at birth and age-standardized rates of premature mortality for males (A) and females (B) in provinces of Argentina 2010–2020. In 2020, the gap (absolute difference in years of life expectancy at birth) between the normal and the COVID-19 mortality scenarios is illustrated and its magnitude indicated (reduction in years of life expectancy at birth, included in red font for the online version).

LEB between the scenarios in both sexes, it had a low level of LEB across the study period. Thus, after the pandemic, it reaches the lowest LEB values (Figure 1).

At a national level, a rising trend in LEB towards 2020 would have been expected if the COVID-19 pandemic had not occurred (Figure 1). While LEB estimated under the normal mortality scenario was 73.65 in males and 79.69 in females in 2020, under the COVID-19 mortality scenario, the values were 72.18 and 78.34, respectively (Table 1 and Table 2). Therefore, the differences between the scenarios in the 2020 LEBs indicate a reduction of 1.47 year in men and 1.35 year in women (Figure 1).

THE RELATIONSHIP BETWEEN PREMATURE MORTALITY AND LIFE EXPECTANCY AT BIRTH

As Figure 1 shows, when LEB increases, premature mortality rates show decreasing trends — or vice versa — in most provinces across the 2010–2019 period. This can be seen more clearly in the male population (Figure 1A). The provinces of Patagonia (Río Negro and Neuquén) were an exception, with rising values for both indicators in the female group (Figure 1B). Considering premature mortality ASR, men exhibited more accentuated decreasing trends across time than females. Among women, the ASRs were lower than in men, but the tendencies were comparatively more unfavorable (increasing or stable) in several provinces.

Supplementary Material Figure 2 illustrates the relationship between LEBs and premature mortality rates over the 11-year study period for both mortality scenarios in Argentina. Two main findings emerged from the graph displayed. First, in the absence of COVID-19 (Supplementary Material Figure 2, sections A and C), a joint improvement in both indicators was estimated toward 2020 for both sexes. Second, when the COVID-19 mortality scenario was considered (Supplementary Material Figure 2, sections B and D), premature mortality and LEB estimations bring 2020 close to the 2010 level in the male population and to an even worse situation in females.

Results of multilevel modeling arranged in Supplementary Material Table 2 show the regression coefficient for the premature mortality rate and the estimated sex effect for each scenario. To visualize the final fitting results, the differential slope of the male effect in relation to the female category was also included. Overall, significant and negative premature mortality rate-coefficient and sex-effect estimates (male in relation to female) were observed in both scenarios, indicating that, on average, LEB values decrease while premature mortality rate increases, mainly among males and this difference between the sexes becomes smaller in the COVID-19 mortality scenario.

DISCUSSION

This study provides the first comprehensive assessment of the impact of the COVID-19 pandemic on mortality in Argentina in 2020 based on temporal trends of mortality across provinces and the comparison of two projected mortality scenarios (with and without the COVID-19 pandemic). The results reveal a reduction in the 2020 LEB after the COVID-19 pandemic, with striking geographical disparities that deepen historical health disadvantages in certain provinces. While men showed more accentuated declines in LEB specific by province during the 2010–2020 period, Argentine women experienced more unfavorable historical trends of premature mortality. At the national level, our findings suggest that the COVID-19 pandemic may also affect the relationship between LEB and the ASR of premature mortality.

Our findings add to growing evidence that the COVID-19 pandemic would entail a strong impact on the LEB of populations, with larger declines observed among men than among women[4,10,22]. Within Latin America, particularly, a LEB reduction of 1.31 year (1.57 in males and 0.95 in females) with respect to the 2019 levels was estimated in Brazil[22]. Similar to our work, other authors compare hypothetical mortality scenarios for 2020 as a method to quantify the impact of the pandemic[5,8,23,24]. Consistently with our findings, a loss in life expectancy at birth above 1 year in North America and Europe was estimated. In Latin America and the Caribbean, similar declines were reported, under a hypothetical scenario of a 10% COVID-19 prevalence rate[8].

The clear geographical disparities observed in terms of COVID-19 mortality and LEB reduction in Argentina agree with the heterogeneity observed within other countries[9,10,22.] In consistency with the notion of multiple underlying vulnerabilities to the COVID-19 pandemic[25], we propose that factors explaining the impact of the COVID-19 on overall mortality are context-specific and might involve multiple vulnerabilities (socioeconomic, biological, sociodemographic) underlying the COVID-19 mortality outcome. In Argentina, Buenos Aires, CABA, Jujuy, Neuquén and Río Negro reported the highest CMR due to COVID-19, even when they have important socioeconomic and demographic differences.

Interestingly, the literature suggests that highly urbanized contexts, with a great concentration of people and a high level of local and international interconnectedness between places — as the case of CABA in Argentina —, have represented scenarios of greater prevalence of infectious diseases in the past[26]. Furthermore, the current studies on COVID-19 report a significant association between population size and COVID-19 crude fatality rates in middle-income countries[27]. In the case of CABA, in particular, its high proportion of elderly may contribute to age-related increased risk and worst disease outcomes.

Conversely, other provinces with younger age structures than CABA showed high COVID-19 mortality levels. This contradictory finding is similar to that from an ecological study carried out in the USA reporting worse death trajectories in "younger" counties[7] and another one referring to high COVID-19 — related excess mortality in older adults living in socioeconomically deprived areas with a higher proportion of young people[6]. The authors highlight the potential role of young people in the intergenerational transmission of the disease to older ones. This mechanism may be plausible for explaining the COVID-19 mortality level observed in Jujuy, where historically there have been high levels of overcrowding and poverty.

The prevalence of comorbidities, such as chronic non-communicable diseases and obesity, known to influence the risk of severe COVID-19[3,28], may also reflect disadvantaged contexts since the prevalence of these health conditions is often inversely associated with socioeconomic status[3]. It is possible that in deprived areas, population groups with chronic conditions get poorer quality medical care for the management of both these comorbidities and COVID-19 infections and are, therefore, more vulnerable to severe outcomes[29]. In a recent study from Argentina, Jujuy was included in a geographical cluster characterized by the "consolidation of the triad obesity-inactivity-cardiometabolic diseases" during the 2005–2018 period[30]. This pre-pandemic epidemiological profile, in addition to Jujuy's socioeconomic disadvantages, might explain, in part, the high CMR from COVID-19 and the noticeable decreases in the estimated LEB.

From the Latin American experience, it has been indicated that LEB levels may be an indicator of the capacity of the health care sector to deal with the possible effects of a health crisis in a country[24]. In Chaco, a province with noticeable sociodemographic disadvantages within the national context, historically low levels of annual LEB and a rising trend of premature mortality from 2010 to 2020 have been observed to converge. The point of inflection on LEB trends in 2012 might reveal that the inadequacies in the public health system and the increasing poverty date back to the pre-pandemic period.

Gross disparities exist in health care in most Latin American countries. The ongoing COVID-19 pandemic has sharply emphasized the impact of health disparities in our societies[31]. Particularly, secular trends of premature mortality rates found in our study evidence strong health inequalities between provinces, considering that this indicator might reflect the capacity of the health system to prevent premature deaths and of the government to address upstream determinants of health[18]. Moreover, growing attention is being directed to understanding how COVID-19, as a novel cause of death, may impact the structure of mortality by causes of death, gender, and age. Thus, changes in the distribution of COVID-19 deaths by age and gender, and the potential impact on premature mortality patterns should be monitored in the course of the pandemic.

Trend analysis of the premature mortality rate allowed us to recognize more unfavorable trends in women than men, in several provinces. Importantly, a preliminary study in the country forecasts that women under 14 constitute one of the groups that will be most affected in terms of potential years of life lost after the pandemic[15]. Regarding the LEB gap between genders, some authors highlight the need to distinguish the relative influence of biology from social factors on the determination of the known female advantage (in terms of LEB), mainly because the social gap is preventable and unjust[32].

This study has some limitations. Although poor quality registration of vital events is an important weakness for research on mortality trends in many Latin American countries, Argentina has reliable mortality data, with levels of coverage and completeness of civil registration of deaths above 90%[33]. Besides, data related to the time of our analyses may have been slightly outdated due to the permanent updates of the public mortality databases made centrally in Argentina. Finally, geographical disparities may reflect, in part, the difference in quality management of COVID-19 data, as well as in the official response to the pandemic at local or regional levels, which have not been properly studied in the country.

In conclusion, our findings add evidence to a growing area of research about inequalities in the COVID-19 pandemic that still needs to be further studied. The study also contributes to understanding the impact of COVID-19 on mortality in Latin America, showing a generalized reduction of LEB expected after the first year of the pandemic in Argentina. In our analysis, the simultaneous consideration of premature mortality trends allowed us to identify pre-existing inequalities between regions and genders. We reinforce the need to consider in future research the gender perspective and to explore temporal trends in population health to better understand emergent disparities and consequences associated with the pandemic.

ETHICAL APPROVAL

No ethical approval was required as the research involved aggregated and anonymized records from datasets available in the public domain.

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