BMJ Open

Estimating inequalities in excess mortality and years of potential life lost by health conditions across ethnic minorities in Colombia: a population-based study, 2018–2022

Oscar Espinosa [ID],[1] Rocco Friebel [ID],[2] Valeria Bejarano,[1] Johnattan García-Ruiz[3]

¹Economic Models and Quantitative Methods Research Group, Centro de Investigaciones para el Desarrollo, Universidad Nacional de Colombia, Bogotá, D C, Colombia
²Department of Health Policy, The London School of Economics and Political Science, London, UK
³Department of Global Health and Population, Harvard T.H. Chan School of Public Health, Boston, Massachusetts, USA

Correspondence to
Professor Oscar Espinosa;
oaespinosaa@unal.edu.co

ABSTRACT

Objectives This study aims to compare the burden of excess mortality and years of potential life lost by cause of death and geography for minority groups to inform targeted policy development.

Design Population-based study using information from the National Administrative Department of Statistics.

Setting National and subnational level (departments, urban and rural areas).

Participants Individuals of all age groups classified as Indigenous, Romani, Raizal, Afro-Colombian and Mestizo in Colombia between 1 January 2018 and 31 December 2022.

Primary and secondary outcome measures Excess mortality and years of potential life lost were calculated for all ethnic-racial groups by cause of death and subnational level expressed per 100 000 population.

Results Our study included 1 420 258 total deaths and we observed significant variation across ethnic-racial groups. Excess mortality and years of potential life lost were most pronounced in Raizal (total of 145 more deaths and 11 769 more years of life lost per 100 000 population) and Romani (total of 7059 more deaths and 85 832 more years of life lost per 100 000 population) populations, when compared with Mestizo populations. Higher mortality rates were driven by suicide, pregnancy, childbirth and accidents.

Conclusions Our findings indicate that Colombia requires effective strategies to address the unique challenges causing these disparities, ranging from improving access to health services and addressing broader social determinants of health.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This research incorporates both ethnic-racial and territorial dimensions, allowing for intersectional analysis.
⇒ It analyses multiple health metrics (mortality and years of potential life lost) for a comprehensive assessment.
⇒ It examines a wide range of causes of death, offering detailed insights into disease-specific inequalities.
⇒ Mortality data by ethnic-racial groups rely on the recognition of ethnicity by the deceased's relatives, which may introduce classification errors.
⇒ The inability to standardise mortality rates by age due to the lack of disaggregated population data by ethnic-racial group.

INTRODUCTION

Colombia is recognised as a pluricultural and multilingual country. Its cultural diversity, expressed through a multiplicity of identities, is reflected in the existence of 65 different languages across several ethnic-racial groups. These include, among others, the Creole language of the people of San Basilio de Palenque, the first free people of the Americas, which has been declared by UNESCO as oral and intangible heritage of humanity.[1]

Ethnic-racial groups defined by common origins, customs, language and other cultural characteristics or physical features are subject to comprehensive legal protection, including the Political Constitution of 1991 as well as other regulations (eg, Law 21 of 1991, Law 70 of 1993, Law 115 of 1994, Law 397 of 1997, CONPES (Consejo Nacional de Política Económica y Social) document 3660 of 2010, Law 1482 of 2011 and Law 1752 of 2015). According to the National Administrative Department of Statistics (DANE), Colombia recognises the ethnic-racial groups described in table 1.[2]

Despite the existing legal framework, structural problems of inequity and discrimination persist. Although few studies have analysed aspects of ethnic inequity in the Colombian health system, previous research has documented disparities in health outcomes (eg, birth weight), access to healthcare and insurance status.[3–5] Individuals belonging to minority groups in Colombia tend to experience poorer health, including lower self-assessed health,[6] likely due to inequalities

Table 1 Ethnic-racial groups in Colombia and population estimates in 2022

Ethnic-racial group	Definition	Population	Percentage
Indigenous	People descended from the original peoples of the Americas (Amerindian). There are 87 traditional indigenous peoples in the country, including the Wayuu, the Embera and the Sikuani	2 426 993	4.70%
Afro-Colombian	People of recognised African descent (which include Afro-descendants, Blacks, Mulattos and Palenqueros of San Basilio)	3 716 343	7.19%,
Raizal from San Andres, Providencia and Santa Catalina Archipelago	People with Afro-Anglo-Antillean cultural traits and a strong Caribbean identity	31 611	0.06%
Romani	People descended from Romani peoples originating in Asia, with a nomadic tradition	3087	0.01%
Mestizo (and others)	All people who are not in any of the above ethnic-racial groups	45 504 658	88.05%

Although not constitutionally recognized as an ethnic-racial group, the Mestizo population is acknowledged as a sociocultural reality.
National Administrative Department of Statistics population projections by municipality and ethnic-racial affiliation.

resulting from the influence of social determinants of health.[7–9] Minorities also fare worse in unmet basic needs, household income, labour force participation, educational attainment and access to basic services such as water, electricity and sewage.[5 10 11]

Addressing these disparities is a key government priority in Colombia; however, information on mortality and years of potential life lost by ethnic-racial group at the national and departmental levels (ie, geographic political-administrative divisions of Colombia territories) has not yet been reported. While mortality rates are commonly used in the international literature to compare time trajectories, years of potential life lost complements this demographic analysis, by accounting for the premature nature of each death, calculating with greater precision the social loss faced by a population as a result of early death.[12 13] Such evidence is essential for the design of regional and state public policies that promote health equity,[8] ultimately aiming to create parity across ethnic-racial groups in Colombia.

In this context, further research on ethnic-racial inequalities in health outcomes should also integrate the geographic dimension. Exploring the intersectionality of ethnicity and territory can provide a more comprehensive understanding of spatial patterns of disadvantage.[14] The observed disparities in mortality and years of potential life lost (YLL) at the subnational level offer a valuable framework for advancing this field and underscore the need for future studies to examine how regional factors may influence the inequalities identified in this analysis.

METHODS
Data source
We used the DANE *Vital Statistics* database, which consolidates and reports the occurrence of specific vital events (births and deaths). Deaths are recorded on the basis of certificates completed physically or digitally by physicians,

authorised health personnel and forensic doctors.[15] We focused on a study period from 2018 to 2022, a time interval with adequate completeness and quality in the information system (with less than 1% of missing data). Following the Centers for Disease Control and Prevention guidelines,[16] only national and subnational (departmental) death counts of size 10 or larger are evaluated for the different analysis in this research.

Population data are drawn from DANE population projections, based on the 2018 National Population and Housing Census. Unfortunately, these data, segmented by ethnic-racial group, include only total population values at the subnational level and do not include sex and age divisions. Therefore, this study estimates crude mortality rates. Given this limitation, it was not possible to estimate age-standardised death rates. Publicly available information on life expectancy was provided by the Population Division of the United Nations Department of Economic and Social Affairs.[17] The classification of municipalities into urban and rural areas of the National Planning Department of Colombia was followed.[18]

Study population
We analysed data from the Indigenous, Afro-Colombian, Raizal from San Andres, Providencia and Santa Catalina Archipelago, Romani and Mestizo populations. The annual number of deaths and the population sizes were obtained from DANE to calculate the mortality rate (per 100 000 population), by ethnic-racial group.

21 causes of death were considered for our study, following the guidelines on health statistics from the Organization for Economic Cooperation and Development (online supplemental table S1).[19] For 2020–2022, deaths due to COVID-19 were included and the chapter on 'pregnancy, childbirth and the puerperium' was additionally considered for the excess years of potential life lost. The criterion for capturing ethnicity in *Vital Statistics*

is through the informed acknowledgement of the parents of the newborn and relatives of the deceased.[20]

Statistical analysis

We calculated mortality rates between 2018 and 2022. To estimate excess deaths, we followed the methodology of Caraballo *et al*.[8] We multiplied the mortality rate of the Mestizo population by the size of the Indigenous population (Afro-Colombian, Raizal from San Andres, Providencia and Santa Catalina Archipelago or Romani) for a given year. Then, the hypothetical number of deaths of the Indigenous population was divided by the size of the Indigenous population to obtain an expected annual mortality rate for the Indigenous population. We then subtracted this expected mortality rate from the observed mortality rate of the Indigenous population to estimate the excess mortality rate for the Indigenous population. This value was multiplied by the observed Indigenous population size to obtain the total annual and cumulative number of excess deaths of the population by ethnic-racial group. The excess mortality ratio was calculated by dividing the observed mortality rate by the expected mortality rate for each ethnic-racial group. We estimated the YLL by adapting the methodology of Espinosa *et al*[12]:

$$YLL_{s,t} = \sum_{i=1}^{l} M_{s,t,i} * \left(LE_t - AIRP_{s,t,i} \right) \; if \; LE_t > AIRP_{s,t,i},$$

where, s represents the health condition, t the year of reference calculation (2018, …,2022), i each age range of analysis (5-year periods for our case, except for the 0-year, 1-year and 2–4-year old groups), M the number of deaths recorded in each age range, LE mean life expectancy of Colombia and $AIRP$ the ages intermediate range point. Excess YLL and YLL ratios were calculated analogously to excess mortality rates: by subtracting the YLL of the Mestizo population from that of each ethnic-racial group (for excess YLL) and by dividing the YLL of each ethnic-racial group by that of the Mestizo population (for the YLL ratio).

To assess temporal changes in the estimated metrics, we evaluated graphically the development of the annual rates of excess deaths and the YLLs. When analysing these metrics by cause of death, we used heat maps as a graphical representation following Tufte's visualisation principles.[21] The programming language used was R, V.4.3.2. This study did not require institutional review by an ethics committee as it used deidentified data at the population level that are publicly available.[15]

RESULTS

For the 2018–2022 study period, the Vital Statistics database reported a total of 1 420 258 deaths from the causes analysed, distributed as follows: 3.5% Afro-Colombians, 1.7% Indigenous, 94.8% Mestizo, 0.07% Raizal and 0.02% Romani. Table 2 shows the variation in mortality and YLLs by ethnic group in Colombia. Both metrics indicate higher mortality patterns within the Romani population,

with a peak in 2019 where mortality rates exceeded those of the Mestizo population by more than four times (1656 excess deaths per 100 000 population). This rate has since decreased to 2.5 times in 2022 (901 excess deaths per 100 000 population). Similarly, YLL rates in the Romani communities for 2020 and 2021 were four times higher than those of the Mestizo population (with a mean excess of 24 174 YLL per 100 000 population).

Lower mortality and YLL were observed in the Afro-Colombian and Indigenous populations compared with the Mestizo population. Despite a decline in excess mortality rates in 2020 and 2021, mainly attributed to COVID-19 (online supplemental table S2 shows the increase in these years for the Mestizo population's mortality rate), the rates returned to prepandemic levels by 2022. Mortality rate ratios exhibited an average of 45% (337 fewer deaths per 100 000 population) and 33% (409 fewer deaths per 100 000 population) for the Afro-Colombian and Indigenous populations, respectively. Similarly, YLL ratios presented a mean of 55% (3372 fewer YLL per 100 000 population) for Afro-Colombians and 73% (2082 fewer YLL per 100 000 population) for the Indigenous population. Additionally, Raizal individuals exhibited similar rates to Mestizo (online supplemental table S2), with marginally higher mortality rates in 2019 (9%, 49 excess deaths per 100 000 population) and 2021 (6%, 48 excess deaths per 100 000 population). However, YLL rates were consistently over 1.2 times higher than Mestizo rates, increasing to 1.5 times in 2020 (3503 excess YLL per 100 000 population).

When analysing urban and rural municipalities, the latter exhibited higher excess mortality and YLL, particularly among Romani in 2019 and 2020 and the Raizal population in 2020 and 2021. The Romani population showed excess mortality in rural areas that was approximately three times that of urban areas. For the Raizal population in urban areas, both rates remained constant over time, while rural areas experienced a peak in 2020, followed by a decline. Finally, the Indigenous population exhibited similar trends between urban and rural areas, while Afro-Colombians experienced fewer YLL in rural areas compared with urban areas.

Our analyses were conducted based on the recorded cause of death (online supplemental table S3), the department of residence of the deceased (online supplemental table S4) and the combination of both factors (online supplemental figure S2). The heat map in figure 1 shows the excess YLL by cause of death, reflecting the previously observed negative excess in Indigenous and Afro-Colombian populations, and substantially higher excess in Romani populations.

We observed significant differences in disease patterns. For example, the Afro-Colombian population consistently exhibited lower YLL rates for cancer, assault, accidents and COVID-19, with the latter showing the most significant difference in 2021 at 1320 fewer YLL per 100 000 population. Suicide, ischaemic heart disease and certain conditions originating in the perinatal period

Table 2 Excess burden of mortality in ethnic minorities of Colombia, in the entire country and in urban and rural municipalities, 2018–2022

Ethnicity	Mortality rate	Excess absolute mortality rate	Excess mortality ratio	Years of potential life lost rates	Excess potential year of life lost	Years of potential life lost rate ratio
Indigenous						
National level						
2018	178.1	−343.7	0.3	5453.7	−2054.8	0.7
2019	180.7	−345.1	0.3	5613.0	−1773.5	0.8
2020	196.6	−443.0	0.3	4838.6	−2663.8	0.6
2021	225.3	−539.2	0.3	5379.2	−3072.3	0.6
2022	213.6	−375.6	0.4	5809.5	−847.5	0.9
Urban						
2018	165.6	−366.1	0.3	4925.4	−2603.5	0.7
2019	179.5	−357.0	0.3	5523.5	−1906.2	0.7
2020	201.7	−458.6	0.3	4840.3	−2752.3	0.6
2021	225.5	−564.3	0.3	5236.6	−3334.4	0.6
2022	201.1	−398.7	0.3	5348.6	−1283.7	0.8
Rural						
2018	188.6	−281.9	0.4	5898.3	−1504.4	0.8
2019	181.7	−288.5	0.4	5688.1	−1474.5	0.8
2020	192.3	−339.9	0.4	4837.3	−2198.6	0.7
2021	225.1	−408.4	0.4	5498.3	−2335.4	0.7
2022	224.1	−310.9	0.4	6193.4	−591.3	0.9
Afro-Colombian						
National level						
2018	259.5	−262.4	0.5	4369.7	−3138.8	0.6
2019	250.6	−275.2	0.5	4122.0	−3264.4	0.6
2020	285.7	−353.9	0.4	4236.9	−3265.6	0.6
2021	307.2	−457.4	0.4	4239.6	−4211.9	0.5
2022	252.2	−337.0	0.4	3679.4	−2977.6	0.6
Urban						
2018	292.6	−239.2	0.6	4696.1	−2832.8	0.6
2019	282.0	−254.5	0.5	4446.0	−2983.7	0.6
2020	320.5	−339.8	0.5	4559.3	−3033.3	0.6
2021	343.2	−446.6	0.4	4551.0	−4019.9	0.5
2022	280.8	−319.0	0.5	3910.1	−2722.2	0.6
Rural						
2018	173.6	−296.9	0.4	3522.5	−3880.2	0.5
2019	169.3	−301.0	0.4	3282.7	−3879.8	0.5
2020	195.6	−336.6	0.4	3403.8	−3632.1	0.5
2021	214.4	−419.2	0.3	3438.3	−4395.5	0.4
2022	179.0	−356.0	0.3	3088.5	−3696.2	0.5
Raizal						
National level						
2018	550.3	28.5	1.1	8727.5	1219.0	1.2
2019	575.3	49.5	1.1	8688.2	1301.7	1.2
2020	643.9	4.3	1.0	11005.8	3503.4	1.5

Table 2 Continued

Ethnicity	Mortality rate	Excess absolute mortality rate	Excess mortality ratio	Years of potential life lost rates	Excess potential year of life lost	Years of potential life lost rate ratio
2021	812.6	48.0	1.1	11 757.8	3306.2	1.4
2022	604.2	15.0	1.0	9096.2	2439.2	1.4
Urban						
2018	546.7	14.9	1.0	8332.8	803.9	1.1
2019	576.1	39.5	1.1	8751.5	1321.8	1.2
2020	623.6	−36.8	0.9	10 500.7	2908.1	1.4
2021	800.3	10.4	1.0	11 219.9	2648.9	1.3
2022	600.1	0.3	1.0	8931.5	2299.2	1.3
Rural						
2018	0.0	−470.5	0.0	25 176.4	17 773.7	3.4
2019	0.0	−470.3	0.0	6098.2	−1064.4	0.9
2020	1474.5	942.3	2.8	31 637.9	24 602.1	4.5
2021	1307.2	673.7	2.1	33 373.5	25 539.7	4.3
2022	0.0	−535.0	0.0	15 591.3	8806.6	2.3
Romani						
National level						
2018	1534.7	1012.9	2.9	17 301.0	9792.5	2.3
2019	2182.1	1656.2	4.1	31 796.0	24 409.5	4.3
2020	2399.2	1759.6	3.8	29 321.9	21 819.4	3.9
2021	2494.3	1729.7	3.3	34 980.1	26 528.5	4.1
2022	1490.1	900.9	2.5	9938.9	3281.8	1.5
Urban						
2018	1570.5	1038.7	3.0	17 727.4	10 198.5	2.4
2019	1878.8	1342.3	3.5	30 262.7	22 833.0	4.1
2020	2208.9	1548.6	3.3	30 354.5	22 761.9	4.0
2021	2542.4	1752.5	3.2	35 485.4	26 914.5	4.1
2022	1346.4	746.6	2.2	8365.7	1733.4	1.3
Rural						
2018	0.0	−470.5	0.0	13 906.9	6504.2	1.9
2019	4615.4	4145.1	9.8	44 099.5	36 937.0	6.2
2020	3939.4	3407.2	7.4	20 964.4	13 928.5	3.0
2021	0.0	−633.5	0.0	30 861.6	23 027.8	3.9
2022	0.0	−535.0	0.0	22 691.4	15 906.8	3.3

Note: zero values indicate that no deaths exceeding 10 were recorded for the specified place, ethnicity and year.

showed average YLL rates that were 161 fewer. However, conditions such as hypertension (10.8), asthma (5.5) and diseases of the blood (4.8) showed an average excess YLL.

The Indigenous population exhibited significant differences, particularly in 2021 due to COVID-19, along with negative excess YLL in cancer, assault, accidents and ischaemic heart disease. HIV-AIDS and cerebrovascular diseases, on average, resulted in 128.8 fewer YLL per 100 000 population. However, conditions such as tuberculosis (with a mean of 50 excess YLL per 100 000 population), pregnancy, childbirth and the puerperium (with

a mean of 85 excess YLL per 100 000 population), influenza and pneumonia (with a mean of 107 excess YLL per 100 000 population) and certain conditions originating in the perinatal period (with a mean of 250 excess YLL per 100 000 population) showed higher excess rates. For the Romani population, most registered causes of death exhibited excess YLL per 100 000 population ranging from 9 to 12 504 per year. The highest burden was linked to ischaemic heart disease, COVID-19 and cancer.

The Raizal population showed higher variability, with values ranging from 424 fewer YLL per 100 000
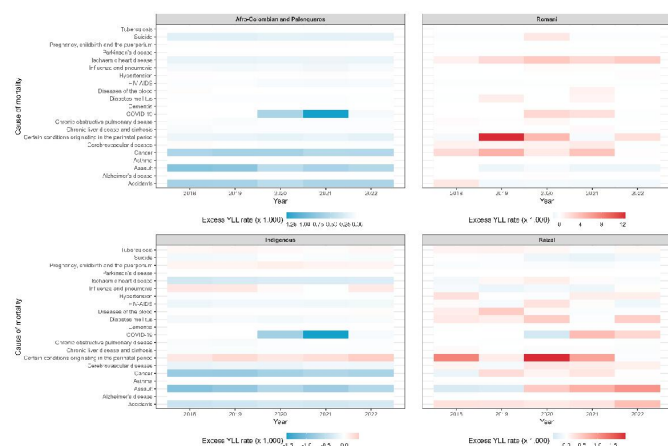
Figure 1 Excess years of potential life lost by causes of death and ethnic-racial group in Colombia, 2018–2022. YLL, years of potential life lost. Note: Figure expressed in 1,000 scale for improved visualisation.

population to 1882 excess YLL per 100 000 population. Ischaemic heart diseases, assault, cerebrovascular diseases, HIV-AIDS, cancer and COVID-19 exhibited a significant increase across the study period. The burden of tuberculosis, accidents, diabetes mellitus, diseases of the blood and certain conditions originating in the perinatal period consistently had higher YLL rates than the Mestizo population, while the burden from suicide, influenza and pneumonia remained below the Mestizo population. A detailed assessment of differences in YLL across ethnic-racial groups and conditions using the Kruskal-Wallis statistical test is presented in online supplemental table S5.

Figure 2 and online supplemental table S4 present the distribution of inequalities across departments; online supplemental table S6, figure S1 shows the distribution of the population by departments for clarity. While the Romani population in Amazonas, Cauca, Guainía, Guaviare, Magdalena, Norte de Santander, Putumayo, Quindío and Vichada exhibited no higher excess mortality compared with other ethnic groups, they had the highest mortality in Valle del Cauca and Cundinamarca with a mean of 9.8 and 15.7 times that of the Mestizo population, respectively.

Most of the Romani and Raizal populations exhibited excess YLL above those of other ethnic groups. For instance, in La Guajira and Atlántico, the highest excess YLL rate was found for certain conditions originating in the perinatal period, whereas in Risaralda, excess YLL was reported for ischaemic heart disease (also in Cundinamarca) and cancer (also in Cesar) and in Chocó for suicide (online supplemental figure S2c,d). Differences were observed in Arauca (2019), Bolívar, Caquetá (2020), Córdoba (2021), Huila (2021), Nariño, César (2019), Santander (2020), Norte de Santander, Cauca, Putumayo and Vichada (2021) where higher excess YLL rates were found in Raizal populations. In these regions, when focusing on causes of death, Vichada shared higher excess rates with Putumayo for assault and Cauca for accidents.
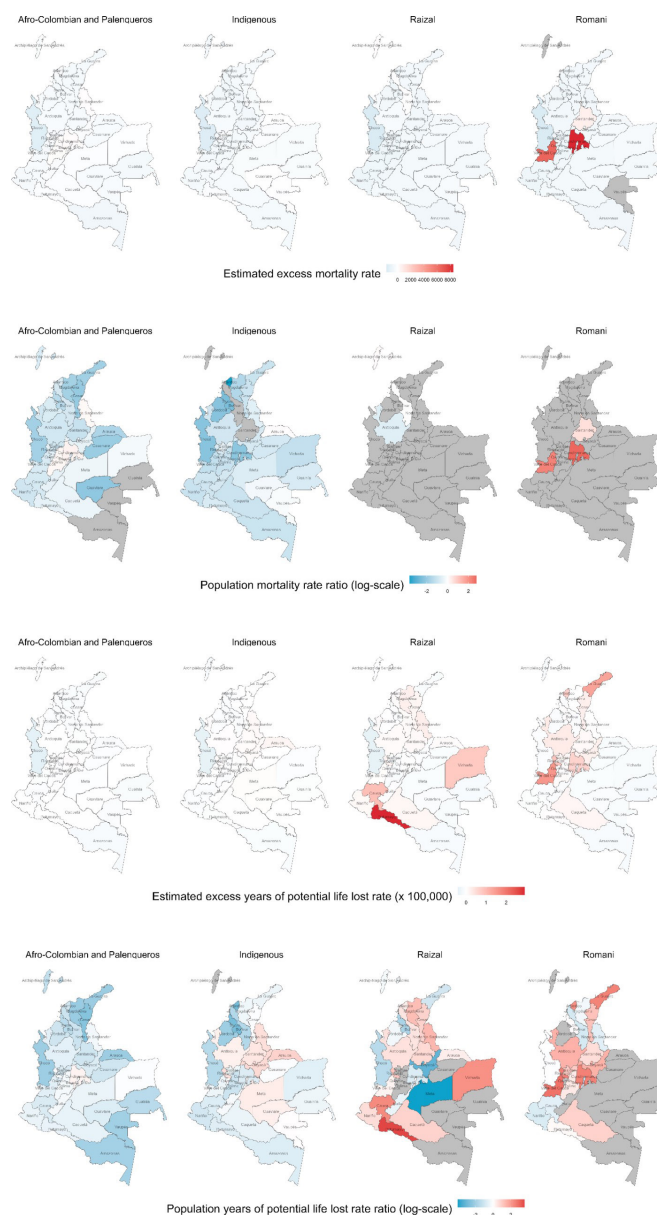

Figure 2 Mortality metrics by ethnic-racial group by department in Colombia, 2022

Among the Indigenous population, suicide, pregnancy, childbirth and the puerperium, influenza and pneumonia, accidents and certain conditions originating in the perinatal period had the highest excess in the departments of Santander, Arauca and Boyacá (online supplemental figure S2a).

Finally, Amazonas, Guainía and San Andrés presented lower mortality across all four ethnic groups compared with the Mestizo population. Vaupés experienced an incremental increase for the Indigenous population since 2020, reaching an excess of 101 deaths per 100 000 population in 2022. Meanwhile, Chocó presents the lowest differences in YLL for Afro-Colombian and Indigenous populations in assault and accidents. However, in Vichada, the Afro-Colombian population experienced excess YLL for conditions such as assault, ischaemic heart

disease, diabetes mellitus and cerebrovascular diseases (online supplemental figure S2b).

DISCUSSION

Mortality and YLLs are valuable metrics for assessing inequalities in population health and evaluating a country's progress towards health equity. While minority groups in Colombia share common challenges such as living in vulnerable areas, which can limit their access to health services or cultural traditions that may impact their experience with the health system, there exists significant heterogeneity in outcomes across ethnic-racial groups. We showed that an estimated excess mortality of 7059 per 100 000 population persisted among the Romani and 145 per 100 000 population among the Raizal population. In contrast, there were fewer deaths per 100 000 population among the Indigenous (2047) and Afro-Colombian (1686) populations compared with the Mestizo population. Between 2018 and 2022, total excess YLL accounted for 85 832 years among the Romani, 11 769 among the Raizal, −10 412 among the Indigenous and −16 858 among Afro-Colombian populations. These differences provide important insights for developing targeted approaches to address health challenges, particularly for Romani and Raizal populations.

Indigenous and Afro-Colombian communities are the largest ethnic-racial groups in Colombia, commonly more evenly distributed across the country compared with the Raizal and Romani populations. This may impact on their experience both in terms of access to health services and social determinants of health, depending on the region in which they live.[22 23] It is possible that Raizal and Romani populations share a more homogeneously negative experience as they have a larger population concentrated in specific regions and municipalities (over 80% of Raizal live in Archipiélago de San Andrés and more than 60% of Romani live in 12 municipalities).[22 24]

Another indirect factor contributing to the difference between minority groups could be their level of representation. The Colombian Constitution has granted Indigenous and Afro-Colombians two quota seats each in the Colombian Congress, to promote better political representation. Consequently, these communities exhibit more power to demand change before the media and high-level positions in government, allowing them to advocate for interventions and funding.[25] Moreover, Indigenous communities own and administer five Health Benefit Plan Management Entities (*Empresas Administradoras de Planes de Beneficios, EAPB*) that cover 60% of the insured Indigenous population, theoretically providing them with health services that are more adaptable to their cultural identity.[26] Despite this, our analysis suggests that Indigenous communities experienced higher YLL rates than Mestizo populations for various conditions, raising questions about the effectiveness of the indigenous EAPBs in the response to their communities.[26]

Causes of deaths at birth, like certain conditions originating in the perinatal period, represent the primary contributor to higher YLL rates. Ethnic-racial minority groups face unequal challenges regarding pregnancy, childbirth, postpartum and newborn care, as well as perinatal conditions. Our study confirms that Indigenous, Raizal and Romani populations experienced significantly higher excess YLL compared with Mestizos between 2018 and 2022 in those categories. For the Indigenous communities, communicable diseases such as influenza remain a major cause of mortality in early life even though vaccines against these infections are included in the *National Vaccine Scheme* and should be available for free to every child in their first 5 years. Based on our findings, COVID-19 took a particular toll on Raizal and Romani populations, which may be due to the Colombian government including only rural Indigenous and Afro-Colombian communities in their priority group to receive the vaccine against the virus,[27] but not Romani population.

Non-communicable diseases and injuries are increasingly causing high burdens of death in ethnic-racial minority populations. Raizal and Romani populations experienced significantly higher excess YLL rates than Mestizo populations in ischaemic heart disease, hypertension, diabetes, cerebrovascular diseases, cancer, assaults and accidents. This result could be attributed to a combination of lifestyle factors (with 90% of Romani and 53% of Raizal living in urban settings)[22 24] and a lack of targeted responses from the health system in preventing and treating these diseases. There are no clear strategies from the EAPBs to implement a differential ethnic-racial approach to follow-up and prevention. For instance, in the Archipiélago de San Andrés, where more than 80% of Raizal reside, none of the two EAPBs appears to have a publicly accessible ethnic-racial plan. Additionally, ethnic-racial groups' failure to enrol in the health system may also contribute to the high burden observed, compared with Mestizo populations. The 2018 Census identified 2649 Romani people, but only 56% (1479) were reported to be affiliated with an EAPB, a situation that affects access to primary and specialised care.[28]

Limitations

Our study has limitations. The research is based on information derived from registrations of ethnic-racial groups, which relies on the recognition by the relatives of the deceased, leading to possible residual classification errors. However, it has been shown in the literature that there is a high concordance between the declared ethnic group and their sociocultural reality.[29 30] Similarly, there may be inaccuracies in the cause of death as reported in death certificates. However, DANE and the Ministry of Health and Social Protection have been working on the robustness of the *National Statistical System*, being presented as an exemplar for the Latin American region.[15] Additionally, the lack of publicly available population data disaggregated by sex and age for ethnic-racial groups limited our ability to standardise mortality rates. While projections from the

2018 census represent progress, further improvements in demographic data disaggregation are essential for future analyses.

The complete and accurate registration of mortality at the national level has always been a constant challenge for official statistical institutes. For Colombia, the recent study by Loja *et al*[31] shows that under-reporting of mortality of racial-ethnic groups decreases with age and that deaths of Afro-descendant and Indigenous people are five and two times more likely, respectively, to be under-recorded in vital statistics, compared with deaths of the Mestizo population. Our results should therefore be read with caution in view of these constraints. Finally, quality and complete information was only available from 2018 onwards, when projections on the population by ethnicity were made from the National Census. This limitation hindered the analysis over a longer time horizon.

CONCLUSION

During the last decades, the Colombian legal framework has been strengthened through the enactment of different mandates to support and protect ethnic-racial minorities' constitutional and fundamental rights, including the right to health. Yet, these mandates have not been able to materialise. For years, the Colombian Constitutional Court has called on national and local governments to design and implement policies with a differential ethnic-racial approach to guarantee access to essential services, including drinking water or medical services. In 2022, the Ministry of Health and Social Protection presented the 2021–2031 Ten-Year Public Health Plan, which included special chapters focused on vulnerable populations, including Indigenous, Afro-Colombians, Raizal and Romani people. This guiding policy emphasises the need for the national and local governments, along with EAPBs, to recognise their cultural identity and worldview and to co-create their own health systems or special pathways with their communities following a differential ethnic-racial approach.[32] The current administration updated the plan and is expected to advance in a comprehensive and multiactor strategy to close the health equity gap between ethnic-racial minorities and the Mestizo population in Colombia.[32]

Minority groups in Colombia have substantially higher mortality rates and YLL compared with the Mestizo population. These populations often face significant challenges in achieving healthy lives, with socioeconomic factors that are a plausible and widely recognised contributor to health inequities. However, further research is needed to better understand and strengthen the evidence supporting these associations. Building on this research, collective efforts are required to develop and implement strategies that address the underlying factors causing disparities, including improving access to health services and addressing social determinants of health.

ORCID iDs
Oscar Espinosa http://orcid.org/0000-0003-4893-0509
Rocco Friebel http://orcid.org/0000-0003-1256-9096

REFERENCES

1 Ministerio de Cultura. Bogotá, D.C.; Diversidad cultural, 2013. Available: https://www.mincultura.gov.co/areas/poblaciones/publicaciones/Documents/Cartilla Diversidad Cultural.pdf
2 Departamento Administrativo Nacional de Estadística. Bogotá, D.C.; Una nación multicultural, 2007. Available: https://www.dane.gov.co/files/censo2005/etnia/sys/colombia_nacion.pdf
3 Ayala J. La salud en Colombia: más cobertura, pero menos acceso. Documentos de trabajo sobre economía regional - Cartagena (Banco de la República); 2014.
4 Viáfara-López CA, Palacios-Quejada G, Banguera-Obregón A. Inequidad por la condición étnico-racial en el aseguramiento de salud en Colombia: un estudio de corte transversal. *Revista Panamericana de Salud Pública* 2021;45:1.
5 Bernal R, Cárdenas M. Race and ethnic inequality in health and health care in colombia. Fedesarrollo; 2005.
6 Agudelo-Suárez AA, Martínez-Herrera E, Posada-López A, *et al*. Ethnicity and health in Colombia: What do self-perceived health indicators tell us? *Ethn Dis* 2016;26:147–56.
7 Williams DR, Lawrence JA, Davis BA. Racism and health: evidence and needed research. *Annu Rev Public Health* 2019;40:105–25.

8   Caraballo C, Massey DS, Ndumele CD, *et al*. Excess mortality and years of potential life lost among the Black population in the US, 1999-2020. *JAMA* 2023;329:1662–70.

9   Nazroo J. London; Race/ethnic inequalities in health: moving beyond confusion to focus on fundamental causes, 2022. Available: https://ifs.org.uk/inequality/wp-content/uploads/2022/11/Race-health-inequalities-final-IFS-Deaton-Review-Inequality.pdf

10 Ortiz E, Núñez J. Etnicidad y exclusión social en Colombia en el período 2012-2017. *Revista de La CEPAL* 2022;2021:33–55.

11 Viáfara C. Diferenciales de ingreso por el color de la piel y desigualdad de oportunidades en Colombia. *Rev Econ Del Rosario* 2017;20:97–126.

12 Espinosa O, Ramos J, Rojas-Botero ML, *et al*. Years of life lost to COVID-19 in 49 countries: a gender- and life cycle-based analysis of the first two years of the pandemic. *PLOS Glob Public Health* 2023;3:e0002172.

13 The Global Health Observatory. Years of life lost (YLL) (per 100 000 population), 2023. Available: https://www.who.int/data/gho/indicator-metadata-registry/imr-details/4427 [Accessed 21 Dec 2023].

14 Bambra C. Placing intersectional inequalities in health. *Health Place* 2022;75:S1353-8292(22)00022-3.

15 Departamento Administrativo Nacional de Estadística. Estadísticas vitales, 2023. Available: https://www.dane.gov.co/index.php/estadisticas-por-tema/salud/nacimientos-y-defunciones [Accessed 15 Dec 2023].

16 Parker J, Irimata K, Zhang G, *et al*. National Center for Health Statistics data presentation standards for rates and counts. *Hyattsville* 2023;200.

17 United Nations - Department of Economic and Social Affairs - Population Division. World population prospects 2022, 2022. Available: https://population.un.org/wpp/Download/Standard/MostUsed/ [Accessed 23 Dec 2023].

18 Departamento Nacional de Planeación. Definición de categorías de ruralidad (informe temático para la misión para la transformación del campo). Bogotá D.C.; 2014.

19 Organisation for Economic Cooperation and Development. OECD Health Statistics 2023 - Definitions, sources and methods - Causes of mortality, 2023. Available: https://stats.oecd.org/Index.aspx?DataSetCode=HEALTH_STAT [Accessed 23 Dec 2023].

20 Departamento Administrativo Nacional de Estadística. Estadísticas vitales - Cifras de defunciones. Bogotá, D.C.; 2023.

21 Tufte E. *The visual display of quantitative information*. 2nd edn. Connecticut: Graphics Press, 2001.

22 Departamento Administrativo Nacional de Estadística. *Población negra, afrocolombiana, raizal y palenquera. Resultados del Censo Nacional de Población y Vivienda 2018*; Bogotá, D.C., 2019.

23 Departamento Administrativo Nacional de Estadística. In: *Población indígena de Colombia. Resultados del Censo Nacional de Población y Vivienda 2018*. Bogotá, D.C., 2019.

24 Departamento Administrativo Nacional de Estadística. In: *Población gitana o rrom de Colombia. Resultados del Censo Nacional de Población y Vivienda 2018*. Bogotá, D.C., 2019.

25 Centro de Estudios en Democracia y Asuntos Electorales. Representación, participación y curules especiales de minorías étnicas. *Bogotá, D.C.*; 2015.

26 Cubillos J, Matamoros M, Perea S. Boletines poblacionales: población indígena. Bogotá, D.C; 2020.

27 Ministerio de Salud y Protección Social, Departamento Nacional de Planeación, Ministerio de Hacienda y Crédito Público, *et al*. Plan nacional de vacunación contra el covid-19 - Versión 2. Bogotá, D.C; 2021.

28 Cubillos J, Matamoros M, Perea S. Boletines poblacionales: población rrom. Bogotá, D.C; 2020.

29 Hoffman RA, Venugopalan J, Qu L, *et al*. Improving validity of cause of death on death certificates. BCB '18; Washington D.C., USA, 2018:178–83. 10.1145/3233547.3233581 Available: https://dl.acm.org/doi/proceedings/10.1145/3233547

30 Arias E, Heron M, Hakes J. National Center for Health Statistics; US Census Bureau. The validity of race and Hispanic-origin reporting on death certificates in the United States: an update. *Vital Heal Stat* 2016;172:1–21.

31 Loja J, Padmadas S, Hilton J. Measuring ethnic mortality in Colombia: the under-registration gap. European Population Conference 2022; Groningen, 2022

32 Ministerio de Salud y Protección Social. Resolución Número 1035 de 2022. Bogotá, D.C.; 2022.