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Mortality from Malignant Neoplasms of Digestive Organs in Ecuador, Period 2019-2023

Mortalidad por neoplasias malignas en órganos digestivos en Ecuador 2019-2023

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ABSTRACT

Introduction: Mortality from malignant neoplasms of the digestive organs is a public health problem with a direct impact on health systems. **Objective:** To determine the mortality caused by malignant tumors of the digestive organs in Ecuador during the years 2019-2023. **Materials and methods:** An observational, descriptive, cross-sectional study was conducted using open data on deaths recorded by INEC between 2019 and 2023. **Results:** According to the ranking of the cumulative mortality rate, the most frequent malignant tumor was stomach cancer (39%), followed by liver and biliary tract cancer (18%), among others, with a 17% increase in colon cancer during the period, with a linear trend R2 of 86% (p: 0.02). A higher age-standardized mortality rate was obtained in men (60.74), mainly in those ≥ 75 years of age. The provinces with the highest mortality rates were Azuay with 200 deaths, followed by Loja with 187 deaths, and Imbabura with 183 deaths per 100,000 inhabitants. **Conclusions:** During the study period, mortality from digestive organ tumors was observed to be among the highest in Ecuador, varying according to sex, age, and province, with malignant neoplasms of the stomach and colon being the most representative.

Keywords: Mortality, malignant neoplasms, digestive organs.

RESUMEN

Introducción: La mortalidad por neoplasias malignas de órganos digestivos constituye un problema de salud pública con un impacto directo en los sistemas de salud. **Objetivo:** Determinar la mortalidad causada por tumores malignos de órganos digestivos en Ecuador durante 2019-2023. **Material y métodos:** Se realizó un estudio con datos abiertos, de diseño observacional, descriptivo y transversal, de las defunciones registradas en el Instituto Nacional de Estadísticas y Censo del Ecuador en el periodo 2019-2023. **Resultados:** Según el *ranking* de la proporción acumulada de mortalidad, se obtuvo que el tumor maligno más frecuente fue el de estómago (39 %), seguido del de hígado y vías biliares (18 %), entre otros, con un incremento en el cáncer de colon del 17 % durante el periodo y con una tendencia lineal R2 del 86 % (p = 0,02). Se obtuvo una tasa estandarizada por edad de la mortalidad mayor en hombres (60,74), principalmente en ≥ 75 años. La provincia con mayor frecuencia fue Azuay con 200 fallecidos, seguida de Loja con 187 fallecidos e Imbabura con 183 fallecidos por

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cada 100 000 habitantes, entre otras provincias. **Conclusiones:** Durante el estudio, se observó que en Ecuador la mortalidad por tumores de órganos digestivos se ha situado en los primeros lugares, con variaciones según el sexo, la edad y las provincias. Las neoplasias malignas de estómago y colon son las más representativas.

Palabras clave: mortalidad, neoplasias malignas, órganos digestivos.

1. Introduction

According to GLOBOCAN estimates, in 2022 there were 4,905,882 new cases of cancer worldwide and an estimated 3,324,774 deaths from this disease [1]. Therefore, cancer is a public health issue because it requires comprehensive management, long-term care, specialized technologies, multidisciplinary staff, among others [2]. Malignant tumors of the digestive organs are considered a major health problem, although their burden is not uniform worldwide. In the US, these tumors account for 18% of cancer cases and 28% of deaths [3] attributed to factors resulting from population aging and changes in lifestyle and living conditions. Thus, it is essential to review the magnitude of this problem [4].

In Latin America, tackling digestive cancer is a major challenge, considering that they are among the leading causes of mortality in different countries. In addition, socioeconomic and environmental differences are reflected in the rates from various regions in each country [5]. For instance, in Cuba, 25.2% of cancer deaths are attributed to malignant tumors of the digestive system [6]. Similarly, in Chile, from 2016 to 2020, digestive oncological pathologies were the most frequent [7]. In Venezuela, between 2015 and 2019, stomach cancer in men had a rate of 10.2, and colon-rectal cancer in women had a rate of 7.1 per 100,000 inhabitants [8].

Furthermore, these types of cancer have a significant economic impact on health systems and rank in the top 10 according to their location in terms of digestive neoplasms, as in Matanzas, Cuba [9].

In Ecuador, there are few studies that show the distribution of these neoplasms and their impact on the population. It was found that, in the period 2020–2022, there were deaths related to these types of cancers and mortality was concentrated in the 70-79 age group (27%), distributed in the provinces of Sierra and Costa, where the highest rates were recorded [10].

The objective of this study is to determine the behavior of mortality caused by malignant tumors of the digestive organs in Ecuador from 2019 to 2023.

2. Materials and Methods

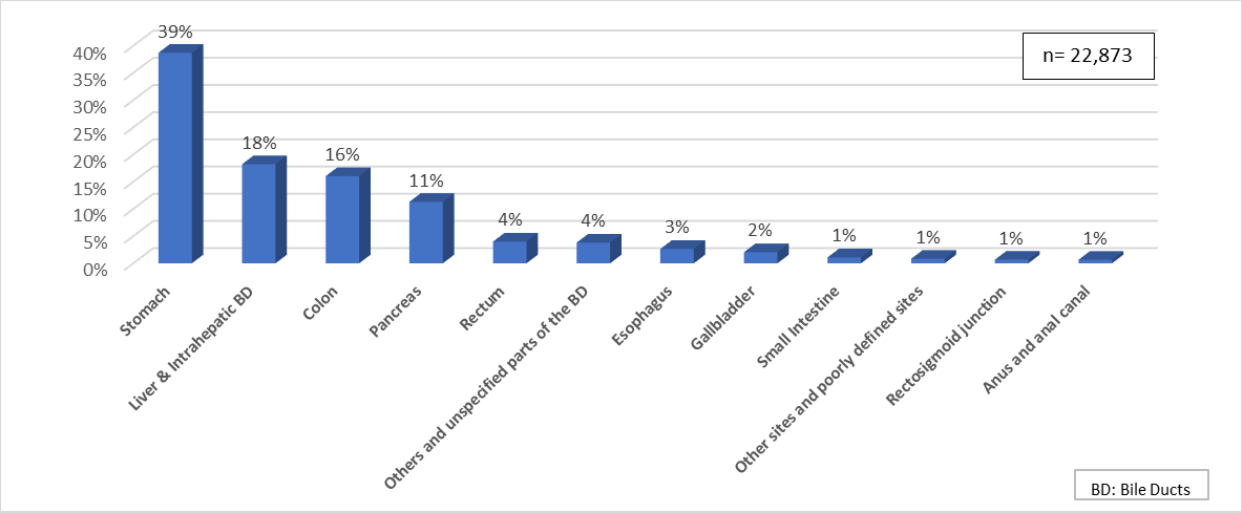
An observational, descriptive, cross-sectional study was conducted. The study population (n= 22,873) includes all deaths from malignant tumors of the digestive organs (codes C15 to C26 according to ICD-10) recorded in Ecuador between 2019 and 2023. Death data were obtained from the National Institute of Statistics and Census of Ecuador (INEC by its acronym in Spanish) in January 2025, when the data had already been validated through the online open database. The following variables were obtained: tumor location, province of residence, age, and sex. A descriptive analysis was performed using frequencies and percentages. To observe temporal changes, the annual behavior was evaluated through online graphs, performing the linear trend test and taking the R2 value, which represents the proportion of variance in the dependent variable that can be explained by the independent variable. Its interpretation indicates that the percentage of variability in the observed data can be explained by the linear relationship between variables. The analysis was performed in Microsoft Excel 2021 (Spanish version) and IBM SPSS Statistics version 29, determining statistical significance with a p-value <0.05.

For this study, anonymized data publicly available on the INEC's open death platform was used. Confidentiality, security, and data protection regulations in force in Ecuador were complied with.

3. Results

Figure 1 shows the ranking of the cumulative proportion of mortality from malignant tumors of the digestive organs in Ecuador from 2019 to 2023. Stomach cancer (C16) was the most frequent with 39%, followed by liver and biliary tract cancer (C22), 18%; colon (C18), 16%; and pancreatic cancer (C25), 11%.

Figure 1. Ranking of cumulative mortality from digestive organ tumors in Ecuador, both sexes, 2019-2023.



Source: Mortality data – INEC

Regarding the mortality trend due to the most common digestive organ tumors between 2019 and 2023, shown in Figure 2, there was a 3% increase in stomach tumors, a 3% decrease in liver and bile duct tumors, and a 0.1% decrease in pancreatic tumors, while colon cancer showed a 17% increase.

In the period 2019-2023, cases of colon cancer showed an upward trend. Linear regression analysis indicated that this trend was statistically significant ($p = 0.023$). The coefficient of determination ($R^2 = 0.86$) showed that 86% of data variability can be explained by the linear relationship between time (years) and the number of cases, thus supporting the consistency of the observed increase.

The age-standardized mortality rate (world population) due to digestive organ tumors by sex shows a rate of 60.74 for men and 42.10 for women per 100,000 inhabitants. They are mainly concentrated in the 75+ age group for men (16.9) and women (11.39). However, most cases are found in both sexes aged 60 and over (Figure 3).

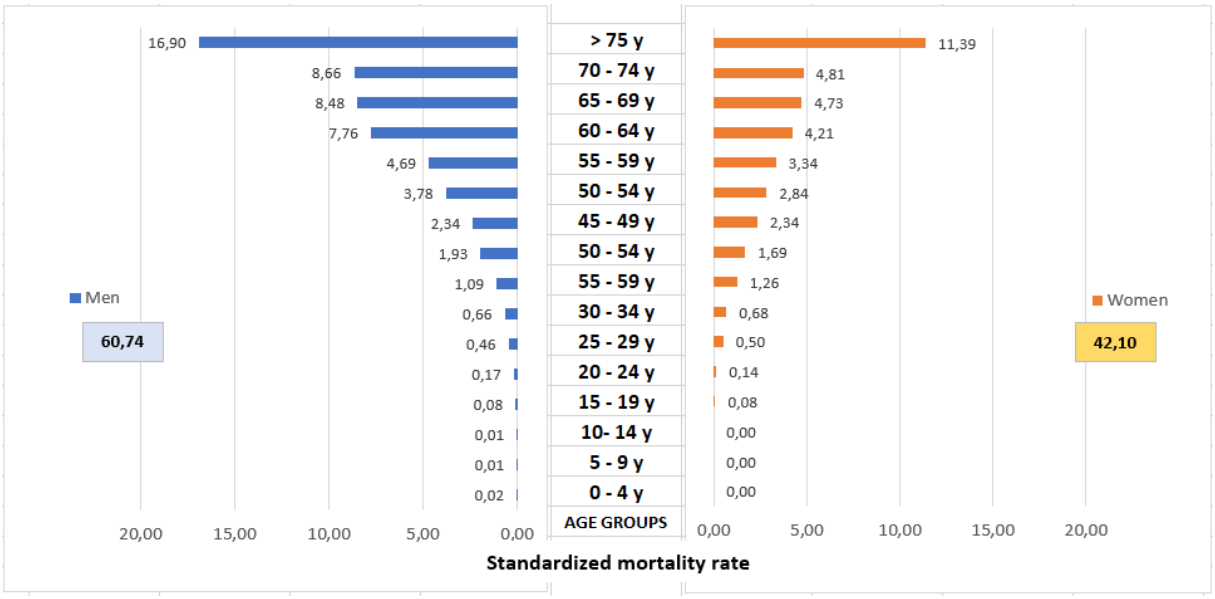
Regarding the place with the highest mortality rate from digestive organ tumors by province of residence, the distribution rate shows that Azuay, with 200 deaths had the highest frequency, followed by Loja with 187 deaths, and Imbabura with 183 deaths per 100,000 inhabitants (Figure 4).

The percentage distribution of mortality by sex was analyzed in the different provinces of Ecuador. In provinces such as Guayas, Manabí, and El Oro, higher mortality was observed in men; while in Pichincha, Azuay, Imbabura, and Chimborazo, mortality was higher in women. In the rest of the provinces, no differences were found in mortality rates between the two sexes (Figure 5).

Figure 2. Mortality trend of the most common malignant tumors of the digestive organs. Ecuador, both sexes, 2019-2023.

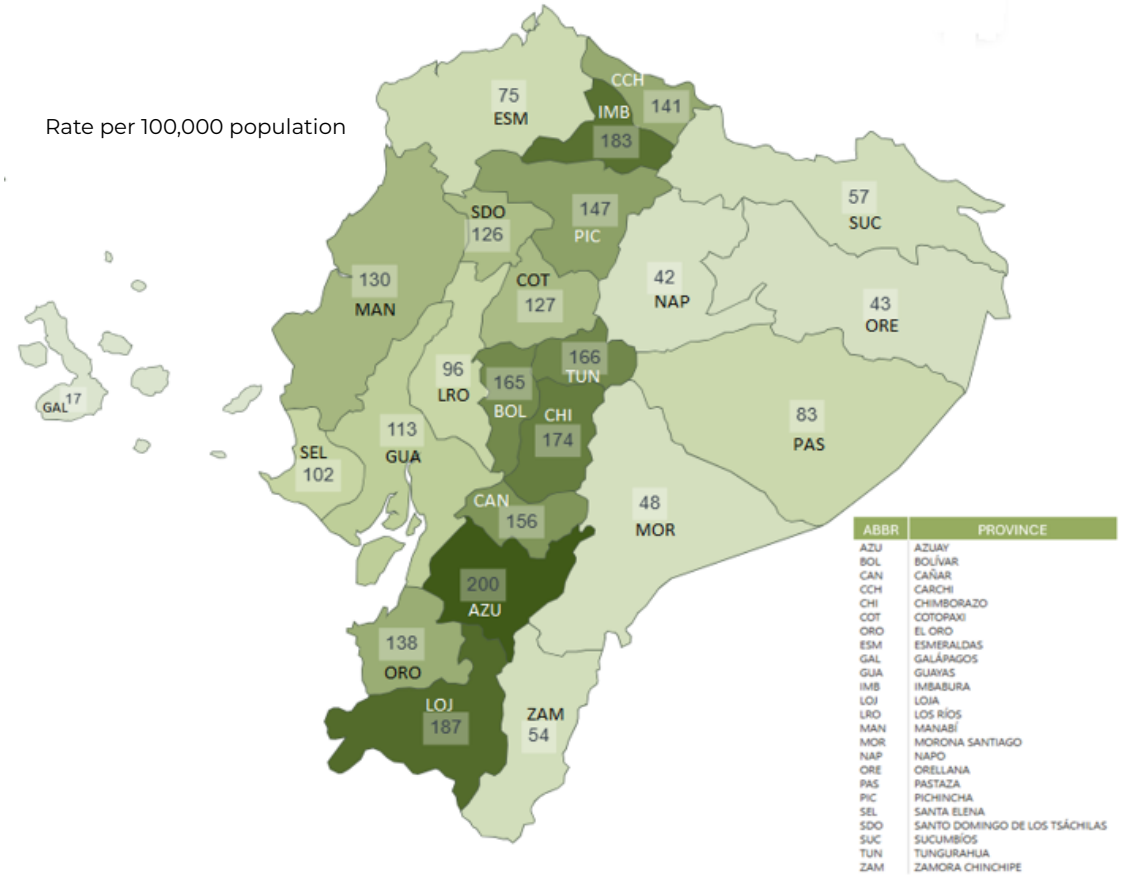
Source: Mortality data – INEC.

Figure 3. Age-standardized mortality rate from malignant tumors of the digestive organs by sex in Ecuador, 2019-2023



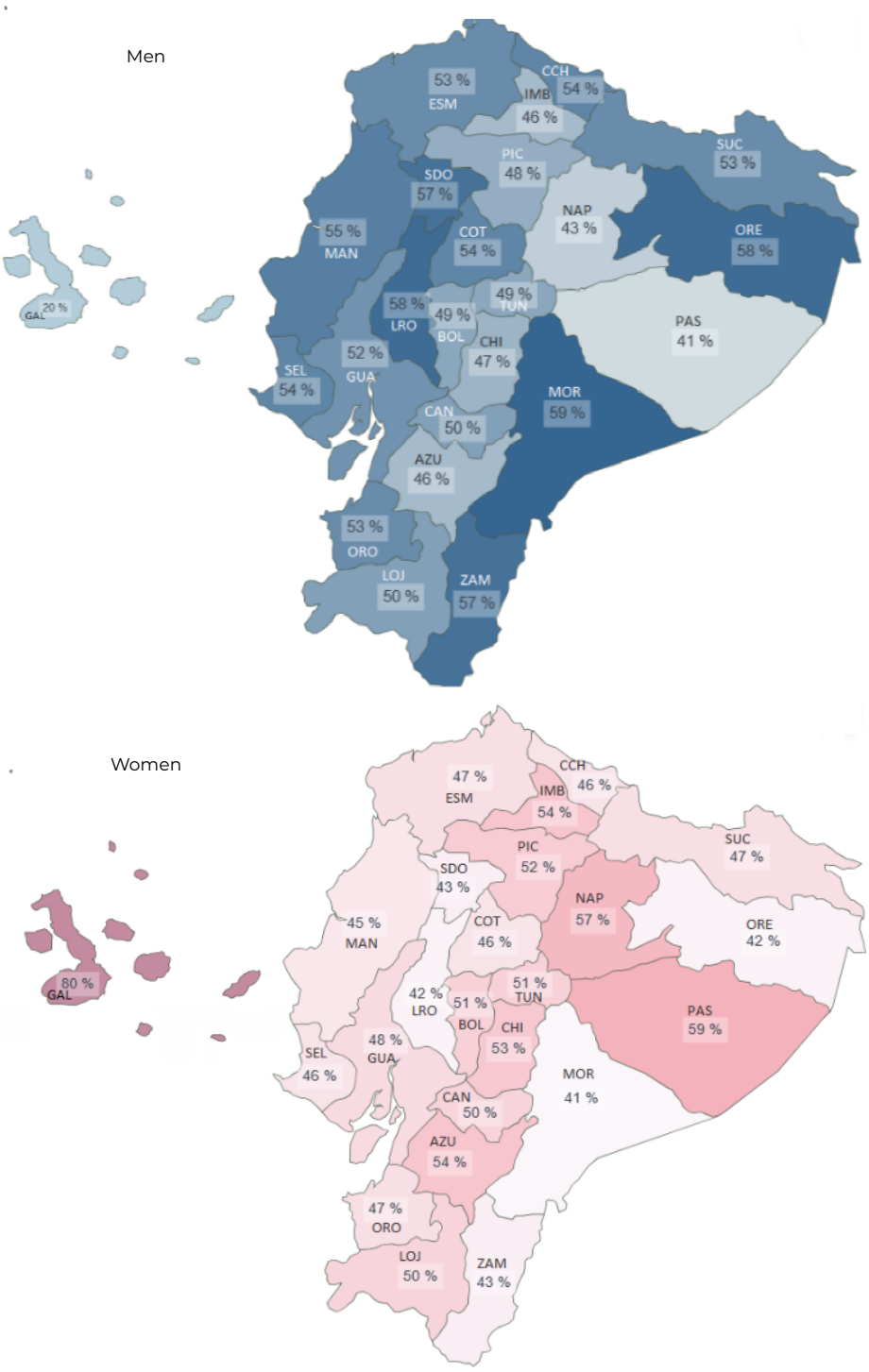
Source: Mortality data – INEC.

Figure 4. Distribution rate of mortality from digestive organ tumors by province in Ecuador, for both sexes, 2019-2023.



Source: Mortality data – INEC.

Figure 5. Percentage distribution of mortality in digestive organ tumors by province and gender in Ecuador. 2019-2023.



Source: Mortality data – INEC.

4. Discussion

In Ecuador, during the period 2019–2023, mortality from malignant tumors of the digestive organs has remained among the leading causes of death, with a sustained trend. Malignant stomach tumors were identified as the most frequent. This finding is consistent with previous studies conducted in Quito and Guayaquil, which reported high mortality rates of up to 80.5% [11,12].

Similar patterns have been described in other Latin American countries, although with epidemiological particularities. In Colombia, for example, a study on mortality trends from digestive tumors showed a more pronounced increase in men between 2002 and 2014 [13]. This trend partially resembles what was observed in our analysis. In contrast, in Colón, Cuba, between 2011 and 2020, there was also a sustained increase in mortality from malignant tumors of the digestive system, but with a predominance of colon cancer (52%), mainly affecting men over 60 years of age [9]. These differences are accentuated when compared with the data collected at Tungurahua, Ecuador, between 2000 and 2014, where the highest mortality was observed in women and malignant stomach tumors were the most common [14].

The variations between countries, and even between provinces within the same territory, probably respond to differences in the distribution of risk factors, eating habits, prevalence of infections such as Helicobacter pylori, access to diagnostic services, availability of timely treatment, and social determinants of health. In the case of Ecuador, the geographical distribution shows higher mortality rates in both coastal and mountain provinces, a pattern that coincides with that described in Chile, where marked differences in mortality rates from digestive tumors have been identified between northern and southern regions, with temporal variations reflecting epidemiological changes between 2002 and 2021 [15].

Taken together, these findings highlight the need for prevention and early detection strategies tailored to the epidemiological and geographical characteristics of each region. They also demonstrate the urgency of public policies that reduce inequalities in access to diagnosis and treatment, with the aim of reducing the burden and mortality associated with these neoplasms in the country.

5. Conclusions

Mortality from digestive organ tumors varies according to sex, age group, and province in Ecuador, with an increase in colon cancer, although the greatest burden of disease continues to be malignant stomach tumors. The findings of this study highlight the need to implement prevention and control measures focused on the most affected provinces and groups.

6. Abbreviations

SOLCA (by its acronym in Spanish): Sociedad de Lucha Contra el Cáncer.

ICD 10: International Statistical Classification of Diseases and Related Health Problems 10th Revision.

INEC (by its acronym in Spanish): Instituto Nacional de Estadística y Censos.

7. Administrative information

7.1 Contribution of the authors

Real J.; Jaramillo L.; Conceptualization, validation, visualization, methodology, project management, writing: review and editing.

Tanca J.; Pacheco L.: Validation, methodology, project management, review.

Real R., Puga G.: Conceptualization, project management, methodology, writing: review and editing.

All authors read and approved the final version of the manuscript.

7.2 Funding

None.

7.3 Availability of data and materials

The data are freely available on the INEC website: https://aplicaciones3.ecuadorencifras.gob.ec/BIINEC-war/index.xhtml

7.4 Declarations

This manuscript has not been previously published, nor is it currently under review for publication in another journal.

7.5 Ethics committee approval

Open or public data was used for this research.

7.6 Conflicts of interest

The authors declare that they have no conflicts of interest.

7.7 Limitations

This study does not explain the causes of mortality from malignant tumors of the digestive organs, but it does provide useful information for identifying their distribution according to location, age, sex, and most affected provinces. These data constitute a baseline for future research to better understand the problem and develop prevention and control strategies appropriate for each region of Ecuador.

7.8 Additional files

None declared by the authors.

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