American Journal of Surgery and Clinical Case Reports

Evolution of Cancer Mortality in Durango, México: Data Update After Two Decades of Follow-Up

Cynthia Mora Muñoz[1*], Hugo Payan Gándara[1], Elio Aarón Reyes Espinoza[2], Manuel Nuno Dena[3], José Luis Molina Marín[4]and Jesús Alonso Gándara Mireles[4]

[1]Epidemiology Service, State Center of Cancerology, CECAN Durango, Mexico

[2]Pediatric Hemato-Oncology Service, State Center of Cancerology, CECAN Durango, Mexico

[3]Statistics Department, State Center of Cancerology, CECAN Durango, Mexico

[4]Genomics Academy, National Polytechnic Institute, CIIDIR-Durango Unit, Mexico

*Corresponding author:

Cynthia Mora Muñoz,
Epidemiology Service, State Center of Cancerology,
CECAN Durango, Mexico

1. Abstract

Cancer continues to be a major public health challenge in both developed and developing countries. Projections indicate a significant increase in cancer incidence and mortality in Latin America, with Mexico registering 207,154 new cases and 96,210 deaths in 2022. Breast and prostate cancer predominate in adults, while acute lymphoblastic leukemia primarily affects children. Genetic and environmental factors, such as exposure to carcinogens, influence cancer development. Malnutrition in Mexico exacerbates the disease burden, especially in an aging population. This study analyzes cancer mortality trends in Durango during the period 2018-2023, comparing the results with a previous study. The data reveal a 4.6% increase in overall cancer mortality compared to data from 2001-2003. Mortality affects men the most (56.5%) and highlights the high incidence of acute lymphoblastic leukemia in children and breast cancer in adult women. The findings underscore the urgent need to strengthen cancer prevention, early diagnosis, and treatment programs in Mexico, with a focus on improving registries and public policies. The aging population and lack of access to high-quality care exacerbate the challenges faced by patients in the region.

2. Introduction

Cancer remains one of the major global public health challenges, affecting both developed and developing countries. The potential impact of cancer in the coming years, especially in less developed countries, poses significant threats to healthcare systems. Trends suggest that by 2030, regions in Central and South America could experience an increase in cancer incidence to 1.7 million cases, with a doubling of mortality rates from 500,000 to 1 million [1, 2]. In Mexico, the World Health Organization reported 207,154 new cancer cases in 2022 and 96,210 deaths from all types of cancer [3]. Breast and prostate cancers are responsible for the highest number of deaths among adults, while acute lymphoblastic leukemia (ALL) is the leading cause of cancer-related deaths in pediatric populations [3]. This is significant as the number of prevalent cases in Mexico is estimated to be around 577,487 [3].

Although the exact causes of the development of different types of cancer are not fully understood, certain factors have been identified that may contribute to its onset and progression [4]. These factors include both genetic and environmental influences. Genetic mutations, which can be inherited or acquired during a lifetime, play a crucial role in the transformation of normal cells into cancerous cells [5]. Additionally, environmental factors such as exposure to carcinogens in tobacco, radiation, certain chemicals, and viral infections have been identified as agents associated with an increased risk of cancer [6]. Epidemiological studies have shown that lifestyle factors such as diet, obesity, and lack of physical activity can influence the likelihood of developing cancer [7]. While the cause of each cancer case cannot be attributed to a specific factor, as each type has a particular development process, understanding these associations allows for the development of prevention

strategies and the implementation of public health policies aimed at reducing the risks associated with this disease.

Despite the predominance of chronic-degenerative diseases in Mexico [1], factors such as malnutrition are influencing morbidity patterns, as reflected in the increasing cancer mortality rates [8-10]. With an aging population, these trends are expected to worsen over time. However, epidemiological studies on cancer in Mexico remain limited. The absence of a specific population-based cancer registry highlights the need for comprehensive epidemiological data on cancer incidence and prevalence in the country. To address the growing challenge of cancer, it is crucial that all new cases are reported [11]. This practice could enable the collection of accurate data on the incidence and prevalence of the disease, which would be essential for the development and implementation of effective public health policies for its prevention and control.

This study aims to update and compare the results on cancer mortality from the 2010 publication titled "Cancer Morbidity and Mortality: Experience of the State Center of Cancerology of the SSA of Durango State, Mexico" [12] with new data up to 2023.

3. Methods

This retrospective and longitudinal study was conducted at the State Center of Cancerology (CECAN) of the SSA in Durango, Mexico, covering the period from January 2018 to December 2023. The clinical records of patients treated at the center during this period were reviewed. Data relevant to the variables of interest were collected using a data collection sheet specifically designed for this research and were entered into a database for analysis. The study included all patients treated during the mentioned period. For data analysis, a descriptive analysis of the mortality of each type of cancer was performed using frequency and proportion tables, histograms, and figures to understand the behavior of different types of cancer according to age and sex.

4. Results

Mortality data were obtained for patients admitted to CECAN-Durango from 2018 to 2023. During this period, a total of 631 deaths were recorded, including children, adults, and elderly patients. Of the total deaths, 357 were men, representing 56.5% of the total, while 274 were women, representing 43.5% of the total deaths recorded during this period (Figure 1).

5. Pediatric Stage

During the 2018-2023 period, 65 deaths were recorded among pediatric patients (ages 0 to 18 years), with a slightly higher number of cases in girls, with 34 cases, compared to boys, who had 31 cases. Figure 2 shows the distribution of the main types of cancer in girls, where the highest percentage of cases was ALL, accounting for 38%, followed by lymphoma/Hodgkin's disease with 14%, osteosarcoma with 12%, and neuroblastoma with 9%.

Figure 3 shows the distribution of deaths by different types of cancer in boys, where ALL was the type of cancer with the highest number of deaths, accounting for 42%, followed by Hodgkin's lymphoma with 13%, and phenotypic leukemia with 10%.

Adult Stage

During the same period from 2018 to 2023, 380 deaths were recorded among adult patients, aged between 19 and 59 years, of which 153 were women and 227 were men. Figure 4 shows the distribution of deaths by the main types of cancer in adult women, where breast cancer ranked first, with a total of 35%. Cervical cancer ranked second with 21%, followed by ovarian cancer and various other types at 27%.

Figure 5 shows the distribution of deaths by the main types of cancer in adult men. There was greater variability in the types of cancer, with diverse cancers presenting the highest frequency at 60%, followed by colon cancer at 21%, testicular cancer at 6%, and prostate cancer at 4%.

6. Senescent Stage

During the period from 2018 to 2023, 186 deaths were recorded among elderly patients, 99 men and 87 women. In senescent women, the most frequent type of cancer was diverse cancers at 42%, followed by breast cancer at 23% and cervical cancer at 19%. Meanwhile, for men in this age group, deaths from diverse cancers accounted for 36%, prostate cancer for 27%, and colon cancer for 15% (Figures 6 and 7).
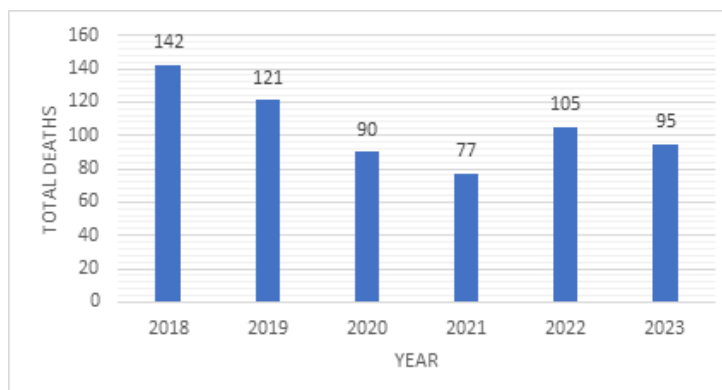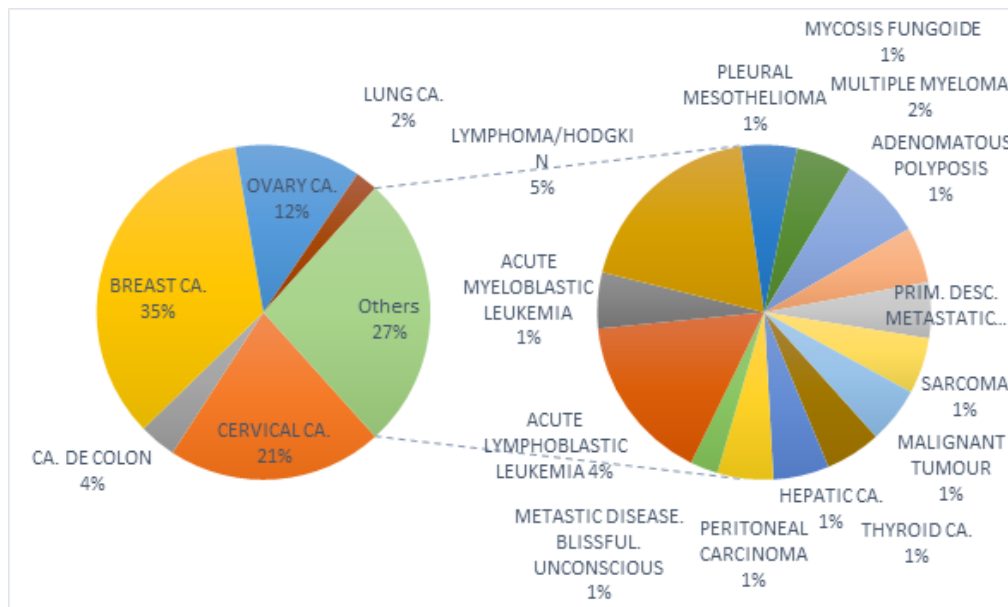

Figure 1: Distribution of Deaths from 2018 to 2023 at CECAN Durango, SSA.
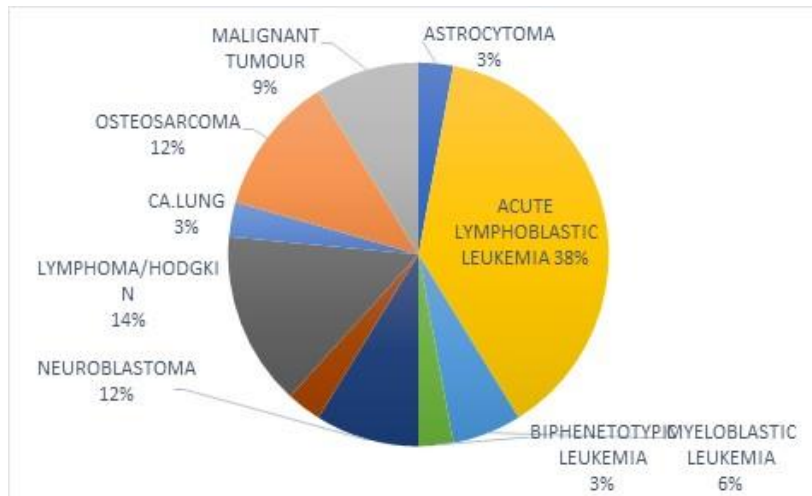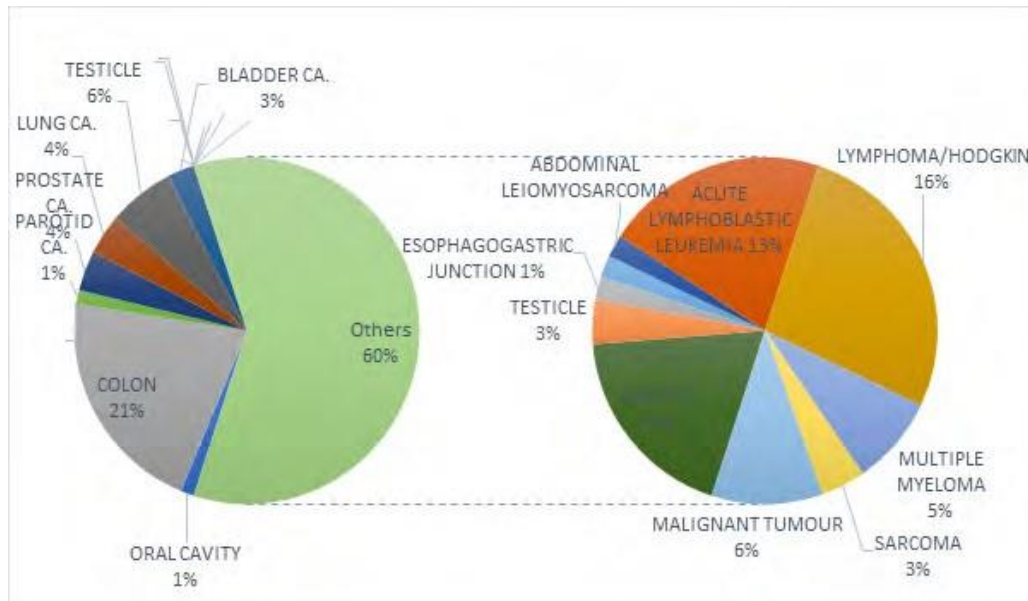
Figure 2: Distribution of deaths from different types of cancer in girls.
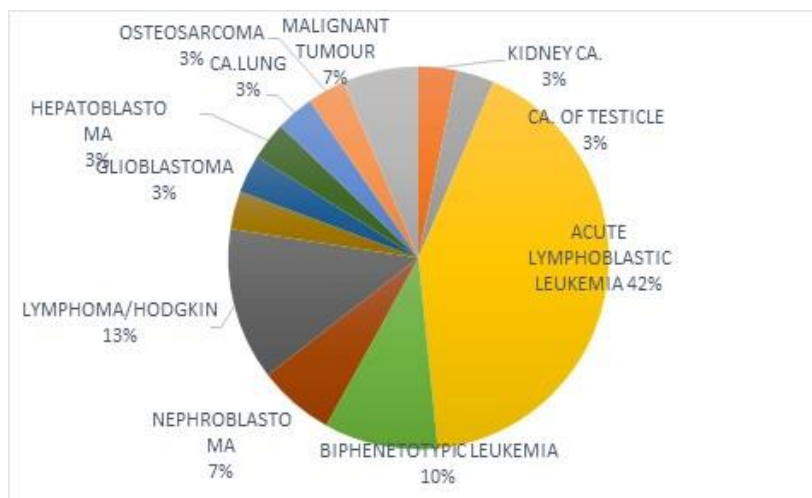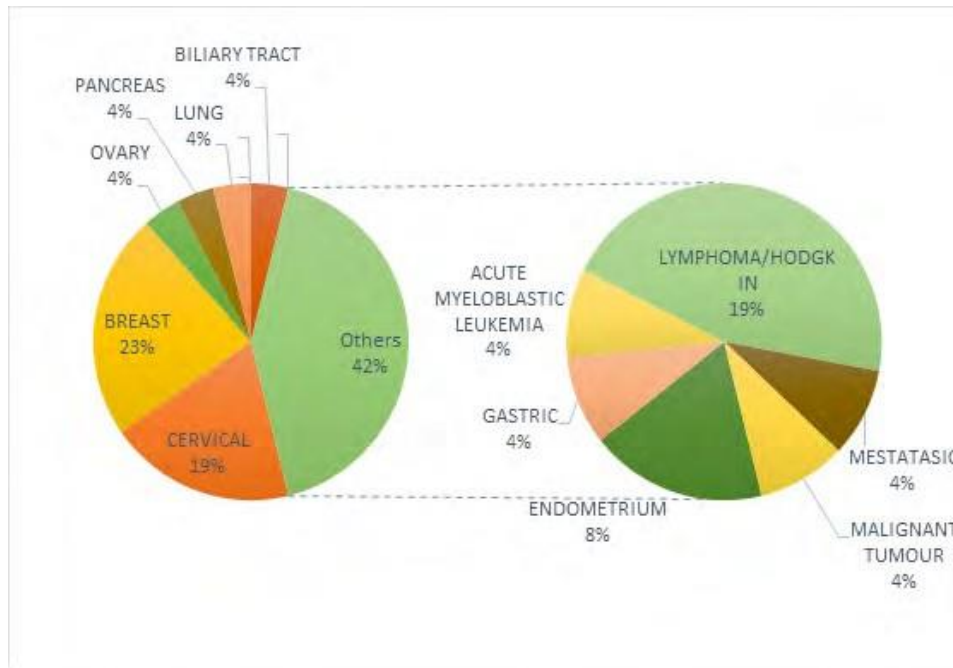

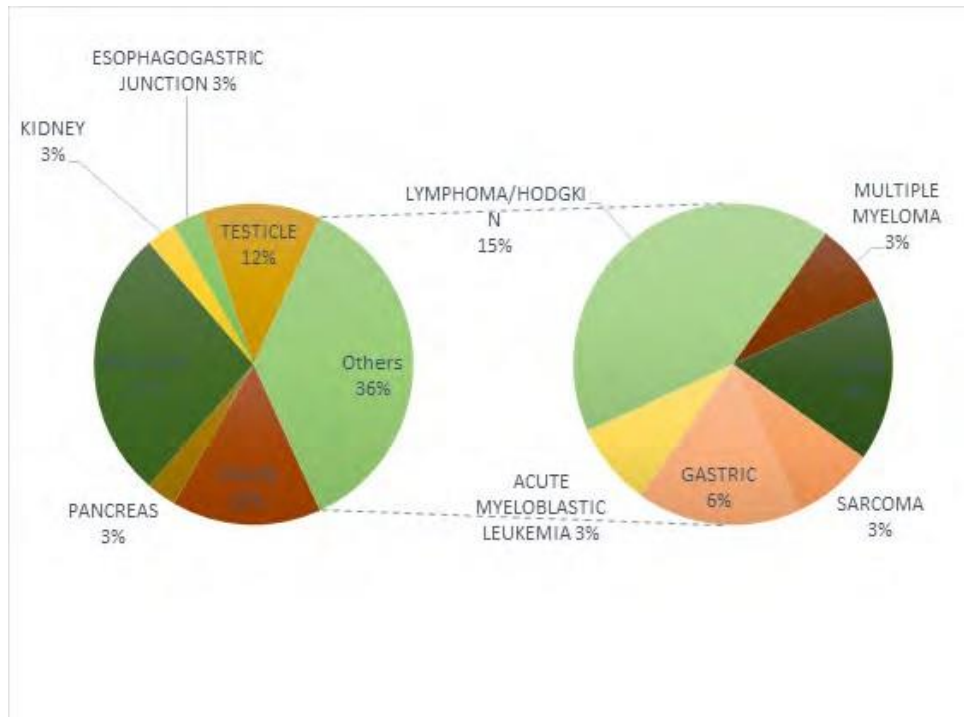**Figure 3:** Distribution of deaths from different types of cancer in children.

Figure 4: Distribution of deaths from the main types of cancer in adult women.

Figure 5: Distribution of deaths from the main types of cancer in adult men.

Figure 6: Distribution of deaths from the main types of cancer in senescent women.

Figure 7: Distribution of deaths from the main types of cancer in senescent women.

7. Discussion

Cancer is a group of diseases that represents a significant public health problem. Mexico, a middle-high-income country, is currently undergoing an epidemiological transition where factors such as malnutrition play an important role in the morbidity of diseases like cancer [13,14].

According to the report by Lares-Asseff et al. [12], from January 2001 to December 2003, 148 deaths were recorded at CE-CAN-Durango, accounting for 10.02% of total deaths. Of these, 50% (74) were male patients, and the same figure was observed in female patients. In our study, we found a total of 631 cancer deaths. Although this period was double the duration measured in the Lares-Asseff et al. study [12], this number of deaths represented 14.8%, indicating a 4.6% increase in mortality. Of the total deaths, 357 were men, representing 56.5% of the total, while 274 were women (43.5%).

The data provide a comprehensive overview of cancer mortality trends in Durango over the past two decades. The analysis highlights several key patterns and changes in mortality, which could indicate broader epidemiological transitions in the region. One of the key findings is the predominance of certain types of cancer in different age and sex groups, underscoring the need for targeted public health interventions. Lopez V and Klainin-Yobas P [15] mention in their work the importance of promoting health with a focus on preventing the development of cancer, specifically emphasizing the importance of promoting the psychological health of patients already diagnosed, as well as interventions to protect against cancer risk.

In the pediatric population, the significant mortality due to acute lymphoblastic leukemia (ALL) remains a critical concern. Compared to the report by Lares-Asseff et al. [12], between 2001 and 2003, this type of cancer accounted for 25%, while in our study, ALL represented 38%, signifying a 13% increase. The relatively high mortality rate in this group suggests that, despite advances in treatment, challenges persist in early diagnosis, treatment adherence, or access to high-quality care. These issues may be exacerbated by socioeconomic factors, which are known to influence cancer outcomes in resource-limited settings like Durango. This aligns with reports on childhood cancer in Mexico, which indicate that this region has the highest incidence of childhood cancer [16].

Among adults, the findings highlight high mortality rates associated with breast cancer in women and colorectal cancer in men. These results are consistent with global cancer mortality trends, where breast and colorectal cancers are two of the leading causes of death [17]. The data also reflect the success of cervical cancer screening programs, as indicated by its lower mortality rate compared to breast cancer. However, the burden of colorectal cancer mortality in men suggests a potential gap in early detection programs for this demographic group.

In the elderly population, the high mortality rate across a variety of cancers may reflect both accumulated lifetime exposure to risk factors and the challenges associated with treating cancer in older adults. The increase in overall cancer mortality in this age group is likely linked to population aging, a trend observed in many parts of the world. While cervical cancer and breast cancer were the leading causes of cancer mortality between 2001 and 2003, representing 34% and 30%, respectively, in the current period, diverse cancers were the leading causes at 42%, followed by breast cancer

at 23% and cervical cancer at 19%.

This study is not without limitations. The retrospective nature of data collection may introduce biases, particularly in terms of incomplete or inaccurate records. Additionally, the study was limited to a single center, which may not fully represent the broader population of Durango or other regions of Mexico. Future research should consider a more extensive, multicenter approach and explore the impact of genetic, environmental, and socioeconomic factors on cancer mortality in this region.

8. Conclusions

This study highlights the growing impact of cancer on the population of Durango, Mexico, as reflected by a significant increase in mortality from this disease compared to previous studies. The cancer mortality rate increased by 4.6% during the 2018-2023 period compared to the data reported between 2001 and 2003, underscoring the urgent need to strengthen cancer prevention, early diagnosis, and treatment programs.

The findings reveal important differences in mortality by sex, with a higher prevalence of deaths in men (56.5%) compared to women (43.5%). Additionally, a high incidence of acute lymphoblastic leukemia (ALL) was observed in the pediatric population, as well as breast cancer in adult women and colon cancer in adult men.

These results suggest that it is essential to develop public health strategies specifically targeted at high-risk groups, with differentiated approaches based on age and gender. Furthermore, the importance of a more comprehensive and accurate cancer case registry should be emphasized to facilitate informed decision-making and the implementation of effective policies that can mitigate the impact of this disease on the Mexican population.

9. Acknowledgment

References

1. Mohar-Betancourt A, Reynoso-Noveron N, Armas-Texta D, Gutierrez-Del- gado C, Torres-Dominguez JA Cancer Trends in Mexico Essential Data for the Creation and Follow-Up of Public Policies. J Glob Oncol. 2017; 3(6): 740-748.

2. Sierra MS, Soerjomataram I, Antoni S, Mathieu Laversanne, Marion Pineros. Cancer patterns and trends in Central and South America. Cancer Epidemiol. 2016; 44(1): S23-S42.

3. Global Cancer Observatory. 484-mexico-fact-sheet.pdf (who.int). 2022.

4. Sullivan BA, Noujaim M, Roper J. Cause, Epidemiology, and Histology of Polyps and Pathways to Colorectal Cancer. Gastrointest Endosc Clin N Am. 2022; 32(2): 177-194.

5. Talseth-Palmer BA, Scott RJ. Genetic variation and its role in malignancy. Int J Biomed Sci. 2011; 7(3): 158-171.

6.

   Anand P, Kunnumakkara AB, Sundaram C. Cancer is a preventable disease that requires major lifestyle changes [published correction appears in Pharm Res. 2008; 25(9): 2200.

7. Friedenreich CM, Ryder-Burbidge C, McNeil J. Physical activity, obesity and sedentary behavior in cancer etiology: epidemiologic evidence and biologic mechanisms. Mol Oncol. 2021; 15(3): 790-800.

8. INEGI Instituto Nacional de Estadistica y Geografía (INEGI). 2023.

9. Hd J, Chande RH. Epidemiología del envejecimiento una fase de la transición demográfica. Population (French Edition). 1997; 52(1): 255.

10. Aggarwal A, Unger-Saldana K, Lewison G, Sullivan R. The challenge of cancer in middle-income countries with an ageing population Mexico as a case study. Ecancermedicalscience. 2015; 9: 536.

11. DOF Diario Oficial de la Federación DOF Diario Oficial de la Federacion. 2023.

12. Lares-Asseff I, Garcia-Hernandez F, Sosa-Macias M, Loera-Castaneda V. mortalidad por cáncer experiencia del Centro Estatal de Cancerología de la SSA del Estado de Durango México. Rev Cubana Hig Epidemiol. 2010; 48(3): 123-147.

13. Martínez Salgado C, Leal Fernández G. La transición epidemiológica en México un caso de políticas de salud mal diseñadas y desprovistas de evidencia. Estudios Demográficos y Urbanos. 2002; 17(3): 547-569.

14. Barquera S, Tolentino L. Geografia de las enfermedades asociadas con la nutricion en México una perspectiva de transicion epidemiologica Pap Poblac. 2005; 11(43): 133-148.

15. Lopez V, Klainin-Yobas P. Health Promotion Among Cancer Patients: Innovative Interventions. In: Haugan G, Eriksson M, editors. Health Promotion in Health Care – Vital Theories and Research [Internet]. Cham (CH): Springer. 2021.

16. Centro Nacional para la Salud de la Infancia y Adolescencia. 2019.

17. Global cancer burden growing, amidst mounting need for services. (n.d.). Retrieved August 26. 2024.