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Article

# Between law and practice: an analysis of time to treatment for head and neck cancer in Northern Brazil

# Entre a lei e a prática: análise do tempo para tratamento do câncer de cabeça e pescoço na região Norte do Brasil

Entre la ley y la práctica: un análisis del tiempo de tratamiento para el cáncer de cabeza y cuello en el Norte de Brasil

**José Gabriel Miranda da Paixão**[1]
Universidade Federal do Pará, Belém, PA.
https://orcid.org/0000-0003-1513-8144
gabrielpaixao@msn.com

**Izabela Lorena Gonçalves da Silva**[2]
Ordem dos Advogados do Brasil, Belém, PA.
https://orcid.org/0009-0004-8143-1001
izabelalsg@gmail.com

**Claudia do Socorro Carvalho Miranda**[3]
Universidade do Estado do Pará, Belém, PA.
https://orcid.org/0000-0002-1913-7176
cllaumiranda@gmail.com

**Nelson Veiga Gonçalves**[4]
Universidade do Estado do Pará, Belém, PA.
https://orcid.org/0000-0003-0276-9318
nelsonveiga@uepa.br

## Abstract

**Objective:** to evaluate the context of care for a specific type of cancer in the state of Pará, Brazil, considering time to treatment, clinical characteristics and possible practical reasons for this situation. **Methodology:** this is a quantitative, cross-sectional study. Data were analyzed from the physical medical records of 568 patients treated between 2018 and 2022; demographic and clinical data, as well as waiting time until treatment — considering Law No. 12.732/2012 — were collected. Descriptive and inferential analyses were performed, alongside Kaplan-Meier estimation. **Results:** demographic populational data was aligned with both national and global findings for Head and Neck Cancer patients. However, the average time to treatment was 128.55 days; statistically significant differences in time to treatment were observed regarding clinical staging and primary

[1] Master in Collective Health, Universidade Federal do Pará, Belém, PA, Brazil. Doctor, Complexo Hospitalar, Universidade Federal do Pará, Belém, PA, Brazil.
[2] Master's student in Collective Health, Universidade Federal do Pará, Belém, PA, Brazil. Attorney, Ordem dos Advogados do Brasil, Belém, PA, Brazil.
[3] PhD in Amazonian Parasitic Biology, Universidade Federal do Pará, Belém, PA, Brazil. Professor, Universidade do Estado do Pará, Belém, PA, Brazil.
[4] PhD in Information Sciences, Universidade de Brasília, Brasília, DF, Brazil. Professor, Universidade do Estado do Pará, Belém, PA, Brazil.

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tumor location in the inferential analysis, as well as in Kaplan-Meier estimation. Longer treatment delays were noted for tumors of the oral cavity and larynx, the same occurring for cases diagnosed at an early stage. **Conclusion:** disparities in access to treatment or the speed at which it is provided are evident among head and neck cancer patients, varying according to the tumor's primary site and disease stage, due to underlying systemic and regional factors. Therefore, it is essential to view cancer as a group of distinct diseases to better define specific characteristics of a population and its healthcare network, thereby generating data that can more equitably inform public policies formulation, as well as the legislation and judicial decisions concerning cancer patients.
**Keywords:** Neoplasms; Head and Neck Neoplasms; Time-to-Treatment; Kaplan-Meier Estimate.

## Resumo

**Objetivo:** Avaliar o contexto do atendimento de um tipo específico de câncer, no estado do Pará, levando em consideração o tempo para tratamento, características clínicas e possíveis justificativas práticas para tal contexto. **Metodologia:** tratou-se de um estudo transversal e quantitativo. Foram analisados dados do prontuário físico de 568 pacientes atendidos entre os anos de 2018 e 2022, considerando dados demográficos, clínicos e tempo de espera até o tratamento conforme disposto na Lei nº 12.732/2012. Foi realizada análise descritiva, inferencial e estimativa de Kaplan-Meier. **Resultados:** as características demográficas da casuística analisada reforçam os resultados descritos nacionalmente, bem como a nível mundial. Porém, o tempo para o tratamento foi em média 128,55 dias, sendo evidenciadas diferenças estatisticamente significativas no tempo para tratamento quando analisadas as variáveis estadiamento clínico e localização primária, tanto na análise inferencial quanto em relação ao estimador Kaplan-Meier. Houve maior atraso no tratamento para casos de tumor de boca, laringe e para casos de estadiamento precoce. **Conclusão:** evidenciou-se disparidades no acesso ou na agilidade do tratamento conforme a localização primária do tumor e estadio da doença, em pacientes com câncer de cabeça e pescoço devido a condicionantes sistêmicas regionais que o determinam. Portanto é mister observar o câncer como um grupo de doenças diferentes entre si para que se possa delimitar melhor as características específicas da população estudada e da rede de saúde, para que produzam dados que embasem de forma mais equânime a elaboração de políticas públicas, bem como as legislações e decisões judiciais que envolvem pacientes oncológicos.
**Palavras-chave:** Neoplasias; Neoplasias de Cabeça e Pescoço; Tempo para o Tratamento; Estimativa de Kaplan-Meier.

## Resumen

**Objetivo:** evaluar el contexto de atención para un tipo específico de cáncer en el estado de Pará, considerando el tiempo de tratamiento, las características clínicas y posibles justificaciones prácticas para este contexto. **Metodología:** se trata de un estudio transversal y cuantitativo. Se analizaron datos de las historias clínicas de 568 pacientes atendidos entre 2018 y 2022, recolectándose información demográfica, clínica y el tiempo de espera hasta el tratamiento, de acuerdo con la Ley N.º 12.732/2012. Se realizaron análisis descriptivo, inferencial y estimación de Kaplan–Meier. **Resultados:** las características demográficas de la muestra refuerzan los resultados descritos a nivel nacional e internacional. Sin embargo, el tiempo medio hasta el tratamiento fue de 128,55 días, encontrándose diferencias estadísticamente significativas para esta variable al analizarse el estadio clínico y localización primaria, tanto en el análisis inferencial como en la estimación de Kaplan–Meier. Se observó mayor retraso en los casos de tumores de cavidad bucal, laringe y en los con estadios tempranos **Conclusión:** en pacientes con cáncer de cabeza y cuello, se observan disparidades en el acceso y la rapidez del tratamiento, según la localización del tumor primario y el estadio clínico, debido a factores sistémicos regionales. Por lo tanto, es fundamental considerar el cáncer como un conjunto de enfermedades distintas para poder definir mejor características específicas de la población estudiada y la red de atención sanitaria, con el fin de generar datos que

respalden de manera más equitativa el desarrollo de políticas públicas, así como la legislación y las decisiones judiciales relacionadas.
**Palabras clave:** Neoplasias; Neoplasias de Cabeza y Cuello; Tiempo de Tratamiento; Estimación de Kaplan-Meier.

## Introduction

In 2050, cancer deaths will increase by 75% compared with those recorded in 2024[1]. This disease is a set of complex pathologies that arise through multiple mechanisms of tumorigenesis that lead to the formation of uncontrolled cellular proliferations, which have different growth patterns according to their location and the anatomical and immunological barriers to which they are exposed; destruction of adjacent anatomical structures and distant metastases may occur[2]. Despite their common origin, this is a group of diseases that differ considerably from one another from the epidemiological and clinical perspectives and in terms of morbidity and mortality.

Each component of this group, despite sharing a relatively common pathophysiological basis, has its own etiology, biological behavior, and particular risk factors. For example, oropharyngeal cancer is closely related to human herpesvírus infection[3,4]; whereas skin câncer is influenced by ultraviolet radiation incidence, occurring more often in body areas with greater sun exposure, as well as in populations residing in areas where there is a higher incidence of ultraviolet radiation[5,6]; thyroid cancer is a disease most often resulting from hereditary genetic alterations that manifest themselves in a minimally aggressive manner, resulting in 98% to 100% five-year survival for adequately treated patients[7,8]. When we speak of aggressiveness, a malignant neoplasm may present itself either as a curable disease, such as Hodgkin lymphoma, or as a highly lethal disease, such as pancreatic adenocarcinoma[9].

In addition, behavioral and environmental changes, especially those that alter mobility and diet and result in exposure to environmental pollutants, favor not only an increase in the number of cancer cases but also in mortality from this disease[10]. Thus, given the growing importance of this group of diseases, it is essential to seek more detailed information about each of its types so that better care and support can be provided to the population.

In the Northern Region, head and neck cancer (HNC) was chosen as the type evaluated in the study because of the considerable unmet demand in the state and the suspicion that there was a delay in complying with the 60-day time limit for care for most patients, given the large number of patients diagnosed at an advanced stage[11,12].

In this regard, Law No. 12.732, of November 22, 2012, represents a regulatory milestone in the field of Brazilian health law by recognizing that time is a determining variable in cancer prognosis. The legislator proceeded from the understanding that the social stigma associated with a cancer diagnosis, combined with difficulties in access to health care system, frequently delays the search for specialized care, making prompt action by the State even more urgent after diagnostic confirmation. Accordingly, Article 2 of this Law establishes that a patient with a confirmed malignant neoplasm has the right to first treatment within the Unified Health System (SUS) within a maximum period of 60 days counted from the date the diagnosis is established in a pathology report, or within a shorter period, according to the therapeutic need recorded in medical record.

The Ministry of Health, through Consolidation Ordinance No. 2, of September 28, 2017, which incorporated the content of the former Ordinance No. 876, of May 16, 2013[13], establishes exceptions to this time period based on the biological behavior of certain types of neoplasms,

recognizing the clinical heterogeneity of cancer as a group of diseases. Systematic failure to comply with this time limit has been one of the main reasons for the judicialization of access to cancer treatment within SUS, a growing phenomenon in Brazil that, although a legitimate instrument for realizing the fundamental right to health provided for in Article 196 of the Federal Constitution, poses challenges to public management by individually privileging access for those who have the ability to resort to the Judiciary, to the detriment of the other patients waiting in administrative queues.

This scenario reinforces the need for judicial decisions and public policies in oncology to be guided by local and regional epidemiological data disaggregated by cancer type, rather than by aggregate statistics that may mask distinct care realities within the same health care system.

At the national level, there are publications that evaluate time to care for various types of cancer in light of the time limit in the cited Law, with patients most often receiving treatment within 60 days[14,15], although these results vary when the study analyzes a single type of cancer[16,17,18]. At the regional level, however, studies are scarce, and the limited existing data show a different reality from that of the other regions of Brazil[19,20].

Considering that promoting patients' health involves comprehensive care, regardless of the rarity of cancer type[21], and the growing number of cancer cases in a population tending toward a demographic transition and changes in morbidity and mortality profiles with a gradual increase in cases of malignant neoplasms[1,22], more specific information about these various cancer types and the population in which they occur is needed, so that continuous monitoring and attention to technical and systemic developments can take place in a way that allows better social oversight in the field of public health[23,24].

Therefore, this study aims to evaluate the context of care for a specific type of cancer in a state in Brazil's Northern Region, with a territorial area of 1,245,870.798 km² and 8,664,306 inhabitants, in which there is a single High-Complexity Oncology Center (CACON) Ophir Loyola Hospital located in Belém, in whose Hospital Cancer Registry (RHC) part of the data collection was carried out. Time to treatment and clinical characteristics were taken into account as possible practical explanations for a context with a large number of cases at an advanced stage. This study is relevant because, within a population known to be vulnerable, there are nuances that need to be recognized, especially those related to the specific cancer type and to populations not commonly represented in large studies, such as cancer patients with HNC. In this way, the preparation of reports and studies directed at specific cancer types can be encouraged, without considering the group to be monolithic or highlighting only the most incident types, generating a basis for more equitable laws and judicial decisions.

## Methodology

The period from January 2018 to December 2022 was defined for data collection because, at the time the research was developed, these were the data most recently consolidated by the local RHC.

Thus, paper medical records of patients whose diagnosis was HNC were the source of data collection, considering only those registered according to the International Classification of Diseases for Oncology (ICD: C00 to C10, C12 to C14, and C32). The inclusion criteria were: having a histopathological diagnosis confirming malignant disease, registration in the RHC with one of the

cited ICD codes, and medical records containing the date of the time of diagnosis and the date of treatment initiation. The "time of diagnosis" was defined as the date the histopathology report was issued, according to a federal ordinance[25] and "treatment initiation" as the date of the first surgery or the date nonsurgical treatment began[26]. Nonsurgical treatment was considered to be chemotherapy and radiotherapy, whether alone or concomitantly. Information such as age, sex, education, income, ethnicity, primary tumor site, and clinical staging at the time of the first visit was also collected.

The collected data were managed using the electronic data capture tool Research Electronic Data Capture (REDCap), which consists of a secure, web-based software platform designed to support the preparation of data collection forms for research[27].

The following variables were used for the descriptive summary and statistical analysis: age (at the time of diagnosis), sex, education, income, ethnicity, primary tumor site (mouth, pharynx, or larynx), clinical staging, and time between diagnosis and first treatment (in days), the latter being termed "time to treatment" and dichotomized into ≤60 days and >60 days, considering Law No. 12.732/2012[26].

After cleaning and eliminating redundancy from the database resulting from data collection, a descriptive analysis of each of the variables involved in the study was first performed. For each categorical variable, a table and a frequency chart are presented, and for the numerical variable, a table containing the variable's descriptive statistics and a histogram containing the frequency and percentage of observations for each category of the variable are presented. It was decided to show only the charts most relevant to the discussion in the final version.

One example was the descriptive statistics for the time-to-treatment variable, for which the following were presented in addition to the mean: standard deviation (a measure of data variation, where the greater the standard deviation, the greater the variation in the sample observations); lower limit of the 95% confidence interval for the mean; upper limit of the 95% confidence interval for the mean; first quartile (a value such that 25% of observations have a value for the variable below it); median (a value such that 50% of observations have a value for the variable below it); and third quartile (a value such that 75% of observations have a value for the variable below it).

In addition to this descriptive analysis, tables, and charts, an inferential analysis was performed by applying Fisher's exact test. The test's p-value should be interpreted as follows: if the p-value is less than 0.05, it means that, at a statistical significance level of 5%, there is an association between the two categorical variables considered. If the p-value is greater than 0.05, we say that, at a statistical significance level of 5%, there is no association between the categorical variables considered.

Subsequently, curves relating time to treatment and the collected variables were prepared using the Kaplan-Meier method, similarly to the study by Silva and colleagues[28]. This analysis is necessary when the time of interest is not observed for the entire sample, because there is censoring, which occurs when it is known that, in a certain case, the time was greater than a certain value, but the exact time is not known. In this study, censoring occurs because there are cases in which patients had a single visit after diagnosis and there was no record of treatment being initiated afterward; that is, contact was lost after the first visit.

This Kaplan-Meier estimator, represented as a curve in a chart, presents the percentage of cases with time to treatment above each value, with the relative position of the curves making it possible to

compare the categories with respect to this time. Thus, the categories of the variable can be compared with respect to the relative position of their curves, with categories whose curves are above another generally having a longer time to treatment, and categories whose curves are below generally having a shorter time to treatment. Each step in the curve represents an occurrence of the event of interest (treatment initiation), and each cross in the chart represents an occurrence of censoring.

Then, curves stratified according to each variable were delineated. The difference between the curves was subjected to the log-rank test to check statistical significance. A significance level of $p \leq 0.05$ was adopted.

The software used for all stages of the statistical analysis was R version 4.4.3. In addition, the Perplexity AI tool was used to review standard Portuguese usage, covering the introduction and conclusion of the text.

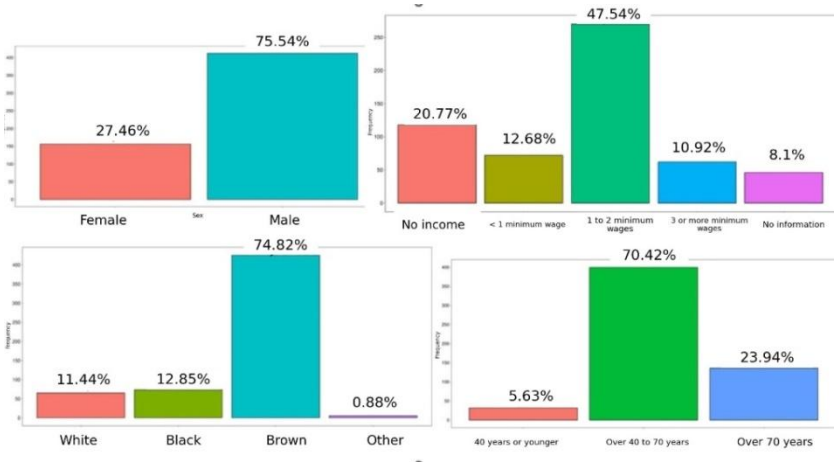
The Research Ethics Committee of the institution where the research was conducted approved its conduct through opinion 6.501.132 (CAAE 69784223.6.0000.5550), in accordance with Resolutionn No. 466, of December 12, 2012, of Brazil's National Health Council[29].

## Results and discussion

A total of 568 confirmed HNC cases were analyzed among patients residing in the state of Pará and seen at the hospital hosting the study from January 2018 to December 2022, with this number being used for bivariate analysis in all analyses except for the variable "time between diagnosis and first treatment," for which 98 cases were excluded because of missing data.

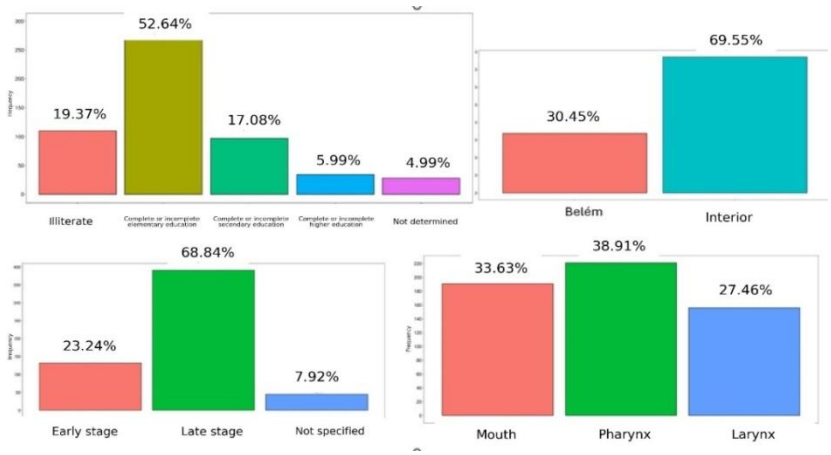
There was a greater representation of patients of the male gender (412; 72.5%), aged between 40 and 70 years (400; 70.4%), of Brown ethnicity (425; 74.8%), with income between 1 and 2 minimum wages (270; 47.5%), an elementary education level (299; 52.5%), and late-stage disease (391; 68.8%). Regarding the primary site, mouth cancer occurred in 191 cases (33.6%), pharyngeal cancer in 221 (38.9%), and laryngeal cancer in 156 (27.5%). Regarding the origin of the patient's referral, 386 (69.5%) were from the interior of the state, while 169 (30.5%) were from the municipality of Belém. All these data are summarized in Graph 1 and 2.

**Graph 1.** Description of the population with head and neck cancer seen at Ophir Loyola Hospital between 2018 and 2022, with respect to sex, income, ethnicity, and age group




Source: Study database.

**Graph 2.** Description of the population with head and neck cancer seen at Ophir Loyola Hospital between 2018 and 2022, with respect to education, place of referral, clinical staging, and primary tumor site




Source: Study Database.

The characteristics of the case series analyzed reinforce results described nationally[4,30], as well as worldwide[31,32,33]. Thus, at the regional level, the clinical and epidemiological profile of the patient affected by HNC is predominantly that of a man between the fifth and eighth decades of life.

Regarding ethnicity, the choice of the criterion used to define it may vary according to the region of the country. For example, in a study in the Southern Region, the variable was dichotomized into "White" and "non-White"[34], while in another in the Southeast, the classification "White," "Black," and "Brown" was adopted[30]. In Brazil, "color" or "race" is defined as a category socially constructed through social interaction rather than as a biological concept, with its categorization proposed as "Black, Brown, White, Yellow, and Indigenous," and self-identification used as the data collection criterion. To follow the national standard and facilitate future comparisons, the subdivision defined nationally was used in this study[35]. Internationally, this comparison becomes difficult because there is considerable variation in the criteria for separating ethnic groups, since most North American studies present forms of stratification entirely different from those used in national studies, such as "Hispanic and non-Hispanic"[36] and "non-Hispanic Blacks and Whites"[37]. There are also regions in which ethnicity is not considered because of the low variability of ethnic groups[38].

Considering the time elapsed between diagnosis and treatment, 15.7% of patients (74 cases) received treatment within 60 days, with a median time of 118 days and a mean of 128.55 days. The interquartile intervals and standard deviation are shown in Table 1.

**Table 1.** Descriptive statistics for the time-between-diagnosis-and-treatment variable for patients with head and neck cancer seen at Ophir Loyola Hospital between 2018 and 2022

| Mean | Standard deviation | Lower limit | Upper limit | 1st quartile | Median | 3rd quartile |
|---|---|---|---|---|---|---|
| 128.55 days | 75.50 days | 120.84 days | 136.27 days | 73.75 days | 118 days | 180.25 days |

Source: Study Database.

In the context of a growing number of HNC cases in the Northern Region[24], indicators of a high number of delays had already been evidenced in 2012, 2013, and 2015, when more than 50% of oral cavity and oropharyngeal cancer cases received treatment more than 60 days after diagnosis[20]. This result shows that Law No. 12.732, of November 22, 2012 ("60-Day Law")[26] still faces difficulties in being fully complied with, at least in HNC cases in the Northern Region. It should be emphasized that a delay in cancer treatment is linked to lower chances of effective local control and increased mortality[39].

Although the case series presented reveals a tendency toward delayed treatment, contrary to the "60-Day Law," the mean waiting time for patients is found to be within the 180 days recommended by the National Judicial Forum for Health[40], a fact that shows that refining existing public data on cancer may contribute to improving dialogue between health professionals and judicial/legislative professionals, favoring alignment between judicial decisions and the legislation in force, with the aim of ensuring faster access to cancer treatment and equity among different cancer types.

This equity, based on more detailed reports than those currently available in the databases of the SUS and its service-providing hospitals, can contribute favorably to addressing the growth of health judicialization within SUS in recent years[41], enabling more effective and efficient decisions guided by the constitutional principles governing the realization of cancer patients' fundamental right to health. In this way, it contributes to resolving shortcomings in the provision of public health services, allowing more directed action by the Public Administration, both in management and in care, as well as in institutional dialogue with the Judiciary, improving the State's response to the demands of this category of patients, which already faces various other obstacles to obtaining adequate care[21].

It should be emphasized that the principle of equity is based on the premise that real equality consists of treating unequal people unequally to the extent of their inequality. Within SUS, this precept requires the State to formulate policies that ensure universal and equal access to health actions, prioritizing care and the distribution of resources for those who need them most. However, promoting equity faces challenges in the growing judicialization of health, which can generate discrimination by privileging patients who have the means to resort to judicial proceedings to the detriment of those who remain on administrative waiting lists. This phenomenon, by focusing on satisfying individual rights in isolation, risks compromising collective health and budgetary balance[42], resulting in a breach of equal treatment among citizens affected by similar, but not completely identical, illnesses, such as cancer patients.

Furthermore, although public data show that 69% of cancer cases treated between 2021 and 2023 at the center where the study was conducted received treatment within 60 days after diagnosis[43], it is necessary to point out that, according to a technical note from the Oncology Panel[44], cases with a diagnosis established after biopsy or after resection (the latter being a time when there is no formalized cancer diagnosis) are counted as if they had received treatment between zero and 30 days after diagnosis, creating an interpretation that may mask the difficulty of access for patients who arrive at the hospital without a diagnosis, receive a generic surgical treatment, and only afterward obtain histopathological confirmation that they have cancer.

Another criticism is that, in this way of counting the data, all cancer types are analyzed together, including diseases with different biological behaviors and treatments, for example, pancreatic adenocarcinoma (a serious disease with high morbidity and mortality[45] and papillary

thyroid carcinoma (minimally aggressive, with indolent behavior and survival rates of up to 100% of cases[46]. These aspects may produce distortions in the interpretation of the results by managers and oversight bodies, reinforcing the need for an analysis of this time interval stratified by cancer type.

Using Fisher's exact test, the analysis of time to treatment did not show statistically significant differences in relation to sex (p = 0.121), age (p = 0.337), ethnicity (p = 0.280), income (p = 0.596), education (p = 0.190), and the place from which the patient was referred (p = 0.091). However, significant differences appear when the variables clinical staging and primary site are observed (p = 0.016 and p = 0.012, respectively), as shown in Table 2.

**Table 2.** Time until first treatment in relation to sex, age, ethnicity, income, education, place of referral, staging, and primary tumor site

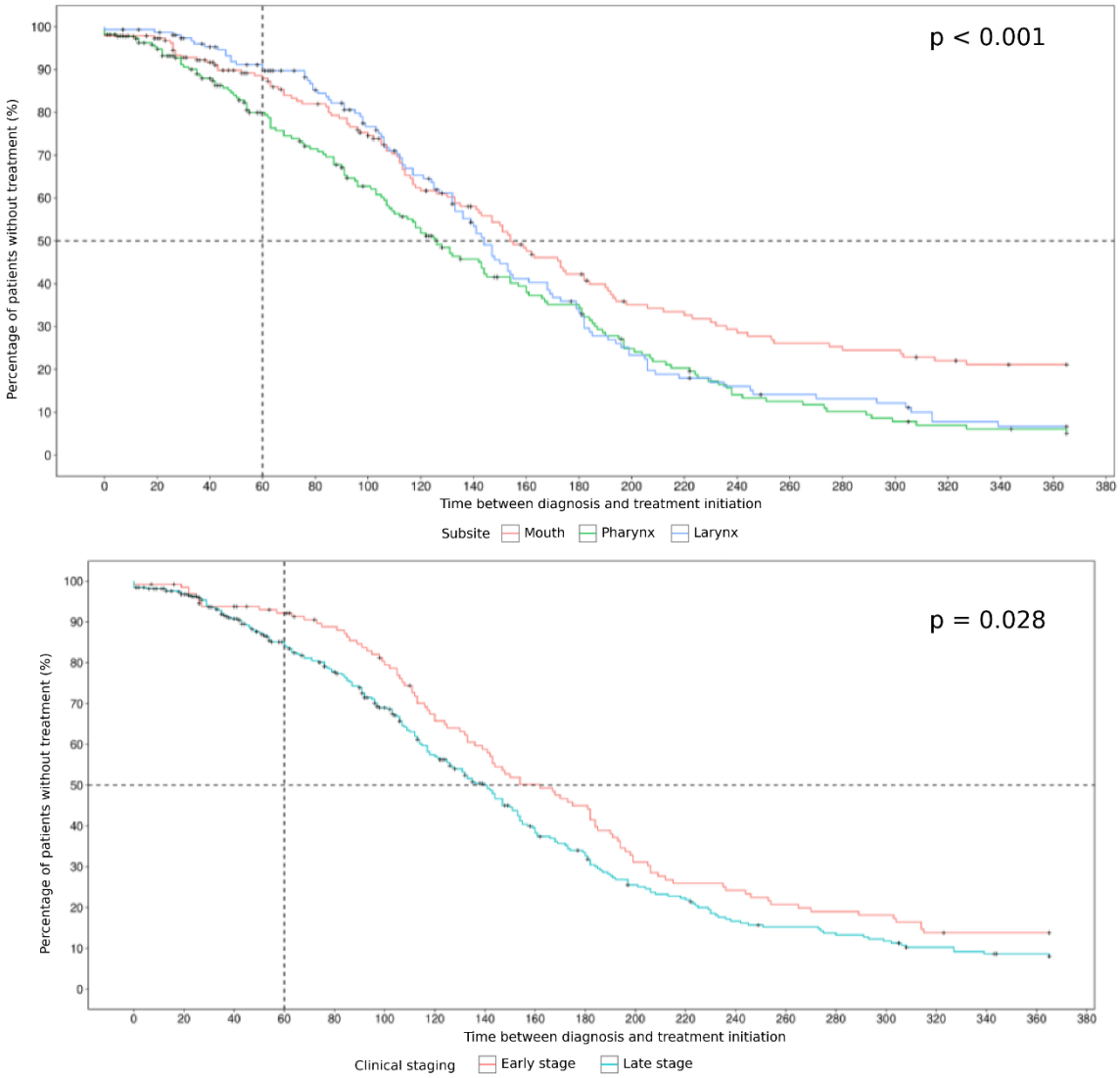
| Variable | Without delay (≤60 days) | With delay (>60 days) | Total | Significance level (p), Fisher |
|---|---|---|---|---|
| **Sex** | | | | ***p = 0.121*** |
| Male | 15 (11.3%) | 118 (88.7%) | 133 (28.3%) | |
| Female | 59 (17.5%) | 278 (82.5%) | 337 (71.7%) | |
| **Age** | | | | ***p = 0.337*** |
| 40 years or younger | 5 (18.5%) | 22 (81.5%) | 27 (5.7%) | |
| Over 40 to 70 years | 57 (16.9%) | 280 (83.1%) | 337 (71.7%) | |
| Over 70 years | 12 (11.3%) | 94 (88.7%) | 106 (22.6%) | |
| **Ethnicity** | | | | ***p = 0.792*** |
| Brown | 53 (15.1%) | 297 (84.9%) | 350 (74.8%) | |
| Black | 11 (18%) | 50 (82%) | 61 (13%) | |
| White | 9 (15.1%) | 48 (84.2%) | 57 (12.2%) | |
| **Income** | | | | ***p = 0.596*** |
| No income | 13 (13.4%) | 84 (86.6%) | 97 (22.4%) | |
| < 1 minimum wage | 13 (21%) | 49 (79%) | 62 (14.3%) | |
| From 1 to 2 minimum wages | 33 (14.7%) | 191 (85.3%) | 224 (51.7%) | |
| 3 or more minimum wages | 8 (16%) | 42 (84%) | 50 (11.6%) | |
| **Education** | | | | ***p = 0.190*** |
| Illiterate | 9 (10.5%) | 77 (89.5%) | 86 (19.2%) | |
| Complete or incomplete elementary education | 38 (15.3%) | 211 (84.7%) | 249 (55.6%) | |

| | | | | |
|---|---|---|---|---|
| Complete or incomplete secondary education | 18 (20.7%) | 69 (79.3%) | 87 (19.4%) | |
| Complete or incomplete higher education | 6 (23.1%) | 20 (76.9%) | 26 (5.8%) | |
| **Place of referral** | | | | ***p = 0.091*** |
| Belém | 28 (20.1%) | 111 (79.9%) | 139 (30.3%) | |
| Interior | 43 (13.5%) | 276 (86.5%) | 319 (69.7%) | |
| **Staging** | | | | ***p = 0.016*** |
| Early stage | 10 (8.1%) | 113 (91.9%) | 123 (28.4%) | |
| Late stage | 54 (17.4%) | 256 (82.6%) | 310 (71.6%) | |
| **Primary tumor site** | | | | ***p = 0.012*** |
| Mouth | 21 (13.3%) | 137 (86.7%) | 158 (33.6) | |
| Pharynx | 38 (22.4%) | 132 (77.6%) | 170 (36.2%) | |
| Larynx | 15 (10.6%) | 127 (89.4%) | 142 (30.2%) | |

Source: Study Database.

The same occurred in Kaplan-Meier estimation, with a significant difference between the curves considering clinical staging and primary site (Graph 3).

**Graph 3.** Kaplan-Meier analysis for time until treatment and the variables primary tumor site and clinical staging




Source: Study database.

A statistically significant difference is observed between the primary tumor site curves ($p < 0.001$ in the log-rank test), indicating that this variable influences time to treatment. It should be emphasized that, based on the chart, it can be stated that 50% of patients with pharyngeal cancer begin treatment within 126 days, whereas, for the same proportion of patients with mouth cancer, this time is 154 days, and for laryngeal cancer, 144 days. The same occurs when we evaluate the clinical staging curves versus time to treatment ($p < 0.028$ in the log-rank test), with patients at a late stage receiving slightly faster treatment. Therefore, these results suggest that patients with malignant neoplasms of the mouth and larynx, as well as patients at an early stage, have a longer treatment delay, showing disparities in access to or the speed of treatment according to the tumor site and disease stage.

Patients with early-stage HNC and with mouth and laryngeal lesions have surgery as their initial treatment[7]. There is a "bottleneck" in the provision of this treatment in the Northern Region because of the scarcity of specialized personnel and the number of hospitals able to provide the treatment required for this disease, a hypothesis already raised in a study in the state of Amazonas, with a similar population and challenges[19], with the cancer incidence pattern in the Northern Region being influenced by inequalities in access to prevention and early diagnosis[22]. To illustrate, considering Porto Alegre, a Brazilian capital with a population similar to that of Belém, there are two hospitals accredited as CACONs, whereas the Amazonian capital has only one[43,47]. In addition, the state of Pará has 8.73 surgeons per 100,000 inhabitants and 4.58 anesthesiologists per 100,000 inhabitants, whereas a state with a numerically similar population, such as Santa Catarina, has 24.74 surgeons per 100,000 inhabitants and 13.36 anesthesiologists per 100,000 inhabitants[48], these professionals being essential to an institution's capacity to perform surgeries. The context is further aggravated when we consider the number of specialists in head and neck surgery in Pará, professionals who are essential in HNC treatment: there are 10 registered physicians, according to the publication Medical Demography of 2025[48], compared with 53 in Santa Catarina. This scenario favors a longer delay in cancer surgery in general for inhabitants of the state of Pará, which may not be exclusive to patients in this case series.

There is a component of delay caused by the professionals who see the patient and another caused by the patient. First, professional-related delay may be influenced by visits that do not solve the problem and by unnecessary investigations, linked, for example, to an incomplete care model currently widespread in various Brazilian cities, including Belém[49], which consists of the operation of low-cost private clinics without a focus on comprehensive treatment, lacking resources for follow-up and treatment of greater technological complexity, and which ultimately contribute to patients returning to public care. At the same time, misdiagnosis and the indiscriminate prescription of antibiotics and analgesics have been related to delays in cancer diagnosis[50], a fact that shows the need for continuous updating of health professionals who work in private clinics, urgent care facilities, and primary care.

Second, although the component of delay attributed to the patient relates to factors such as "denial," "personal experience with cancer," and "knowledge about cancer"[50], this explains only part of the context in which these people are situated. Certainly, the causes are more complex and extend beyond the field of health, since low educational levels, tobacco and alcohol abuse, and difficulty in accessing quality public treatment have deep historical roots, with social, economic, and cultural repercussions that fall outside the scope of this study but can be better understood in Martins et al.[12].

It can be stated that the results presented here have direct implications for the debate on the judicialization of access to cancer treatment in the SUS. The mean delay of 128.55 days found in head and neck cancer cases in Pará, more than twice the time limit established by Law No. 12.732/2012, indicates that noncompliance with the rule is not episodic but structural in the regional reality.

This finding is relevant to the Judiciary because it shows that treatment delay does not generally arise from an individualized and arbitrary omission by the Public Administration, but from systemic conditions related to the scarcity of specialized human resources and the insufficiency of the high-complexity care network in the Northern Region. Understanding this distinction is essential

for judicial decisions to be issued on the basis of parameters compatible with the local reality, avoiding individual judicial protection that deepens inequalities by reallocating already scarce resources to the detriment of other equally (or even more) vulnerable patients.

Furthermore, the statistically significant difference in time to treatment according to the primary tumor site and clinical staging demonstrates that cancer cannot be treated as a homogeneous category either for administrative management purposes or for judicial protection purposes, under penalty of producing decisions that, by ignoring the heterogeneity of neoplasms, compromise the equity of the system as a whole.

It is important to point out that this case series may reflect only the characteristics of patients seen at the hospital hosting the study, and that the centrality of this institution in Pará's state regulatory system makes it a place where the most complicated cases are seen. In addition, the group shown here and its characteristics are those of patients who managed to reach treatment, and it is not possible with this dataset to know how many remained without a diagnosis and, consequently, without registration and without treatment. Despite the foregoing, it should be emphasized that the case series (568 cases) represents 35.06% of the total HNC cases estimated by the National Cancer Institute for Pará from 2018 to 2022[51,52].

## Final considerations

This study demonstrated that, considering patients with head and neck cancer seen at the CACON in the capital of the state of Pará between 2018 and 2022, there was a longer treatment delay for cases of mouth and laryngeal tumors and for cases at an early stage. This finding shows disparities in access to or the speed of treatment according to the primary tumor site and disease stage, which may be related to local characteristics of the provision of specialized care, due to the scarcity of human resources or the State's failure to adequately meet the demand for care.

The findings of this study reinforce the importance of the judicialization of access to cancer treatment being shaped by epidemiological evidence disaggregated by cancer type and region. Structural noncompliance with the time limit provided in Law No. 12.732/2012, evidenced in the data from the CACON in the state of Pará, cannot be adequately understood without considering the regional systemic conditions that determine it, including the scarcity of specialists in head and neck surgery and the insufficiency of the high-complexity oncology network.

It is suggested that further studies observe cancer as a group of diseases that differ from one another and that populational specific characteristics can better delineated along with health care network in which this population is situated, so that data can be produced at local and regional levels that more equitably support public policies development, as well as legislation and judicial decisions involving cancer patients, since data specific to the type of neoplasm not only improve the State's administrative response but also support the Judiciary in formulating more equitable, technically grounded decisions compatible with the constitutional principles of equality, comprehensiveness, and universality of access to health care. Failure to consider this information contributes to judicialization operating unequally, disproportionately benefiting those with greater access to judicial proceedings and perpetuating inequities in cancer care, in a diametrically opposed direction to what is advocated by health law as a field committed to the collective realization of the right to health.

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## Authors' contributions

J.G.M. Paixão: conception/design of the article, data analysis and interpretation, writing of the article, and approval of the final version.
I.L.G. Silva: critical review of its content.
C.S.C. Miranda: data analysis and interpretation, writing of the article and approval of the final version.
N.V. Gonçalves: data analysis and interpretation, writing of the article and approval of the final version.

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The data underlying the research text will be available upon request to the authors after publication, as justified in the manuscript.

## Declaration of use of Artificial Intelligence (AI) tools

The authors declare that artificial intelligence tools were used in the preparation of this manuscript or in the research reported therein.


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