

Epidemiology, Diagnosis, Surgical Management, and Prognosis of Digestive Cancers in Young Adults under 50 Years of Age in Cotonou, Benin (2017-2022)

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Abstract

Background: Digestive cancers are a major contributor to global cancer-related morbidity and mortality. With an estimated 19 million new cases and 9 million deaths annually, cancer now exceeds HIV/AIDS, tuberculosis, and malaria as a cause of death worldwide. Several studies from Benin and sub-Saharan Africa have reported a relatively young age at diagnosis of digestive cancers. This study aimed to describe the epidemiological, diagnostic, therapeutic, and prognostic characteristics of digestive cancers in young adults in Benin. **Methods:** We conducted a retrospective descriptive and analytical study over a six-year period, from January 2017 to December 2022. Patients aged 18 - 49 years diagnosed with digestive cancers were included. **Results:** A total of 175 patients were analyzed. Liver cancer was the most frequent digestive malignancy (34.9%), followed by colorectal cancer (28.0%) and gastric cancer (17.1%). A male predominance was observed (sex ratio = 2.3). The mean age was 38.1 ± 8.4 years (range: 18 - 49). Identified risk factors included alcohol consumption (43%), chronic hepatitis B infection (22.9%), gastroduodenal ulcer disease (16%), and tobacco use (3%). Adenocarcinoma was the predominant histological subtype (88%). The highest crude mortality rates were observed in esophageal, colorectal, liver, and pancreatic cancers. **Conclusion:** Digestive cancers represent a substantial burden among young adults in Benin and are associated with high mortality. Improving access to early de-

tection, strengthening prevention and control of modifiable risk factors, and optimizing prognostic and therapeutic capacities are essential to enhance patient management and survival outcomes.

Keywords

Digestive Cancers, Young Adults, Epidemiology, Diagnosis, Surgical Oncology, Benin, Africa South of the Sahara

1. Introduction

Cancer is among the leading causes of morbidity and mortality worldwide. According to the World Health Organization, approximately 19 million new cancer cases and 9 million cancer-related deaths occur each year, placing cancer among the most lethal diseases globally, ahead of HIV/AIDS, tuberculosis, and malaria [1]. Once considered predominantly diseases of industrialized countries, cancers have increased markedly over recent decades in low- and middle-income countries.

Numerous epidemiological studies have examined the distribution of different cancer types and have highlighted digestive cancers because of their high incidence and severity worldwide [2] [3]. Globally, the most prevalent digestive malignancies include colorectal cancer, which accounts for approximately 10.2% of all cancers, gastric cancer (5.7%), and primary liver cancer. In Benin and across sub-Saharan Africa, most studies emphasize the relatively young age at diagnosis among patients affected by digestive cancers [4].

In the context of the rising cancer burden in sub-Saharan Africa [5], the establishment of effective cancer surveillance systems has become a major public health priority [6].

Cancer has traditionally been regarded as a disease of older adults. However, the incidence of cancer among individuals under 50 years of age has increased globally over recent decades [7]. In particular, the incidence and mortality of early-onset colorectal cancer (CRC) are rising worldwide [8]. These early-onset cancers often display more aggressive clinical behavior and contribute disproportionately to premature mortality and disability, while also posing specific diagnostic, therapeutic, and socioeconomic challenges [7].

In this context, the present study aimed to describe the epidemiological, diagnostic, therapeutic, and prognostic characteristics of digestive cancers in young adults in Benin.

2. Methods

2.1. Study Design and Setting

This was a retrospective, cross-sectional descriptive study based on the medical records of patients managed for digestive cancers in the departments of visceral

surgery, internal medicine, and hepatogastroenterology at the National Teaching Hospital Hubert Koutoukou Maga (CNHU-HKM) and the Suru-Léré University Hospital, both located in Cotonou, Benin.

2.2. Study Population

The study population included patients aged 18 to 49 years in whom a diagnosis of digestive cancer was established on the basis of clinical, paraclinical, and/or histopathological findings, and who were treated and followed up in the participating departments. Medical records were reviewed over a six-year period, from 1 January 2017 to 31 December 2022.

2.3. Inclusion Criteria

Patients were included if they met all of the following criteria:

- a confirmed or highly suspected diagnosis of digestive cancer based on clinical, paraclinical, and/or histopathological evidence;
- availability of information related to therapeutic management (including surgical reports and chemotherapy);
- complete and exploitable medical records.

2.4. Diagnosis

The diagnosis of cancer was confirmed histologically whenever possible. In cases where histological confirmation was not available, the diagnosis was considered highly suspected based on a combination of clinical presentation, imaging findings, and biological markers.

2.5. Prognostic Assessment

Prognosis was assessed using crude mortality by tumor site during the study period.

3. Results

3.1. Epidemiological Characteristics

During the study period, 982 patients were admitted for digestive cancers in the participating centers. Among them, 283 were young adults under 50 years of age, representing 28.8% of all digestive cancer cases. Of these 283 patients, complete medical records were available for 175 cases, which were included in the analysis.

Figure 1 illustrates the flow diagram of patient inclusion.

Over the study period, a steady increase in the number of digestive cancer cases among young adults was observed. **Figure 2** shows the annual distribution of patients diagnosed with digestive cancers.

The mean age of patients was 38.14 ± 8.39 years. The peak age at diagnosis ($n = 64$) was observed in the 35 - 45-year age group. **Figure 3** presents the distribution of patients according to age groups.

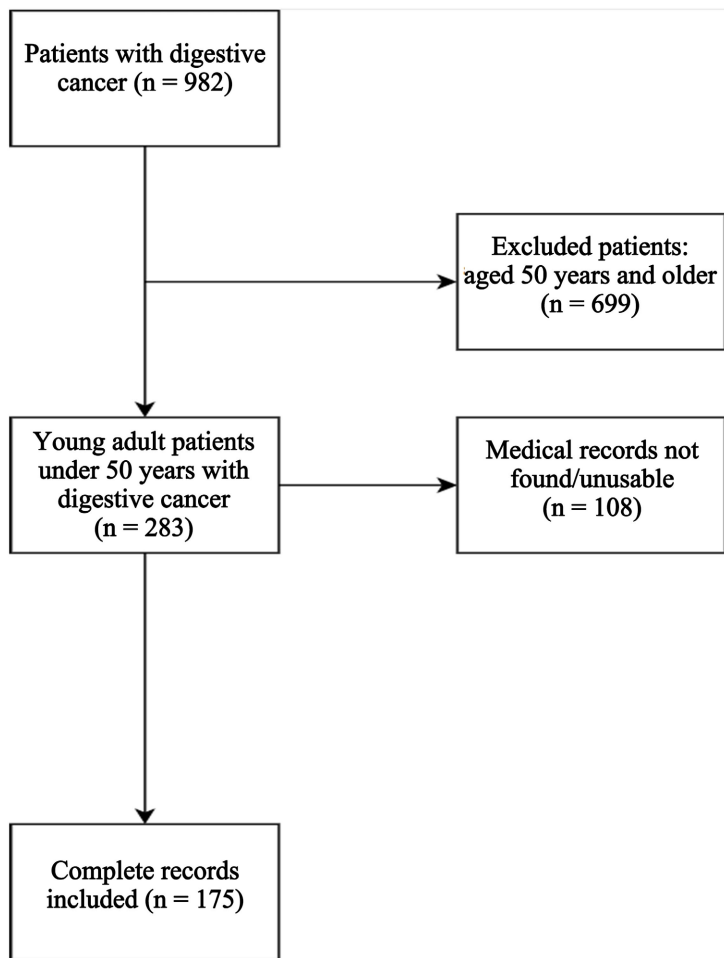


Figure 1. Flow chart of patient inclusion in the study.

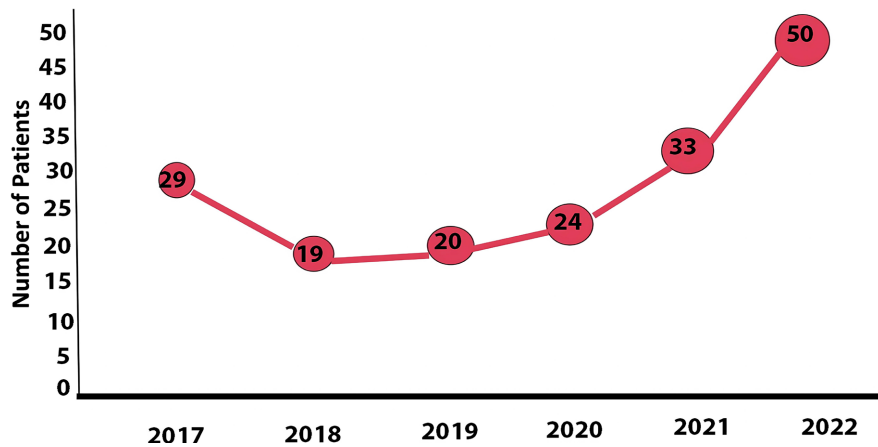


Figure 2. Distribution of patients with digestive cancer according to the year of diagnosis.

Liver and colorectal cancers were more frequent in patients aged 35 - 45 years, whereas gastric, esophageal, and pancreatic cancers were more commonly diagnosed in patients aged ≥ 45 years. In the youngest age group (18 - 25 years), liver cancer was the most frequently observed malignancy.

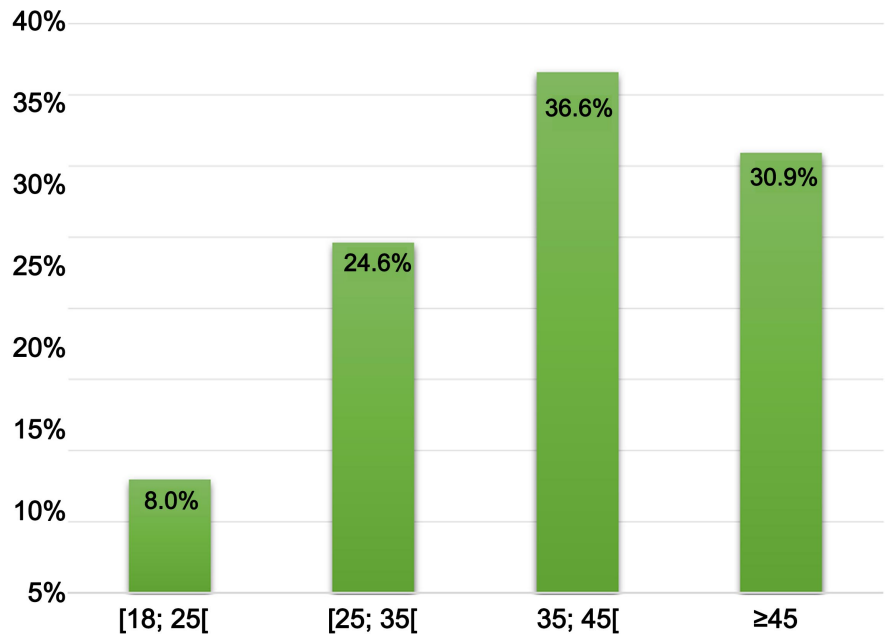


Figure 3. Distribution of digestive cancer patients by age group.

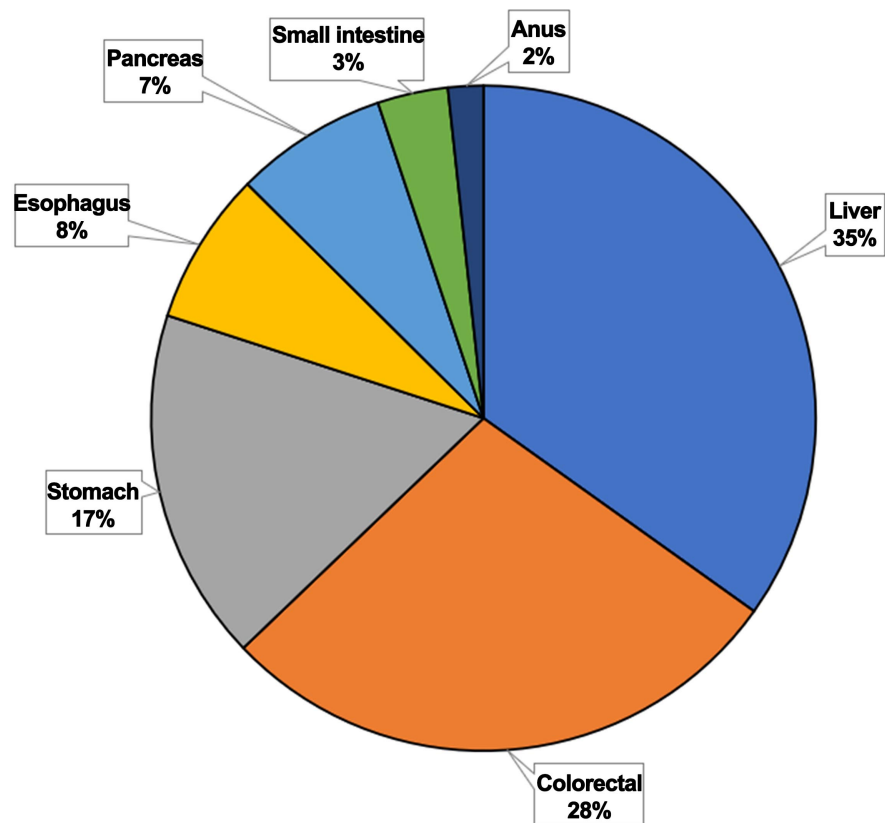


Figure 4. Distribution of patients according to the site of digestive cancer.

The most frequent tumor site was the liver, accounting for 35% of cases ($n = 61$), followed by the colon and rectum (28%, $n = 49$) and the stomach (17%, $n = 30$). The least frequent site was the anus, representing 2% of cases ($n = 3$). Hepatic

cancers were mainly managed in the departments of internal medicine and hepatogastroenterology. **Figure 4** shows the distribution of digestive cancers by tumor site.

Male patients predominated, accounting for 69.7% of cases ($n = 122$), corresponding to a male-to-female ratio of 2.3. Regarding socioeconomic status, traders constituted the most represented occupational group (21.1%), followed by civil servants (19.6%). Most patients resided in urban areas (74.9%, $n = 131$), compared with 16% ($n = 29$) living in rural settings.

3.2. Diagnostic Characteristics

3.2.1. Clinical Findings

The mean delay between symptom onset and the first medical consultation was 8 months, with a standard deviation of 19.5 months. The delay ranged from 1 to 180 months.

The most frequently reported medical histories included chronic hepatitis B infection (22.9%), gastric or duodenal ulcer disease (16%), and hypertension (8%). Alcohol consumption was common, reported in 43% of patients, whereas tobacco use was identified in 3%.

The most frequent presenting symptoms were abdominal pain (94.3%) and vomiting (42.9%). At admission, most patients were in poor general condition, with a World Health Organization (WHO) performance status of 3 in 74.4% of cases. **Figure 5** shows the distribution of WHO performance status among young patients with digestive cancers.

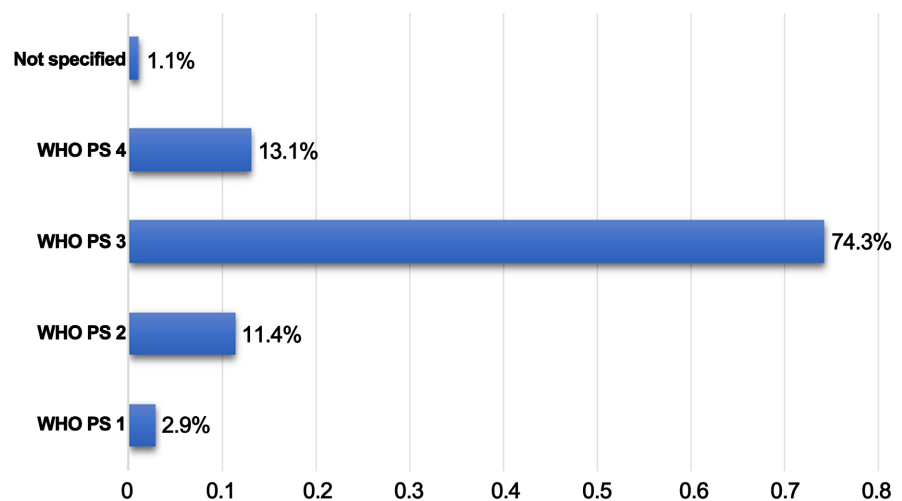


Figure 5. Distribution of young patients with digestive cancers according to their WHO Performance Status.

On physical examination, abdominal masses were detected in 26.9% of patients, and jaundice was observed in 33.1%.

3.2.2. Paraclinical Findings

Endoscopy

Digestive endoscopy was performed in 88 patients. Ulcerative and exophytic lesions were identified in 40.6% of digestive tract cancers.

Histopathology

Histological analysis showed that the majority of digestive tumors were adenocarcinomas, accounting for 66 cases (88%). Squamous cell carcinomas were observed in 5 cases (6.7%), while gastrointestinal stromal tumors (GIST) accounted for 4 cases (5.3%).

3.3. Surgical Management, Adjuvant Therapies, and Overall Outcomes

Surgical treatment was performed in 60 patients (34.3%). Surgery was undertaken with curative intent in 56.6% of cases (34/60) and with palliative intent in 43.3% (26/60). **Table 1** presents the distribution of patients according to curative and palliative surgical interventions.

Table 1. Distribution of patients according to curative and palliative surgical interventions.

	Number	Percentage
Surgery		
Performed	60	34.3
Not Performed	86	49.1
Not specified	29	16.6
Curative-intent surgery		
Curative-intent surgery	34	56.6
Esophagectomy	1	1.7
Gastrectomy	8	13
Small bowel resection	3	5
Right hemicolectomy	6	10
Left hemicolectomy	1	1.7
Segmental colectomy	11	18.3
Cephalic duodeno-pancreatectomy	1	1.7
Left pancreatectomy	2	3.3
Excision, cauterization	1	1.7
Palliative-intent surgery		
Palliative-intent surgery	26	43.3
Feeding jejunostomy	9	15
Gastrostomy	2	3.3
Colostomy	12	20
Right hepatectomy	2	3.3
Duodeno-pancreatectomy, cholecystectomy, and double bypass	1	1.7

Chemotherapy was administered to 13.1% of patients (n = 23), including neo-adjuvant chemotherapy in 3.4% (n = 6), adjuvant chemotherapy in 4.0% (n = 7),

and palliative chemotherapy in 5.7% (n = 10). The FOLFOX regimen was the most frequently used chemotherapy protocol. Targeted therapy was administered to 37 patients, of whom 33 (89.2%) received sorafenib and 4 (10.8%) were treated with imatinib (Glivec®).

The highest crude mortality rates were observed in esophageal, colorectal, liver, and pancreatic cancers. **Table 2** presents the crude mortality of digestive cancers by affected organ.

Table 2. Crude mortality of digestive cancers by affected organ.

	N	Deaths (Yes)	%
Anus	3	0	0.00
Small intestine	6	3	50.00
Rectum	19	10	52.63
Stomach	30	18	60.00
Pancreas	13	8	61.54
Liver	61	40	65.57
Colon	30	20	66.66
Esophagus	13	9	69.23

4. Discussion

4.1. Epidemiology

The proportion of digestive cancers occurring in young adults under 50 years of age in our series (28.8%) is remarkably high. This finding confirms that, in our setting, digestive cancers are no longer confined to older populations and suggests a concerning shift in the epidemiological profile of these malignancies in Benin. This elevated proportion may reflect both earlier and sustained exposure of younger individuals to major risk factors—particularly chronic viral infections, alcohol consumption, dietary habits, and environmental toxins—as well as a gradual improvement in diagnostic capacity within referral hospitals over recent years.

From an anatomical standpoint, liver (34.85%), colorectal (28%), and gastric cancers (17.14%) were the most frequently observed sites. This distribution is consistent with reports from Kpoussou *et al.* in Cotonou [4] and Gnanon *et al.* in the Ouémé region [9], and reflects the substantial burden of cancers related to infectious and environmental exposures in sub-Saharan Africa. The predominance of liver cancer among young adults is likely attributable to the high endemicity of hepatitis B virus infection in Benin—often acquired early in life—combined with alcohol consumption and exposure to foodborne toxins.

The mean age at diagnosis was 38.14 ± 8.39 years, with a peak incidence between 35 and 45 years, underscoring the early onset of digestive cancers in this population. This mean age is lower than that reported by Gnanon *et al.* (48.5 ± 15.2 years) [9], a difference explained by the deliberate restriction of our study population to individuals under 50 years of age. Nevertheless, these findings high-

light the need to reconsider current prevention and screening strategies, which are typically targeted toward older age groups.

A marked male predominance was observed (69.7%; sex ratio = 2.3), in line with most African studies, including those by Gnanon *et al.* in Porto-Novo [9] and Kissi *et al.* in Abidjan [10]. This disparity may be related to greater exposure of men to behavioral risk factors such as alcohol and tobacco use, as well as sociocultural differences in health-seeking behavior.

4.2. Diagnostic Aspects

The mean delay between symptom onset and hospital admission was 8 months, indicating a substantial diagnostic delay. Comparable delays have been reported by Kanhonou *et al.* (9 months) [4] and Maiga *et al.* in Mali (4 - 7 months) [11]. Such prolonged delays reflect limited awareness of warning signs, late referral to specialized care, and persistent financial, geographic, and cultural barriers to healthcare access. These factors contribute directly to diagnosis at advanced stages of disease.

Clinically, most patients presented with a poor general condition at admission (87.42%), with abdominal pain (94.3%) and vomiting (42.9%) being the most frequent presenting symptoms. These findings are consistent with those reported by Diarra *et al.* in Mali [12], supporting the observation that digestive cancers in low-resource settings are often diagnosed only after significant clinical deterioration. Physical findings such as abdominal masses (26.9%) and jaundice (33.1%) further suggest advanced locoregional or metastatic disease at presentation. Higher proportions reported by Kissi *et al.* [10] may reflect differences in referral patterns or study populations.

Digestive endoscopy, performed in 49.7% of patients, remains a cornerstone of diagnostic evaluation for gastrointestinal malignancies. However, its limited accessibility, as also reported by Gnanon *et al.* [9], represents a major challenge. Financial constraints, limited availability of endoscopic equipment, and cultural beliefs minimizing cancer-related symptoms all contribute to underutilization. The predominance of ulcerative and stenosing lesions observed at endoscopy is indicative of advanced disease at the time of diagnosis.

The histological confirmation rate of 42.9% observed in our study is higher than those reported by Kpoussou *et al.* (30.5%) [4] and Gnanon *et al.* (11.3%) [9]. This improvement likely reflects the increasing availability of pathology services in Cotonou and a growing recognition of the importance of histopathological confirmation. Adenocarcinoma accounted for 88% of confirmed cases, reaffirming its predominance as the most frequent histological subtype of digestive cancers, in agreement with previous reports [4] [13].

4.3. Outcomes and Prognosis

The overall mortality rate in our study was high (61.7%). This figure is comparable to those reported by Kpoussou *et al.* in Cotonou (58.4%) [4] and Gnanon *et al.*

in the Ouémé region (64.2%) [9], but substantially higher than the rate observed by Kissi *et al.* in Abidjan (42.6%) [10]. Such elevated mortality largely reflects late presentation, poor general condition at admission, and limited access to comprehensive oncologic treatment, including curative surgery, chemotherapy, and radiotherapy. In addition, financial toxicity may negatively impact oncologic outcomes by delaying diagnosis and limiting access to optimal treatment, particularly in low-resource settings such as Benin [14].

Liver, colorectal, gastric, esophageal, and pancreatic cancers accounted for most deaths in our series. This pattern is consistent with GLOBOCAN 2018 data for Benin, which identified liver, gastric, pancreatic, and colorectal cancers as leading causes of cancer-related mortality [1]. These findings underscore the particularly poor prognosis of digestive cancers in resource-limited settings. In a hospital-based study conducted in Cotonou, primary liver cancer was associated with an extremely poor prognosis, characterized by very high early mortality and a median survival of approximately two months after diagnosis [15].

4.4. Role of Surgery in the Management of Digestive Cancers in Young Adults in Sub-Saharan Africa

Surgery is essential for global cancer care across all resource settings [16]. It remains the cornerstone of curative treatment for digestive cancers in young adults when complete resection is feasible. In this population, surgical management aims not only to achieve optimal oncological control through radical resection, but also to preserve long-term functional outcomes and quality of life, given the life expectancy, socioeconomic responsibilities of young patients, and the often aggressive biological behavior of tumors diagnosed at an early age.

In Benin, as in many countries of sub-Saharan Africa, delayed diagnosis and advanced disease at presentation substantially limit access to curative surgery, resulting in a high proportion of palliative procedures and persistently poor survival outcomes. Even when surgery is feasible, late-stage diagnosis often increases the technical complexity of surgical procedures [17] [18] and the risk of postoperative morbidity [19].

5. Study Limitations

A major limitation of this study is the inclusion of highly suspected digestive cancer cases without histological confirmation, which represented 57.1% of the sample. Although this approach reflects real-life clinical practice in settings with limited access to pathology services, it may have introduced misclassification bias and affected the accuracy of site-specific epidemiological estimates.

Another important limitation is the exclusion of 108 patients (38% of eligible cases) due to incomplete medical records. This may have introduced selection bias, as excluded patients could differ in terms of disease severity, access to care, or outcomes.

In addition, the high proportion of patients lost to follow-up limited our ability

to assess prognosis using robust survival indicators. As a result, prognostic evaluation relied solely on crude mortality, which does not fully capture long-term survival outcomes and may underestimate or overestimate the true prognostic impact of digestive cancers in this population.

Consequently, the findings should be interpreted with caution and may not be fully generalizable to all young adults with digestive cancers in Benin.

6. Conclusions

This retrospective descriptive and analytical study provides important insights into the epidemiological, diagnostic, therapeutic, and prognostic characteristics of digestive cancers in young adults under 50 years of age in Cotonou, Benin. Liver cancer was the most frequent malignancy (34.85%), followed by colorectal (28%) and gastric cancers (17.14%). A marked male predominance was observed, with a sex ratio of 2.3. The mean age at diagnosis was 38.14 ± 8.39 years, ranging from 18 to 49 years. Major risk factors included chronic viral hepatitis (B and C), alcohol consumption, tobacco use, and gastroduodenal ulcer disease. Histological confirmation was obtained in 42.9% of cases, with adenocarcinoma representing the predominant histological subtype (88%). The highest crude mortality rates were observed in esophageal, colorectal, liver, and pancreatic cancers.

These findings highlight the substantial burden and poor prognosis of digestive cancers among young adults in Benin, largely driven by delayed diagnosis, advanced disease at presentation, and limited access to optimal oncologic care. Improving access to early diagnostic services, strengthening prevention and control of modifiable risk factors, and enhancing therapeutic and prognostic capacities—particularly surgical and multidisciplinary care—are essential to improve patient management and survival outcomes for digestive cancers in Benin.

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Conflicts of Interest

The authors declare no conflicts of interest related to this study.

Ethical Considerations

Ethical considerations and data confidentiality were respected. Permissions from relevant hospital authorities were obtained beforehand.

Data Availability

Data are available in the hospital's data collection system and medical records and can be accessed in compliance with ethical and confidentiality requirements.

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