

Primary Liver Cancer: Epidemiological, Diagnostic, Therapeutic, and Outcome Characteristics at Brazzaville University Hospital

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Abstract

Objective: To describe the epidemiological, diagnostic, therapeutic, and outcome characteristics of primary liver cancer (PLC) at Brazzaville University Hospital (CHU-B). **Methods:** We conducted a single-centre descriptive cohort study with retrospective and prospective data collection from January 1, 2021, to September 30, 2025, at Brazzaville University Hospital. Data were collected using a pre-established questionnaire. The variables included epidemiological, diagnostic, therapeutic, and outcome characteristics. **Results:** A total of 117 patients were included, corresponding to a hospital frequency of 9.4% for PLC. The male-to-female ratio was 2.25 and the mean age was 53.9 ± 9.2 years. Hepatomegaly (51.3%) was the most common reason for consultation. Alcohol use was reported in 60.7% of patients and 94% had poor general condition. Anaemia was observed in 83.0% of patients, and alpha-fetoprotein was elevated in 64.5%. On ultrasonography, 83.3% of patients had hepatomegaly, including 42.4% with a multinodular liver. On computed tomography, arterial enhancement followed by washout was observed in 85.7% of patients. Viral hepatitis was the leading aetiology (46.9%); cirrhosis was present in 65.8% of patients, with no compensated cases. Few patients were diagnosed at an early stage according to the Barcelona Clinic Liver Cancer classification (BCLC A: 8/117, 6.8%). All patients received palliative treatment. At the last recorded follow-up, 50.5% of patients had died and 49.5% were lost to follow-up. **Conclusion:** PLC is common in Brazzaville. Hepatitis B and C viruses remain the

principal aetiologies. Prognosis is poor because of delayed diagnosis and barriers to accessing care.

Keywords

Primary Liver Cancer, Epidemiology, Diagnosis, Prognosis,
Brazzaville University Hospital, Congo

1. Introduction

Primary liver cancer (PLC) is a major public-health problem because of its high incidence, high mortality, and particularly poor prognosis [1]-[4]. According to the World Health Organization, PLC is among the world's most lethal cancers, with a high mortality-to-incidence ratio reflecting frequent late diagnosis and limited access to curative treatment [4].

GLOBOCAN 2022 data confirm this substantial global burden. PLC ranks sixth among the most common cancers worldwide and third among causes of cancer death, with approximately 866,136 new cases and 758,725 deaths in 2022 [5]. This gap between incidence and mortality reflects the intrinsic severity of the disease and low five-year survival rates.

In Africa, PLC remains common, severe, and markedly underdiagnosed. GLOBOCAN 2022 reported approximately 73,844 new cases and 70,315 deaths on the continent, ranking PLC third for incidence and fourth for cancer mortality [5]. These figures are probably underestimated because cancer registries are incomplete, access to advanced imaging is limited, and histological diagnosis is often delayed [6] [7].

In this context, contrast-enhanced abdominal computed tomography (CT) is central to diagnosis. It can demonstrate the characteristic radiological hallmarks of hepatocellular carcinoma (HCC): intense arterial enhancement (wash-in) followed by portal or delayed washout. These findings often establish the diagnosis without biopsy [8] [9].

Several African hospital studies illustrate the burden of primary liver cancer [10]-[12]. In Côte d'Ivoire, Kissi Anzouan-Kacou *et al.* reported a high HCC frequency (67.8%) among patients admitted to the hepatogastroenterology department of Yopougon University Hospital in Abidjan [10]. In Mali, Guindo *et al.* reported a hospital frequency of 3.04% in Gao in 2024, likewise emphasizing late presentation and high mortality [11]. In Central Africa, Camengo Police *et al.* reported a hospital frequency of 4.7% at the Sino-Central African Friendship University Hospital in Bangui in 2017 [12].

In the Republic of the Congo, Ibara *et al.* reported a frequency of 2.4% in 1999 [13]. According to the Congolese cancer registry, liver cancer was the most common cancer in men in a report published in 2013 [14]. No recent study has updated these data in our setting. We therefore conducted this study to describe the

current characteristics of primary liver cancer in the Republic of the Congo.

2. Patients and Methods

We conducted a single-centre descriptive cohort study with retrospective and prospective data collection from January 1, 2021, to September 30, 2025, in the Department of Gastroenterology and Internal Medicine at Brazzaville University Hospital (CHU-B). The retrospective component consisted of reviewing available medical records of patients managed before the start of prospective data collection. The prospective component included the systematic collection of clinical, biological, imaging, therapeutic, and outcome data for patients managed during the prospective study period.

The study population comprised all adult patients managed for suspected or confirmed primary liver cancer in the Department of Gastroenterology and Internal Medicine of CHU-B, the official designation of a single clinical department. We included patients aged at least 18 years, of either sex, with a diagnosis of primary liver cancer based on predefined clinical, biological, and radiological criteria.

Primary liver cancer was diagnosed on the basis of concordant clinical, biological, and radiological findings. Clinical arguments included hepatomegaly and impaired general condition. Biological evidence was an alpha-fetoprotein level greater than 400 ng/mL. Abdominal ultrasonography supported the diagnosis by showing one or more hepatic nodules. On contrast-enhanced computed tomography, the diagnosis was supported by the characteristic pattern of arterial enhancement followed by portal venous or delayed-phase washout. The diagnosis was retained when the available clinical, biological, and imaging findings were concordant. In patients without computed tomography, the diagnosis was based on the combination of clinical presentation, an alpha-fetoprotein level greater than 400 ng/mL, and ultrasonographic evidence of hepatic nodules.

No patient had histological confirmation. Histology could not be performed because of limited technical facilities and the financial constraints faced by patients. Consequently, diagnoses were considered clinically and radiologically compatible with hepatocellular carcinoma. This absence of histological confirmation is a limitation of the study, as it did not allow a definitive distinction between hepatocellular carcinoma and all other primary malignant liver tumours.

We used exhaustive sampling, including all records and patients fulfilling the inclusion criteria. Data were collected by the investigators with assistance from departmental physicians, using a pre-established survey form based on the literature. Patients with incomplete or non-interpretable records were excluded.

The variables studied were sociodemographic characteristics (sex, age, marital status, occupation, religion, and education); clinical characteristics (medical history, reason for consultation, general and physical signs, and non-cirrhotic or cir-

rhotic liver); imaging findings (abdominal ultrasonography, abdominal CT, and liver MRI); aetiologies (hepatitis B, hepatitis C, alcohol, and metabolic syndrome); treatment (palliative or curative); prognostic variables (Barcelona, Okuda, and Child-Pugh classifications); and outcomes. Data were processed and analysed using SPSS software.

Viral aetiology was retained in patients with hepatitis B virus infection, defined by the presence of hepatitis B surface antigen (HBsAg), or with hepatitis C virus infection, defined by the presence of anti-hepatitis C virus antibodies (anti-HCV). It was also retained in patients already followed for hepatitis B- or hepatitis C-related cirrhosis. Alcohol-related aetiology was retained in patients reporting alcohol consumption of at least 40 g per day for more than 20 years. Alcohol use was recorded separately from alcohol-related aetiology; patients reporting alcohol consumption who did not meet this threshold were not classified as having alcohol-related primary liver cancer. Metabolic syndrome-related aetiology was retained in patients with obesity or uncontrolled diabetes mellitus and no other identified aetiology, namely no hepatitis B virus infection, hepatitis C virus infection, or alcohol-related liver disease. When more than one aetiological criterion was present in the same patient, all relevant aetiologies were retained.

3. Results

During the study period, 1,249 patients were admitted to the Department of Gastroenterology and Internal Medicine. Of these, 128 patients were initially suspected of having primary liver cancer; 11 were excluded because they did not meet the operational definition of primary liver cancer. Specifically, they did not present the concordant clinical, biological, and radiological criteria required to support the diagnosis. A total of 117 patients were retained for analysis, corresponding to a department-based hospital frequency of 9.4% (117/1,249).

Age and sex. The mean age was 53.91 ± 9.15 years (range: 19 - 93 years), with a male-to-female ratio of 2.25. There were 81 men (69.2%) and 36 women (30.8%).

Reason for consultation. More than half of patients (51.3%, $n = 60$) presented with hepatomegaly. Almost one-third presented with ascites (38.4%, $n = 45$), jaundice (35.9%, $n = 42$), or right upper-quadrant pain (31.6%, $n = 37$). Other reasons for consultation were weight loss (18.8%, $n = 22$), epigastric pain (10.2%, $n = 12$), and impaired consciousness (9.4%, $n = 11$).

Medical history and comorbidities. Most patients consumed alcohol (60.7%, $n = 71$); more than half had hypertension (53%, $n = 62$), and 40.2% ($n = 47$) used tobacco. A history of blood transfusion was reported in 17.9% ($n = 21$), diabetes in 15.4% ($n = 18$), heart disease in 10.2% ($n = 12$), and prior jaundice in 6.8% ($n = 8$). Only 3.4% ($n = 4$) were living with HIV.

General examination. No patient was admitted with a WHO performance status of 1 and only 6% had a score of 2 (**Table 1**). The remaining 94% ($n = 110$) had poor general condition, with a WHO performance status of 3 or 4. At admission,

75.2% (n = 88) had a body mass index below 18 kg/m²; 19.6% (n = 23) had normal BMI, 4.2% (n = 5) were overweight, and one patient had moderate obesity.

Table 1. Distribution of patients according to general examination findings.

Finding	n	%
Impaired consciousness	11	9.4
Jaundice	67	57.2
Anaemia	97	83.0
Anorexia	62	53.0
Fever	6	5.1
Asthenia	90	77.0
WHO performance status 1	–	–
WHO performance status 2	7	6.0
WHO performance status 3	93	79.4
WHO performance status 4	17	14.6

Table 2. Distribution of patients according to physical examination findings.

Finding	n	%
Hepatomegaly	80	68.4
Irregular surface	21	26.2
Blunt lower edge	66	82.5
Sharp lower edge	14	17.5
Liver span >20 cm	62	77.5
Liver span <20 cm	18	22.5
Right upper-quadrant pain	37	31.6
Ascites	45	38.5
Splenomegaly	32	27.3
Collateral venous circulation	28	23.9
Melaena	15	12.8
Epigastric pain	12	10.2

Table 3. Distribution of patients according to imaging findings.

Examination/finding	n	%
Abdominal ultrasonography (n = 99)		
Single tumour mass	57	57.5
Multinodular liver	42	42.4
Irregular contours	78	78.8
Hepatomegaly	83	83.8

Continued

Normal liver volume	5	5.1
Atrophy	11	11.1
Portal-vein dilatation	54	54.5
Splenomegaly	49	49.4
Ascites	58	58.6
Abdominal CT (n = 77)		
Multinodular liver	19	24.7
Single tumour mass	58	75.3
Washout	66	85.7
Vascular invasion	29	37.6
Liver MRI (n = 12)		
Multinodular liver	8	66.7
Single tumour mass	4	33.3

Table 4. Distribution of patients according to aetiology.

Aetiology	n	%
Hepatitis B virus	32	27.3
Hepatitis C virus	13	11.1
Alcohol	12	10.2
Metabolic syndrome	8	6.8
HBV + HCV co-infection	10	8.5
Undetermined	42	35.9

Note: Percentages may exceed 100% because more than one aetiology could be retained for the same patient.

Table 5. Distribution of patients according to liver status.

Liver status/Child-Pugh class	n	%
Cirrhotic liver	77	65.8
Normal liver	40	34.2
Child-Pugh class A	–	–
Child-Pugh class B	56	72.7
Child-Pugh class C	21	27.3

Table 6. Distribution of patients according to staging classifications.

Classification/stage	n	%
OKUDA stage		
Okuda stage 1	–	–

Continued

Okuda stage 2	39	33.3
Okuda stage 3	78	66.7
BCLC stage		
BCLC stage A	8	6.8
BCLC stage B	22	18.8
BCLC stage C	52	44.4
BCLC stage D	35	29.9

Table 7. Distribution of patients according to treatment.

Treatment	n	%
Curative treatment	–	–
Palliative treatment	117	100
Sorafenib	5	4.3
Analgesics	117	100
Blood transfusion	29	24.8
Cholestyramine	11	9.4
Ursodeoxycholic acid	15	12.8

Table 8. Distribution of patients according to outcome.

Outcome	n	%
Lost to follow-up	58	49.5
Death	59	50.5
Total	117	100.0

Note: Outcome was reported according to the last available follow-up information. No formal survival analysis was performed.

4. Discussion

The frequency of PLC in our study was 9.4%. This proportion is markedly higher than that reported by Ibara *et al.* in Brazzaville in 1999 [13], nearly 25 years earlier, when the frequency was approximately four times lower. Several factors may explain this apparent increase. First, diagnostic methods have improved over time, enabling better identification of cases. In the study by Ibara *et al.*, histological confirmation was required, whereas our diagnosis was based on a combination of clinical, biological, and radiological evidence, in line with current recommendations [8]. Use of non-invasive diagnostic criteria probably increased the number of diagnosed cases.

This change may also reflect altered care-seeking behaviour. Compared with the 1990s, the population appears to use modern medicine more frequently, rather than relying exclusively on traditional or religious healing, which has long been

common in our cultural context. Furthermore, Nsondé Malanda *et al.* reported in 2010, through the cancer registry, that the liver was already the most frequently affected organ in our country [14], suggesting a growing burden of this disease.

The frequency observed in our study also exceeds those reported in other African series, including Guindo *et al.* in Gao (3.04%) [11], Camengo Police in the Central African Republic (4.7%) [12], and Boulouga O. in Togo (5.1%) [15]. These differences may reflect methodological variation, differences in access to diagnostic tools, and local epidemiological factors such as the prevalence of viral hepatitis and national screening and management strategies.

The male predominance and increasing frequency of PLC with age observed in our study are consistent with published data [10]–[17]. This distribution may partly result from the slow progression of liver fibrosis to cirrhosis, the principal background condition for HCC development.

Reason for consultation. Hepatomegaly (51.3%) was the leading reason for consultation and was found in more than half of the study population. It was followed by ascites, jaundice, and right upper-quadrant pain, at 38.4%, 35.9%, and 31.6%, respectively. These are indeed the most commonly reported symptoms in the literature [10]–[12]. Also the WHO score was greater than or equal to 3 (Table 1).

Medical history. More than half of patients consumed alcohol and had hypertension, at 60.7% and 53%, respectively. Alcohol consumption is a major public-health issue in the Republic of the Congo. Déby Gassaye *et al.* reported alcohol use in 61% of adults and 26% of adolescents in 2015 [18]. More recently, Mimiesse *et al.* reported alcohol misuse in a large proportion of patients (96%) in 2024 [16]. These data underline the importance of alcohol as a major risk factor for cirrhosis and, consequently, primary liver cancer in our setting. Targeted prevention should be strengthened through awareness of alcohol-related harm, policies to reduce consumption, and integration of screening and follow-up for at-risk patients into the public-health system.

Clinical examination. More than half of patients had an enlarged liver on examination (Table 2); among these, the liver span exceeded 20 cm in 77.5%. Massive hepatomegaly is well described in African studies [16] [17]. After hepatomegaly, ascites, abdominal pain, and splenomegaly were the most frequent signs, probably reflecting PLC arising in cirrhotic livers.

Abdominal ultrasonography. Most patients for whom ultrasound was available had hepatomegaly (Table 3), with a single tumour mass in 57.5% and a multinodular liver in 42.4%. Because presentation is late, most African patients are diagnosed at an advanced stage. Ultrasound also identified features of portal hypertension in almost half of cases, including portal-vein dilatation, splenomegaly, and ascites, reflecting HCC developing on cirrhosis.

Abdominal CT. Abdominal CT (Table 3) could not be performed for all patients, mainly because of financial constraints. Among those examined, 24.7% had a multinodular liver and 75.3% had a single hepatic tumour mass. The wash-in/wash-out pattern—hypervascularisation of nodules during the arterial phase

followed by hypovascularisation during the portal or delayed phase—was observed in 85.7%. This radiological profile strongly suggests hepatocellular carcinoma and is a key diagnostic element. In resource-limited countries, where liver biopsy is often difficult because of cost, lack of technical facilities, or bleeding risk in cirrhosis, this imaging feature is widely used as a major, almost pathognomonic diagnostic criterion. These findings underline the importance of access to high-performance imaging for early PLC diagnosis and support strengthening diagnostic imaging capacity in developing countries.

Aetiologies. Nearly half of patients (46.9%) had chronic viral hepatitis, the leading identified aetiology (**Table 4**) of PLC. Alcohol use was the second reported cause (10.2%). However, the aetiology remained undetermined in 35.9%, which may be explained by limited aetiological investigation, late diagnosis, or restricted access to specialised tests. The predominance of viral aetiologies is consistent with sub-Saharan African data. Guindo in Mali [11] and Camengo Police in Bangui [12] also reported a major role for hepatitis B and C in primary liver cancer. Inadequate systematic screening for viral hepatitis, limited access to antivirals, and lack of financial coverage contribute to silent progression from chronic liver disease to cirrhosis and HCC. Although several African countries have introduced national viral-hepatitis programmes, including hepatitis B vaccination and prevention, screening, and treatment strategies, substantial efforts are still needed to expand coverage and access to care.

Liver status. More than 65% of patients had underlying cirrhosis (**Table 5**), all decompensated at diagnosis. This high proportion of advanced cirrhosis reflects the severity of liver disease associated with PLC in our setting. Similar findings have been reported in sub-Saharan Africa, notably by Kouassi B. in Côte d'Ivoire [17] and Ocama P. in Uganda [19]. Late diagnosis reflects delayed care-seeking, lack of structured HCC screening among at-risk patients, and health-system limitations. Regular follow-up of cirrhotic patients, including abdominal ultrasound and alpha-fetoprotein measurement, is rarely accessible or systematically implemented. Geographic inequities in access to care, particularly in rural areas, also contribute to late detection.

Classifications. Few patients in our series were admitted at an early stage (BCLC A: 8/117, 6.8%). Most patients were admitted at intermediate or, more often, advanced stages, limiting curative management and leaving mainly palliative options (**Table 6**). This finding demonstrates major diagnostic delay, widely reported in the literature [10]–[19]. Sociocultural and religious beliefs influence therapeutic pathways: initial consultation with traditional healers or religious authorities remains common and delays attendance at conventional health facilities. Socioeconomic constraints are also a major barrier to early care. Inadequate health coverage and the high cost of specialised consultations and investigations create a financial burden that is often incompatible with average household income.

Therapeutic characteristics. No patient received curative treatment (**Table 7**),

all were managed palliatively. Management mainly relied on analgesics for pain relief and blood transfusions to correct anaemia. Chemotherapy was indicated in only 4.3% of cases. The limited use of specific oncological therapy reflects the advanced stage at diagnosis and restricted therapeutic options. These results are consistent with data from sub-Saharan Africa, where PLC management is predominantly palliative because of late diagnosis and limited access to care [10]-[19].

Patient outcomes. At the last recorded follow-up, 59 patients (50.5%) had died, whereas 58 patients (49.5%) were lost to follow-up (**Table 8**). This substantial proportion of patients lost to follow-up probably reflects financial barriers to continuing care. Because the exact dates of death and last contact were not consistently available, no formal survival analysis was performed. The observed outcomes nevertheless reflect the advanced stage of disease at diagnosis, limited access to specific treatments, and difficulties in maintaining long-term follow-up.

5. Conclusion

Primary liver cancer is a major public-health problem in the Republic of the Congo, characterised by late diagnosis and advanced stages that limit curative management. Hepatitis B and C viruses and alcohol use appear to be the principal aetiologies, while decompensated cirrhosis reflects the silent progression of the disease. Limited access to diagnostic tests and the absence of systematic screening aggravate diagnostic delay. Patient outcomes remain very poor, underlining the unfavourable prognosis of this condition in our setting.

Author Contributions

Study conception and design: Mauria Gilga IBOBI, Hostaud Bienvenue ATIPO-IBARA, Bovane Jhonsial Joseph MOLAMI, Jile Florient MIMIESSE MONAMOU. **Data collection:** Herman TOMAKI-DÂ, Mauria Gilga IBOBI, Bovane Jhonsial Joseph MOLAMI. **Manuscript writing:** Mauria Gilga IBOBI, Hostaud Bienvenue ATIPO-IBARA, Bovane Jhonsial Joseph MOLAMI, Daniela Blaise MONDINZOKO. **Critical review:** Daniela Blaise MONDINZOKO, Bénédicte AHOMBO, Mardochée MOTOULA LATOU, Rody Stéphane NGAMI, Jile Florient Mimiesse Monamou, Arnaud MONGO ONKOUO, Clausina MIKOLELE AHOUI. **Supervision:** Jile Florient MIMIESSE MONAMOU, Blaise Irénée ATIPO IBARA. All authors read and approved the final version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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