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Factors Associated with Colorectal Cancer Diagnosis Compared to Other Digestive Cancers at the National Cancer Control Center of Niamey (Niger), 2018–2023: A Hospital-Based Analytical Study

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Abstract

Introduction: Colorectal cancer (CRC) is a major public health concern, with a rising incidence in low- and middle-income countries, particularly in sub-Saharan Africa. In Niger, data on factors associated with CRC are limited. This study aimed to identify sociodemographic, socioeconomic, clinical, and behavioral factors associated with colorectal cancer diagnosis compared to other digestive cancers in a hospital-based population.

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Methods: This retrospective analytical study was conducted at the National Cancer Control Center (CNLC) of Niamey, including patients with histologically confirmed digestive cancers between January 1, 2018, and December 31, 2023. Associations between CRC diagnosis and independent variables were assessed using bivariate analyses (χ^2 or Fisher's exact test), followed by multivariate logistic regression for variables with $p < 0.20$. Adjusted odds ratios (ORs) with 95 % confidence intervals (CI) were calculated. Verbal informed consent was obtained from participants or their relatives during telephone interviews, especially for patients whose vital status was unknown from medical records.

Results: A total of 433 digestive cancer cases were initially identified, including 231 colorectal cancers and 202 other digestive cancers. After exclusion of 9 incomplete CRC records, 424 cases were included in the final analysis (222 CRC and 202 non-CRC). The mean age was 48.6 ± 15.4 years, with a male predominance (62.2 %). In multivariate analysis, Lack of income was significantly associated with CRC diagnosis (OR = 4.85; 95 % CI: 1.40–16.00; p = 0.014). A consultation delay of two years or more was also significantly associated with hospital-diagnosed colorectal cancer (OR = 4.05; 95 % CI: 1.90–18.00; p = 0.034). Behavioral factors (tobacco, alcohol, obesity) and family history of CRC were not independently associated with colorectal cancer diagnosis.

Conclusion: Colorectal cancer accounted for a substantial proportion of digestive cancers in this hospital-based study. Patients with colorectal cancer were more likely to present with low socioeconomic status and prolonged consultation delays compared to those with other digestive cancers. These findings highlight disparities in access to care and diagnostic pathways rather than etiological risk factors. Strengthening early detection, community awareness, and financial accessibility to care may help improve patient management and outcomes in Niger.

Keywords: Colorectal cancer, associated factors, consultation delay, digestive cancers, Niger

Introduction

Colorectal cancer (CRC) is one of the most common cancers worldwide and represents a major public health concern due to its high incidence and significant mortality rates (American Cancer Society, 2014; Bray et al., 2013). It ranks third globally in terms of incidence and second among cancer-related causes of death (World Health Organization, 2023). In 2020, more than 1.9 million new cases of CRC were reported, with approximately 930,000 deaths worldwide (World Health Organization, 2023).

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Several risk factors are involved in the development of CRC. An unbalanced diet rich in fats and low in fiber is believed to account for 30–50% of cases (Bosman et al.,2010; Kassab et al., 2013). Other factors, including genetic predisposition, sedentary lifestyle, smoking, alcohol consumption, obesity, and certain environmental exposures, are also recognized contributors to the occurrence of this disease.

In Niger, since the early 2000s, a progressive increase in digestive cancers, particularly colorectal cancers, has been observed (Niaouro et al., 2021). Colon and rectal cancers rank third after breast and liver cancers. In 2020, the number of deaths attributed to colorectal cancer reached 522, representing approximately 0.3% of all recorded deaths in the country (Sung et al., 2021).

Despite the establishment of the National Cancer Control Center (CNLC) in 2011, which has significantly improved cancer management, national epidemiological data on the characteristics and factors associated with CRC remain limited. Insufficient information in the national cancer registry and the lack of a systematic case follow-up system hinder accurate evaluation of survival outcomes for digestive cancers, particularly CRC. Cancer registries, which record all diagnosed cases and their follow-up, are essential tools for measuring survival and guiding public health policies (Arnold et al.,2017).

In this context, the present study was conducted to identify factors associated with colorectal cancer diagnosis compared to other digestive cancers in a hospital-based setting.

Materials and Methods:

Study design and setting: This was a retrospective analytical study conducted at the National Cancer Control Center (CNLC) of Niamey, the national referral facility for cancer management in Niger.

Study period: The study covered the period from January 1, 2018, to December 31, 2023.

Study population: All patients with histologically confirmed digestive cancers managed at the CNLC of Niamey during the study period.

Inclusion criteria: Patients were included if they: were of any age or sex; had a confirmed diagnosis of digestive cancer; were managed at the CNLC between 2018 and 2023; and had a complete and exploitable medical record.

Non-inclusion criteria: Patients were excluded if they: had incomplete or unusable medical records; had non-digestive cancers.

Study variables: Data were primarily extracted from patients' medical records. Vital status, when not available in the medical records, was obtained through telephone interviews with patients or their relatives.

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- ✓ Dependent variable: diagnosis of colorectal cancer among digestive cancers (Yes = 1; No = 0).
- ✓ Independent variables: sociodemographic, socioeconomic, behavioral, clinical, biological, radiological, histological, and therapeutic factors.

Behavioral variables: Tobacco use, alcohol consumption, and obesity were extracted solely from patients' medical records. Obesity was defined based on body mass index (BMI), while tobacco and alcohol use were based on patient self-report; no standardized quantitative thresholds were available.

Statistical analysis: Data were entered using KoBotoolbox software and exported to SPSS version 2021. Qualitative variables were expressed as frequencies and percentages. Quantitative variables were expressed as means ± SD or medians with interquartile ranges. Bivariate analysis used χ^2 or Fisher's exact test. Variables with $p < 0.20$ were included in multivariate logistic regression. Adjusted ORs with 95% CI were calculated. Significance set at $p < 0.05$.

Results

Sociodemographic characteristics of patients

A total of 433 digestive cancer cases were initially identified, including 231 colorectal cancers and 202 other digestive cancers. After exclusion of 9 incomplete CRC records, 424 cases were included in the final analysis (222 CRC and 202 non-CRC). The hospital-based prevalence of colorectal cancer was 52.36% among recorded digestive cancers.

The mean age of patients was 48.60 ± 15.40 years, ranging from 17 to 89 years. The majority of patients were aged between 40 and 60 years. Male patients were predominantly affected, representing 62.2% of cases, with a male-to-female sex ratio of 1.64.

Regarding geographic distribution, the Niamey region reported the highest number of cases (53.6%), followed by the Dosso region (23%), and the Tahoua and Maradi regions (6.8%). (Table1)

Table 1: Distribution of colorectal cancers recorded at CNLC Niamey according to sociodemographic characteristics from 2018 to 2023

	Frequency	**Percentage%**
Age (year)		
< 20	05	02.30
20-39	69	31.10
40-59	90	40.50
60-79	56	25.20
≥80	02	00.90
Sex		
Male	138	62.20
Female	84	37.80

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e-ISSN 1857-7431 (Online)

Region		
Agadez	07	03.20
Diffa	03	01.40
Dosso	51	23.00
Maradi	15	06.80
Niamey	119	53.60
Tahoua	15	06.80
Zinder	12	05.40
Nationality		
Nigerien	214	96.40
Other Nationality	08	03.60

(n=222)

Pathological and Anatomical Characteristics

The most common histological type was Lieberkuhnian adenocarcinoma, accounting for 86.48% of cases. The rectum was the most frequent tumor location, representing 67.10% of cases. Additionally, 36% of patients presented with metastases. (Table 2)

Table 2: Distribution of colorectal cancer cases recorded at CNLC Niamey according to, radiological, histological profiles, and tumor site

	Frequency	**Percentage%**
Histological type		
Lieberkühn Adenocarcinoma	192	86.48
Mucous colloid Adenocarcinoma	06	02.70
Signet Ring Adenocarcinoma	02	00.90
Mucous carcinoma	10	04.50
Not specified	12	05.40
Tumor location		
Colon	56	25.20
Rectum	149	67.10
Caecum	15	06.80
Colorectal	02	00.90
Metastases		
Yes	80	36.04
No	142	63.96

(n=222)

Factors Associated with Colorectal Cancer

Bivariate Analysis

Bivariate analysis identified several factors significantly associated with colorectal cancer diagnosis, including age, occupational status, income level, and consultation delay ($p < 0.05$).

Patients with no income were significantly more represented among CRC cases compared with other digestive cancers (31.5% vs 1%; $p < 0.001$).

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A prolonged consultation delay, particularly ≥720 days, was also more frequent among CRC patients (18.50% vs 7.9%; p < 0.001).

No statistically significant association was observed for sex (p = 0.18), risk factors (p = 0.05) or metastatic status (p = 0.20). (Table 3)

Table 3: Association between colorectal cancer diagnosis and sociodemographic, clinical and radiological factors

Variables	Colorectal Cancer Frequency (percentage %)		
	Yes (n=222)	No (n=202)	P
Age			< **0.001**
<20	05 (02.30)	00 (00.00)	
20-39	69 (31.10)	28 (13.90)	
40-59	90 (40.50)	111 (55.00)	
60-79	56 (25.20)	59 (29.20)	
≥80	02 (00.90)	04 (02.00)	
Sex			0.18
Female	84 (37.80)	64 (31.70)	
Male	138 (62.20)	138 (68.30)	
Occupational status			**0.02**
Unemployed	77 (34.70)	61 (30.19)	
Active	106 (47.74)	121 (59.90)	
Retirement	39 (17.56)	20 (09.90)	
Income level			< **0.001**
No Income	70 (31.50)	02 (01.00)	
Low Income	65 (29.30)	140 (69.30)	
Middle Income	62 (27.92)	44 (21.80)	
High Income	25 (11.30)	16 (07.90)	
Delay before consultation (Day)			< **0.001**
< 30	14 (06.30)	16 (07.90)	
31-180	64 (28.80)	95 (47.00)	
181-360	22 (09.90)	59 (29.20)	
361-720	81 (36.50)	16 (07.90)	
≥ 720	41 (18.50)	16 (07.90)	
Risk factor			**0.05**
Tobacco	45 (20.30)	44 (21.80)	
Alcohol	05 (02.30)	02 (01.00)	
Obesity	07 (03.20)	00 (00.00)	
None	165 (74.30)	156 (77.20)	
Metastases			0.20
Yes	80 (36.04)	52(25.70)	
No	142 (63.96)	150(74.30)	

Multivariate Analysis

In multivariate analysis: No income was significantly associated with colorectal cancer diagnosis (OR = 4.85; 95% CI: 1.40–16.00; p = 0.014).

A consultation delay ≥ 2 years was also significantly associated with colorectal cancer diagnosis (OR = 4.05; 95% CI: 1.90–18.00; p = 0.034).

ISSN: 1857-7881 (Print)
e-ISSN 1857-7431 (Online)

Table 4: Multivariate model of potential predictors of colorectal cancer at CNLC Niamey

Variables	OR	CI 95%	P
Income level			**0.014**
No Income	4.848	[1.40 –16.00]	
Low Income	0.270	[0.07 – 1.10]	
Middle Income	0.527	[0.12 – 2.32]	
High Income	1		
Consultation period			**0.034**
< 30	1		
31-180	0.75	[0.10 – 5.53]	
181-360	1.29	[0.35 – 4.70]	
361-720	0.37	[0.08 – 1.74]	
≥ 720(≥ 2 year)	4.05	[1.90–18.00]	

Discussion

Epidemiological Profile (Frequency, Age, and Sex)

In our series, colorectal cancer (CRC) accounted for 52.36% of digestive cancers managed in Niger between 2018 and 2023 (222 cases), highlighting its predominance among digestive tumors. A previous study conducted in Niger by Niaouro on 106 cases found that CRC represented 32% of digestive cancers (Niaouro et al., 2021), a lower proportion than in our study, which could be explained by the smaller sample size and the different study period.

Regionally, Ouédraogo et al. (2019) reported that 39.2% of CRC cases occurred in patients aged 20-45 years, while in Benin, Kpossou et al. (2025) reported a hospital prevalence of 1.4%. Although these data are based on different indicators and are not directly comparable, they all confirm the growing burden of colorectal cancer in West African hospital series and highlight the need to strengthen screening and management in the region.

In the present study, the mean age at diagnosis was 48.60 years, indicating an earlier onset than expected. This early occurrence may be related to Niger's particular demographic structure, characterized by a predominantly young population, where more than two-thirds (70%) of residents are under 25 years old (World Bank, 2023) This concerning emergence of early-onset cases observed in recent years aligns with findings from other Sub-Saharan African authors, such as (Irabor et al.,2017) in Nigeria, (Ouédraogo et al., 2019) in Burkina Faso, (Bagnaka et al.,2020) in Cameroon, and (Odo et al., 2024.) in Côte d'Ivoire, who report a notable frequency of CRC among young Black African adults.

Male predominance of CRC, well-documented in both Western and African contexts, is also confirmed in our series, with a sex ratio of 1.64, comparable to studies in Morocco (Imad et al., 2016), Algeria (Benbekhti et al., 2022), and Mali (Dembele et al., 2024.), which reported ratios of 1.12, 1.42, and 1.5, respectively.

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Histological Type

In our series, Lieberkuhnian adenocarcinoma was the predominant histological type of CRC, consistent with the global predominance of conventional adenocarcinomas reported in the literature (Bosman et al., 2010). This predominance is observed across various geographic and healthcare contexts.

In Africa, although fewer studies exist, results are similar. An Ivorian study by (Odo et al.,2024.) reported that Lieberkuhnian adenocarcinoma was the main histological subtype observed. In Morocco, the same subtype accounted for 82% of cases in a case-control study conducted by (Imad et al.,2016).

Less common histological subtypes, such as mucinous adenocarcinoma and signet-ring cell carcinoma, are associated with distinct clinical profiles and often poorer prognosis. Recognition of these subtypes is essential for guiding treatment and prognostic evaluation.

Factors Associated with Colorectal Cancer Diagnosis

This study highlights the main factors associated with colorectal cancer diagnosis in the Nigerien context, notably low socioeconomic status, delayed consultation, and limited access to treatment. These findings are consistent with both African and global literature, confirming that these factors are major barriers to optimal CRC management.

No income

In multivariate analysis, Lack of income was significantly associated with CRC diagnosis (OR = 4.85; p = 0.014). This association suggests the influence of socioeconomic inequalities on patient care pathways.

In a context of out-of-pocket healthcare payments, financial hardship constitutes a major barrier to accessing health facilities, early diagnosis, and referral to specialized centers. Similar findings have been reported in several Sub-Saharan African studies, where socioeconomic status strongly affects the utilization of oncology care. Studies conducted in Nigeria (Alatise et al., 2018; Leng et al., 2020), Côte d'Ivoire (Acray-Zengbé et al., 2018), and the United States (Doubeni et al., 2012) have demonstrated a strong correlation between low socioeconomic status, low educational level, and CRC.

Delay in Seeking Care

Delayed consultation is another concerning factor. In our series, a consultation delay of more than two years (OR ≈ 4.05; p = 0.034) reflects late presentation. This finding is consistent with observations by (Ouédraogo et al.,2019) in Burkina Faso and (Bagnaka et al.,2020) in Cameroon, who reported mean consultation delays of six months or more. Another Nigerian

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study by (Fayehun et al.,2025) reported a median time from symptom onset to cancer diagnosis of 12 months (interquartile range: 5-27 months). Such delays inevitably lead to diagnosis at advanced stages, reducing chances of curative treatment. Contributing factors include lack of health education, reliance on traditional treatments, financial and geographic barriers, and social stigma associated with cancer.

Behavioral Factors

Alcohol and Tobacco: In our series, 20.3% of patients consumed tobacco and 11.5% consumed alcohol. No statistically significant association was found between these behavioral factors and CRC diagnosis. This contrasts with literature data. Studies in Algeria (Negrichi et al., 2021) and across Africa suggest a notable influence of these behaviors on CRC risk. Notably, a meta-analysis by (Tazinkeng et al.,2024) demonstrated significant associations between alcohol consumption (OR = 2.38), smoking (OR = 2.27), and CRC risk in Africa. The absence of association observed in our series could be explained by generally moderate consumption, a limited sample size, or reporting biases related to sociocultural factors. Furthermore, behavioral factors such as alcohol and tobacco consumption may have been underreported due to patients' reluctance to disclose such information, potentially leading to information bias.

Obesity

Found in only 3.15% of patients, obesity was not associated with CRC diagnosis. However, meta-analyses by Moghaddam et al.,2007) and (Ungvari et al.,2024) have clearly established obesity as a major risk factor for CRC. Although still limited in Niger, this issue may become more relevant with ongoing nutritional transitions.

Family history of CRC

Family history was reported in 6.8% of patients, without significant association in multivariate analysis. Nevertheless, several studies, including (Negrichi et al., 2021) in Algeria, have demonstrated a significantly increased risk of CRC in the presence of first-degree family history. This factor may be underestimated in our context due to insufficient family documentation and limited awareness of hereditary conditions.

Study Limitations

This study has several limitations. Its retrospective, hospital-based design introduces selection bias and limits the generalizability of results to the general population. The absence of a control group prevents identification of etiological risk factors for CRC. Certain behavioral variables may have been

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underreported. Finally, the wide confidence intervals observed in the multivariate analysis suggest limited statistical precision, likely due to the relatively small sample size and the distribution of certain variables. This limitation may reduce the robustness of the estimated associations and calls for cautious interpretation of the findings.

Conclusion

Colorectal cancer represents a substantial proportion of digestive cancers managed at the National Cancer Control Center of Niamey. In this hospital-based comparative study, patients with colorectal cancer were more likely to present with unfavorable socioeconomic conditions and delayed consultation compared to those with other digestive cancers. These findings suggest the presence of potential disparities in access to care and diagnostic pathways within this setting.

While causal inferences cannot be established, these results highlight the need for targeted public health interventions. Strengthening early detection strategies, improving financial accessibility to care, and promoting community-based health education may contribute to earlier diagnosis and improved management of colorectal cancer in Niger. Further population-based studies are warranted to better understand the determinants of colorectal cancer in this context.

Conflict of Interest: The authors reported no conflict of interest.

Data Availability: All data are included in the content of the paper.

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Declaration for Human Participants

Authorization (No. 000080/MSP/P/AS/DGSP/CNLC dated 29/05/2024) was obtained. Verbal informed consent was obtained from participants or their relatives during telephone interviews, especially for patients whose vital status was unknown from medical records. Anonymity and confidentiality were maintained.

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