ESI Preprints **Not Peer-reviewed**

Factors Associated with Colorectal Cancer Diagnosis among Patients with Digestive Malignancies at the National Cancer Control Center of Niamey, Niger (2018–2023)

Fatima Mohamed Amghar, MD
Damien Barikissou Georgia, MD, Associate Professor (CAMES)
Faculty of Health Sciences, University of Abomey-Calavi, Cotonou, Benin
Alkassoum Salifou Ibrahim, MD, Associate Professor (CAMES)
Faculty of Health Sciences, Abdou Moumouni University, Niamey, Niger
Amadou Soumaila, MD
Surgical Oncologist, Director General,
National Center for Cancer Control (CNLC), Niamey, Niger
Badirou Aguemon, MD, Full Professor of Public Health (CAMES)
Faculty of Health Sciences, University of Abomey-Calavi, Cotonou, Benin

Doi: 10.19044/esipreprint.2.2026.p402

Approved: 14 February 2026
Posted: 16 February 2026

Cite As:
Amghar, F.M., Barikissou, G.D., Salifou, I.A., Soumaila, A. & Aguemon, B. (2026). *Factors Associated with Colorectal Cancer Diagnosis among Patients with Digestive Malignancies at the National Cancer Control Center of Niamey, Niger (2018–2023).* ESI Preprints. https://doi.org/10.19044/esipreprint.2.2026.p402

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 the diagnosis of colorectal cancer among patients with digestive cancers.

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.

Results: Among 424 digestive cancer cases, 231 (54.5 %) were colorectal cancers. After excluding incomplete records, 222 patients were analyzed. The mean age was 48.6 ± 15.4 years, with a male predominance (62.2 %). In multivariate analysis, no 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 CRC diagnosis (OR = 4.05; 95 % CI: 0.90–18.00; p = 0.034). Behavioral factors (tobacco, alcohol, obesity) and family history were not significantly associated with CRC.

Conclusion: This study highlights that low socioeconomic status and delayed consultation are strongly linked to the hospital diagnosis of colorectal cancer in Niger. Strengthening early detection, community awareness, and financial access to care is essential to improving patient management and prognosis.

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).

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 (ARCAGY-GINECO, 2024; 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 (Faivre et al., 2003).

In this context, the present study was conducted to identify sociodemographic, clinical, biological, and behavioral factors associated with the diagnosis of colorectal cancer among patients managed at the CNLC in Niamey between 2018 and 2023.

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: the study population consisted of all patients with 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; 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: dependent variable the dependent variable was the diagnosis of colorectal cancer among digestive cancers, coded as binary:

Yes (1): patients with colorectal cancer

No (0): patients with other digestive cancers

Independent variables the independent variables included:

Sociodemographic variables: age, sex, region of origin, place of residence, educational level, marital status

Socioeconomic variables: occupational status, income level, method of healthcare financing

Behavioral variables: alcohol consumption, smoking, obesity

Clinical variables: medical and surgical history, family history of CRC, reason for consultation, consultation delay, WHO performance status

Biological, radiological, and histological variables: tumor markers, imaging examinations, histological type, tumor location, presence of metastases
Therapeutic variables: surgery, chemotherapy (adjuvant, neoadjuvant, or palliative), radiotherapy, diagnostic-to-treatment delay
Outcome variables: treatment adherence and clinical outcome (death, remission, recurrence, loss to follow-up)

Statistical analysis: Data were entered using KoBotoolbox software and then exported to SPSS version 2021 for analysis.

Qualitative variables were described using frequencies and percentages. Quantitative variables were expressed as means ± standard deviations or medians with interquartile ranges, depending on their distribution. Bivariate analysis: The association between colorectal cancer and independent variables was assessed using the Pearson chi-square test or Fisher's exact test when expected counts were small. Multivariate analysis Variables with a p-value < 0.20 in bivariate analysis were included in a binary logistic regression model to identify factors independently associated with colorectal cancer. Results were expressed as adjusted Odds Ratios (OR) with their 95% confidence intervals (95% CI). Statistical significance was set at $p < 0.05$.

Results

Sociodemographic characteristics of patients

A total of 424 cases of digestive cancers were recorded at the National Cancer Control Center (CNLC) in Niamey from January 1, 2018, to December 31, 2023, among which 231 cases were colorectal cancers (CRC). The hospital prevalence of colorectal cancer was therefore 54.48%.

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%). (Table 1)

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

	Effective	Percentage%
Age (year)		
< 20	05	2,3
20-39	69	31,1
40-59	90	40,5
60-79	56	25,2
≥80	02	0,9
Sex		
Masculin	138	62,2
Féminin	84	37,8
Region		
Agadez	07	3,2
Diffa	03	1,4
Dosso	51	23
Maradi	15	6,8
Niamey	119	53,6
Tahoua	15	6,8
Zinder	12	5,4
Nationality		
Nigérienne	214	96,4
Autre Nationalité	08	3,6

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 biological, radiological, histological profiles, and tumor site

	Effective	Percentage
Histological type		
Lieberkühn Adenocarcinoma	192	86,48
Mucous colloid Adenocarcinoma	06	2,70
Signet Ring Adenocarcinoma	02	0,90
Mucous carcinoma	10	4,50
Not specified	12	5,40
Tumor location		
Colon	56	25,20
Rectum	149	67,10
Caecum	15	6,80
Colorectal	02	0,90
Metastases		
Yes	80	36,00
No	141	63,50

Factors Associated with Colorectal Cancer

Bivariate Analysis

In bivariate analysis, several variables were found to be significantly associated with the diagnosis of colorectal cancer. Detailed results are presented in the following tables. (Table 3; Table 4)

Table 3: Relationship between colorectal cancer diagnosis and sociodemographic and clinical factors

Colorectal cancer			
	Effective (percentage %)		
	Yes	**No**	**P**
Age			**0,00**
<20	05 (1,2)	00 (0,0)	
20-39	69 (16,3)	28 (6,6)	
40-59	90 (21,2)	111(26,2)	
60-79	56 (13,2)	59 (13,9)	
≥80	2 (0,5)	04 (0,9)	
Sex			0,18
Female	84 (19,8)	64 (15,1)	
Male	138 (32,5)	138 (32,5)	
Professionnel status			**0,02**
Unemployed	77 (18,2)	60 (14,2)	
Active	106 (25,1)	121 (28,7)	
Retirement	38 (9,0)	20 (4,7)	
Income level			**0,00**
No Income	70 (16,5)	02 (0,5)	
Down	65 (15,4)	140 (33,1)	
Average	61 (14,4)	44 (10,4)	
High	25 (5,9)	16 (3,8)	
Consultation period			**0,00**
< 30	14 (3 ,3)	16 (3,8)	
31-180	64 (15,1)	95 (22,4)	
181-360	22 (5,2)	59 (13,9)	
361-720	81 (19,1)	16 (3,8)	
≥ 720	41 (9,7)	16 (3,8)	
Risk factor			**0,05**
Tobacco	45 (10,6)	44 (10,4)	
Alcohol	05 (1,2)	2 (0,5)	
Obesity	07 (1,7)	0 (0,0)	
None	165 (38,9)	156 (36,8)	

Table 4: Relationship between colorectal cancer diagnosis and radiological characteristics

Colorectal cancer	Effective (percentage)		
	Yes	**No**	**P**
Tumor location			**0,00**
Rectum	149 (35,1)	0 (0,0)	
Colon	56 (13,2)	0 (0,0)	
Caecum	17 (4,0)	0 (0,0)	
Anus	0 (0,5)	2 (0,5)	
Pancreas	0 (0,0)	48(11,3)	
Stomach	0 (0,0)	65(15,3)	
Liver	0 (0,0)	67 (15,8)	
Duodenum	0 (0,0)	3 (0,7)	
Œsophagus	0 (0,0)	17 (4,0)	
Métastases			**0.20**
No	141 (33,3)	150 (35,5)	
Yes	80 (18,9)	52 (12,3)	

Multivariate Analysis

In multivariate analysis:

A low-income level was significantly associated with late-stage disease presentation (OR = 4.85; 95% CI: 1.40–16.00; p = 0.014).

A consultation delay of more than two years was also significantly associated with a diagnosis of colorectal cancer at an advanced stage (OR = 4.05; 95% CI: 0.90–18.00; p = 0.034). (table 5)

Tableau 5: Multivariate model of potential predictors of colorectal cancer at CNLC Niamey

Variables	OR	IC 95%	P
Income level			0,014
No Income	4,848	[1,40 - 16,00]	
Down	0,270	[0,07 - 1,10]	
Average	0,527	[0,12 - 2,32]	
High	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	4,05	[0,90 - 18,00]	

Discussion

Epidemiological Profile (Frequency, Age, and Sex)

In our series, colorectal cancer (CRC) accounted for 54.48% 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 (Country Economy, 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.

Histological Type

In our series, Lieberkuhnian adenocarcinoma was the predominant histological type of CRC, consistent with recent literature. Indeed, according to Info Cancer–ARCAGY–GINECO, adenocarcinomas constitute the majority of colorectal cancers (90-95%). (ARCAGY-GINECO, 2024). This predominance is consistently observed across various geographic and healthcare contexts.

In Africa, although fewer studies exist, the 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.

Determinants of Colorectal Cancer

This study also highlights the main factors associated with the diagnosis of CRC in the Nigerien context, with a marked predominance of socioeconomic determinants, delayed diagnosis, and limited access to treatment. These results are consistent with African and global literature, confirming that these factors represent major obstacles to optimal CRC management.

Low income: In multivariate analysis, a low-income level 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 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 the 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 in our series could be explained by generally moderate consumption, a limited sample size, or reporting biases due to sociocultural norms.

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 a 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 underreported. Finally, the wide confidence intervals observed in some analyses indicate limited statistical power.

Conclusion

Colorectal cancer represents a significant proportion of digestive cancers managed at the National Cancer Control Center of Niamey. This study highlights the major influence of unfavorable socioeconomic factors and delayed consultation on hospital-based CRC diagnosis in Niger. These findings underscore the urgent need to strengthen early screening strategies, improve financial accessibility to care, and promote health education to optimize management and reduce the burden of colorectal cancer in the country.

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

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

Funding Statement: The authors did not obtain any funding for this research.

References:

1. World Health Organization. (2023, July). Colorectal cancer. https://www.who.int/fr/news-room/fact-sheets/detail/colorectal-cancer.
2. American Cancer Society. (2014). Cancer facts and figures. American Cancer Society. https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/2025-cancer-facts-figures.html.
3. Bray, F., Ren, J. S., Masuyer, E., & Ferlay, J. (2013). Estimates of global cancer prevalence for 27 sites in the adult population in 2008. International Journal of Cancer, 132(5), 1133–1145. https://doi.org/10.1002/ijc.27711.
4. Sung, H., Ferlay, J., Siegel, R. L., Laversanne, M., Soerjomataram, I., Jemal, A., & Bray, F. (2021). Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA: A Cancer Journal for Clinicians, 71(3), 209–249. https://doi.org/10.3322/caac.21660.
5. InfoCancer – ARCAGY – GINECO. (2024). Les différents types histologiques du cancer du côlon et du rectum. https://www.arcagy.org/infocancer/localisations/appareil-digestif/cancer-colon-et-rectum/formes-de-la-maladie/les-differents-types-histologiques.html/.
6. Niaouro, I., Hassan, N., Djimba, H., Soumaila, A., Dourahmane, A., Balkissa, M., & Alhassane, A. (2021). Colorectal cancers at the National Hospital of Niamey: Epidemiological, diagnostic, therapeutic and prognostic aspects (106 cases) [Doctoral thesis, University of Niamey].
7. Faivre, J., & Bouvier, A.-M. (2003). Frequency and prognosis of digestive cancers. FMC Gastroenterology. https://www.fmcgastro.org/wp-content/uploads/file/pdf/169.pdf.
8. Kassab, A., Landolsi, S., Miled, A., Ben Ahmed, S., & Gharbi, O. (2013). Is there a relationship between dietary habits in Tunisia and colorectal cancer? Immunologie et Biologie Spécialisée, 28(5–6), 327–333. https://doi.org/10.1016/j.immbio.2013.05.003.
9. Ouédraogo, S., Tapsoba, T. W., Bere, B., Ouangre, E., & Zida, M. (2019). Colorectal cancer in young adults in sub-Saharan Africa. Pan African Medical Journal. https://pubmed.ncbi.nlm.nih.gov/31615647/.
10. Kpossou, A. R., Vignon, R. K., Hadjete, J., Sokpon, C. N. M., Gnangnon, F. H. R., Dossou, S., Kouanou, A. A., Gbessi, D. G., & Sehonou, J. (2025). Colorectal cancers in two hospitals in Cotonou: Epidemiological, diagnostic, therapeutic and prognostic aspects. Mali

Médical, 40(3), 1–8. https://pmc.ncbi.nlm.nih.gov/articles/PMC12623583/.
11. Bagnaka Eloumou, S. A. F., Bekolo Nga, W. T., Kenfack, G. U., Touko, L., Malongue, A., Tzeuton, C., & Noah, D. (2020). Prognostic factors of colorectal cancer in Cameroon. Health Sciences and Disease. https://www.hsdfmsb.org/index.php/hsd/article/view/1826.
12. Country Economy. (2023). Niger – Population pyramid. https://fr.countryeconomy.com/demographie/structure-population/niger.
13. Irabor, D. O. (2017). Emergence of colorectal cancers in West Africa: Accepting the inevitable. Nigerian Medical Journal, 58(3), 87–91. https://pmc.ncbi.nlm.nih.gov/articles/PMC6009139/.
14. Odo, B. A., Kouassi, K. K. Y., Issiaka, H., Nzamba, B. P. L., Toure, Y. L., Souge, O. P. M., & Toure, M. (2024). Colorectal carcinoma in Côte d'Ivoire: Comparative study according to age. Médecine d'Afrique Noire. https://www.santetropicale.com/sites_pays/resume_oa.asp?id_article=3719&revue=man&rep=rci.
15. Imad, F. E., Drissi, H., Radallah, D., Tawfiq, N., Benider, A., Bendahhou, K., et al. (2016). Nutritional risk factors for colorectal cancer in Morocco: A case–control study. Revue d'Épidémiologie et de Santé Publique, 64, S150. https://panafrican-med-journal.com/content/article/35/59/full/.
16. Benbekhti Abdrebbi, S. (2022). Five-year survival of colorectal cancers in Tlemcen Wilaya. https://ajhs.atrss.dz/ressources/fichiers_produits/fichier_produit_96.pdf.
17. Dembele, B. T., Traore, D., Saye, J., & Bengaly, B. (2024). Colorectal cancers: Clinical and therapeutic aspects in Mali. https://www.bibliosante.ml/bitstream/handle/123456789/13725/Memoire%20D.E.S.Dr%20Youssouf%20DEMBELE.pdf?sequence=1&isAllowed=y.
18. Alatise, O. I., Fischer, S. E., Ayandipo, O. A., Omisore, A. G., Olatoke, S. A., & Kingham, T. P. (2018). Health-seeking behavior and barriers to care among patients with rectal bleeding in Nigeria. Journal of Global Oncology. https://pubmed.ncbi.nlm.nih.gov/29244996/.
19. Doubeni, C. A., Laiyemo, A. O., Major, J. M., Schootman, M., Lian, M., Park, Y., & Sinha, R. (2012). Socioeconomic status and risk of colorectal cancer. Cancer Epidemiology, Biomarkers & Prevention, 21(10), 1722–1730. https://pubmed.ncbi.nlm.nih.gov/22898918/.

20. Leng, J., Ntekim, A. I., Ibrahee, A., Anakwenze, C. P., Golden, D. W., & Olopade, O. I. (2020). Infrastructure challenges leading to delays in curative radiotherapy in Nigeria. Journal of Global Oncology. https://ascopubs.org/doi/full/10.1200/JGO.19.00286.
21. Acray-Zengbé, P., Akani, B. C., Coulibaly, J., Memel Esme, M., Dagnan N'Cho, S., & Die-Kakou, H. (2018). Financial accessibility of anticancer treatments in Abidjan. Médecine et Santé Tropic ales. https://www.em-consulte.com/article/1212618/accessibilite-financiere-aux-traitements-anticance.
22. Fayehun, O., Apenteng, P., Umar, U. A., Adebayo, K. O., Owoaje, E., Sartori, J., & Richard, R. (2025). Cancer diagnosis delays in southern and northern Nigeria: Duration and causes. BMC Health Services Research. https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-025-12707-8.
23. Tazinkeng, N. N., Pearlstein, E. F., Manda-Mapalo, M., Adekunle, A. D., Monteiro, J. F. G., Sawyer, K., & Asombang, A. W. (2024). Incidence and risk factors of colorectal cancer in Africa. Cancers. https://pmc.ncbi.nlm.nih.gov/articles/PMC11382465/.
24. Moghaddam, A. A., Woodward, M., & Huxley, R. (2007). Obesity and risk of colorectal cancer: A meta-analysis. Obesity Reviews, 8(1), 41–49. https://pubmed.ncbi.nlm.nih.gov/18086756/.
25. Ungvari, Z., Fekete, M., Varga, P., Lehoczki, A., Fekete, J. T., Ungvari, A., & Győrffy, B. (2024). Obesity and colorectal cancer: A meta-analysis of 66 studies. Cancers. https://pubmed.ncbi.nlm.nih.gov/39379738/.
26. Negrichi, S., & Taleb, S. (2021). Hereditary, environmental, and dietary risk factors for colorectal cancer: a case-control study in eastern Algeria. In Public Health perspectives on cancer in Africa. Springer. https://pubmed.ncbi.nlm.nih.gov/32767215/.