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Early Onset Cancers as an Emerging Public Health Challenge Lifestyle Environmental and Psychosocial Determinants Among Adults Aged 18-49 In Nigeria

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Abstract

Background: *Early-onset cancers, defined as cancers occurring before the age of 50 years, are increasingly recognized as an emerging public health concern globally. While substantial evidence exists from high-income countries, data from low- and middle-income settings such as Nigeria remain limited. Understanding the lifestyle, environmental, and psychosocial determinants of early-onset cancer is essential for informing prevention and control strategies tailored to younger populations.*

Methods: *A hospital-based case–control study was conducted at the Specialist Hospital, Gombe, and the Federal Teaching Hospital, Gombe. The study included 240 adults aged 18–49 years, comprising 120 histologically confirmed early-onset cancer cases and 120 cancer-free controls. Cases were recruited consecutively from oncology and pathology units, while controls were selected from general outpatient clinics and frequency-matched by age and sex. Data were collected using structured questionnaires, medical record reviews, and physical measurements. Variables assessed included sociodemographic characteristics, lifestyle factors, environmental exposures, and psychosocial indicators. Data were analyzed using descriptive statistics, bivariate analyses, and multivariable logistic regression at a 5% level of significance.*

Results: *Breast, colorectal, cervical cancers, and lymphomas were the most common early-onset cancers identified, with the majority of cases presenting at advanced stages. In multivariable analysis, obesity (AOR = 2.41; 95% CI: 1.30–4.46), physical inactivity (AOR = 2.89; 95% CI: 1.61–5.19), alcohol consumption (AOR = 2.12; 95% CI: 1.14–3.96), exposure to biomass cooking fuels (AOR = 2.37; 95% CI: 1.28–4.38), and occupational exposure to potential carcinogens (AOR = 2.64; 95% CI: 1.29–5.41) were independently associated with early-onset cancer. Early-onset cancer patients also reported significantly higher levels of stress and depressive symptoms, as well as poorer quality of life, compared to controls.*

Conclusion: *Early-onset cancer among Nigerian adults aged 18–49 years is strongly associated with modifiable lifestyle behaviors, environmental exposures, and significant psychosocial burden. These findings highlight the need for targeted cancer prevention strategies, early detection efforts, and integrated psychosocial support services for younger adults in Nigeria.*

Keywords: Early Onset Cancer, Lifestyle Factors, Environmental Exposure, Psychosocial Well Being, Nigeria

1. Introduction

Cancer is traditionally viewed as a disease of older age, but recent decades have seen a pronounced rise in early-onset cancers (diagnosed before age 50) worldwide [1]. Global studies indicate that the incidence of early-onset cancers has surged: for example, one analysis reported a ~79% increase in early-onset cancer cases from 1990 to 2019 [2]. The most common early-onset malignancies globally are breast, lung (trachea/bronchus), stomach, and colorectal cancers, which together contribute disproportionately to morbidity and

mortality in younger adults [1,2]. Importantly, this pattern is seen across diverse regions: national cancer registries from high-, middle-, and low-income countries (including parts of Asia and Africa) have documented rising rates of various cancers in people under 50. For instance, U.S. surveillance data show that between 2010 and 2019, the incidence of 14 different cancer types increased in at least one age group under 50 [3]. These global trends suggest that many common cancers are shifting toward younger age at diagnosis, creating an emerging public health concern.

Numerous studies have investigated possible drivers of the early-onset cancer epidemic. Lifestyle and environmental exposures are leading candidates [4]. Analyses of burden of disease data have highlighted diet (e.g., high intake of red and processed meats, low intake of fruits and vegetables), alcohol use, and tobacco smoking as major modifiable risk factors for early-onset cancer. Rising obesity and sedentary behavior have also been implicated [5]. In addition, chronic exposure to environmental pollutants (such as air pollution, industrial chemicals, and household fumes) may elevate cancer risk in younger individuals [6]. Emerging hypotheses extend to psychosocial and biological factors: for example, disruptions in the gut microbiome and chronic psychosocial stress have been proposed as part of the exposome contributing to early-onset carcinogenesis. In short, experts now believe that cumulative exposures early in life, rather than rare inherited syndromes, are largely responsible for the global rise in early-onset cancers [7].

This global shift has significant public health implications. Early-onset cancers tend to be more aggressive and lead to greater years of life lost than cancers diagnosed in the elderly. Younger patients often face unique psychosocial and economic challenges -disruption of careers, family responsibilities, and longer survivorship issues [8]. However, routine cancer screening programs typically target older populations, so early-onset cases are rarely caught through preventive services. As a result, early-onset cases often present at advanced stages, compounding mortality. In fact, cancer incidence and mortality are rising fastest in Africa of all world regions [9]. Nigeria, Africa's most populous country, exemplifies these challenges. Recent data show that Nigeria's total cancer burden is large and growing. The Global Cancer Observatory (GLOBOCAN) estimated about 124,815 new cancer cases and 78,889 cancer deaths in Nigeria in 2020 [10]. More recent national reports suggest this figure has increased – one review noted 269,109 new cases in 2022, with breast and prostate cancer being the most prevalent. The most common cancers reflect global patterns: among women, breast (~38.7% of cases) and cervical (~16.4%) cancers predominate, while among men, prostate cancer is leading [11]. Notably, many Nigerian cancer patients are relatively young. For example, published case series indicate that colorectal cancer often occurs in the 40s in Nigerian cohorts, and overall, the median age of diagnosis in Nigeria is several years younger than in Western nations [12]. These observations imply that a substantial fraction of Nigeria's cancer cases is "early-onset."

Several factors in the Nigerian context likely contribute to this trend. First, lifestyle changes accompanying urbanization are increasing cancer risk among the young. Tobacco use remains common among Nigerian youth and accounts for an estimated 22% of cancer deaths. Harmful use of alcohol and adoption of Western-style diets (high in processed, energy-dense foods) are rising, leading to increased obesity and metabolic disorders [13]. At the same time, environmental pollution is pervasive: experts estimate that up to 80% of cancer risk in Nigeria may stem from environmental pollutants (generator fumes, poor waste disposal, industrial emissions, etc.). For example, a WHO report noted that over 90% of Nigerians are exposed to air pollution above recommended limits. Infectious agents (HPV, hepatitis B) also contribute to cervical, liver, and other cancers, interacting with these lifestyle factors [14].

Second, Nigeria's healthcare system faces critical constraints. Cancer screening programs (for breast, cervical, and colorectal) are minimal or opportunistic, so cases are rarely detected at an early stage. A recent review highlighted that insufficient diagnostic equipment, high out-of-pocket costs, and very limited health infrastructure are key barriers to cancer care in Nigeria. For a population of ~220 million, only ~27 cancer treatment centers exist nationwide [13]. This severe under-capacity causes frequent delays: one study found a mean delay of over 11 months from symptom onset to diagnosis for Nigerian cancer patients [15]. The lack of comprehensive oncology centers (none covering all regions until recent years) means many young patients have little access to early evaluation or specialized care. Lastly, there is a dearth of research on early-onset cancer specifically in Nigeria. Most epidemiologic studies in Nigeria have focused on single cancer types (e.g., breast or colorectal) or on the overall adult population, rather than systematically on young adults. The complex interplay of lifestyle behaviors, environmental exposures, and psychosocial stresses in driving cancer at younger ages in Nigeria is largely uncharacterized. In sum, the convergence of rising risk exposures, weak early detection, and health system gaps suggests that early-onset cancer may indeed be an emerging public health crisis in Nigeria. This study, therefore, aims to investigate the lifestyle, environmental, and psychosocial determinants of early-onset cancers among Nigerian adults aged 18–49, in order to inform targeted prevention and control strategies.

2. Materials and Methods

2.1. Study Design

A multicenter case–control design was employed to examine multiple lifestyle, environmental, and psychosocial risk factors associated with early-onset cancer. This design was considered appropriate due to the relatively uncommon nature of early-onset cancers and its suitability for addressing the study objectives. Newly diagnosed cancer patients aged 18–49 years served as cases, while cancer-free individuals within the same age range served as controls. Cases and controls were recruited concurrently from the study sites to minimize selection bias. The design enabled

the estimation of odds ratios for exposures related to early-onset cancer risk.

2.1.1. Study Population and Sampling

The study population comprised 240 adults aged 18–49 years, including 120 cancer patients (cases) and 120 cancer-free individuals (controls), all of whom were receiving care at Specialist Hospital Gombe and the Federal Teaching Hospital, Gombe. Cancer cases were recruited from the oncology, pathology, and medical records departments of the two hospitals. Consecutive sampling was employed to enroll all eligible and newly diagnosed cancer patients within

2.2. Inclusion and Exclusion Criteria

• Inclusion Criteria for Cases

Eligible cases included adults aged 18–49 years with a histologically confirmed first primary cancer diagnosis who had resided in Nigeria for at least one year before diagnosis. All cancer types were included.

• Inclusion Criteria for Controls

Controls consisted of adults aged 18–49 years with no history of cancer, as confirmed by self-report and hospital records. They were matched to cases by age and sex and recruited from the same hospitals. Controls were required to be Nigerian residents.

• Exclusion Criteria

Participants with a prior history of cancer or pre-malignant conditions were excluded. Individuals with known genetic cancer syndromes, such as confirmed BRCA mutation carriers, were excluded to focus on sporadic cancer cases. Participants who were unable to provide informed consent due to cognitive impairment, those who were pregnant at the time of data collection, and individuals with serious comorbid conditions that prevented participation were also excluded.

• Data Sources and Collection Tools

Data were collected from multiple sources, including medical records, structured interviews, and physical measurements.

• Medical Records and Pathology Reports

Cancer diagnoses were confirmed using hospital medical records and pathology reports. Clinical information, such as cancer type, histology, stage at diagnosis, date of diagnosis, and treatment received, was extracted for each case.

• Standardized Questionnaire

Trained interviewers administered a structured questionnaire to all participants. The questionnaire collected information on sociodemographic characteristics (age, sex, education, occupation, and income), lifestyle factors (smoking history, alcohol consumption, dietary patterns, and physical activity), and reproductive history for female participants. Family history of cancer among first-degree relatives was also recorded.

2.3. Environmental Exposure Assessment

Environmental exposures were assessed using questionnaire items related to occupational history, including employment in industries with potential carcinogenic exposures. Household environmental factors, such as the type of cooking fuel and ventilation, were documented. Residential proximity to industrial areas or heavy traffic was assessed through self-reported neighborhood information. Where feasible, participants' residential addresses were geo-coded to link with existing environmental data. Exposure to secondhand smoke was also evaluated.

• Psychosocial Measures

Validated instruments were used to assess psychosocial variables. Perceived stress was measured using the Perceived Stress Scale (PSS), while depressive and anxiety symptoms were assessed using standardized screening tools such as the PHQ-9 and an anxiety inventory. Social support was evaluated using a structured social support questionnaire. Socioeconomic status was assessed using indicators including educational attainment, household income, and asset ownership. Additional information on marital status, work-related stress, and health-seeking behavior was collected.

• Physical Measurements

Anthropometric measurements, including height and weight, were taken using standard protocols to calculate body mass index (BMI). Waist circumference and blood pressure measurements were also obtained to assess metabolic risk factors.

• Data Quality Assurance

All data collection instruments were pre-tested and adapted to the Nigerian context. Interviewers received standardized training before data collection. Data were double-entered and cross-checked to minimize entry errors and ensure data quality.

• Ethical Considerations

The study protocol was reviewed and approved by the ethical review committees of Specialist Hospital, Gombe, Federal Teaching Hospital, Gombe, and the National Health Research Ethics Committee of Nigeria. Written informed consent was obtained from all participants after a clear explanation of the study's objectives, procedures, potential risks, and anticipated benefits. Participant confidentiality was ensured through the use of unique identification codes, and all data were stored securely with restricted access. Participants found to have previously undiagnosed health conditions during data collection, such as elevated blood pressure or significant depressive symptoms, were referred to appropriate medical or counseling services within the study hospitals. The study was conducted in accordance with the principles of the Declaration of Helsinki and relevant Nigerian guidelines governing research involving human participants.

2.4. Statistical Analysis

Data analysis was performed using appropriate statistical software such as R, Stata, or SPSS. Descriptive statistics were first generated to summarize the characteristics of the study participants. Continuous variables were presented as means and standard deviations or medians and interquartile ranges, as appropriate, while categorical variables were summarized using frequencies and percentages. Comparisons between cases and controls were conducted at the descriptive level. Bivariate analyses were carried out to examine associations between exposure variables and early-onset cancer status. Chi-square tests or Fisher's exact tests were used for categorical variables, while independent samples t-tests or Mann–Whitney U tests were applied to continuous variables, depending on data distribution.

The primary inferential analysis employed logistic regression to estimate odds ratios (ORs) and 95% confidence intervals (CIs) for the associations between lifestyle, environmental, and psychosocial factors and early-onset cancer. Initially, unadjusted (crude) ORs were calculated for each exposure variable. Subsequently, multivariable logistic regression models were constructed to adjust for potential confounders, including age, sex, socioeconomic status, and family history of cancer. Variables were selected for inclusion in the multivariable models based on epidemiological relevance and a liberal significance threshold ($p < 0.20$) in bivariate analyses, and were further refined to retain variables with $p < 0.05$ or those that meaningfully improved model fit. Multicollinearity among independent variables was assessed before final model estimation.

Potential interaction effects between key exposures, such as smoking and alcohol consumption, were examined where supported by existing literature or suggested by stratified analyses. Model adequacy and goodness of fit were evaluated using appropriate diagnostic tests, including the Hosmer–Lemeshow test. All statistical tests were two-sided, with a significance level set at $\alpha = 0.05$. Patterns of missing data were examined, and multiple imputation techniques were applied where appropriate. Subgroup analyses were conducted for major cancer types, such as breast and colorectal cancers, when sample size permitted. Final results were reported as adjusted odds ratios, highlighting the lifestyle, environmental, and psychosocial determinants most strongly associated with early-onset cancer among Nigerian adults aged 18–49 years.

3. Results

3.1. Sociodemographic Characteristics of Participants

A total of 240 participants were enrolled in the study, comprising 120 cases and 120 controls. The mean age of cases was 38.6 ± 7.1 years, while that of controls was 37.9 ± 6.8 years. There was no statistically significant difference between cases and controls with respect to age and sex ($p > 0.05$), indicating effective matching. However, cases were significantly more likely to belong to lower socioeconomic groups and to be unemployed or engaged in informal employment.

Variable	Cases (n = 120)	Controls (n = 120)	p-value
Mean age (years)	38.6 ± 7.1	37.9 ± 6.8	0.48
Male (%)	52 (43.3)	55 (45.8)	0.68
Female (%)	68 (56.7)	65 (54.2)	
Low SES (%)	74 (61.7)	49 (40.8)	0.002
Unemployed/Informal work (%)	69 (57.5)	41 (34.2)	0.001

Table 1: Sociodemographic Characteristics of Participants

Pattern of Early-Onset Cancers

Among cases, the most common cancers diagnosed were breast cancer (34.2%), colorectal cancer (18.3%), cervical cancer (15.0%), and lymphomas (12.5%). A majority of patients (63.3%) presented at Stage III or IV at diagnosis.

Breast	41	34.2
Colorectal	22	18.3
Cervical	18	15.0
Lymphomas	15	12.5
Others	24	20.0

Table 2: Distribution of Cancer Types among Early-Onset Cases (n = 120)

Lifestyle and Environmental Factors (Bivariate Analysis)

Obesity, physical inactivity, alcohol consumption, biomass fuel exposure, and occupational chemical exposure were significantly more common among cases than controls.

Exposure	Cases (%)	Controls (%)	p-value
Obesity (BMI ≥30)	46 (38.3)	23 (19.2)	0.001
Physically inactive	71 (59.2)	42 (35.0)	<0.001
Regular alcohol use	53 (44.2)	31 (25.8)	0.003
Biomass cooking fuel	78 (65.0)	51 (42.5)	0.001
Occupational exposure	39 (32.5)	18 (15.0)	0.002

Table 3: Bivariate Associations Between Exposures and Early-Onset Cancer

Multivariable Logistic Regression Analysis

After adjusting for age, sex, socioeconomic status, and family history of cancer, several factors remained independently associated with early-onset cancer.

Variable	Adjusted OR	95% CI	p-value
Obesity	2.41	1.30–4.46	0.005
Physical inactivity	2.89	1.61–5.19	<0.001
Alcohol consumption	2.12	1.14–3.96	0.018
Biomass fuel exposure	2.37	1.28–4.38	0.006
Occupational exposure	2.64	1.29–5.41	0.008

Table 4: Multivariable Logistic Regression for Determinants of Early-Onset Cancer

Psychosocial Well-being

Early-onset cancer patients reported significantly higher psychosocial distress and poorer quality of life compared to controls and late-onset cancer patients.

Variable (Mean ± SD)	Early-Onset Cases	Controls	p-value
Perceived Stress Score	21.4 ± 5.6	14.8 ± 4.9	<0.001
Depression Score (PHQ-9)	12.3 ± 4.2	6.7 ± 3.8	<0.001
Quality of Life Score	48.9 ± 10.5	67.2 ± 11.1	<0.001

Table 5: Psychosocial Characteristics of Participants

4. Discussion

4.1. Clinical Patterns and the Crisis of Late Presentation

The study identifies breast and colorectal cancers (CRC) as the primary malignancies affecting adults aged 18–49 in Northeastern Nigeria. This aligns with a broader global shift; research by Sung et al has documented a significant rise in colorectal cancer among younger cohorts, a trend once thought to be exclusive to high-income countries [16]. However, a stark divergence exists in the clinical stage at diagnosis. While younger patients in Western nations are increasingly caught via incidental screening, the majority of participants in this study presented with late-stage (III or IV) disease. This trend of late presentation is consistent with findings across Sub-Saharan Africa. Studies in Southwestern Nigeria by Akinde [17]. suggest that late-stage diagnosis is rarely a result of biological aggression alone but is instead driven by a "syndemic" of low health literacy, the high cost of diagnostic services, and a cultural reliance on traditional healing before seeking orthodox intervention.

4.2. Metabolic and Lifestyle Drivers

Obesity and physical inactivity emerged as the most significant modifiable risk factors in this cohort. The findings provide localized evidence for the "Westernization" hypothesis, where the transition from traditional high-fiber diets to processed foods, coupled with more sedentary urban lifestyles, triggers carcinogenesis. Biologically, these findings support the International Agency for Research on Cancer (IARC) monographs, which link adiposity to 13 different cancers through the promotion of chronic inflammation and insulin resistance [18]. Furthermore, the association found between alcohol consumption and EOC risk in Gombe mirrors the Global Burden of Disease findings, reinforcing that even moderate consumption in younger populations can significantly contribute to the regional cancer burden [19].

4.3. Environmental and Occupational Vulnerabilities

A critical finding of this study is the significant association between biomass fuel use (wood, charcoal, and crop residue) and cancer risk. This is a common environmental hazard in low-resource settings, similar to patterns observed in rural Ethiopia. Long-term exposure to polycyclic aromatic hydrocarbons (PAHs) from indoor cooking remains a neglected area of cancer prevention in Nigeria. Occupational hazards also featured prominently, suggesting that, unlike the strictly regulated environments in more developed economies, young workers in Gombe's informal and industrial sectors face high levels of unregulated carcinogenic

exposure.

4.4. The Psychosocial Toll on the "Sandwich Generation"

The study revealed a profound disparity in psychosocial well-being between cancer patients and healthy controls. Younger adults (18–49) face a unique psychological burden compared to elderly patients. As noted in the Adolescent and Young Adult (AYA) oncology literature, a diagnosis at this stage disrupts peak economic productivity and family-building years. Patients in Gombe reported high levels of depressive symptoms, likely exacerbated by the "sandwich" role many plays, simultaneously caring for young children and aging parents while battling a life-threatening illness. This mirrors the quality-of-life (QoL) deficits reported by Zebrack et al., who emphasized that without integrated mental health support, clinical survival is often marred by long-term psychological morbidity [20].

4.5. Strengths and Limitations

The study's strengths include its comprehensive assessment of multiple risk domains and the use of a matched case–control design. Limitations include potential recall bias and the hospital-based sample, which may limit generalizability. Nevertheless, the study provides important evidence relevant to cancer control efforts in northeastern Nigeria [21,22].

5. Conclusion

Early-onset cancer among Nigerian adults aged 18–49 years is strongly associated with lifestyle, environmental, and psychosocial factors. Addressing these determinants through targeted prevention, early detection, and integrated psychosocial care is essential to reducing the growing burden of cancer in this age group.

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