

## Review Article

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## Exploring Sociodemographic and Lifestyle Risk Factors Associated with Cancer Among Patients at National Cancer Control Foundation, Yemen, 2024

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### ABSTRACT

Cancer remains one of the leading causes of death worldwide and it is considered a main public health challenge. In 2020, data revealed 19.3 million new cancer cases and 10 million cancer-related deaths worldwide. So, this study aimed to identify and analyze the associations between sociodemographic and lifestyle factors and cancer risk among patients and provide valuable insights for targeted prevention and health education efforts.

**Method:** A descriptive, cross-sectional study was conducted with 234 cancer patients.

**Results:** The age ranged from 16 to 84 years, with a mean age of  $43.48 \pm 7.4$  years. 57.3% of the participants were female, 70.1% lived in urban areas, 41.5% were smokers, and 52.6% were illiterate. The four most common types of cancer which were identified were breast (17.5%), lymph nodes (9.8%), colon (9%), and stomach (6.8%). There were significant differences between cancer incidence and the sociodemographic factors of marital status and educational level ( $p=0.0418$  and  $p=0.000$ , respectively). Also, there was a relationship between cancer and lifestyle factors, including Qat chewing, smoking, and physical activity ( $p=0.000$ ), among Qat chewers, cancer prevalence was higher in males (78%) compared to females (53.7%). Regarding smoking, cancer rates were 72.4% in females and 60% in males though non-smoking males had a slightly higher cancer incidence than non-smoking females, and in physical activity, the rate of cancer was significantly higher among both sexes.

**Conclusion:** Cancer risk was strongly associated with education level, Qatchewing, smoking, and lack of physical activity. Health education campaigns are recommended to raise awareness among the Yemeni population about cancer risk factors and further research to explore additional risk factors.

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### Introduction

Cancer remains one of the leading causes of death in the world and poses an increasing public health challenge [1]. In 2020, data revealed 19.3 million new cancer cases and 10 million cancer-related deaths worldwide [2]. Breast cancer emerged as the most diagnosed cancer globally, followed by lung cancer [3,4]. Lifestyle medicine examines how modifiable factors such as diet, physical activity, stress, social support, sleep, and the mind-body connection impact health outcomes [5]. Experts estimate that at least 42% of newly diagnosed cancer cases in the United States are linked to these modifiable factors, making them potentially preventable [6]. Although extensive data has been published on various modifiable risk factors, significant gaps remain in the understanding of their full impact [7,8]. Among

these factors, diet and physical activity have the strongest evidence supporting their influence on cancer outcomes [9]. Several measures and indices, such as weight, body mass index (BMI), and obesity, assess the status of these lifestyle factors [10]. In addition, diet and physical activity, regardless of how they are measured, associated with an increased risk of developing cancers such as lung, prostate, colorectal, breast, oral, esophageal, pancreatic, stomach, liver, and kidney cancers [11,12]. Sociodemographic factors, including age, sex, race, income, and education level significantly influence cancer occurrence, treatment access, and outcomes [13,14]. Cancer is often diagnosed in the late stage in lower-income individuals due to limited access to preventative care, and impacting survival rates [15].

The Objective of this Study was to explore lifestyle and sociodemographic factors which contribute seriously to the onset of cancer among patients.

## Methods

### Setting

The study was conducted at the National Cancer Control Foundation (NCCF) in Ibb governorate, Yemen.

### Design

Descriptive, a Cross-Sectional study was Conducted Among Cancer Patients.

### Study Population and Sampling

The criteria included patients who aged 16–84 years, were diagnosed with cancer, received chemotherapy, able to communicate verbally, and visited the cancer center during the study period. Patients who were undiagnosed or had cognitive or communication impairments were excluded. A non-probability quota sampling technique was used to recruit a nationally representative sample of patients in term of gender, age, residence, education level, Qat chewing, smoking, lack of physical activity, eating vegetables and fruits, and obesity [16]. A pilot study was conducted with 20 patients (40% male and 60%female), who were part of the sample, prior to the commencement of data collection. The pilot test was done to test the clarity of the questionnaire and to estimate the time required for participants to complete it.

### Sample Size

According to the National Cancer Control Foundation, there were 5,060 cancer survivors aged over 16 years. The estimated sample size was 254 individuals, based on a 95% confidence interval, a precision of 6%, and a population proportion of 50%. However, 20 participants were excluded from the study due to incomplete interviews. The sample size calculation was performed to obtain a sufficiently precise estimate of the minimum number of participants needed to ensure adequate study power.

### Tools of the Study

The questionnaire was developed by the researchers based on a review of relevant literature and was designed to assess two main sections. The first section focused on patients' sociodemographic characteristics, gathering six variables: gender, age, education level, marital status, residence, and smoking status. The second section included eight lifestyle factors, such as Qat chewing, fruit and vegetable consumption, smoking, and physical activity.

### Administrative Phase

An official approval letter was obtained from the Rector of Jiblah University for Medical & Health Sciences to the National Cancer Control Foundation (NCCF).

### Data Collection

The researcher and co-researchers began by explaining the study's objectives and the sections of the questionnaire to the patients. Oral consent was obtained from participants prior to data collection. Face-to-face formal interviews were conducted using the questionnaire described in the study tools section. Each interview lasted between 20 and 30 minutes. Data was collected from June 3, 2023, to August 23, 2024. All participants were informed that they could withdraw or stop the interview at any time.

### Statistical Analysis

The collected data were reviewed and prepared for coding, tabulation, and computer-based analysis. Statistical methods were employed using the Kobo data collection program, and SPSS software version 26 was used for data analysis. Descriptive statistics, including frequencies (n) and percentages (%), were

calculated for categorical variables. The mean and standard deviation were used to describe continuous variables. The Chi-square test was applied to assess the significance of associations between sociodemographic and lifestyle factors and cancer. A p-value of less than 0.05 was considered statistically significant.

### Ethical Approval

This study was approved by the International Cancer Institution in Ibb, Yemen, after receiving ethical approval from the Ethical Committee of the Medical and Health Sciences Department at Jiblah University for Medical and Health Sciences, Yemen (Reference number: Nur.grad.6.2024). The committee approved the use of verbally informed consent for patients who agreed to participate in the study, following a thorough explanation of the study's objectives to all participants.

## Results

### Respondent Characteristics

A total of 234 out of 254 individuals participated in the study, resulting in a response rate of 92.1%. Twenty participants did not complete the questionnaire due to time constraints and personal reasons. The background characteristics of the participants are as follows: ages ranged from 16 to 84 years, with a mean age of 43.48 years (SD ± 7.47). More than half of the respondents were female (n=134; 57.3%), lived in urban areas (n=164; 70.1%), were married (n=137; 58.5%), smokers (n=97; 41.5%), and were illiterate (n=123; 52.6%). See Table 1.

### Types of Cancer

Among the study participants, the four most common types of cancer were breast (n=41; 17.5%), lymph nodes (n=23; 9.8%), colon (n=21; 9%), and stomach (n=16; 6.8%). Other cancers included bladder (n=12; 5.1%), bones and joints (n=12; 5.1%), leukemia (n=10; 4.3%), and brain (n=10; 4.3%). Additionally, Table 2 shows that each of esophageal, lung, uterine, prostate, and liver cancers accounted for (n=9; 3.8%), while other types of cancer were grouped together (n=44; 18.8%). See Table 2.

**Table 1: Socio-Demographic Characteristics of Cancer Patients at the National Cancer Control Foundation (NCCF), Ibb Governorate, Yemen, 2024 (n=234).**

Variable	Frequency	Percentage
Gender		
Male	100	42.7%
Female	134	57.3%
Age groups		
<18	43	18.4%
19-40	58	24.8%
41-60	90	38.4%
60>	43	18.4%
Residence		
Urban	164	70.1%
Rural	70	29.9%
Material Status		
Widow/divorced	21	9.0%
Single	37	15.8%
Married	176	75.2%
Smoking status		
Yes	97	41.5%

No	137	58.5%
Educational level:		
Illiterate	123	52.6%
Primary school	69	29.5%
Secondary school	24	10.2%
University degree	18	7.7%

**Table 2: Types of Cancer among Study Participants at the National Cancer Control Foundation (NCCF), Ibb Governorate, Yemen, 2024 (n=234).**

Type of Cancer	Frequency	%
Breast	41	17.5
Lymph Node	23	9.8
Colon	21	9.0
Stomach	16	6.8
Bladder	12	5.1
Bones and Joint	12	5.1
Esophageal	9	3.8
Leukemia	10	4.3
Brain	10	4.3
Lung	9	3.8
Uterus	9	3.8
Prostate	9	3.8
Liver	9	3.8
Others	44	18.8
Total	234	100.0

### Sociodemographic Characteristics Risk Factors Associated with Cancers

Table 3 illustrates the relationship between sociodemographic characteristics and cancer by gender. It is evident that there are significant differences between cancer occurrence and the sociodemographic factors of marital status and educational level ( $p=0.0418$  and  $p=0.000$ , respectively), except for age group, residence, and employment status prior to cancer diagnosis.

Regarding marital status, cancer prevalence was higher among married individuals with ( $n=105$ ; 78.4%) in males and ( $n=71$ ; 71%) in females, compared to the widow/divorced group, which had ( $n=6$ ; 2.6%) in males and ( $n=15$ ; 11.2%) in females. Additionally, cancer prevalence was higher in illiterate females ( $n=90$ ; 67.2%) and males with a primary school education ( $n=36$ ; 36%) than in those with a university degree ( $n=3$ ; 2.2% for males and  $n=15$ ; 15% for females).

Finally, Table 3 indicates that there are no significant associations between cancer and other sociodemographic factors, such as age group, residence, and employment prior to cancer. However, within the age group, cancer prevalence was the highest among individuals aged 41–60 years in both sexes with ( $n=56$ ; 41.8%) for females and ( $n=34$ ; 34%) for males, compared to other age groups. In terms of residence, cancer was more prevalent among urban residents in both sexes with ( $n=98$ ; 73.1%) for females and ( $n=66$ ; 66%) for males, compare to rural group ( $n=36$ ; 26.9% in female, and  $n=34$ ; 34% in male).

**Table 3: Relationship Between Sociodemographic Risk Factors and Cancer by Gender at the National Cancer Control Foundation (NCCF), Ibb Governorate, Yemen, 2024 (n=234).**

Variables	Gender		Statistics
	Male (n=100)	Female (=134)	
	Frequency (%)	Frequency (%)	p-value
<b>Age groups</b>			
<18	19 (19.0%)	24 (17.9%)	0.3891
19-40	24 (24%)	34 (25.4%)	
41-60	34 (34%)	56 (41.8%)	
>60	23 (23%)	20 (14.9%)	
<b>Residence</b>			
Urban	66 (66%)	98 (73.1%)	0.2390
Rural	34(34%)	36 (26.9)	
<b>Marital Status</b>			
Married	71 (71%)	105 (78.4%)	0.0418
Single	23 (9.8%)	14 (10.4%)	
Widow/divorced	6 (2.6%)	15 (11.2%)	
<b>Educational level</b>			
Illiterate	33 (33%)	90 (67.2%)	0.000*
Primary school	36 (36%)	33 (24.6%)	
Secondary school.	16 (16%)	8 (6.0%)	
University degree	15 (15%)	3 (2.2%)	
<b>Work Before Cancer</b>			
Yes	28 (28%)	38 (28.4%)	0.9520
No	72 (72%)	96 (71.6%)	

### Lifestyle Risk Factors Associated with Cancer

Table 4 presents the relationship between lifestyle risk factors and cancer. A significant association was found between cancer and lifestyle risk factors such as Qat chewing, smoking, and physical activity ( $p=0.000$ ), with the exception of vegetable and fruit consumption and obesity.

Regarding Qat chewing, cancer prevalence was higher among males ( $n=78$ ; 78%) compared to females ( $n=72$ ; 53.7%) who involved in Qat chewing. Conversely, cancer rates were lower among both males and females who do not chew Qat ( $n=22$ ; 22% for males and  $n=62$ ; 46.3% for females).

In terms of smoking, cancer prevalence was higher among smokers of both sexes, however, it is more frequent in females ( $n=97$ ; 72.4%) than in males ( $n=60$ ; 60%). Additionally, the rate of cancer was higher among non-smoking males ( $n=40$ ; 40%) compared to non-smoking females ( $n=37$ ; 27.6%).

With respect to physical activity, cancer prevalence was significantly higher among individuals who were inactive in both sexes ( $p=0.000$ ), with a greater incidence in males ( $n=85$ ; 85%) compared to females ( $n=74$ ; 55.2%). Furthermore, cancer prevalence was higher among physically active females than physically active males ( $n=60$ ; 44.8% for females and  $n=15$ ; 15% for males).

Finally, Table 4 indicates that cancer prevalence was higher among

individuals who consumed vegetables and fruits, with (n=101; 75.4%) for females and (n=71; 71%) for males, compared to those who did not consume vegetables and fruits (n=33; 24.6% for females and n=29; 29% for males)

**Table 4: Relationship Between Lifestyle Risk Factors and Cancer Among Patients at the National Cancer Control Foundation (NCCF), Ibb Governorate, Yemen, 2024 (n=234).**

Variables	Gender		P-value
	Male (100)	Female (134)	
	Frequency (%)	Frequency (%)	
Qat (Khat) chewing			
-Yes	78 (78%)	72 (53.7%)	0.000*
-No	22 (22%)	62 (46.35)	
Eating Vegetables and Fruits			
Yes	71 (71%)	101 (75.4%)	0.453
-No	29 (29%)	33 (24.6%)	
Smoking			
-Yes	60 (60%)	97 (72.4%)	0.000*
-No	40 (40%)	37 (27.6%)	
Physical Activity			
-Yes	15 (15%)	60 (44.8%)	0.000*
-No	85 (85%)	74 (55.2%)	
Obesity			
-Obese	19 (19%)	32 (23.9%)	0.371
-Non obese	81(81%)	102 (67.1)	

**Discussion**

The current study involved 243 cancer patients and can be considered representative of the primary types of cancer cases who access the National Cancer Control Foundation in Ibb Governorate, central Yemen. In the last three years, two studies have been published concerning cancer awareness among Yemenis. One study surveyed 370 Yemeni immigrant women in Malaysia, aiming to assess their awareness of cervical cancer and its socio-demographic variations [17]. Another study focused on households across four governorates (Al Hudaydah, Dhamar, Hajjah, and Raymah), aiming to evaluate the level of public awareness regarding cancer risk factors and their determinants among the adult people in Yemen [18]. Previous studies targeted Yemenis to assess their awareness of cancer risk factors, whereas the current study specifically focused on cancer patients, exploring lifestyle and socio-demographic factors as potential contributors to cancer among individuals aged 16 to 85 in Ibb Governorate, Yemen.

Regarding age groups, cancer statistics in Yemen, cancer increases with age for both sexes, showing a higher prevalence rate with males than females in childhood [19]. However, this trend reverses, i.e., higher rates of cancer were in females, particularly in the age group (30-50) years. This can be attributed to the high prevalence of breast cancer among females. Furthermore, cancer incidence rates for both sexes continue to rise among individuals of 60 years and older, with a slight increase in rates observed among females in Yemen [20].

In Yemen, the age-standardized rate (ASR) is 97.0 per 100,000,

with a cumulative risk of 23.2 per 100,000 for males and 21.3 per 100,000 for females; the cumulative risk for both sexes combined is 22.0 per 100,000 [21]. This study showed that cancer was higher among age group (41-60) in female, and in male, than in other groups. These results were agreed with by two studies; one study was carried out with 3413 participants in Dr. Mohammad Hoesin Hospitals Cancer Incidence: Hospital-Based Cancer Registration Data, Indonesia, it showed that more than 53% of cases of cancer are diagnosed at the age range of (41-60) years [22]. The other study was carried out in India [23]. Cancer control and prevention programs face two challenges in low- and middle-income countries: urban population experience and unhealthy lifestyles, while rural population lack access to healthcare [24]. In this study, the results showed that cancer was higher among urban group in both females and males. This result was supported by other studies [25,26].

Regarding educational level, the findings indicated a significant difference in cancer prevalence based on education. Cancer rates were higher among illiterate females. This result was supported by two studies which were carried out in Yemen. One study was conducted at five major hospitals in Sana'a, the capital of Yemen, entitled "Factors Related to Knowledge, Attitudes, and Behaviors Regarding Cervical Cancer among Yemeni Women". Its results showed that 57% of case study were illiteracy [27]. The other study entitled "Risk Factors of Breast Cancer in Hadramout Valley and Desert, Yemen". Its results showed that 70.5% of case study participants were illiterate [28]. Cancer was higher among male patients who had a primary school education. On the other hand, this study showed that there was a relationship between cancer and marital status, with higher cancer prevalence observed among married individuals in both sexes. This result was in same line with a systematic review and meta-analysis that included 67 articles reported that marriage was significantly associated with better overall survival compared to unmarried cancer patients [29]. Systematic review study includes seventeen articles which showed argument about the relationship between Qat and cancer. Seven studies out of eight revealed that Qat causes premalignant oral lesions with moderate evidence level. Four studies reported that Qat causes cancer with low evidence level, while three studies pointed out that Qat has anti-cancer effect with moderate to high evidence level. Only one study suggested that Qat is irrelevant to cancer [30]. Other studies were carried out in different countries showing that there is a relationship between oral and esophageal cancer and Qat chewed [31-34]. The results of data analysis of the current study showed that cancer rate was higher among both sexes who chewed Qat. This result also was supported by other studies which were carried out in other governorates in Yemen [35-37]. Moreover, the current study showed that cancer was higher among smokers in both sexes. This result was in alignment with other studies [38, 39]. Finally, cancer prevalence was greater among patients who practice low physical activity of both sexes, though males showed higher rates of cancer in this group. Conversely, cancer rates were higher among physically active females compared to their male counterparts. A systematic review of 13 cohort studies indicated that "the level of physical activity increases the survival rate in individuals with colorectal cancer" [40].

**Study Limitations**

The study encountered several limitations, including challenges in obtaining cooperation from some patients, difficulties in data collection due to patient illness, a lack of extensive research on this topic, and a small sample size.



## Conclusion

This cross-sectional study aimed to assess lifestyle and socio-demographic factors as potential risk contributors to cancer among patients. The findings indicated a higher incidence of cancer among illiterate females and males with a primary school education. Additionally, there were significant associations between cancer and factors such as Qat chewing, smoking, and low levels of physical activity.

## Recommendations

- Healthcare Personnel Should Implement Community Health Education Programs to Raise Awareness About Cancer Risk Factors Among Yemenis.
- Comprehensive Research should be Conducted Among Cancer Patients to Investigate Additional Risks Related to Environmental Factors, Cultural Practices, and Lifestyle Habits.

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