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Awareness of chronic obstructive pulmonary disease and its risk factors among the adult population in the Jazan region, Saudi Arabia

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ABSTRACT

Background: Chronic obstructive pulmonary disease (COPD) is a leading cause of morbidity and mortality worldwide, yet public awareness remains limited, particularly in developing regions. This study aimed to assess COPD awareness and its associated risk factors among adults in the Jazan region, Saudi Arabia, and to identify factors associated with good knowledge.

Methods: A cross-sectional study was conducted among 513 adults using a structured questionnaire assessing sociodemographic characteristics, smoking behaviors, environmental exposures, and COPD-related knowledge. An awareness score was developed and categorized into low, moderate, and high levels. Associations were analyzed using chi-square tests and multivariate logistic regression.

Results: Only 31.4% had heard of COPD. While most identified smoking as a cause (468, 91.2%) and the lung as the affected organ (447, 87.1%), misconceptions were common: 266 (51.9%) believed COPD is rare, 187 (36.5%) thought it is curable with antibiotics, and only 192 (37.4%) recognized it as a lifelong disease. Most participants had moderate knowledge (358, 69.8%), followed by high (112, 21.8%) and low (43, 8.4%) levels. Cigarette smoking was significantly associated with lower knowledge (34.8% *vs.* 7.1%, $p < 0.001$). In multivariate analysis, male gender adjusted odds ratios (aOR = 0.612, $p = 0.037$) and lower income were associated with poorer knowledge, while higher income predicted better awareness (aOR = 1.329, $p = 0.004$).

Conclusion: COPD awareness in the Jazan region is suboptimal, with significant misconceptions and a disconnect between knowledge and behavior. Targeted public health interventions are needed to improve awareness and promote preventive practices.

Keywords: Chronic obstructive pulmonary disease (COPD), awareness, smoking, environmental exposure, socioeconomic factors, behavioral risk factors.

Introduction

Chronic obstructive pulmonary disease (COPD) is a progressive and preventable condition of the respiratory system, which is characterized by persistent limitation of airflow and chronic inflammation of the airways [1]. It is a major global health challenge as it is currently ranked among the top three leading causes of death worldwide [2]. According to the World Health Organization, it is responsible for approximately 3.2 million deaths annually, which accounts for nearly 5% of all deaths

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worldwide [3]. The burden of COPD is expected to increase further in the coming years due to aging of the populations, continued exposure to risk factors, and high rate of underdiagnoses, particularly in low- and middle-income countries [4].

The most well-established risk factor for COPD is tobacco smoking, and is responsible for the majority of cases [5]. However, a significant proportion of patients develop COPD in the absence of smoking. This highlights the role of other important risk factors such as exposure to biomass fuel, occupational dust, fumes, and environmental pollution [6]. The documented evidence has shown that up to 25%-45% of COPD cases occur among non-smokers, especially in regions where indoor air pollution and occupational hazards are very common [7]. These findings emphasize that COPD is not solely a disease that occurs in smokers, but rather a multifactorial condition that is influenced by a range of environmental and occupational exposures [8].

Despite its high prevalence and preventable nature, the awareness of COPD among the general population is very low. There are various studies conducted previously in various regions, such as Saudi Arabia, which reported low awareness levels. The awareness of COPD among the general population often ranged between 20% and 40% [9,10]. Even among high-risk populations such as smokers, knowledge about COPD is limited. In addition, several misconceptions about COPD are present among the population among the population, with many individuals believing that COPD is a rare disease, only affects the elderly, or is curable with short-term treatment [9]. Such misconceptions can delay diagnosis of this condition, reduce healthcare-seeking behavior, and negatively impact the outcome of the disease.

Importantly, awareness alone does not always lead to appropriate changes in behavior. Some individuals may recognize smoking as harmful to their health yet continue to engage in it [11]. This may also underestimate the risks associated with passive smoking, occupational exposure, and indoor pollution. This disconnect between knowledge and practice is an important barrier to effective disease prevention [12]. Therefore, there is a need to improve the level of awareness, which must be accompanied by strategies that promote behavioral change and risk reduction.

In Saudi Arabia, and particularly in the Jazan region, data on COPD awareness and its determinants remain limited. Due to the unique sociodemographic characteristics and potential exposure to environmental and occupational risk factors in this region, it is very important to assess the level of public awareness and identify the existing knowledge gaps in the region. Such information is crucial for designing targeted public health interventions and educational programs tailored to the local population. Therefore, this study aims to assess the level of awareness of COPD and the risk factors associated with awareness among adults in the Jazan region, Saudi Arabia.

Methods

Study design and setting

This study was a survey-based cross-sectional study conducted over a 5-month period, from June 2024 to November 2024. The study was carried out across multiple cities within the Jazan region, located in the southern part of Saudi Arabia. The region comprises 13 governorates with a population exceeding 1.5 million people, distributed across urban and rural areas.

Study population

The study population included adult individuals who met the predefined inclusion and exclusion criteria. Eligible participants were mentally competent adults aged 18 years or older who were willing to participate in the study. Individuals under the age of 18, those who declined participation, and those with psychiatric illnesses or impaired judgment were excluded.

Sampling and data collection procedure

A random sampling technique was employed to recruit participants, and the sample size was estimated to be 400 individuals to ensure adequate statistical power. Data were collected using a pretested and validated questionnaire that had been adapted from previously published studies and translated into Arabic. Before the main data collection, a pilot study was conducted on 10-15 participants to identify and resolve any ambiguities or technical issues in the questionnaire.

Questionnaire/study tool

The questionnaire consisted of 23 items divided into two main domains. The first domain included six questions addressing sociodemographic characteristics and clinical information of the participants. The second domain focused on assessing awareness of COPD and its associated risk factors, including knowledge of symptoms, risk factors, disease progression, and complications. Each item in the awareness domain was scored dichotomously, with a correct response assigned a score of 1 and an incorrect or unknown response assigned a score of 0, yielding a total possible score of 17. Based on the total score, participants were categorized into three levels of awareness: low (0-5), moderate (6-11), and high (12-17). This scoring system was newly developed for the purposes of this study, informed by the structure of previously published tools assessing COPD awareness.

Ethical approval

Ethical approval for this study was obtained from the Standing Committee for Scientific Research at Jazan University (reference number: REC-46/03/1184), dated September 25, 2024. Participation was voluntary, and informed consent was obtained from all participants before data collection. Confidentiality and anonymity of the collected data were strictly maintained throughout the study.

Statistical analysis

Data analysis was performed using the Statistical Package for the Social Sciences (version 29.0; IBM Corp., Armonk, NY). Descriptive statistics were presented as frequencies and percentages for categorical variables, and as means ± standard deviations for continuous variables. An overall awareness score was calculated and categorized into low, moderate, and high levels. Associations between categorical variables and awareness levels were assessed using the chi-square test. Furthermore, multivariate logistic regression analysis was conducted to identify independent predictors of good awareness. Adjusted odds ratios (aORs) with 95% confidence intervals were reported, and a *p*-value of less than 0.05 was considered statistically significant.

Results

Our study included 513 participants, with a higher proportion of females (306, 59.6%) compared to males (207, 40.4%). Most participants were younger than 25 years (211, 41.1%), with a mean age of 33.4 ± 12.7 years. Most participants had a bachelor's degree (332, 64.7%). Marital status was nearly balanced, with 259 (50.5%) single and 234 (93.6%) had children married. Among married participants, 93.6% had children. Employment distribution was comparable across categories, with students (185, 36.1%), employees (184, 35.9%), and unemployed individuals (144, 28.1%). Slightly more participants resided in urban areas (281, 54.8%) than rural areas (232, 45.2%). The population was predominantly Saudi (499, 97.3%). Income levels were varied, with 159 (31.0%) earning <5,000 SAR and 132 (25.7%) reporting >15,000 SAR (Table 1).

Figure 1 shows the distribution of employment sectors among participants. The majority were engaged in the educational sector (66.1%). Healthcare workers constituted 11.8%, followed by military personnel (8.6%). Smaller proportions were observed in industrial (3.6%) and freelance sectors (3.6%), while legal and financial services each accounted for 2.7%. The agricultural sector was minimally represented (0.9%).

Table 2 shows the distribution of smoking behaviors and environmental exposures among participants. Active smoking was relatively uncommon, with only 23 (4.5%) reporting shisha use and 23 (4.5%) cigarette smoking, while electronic cigarette use was reported by 11 (2.1%). In contrast, passive exposure was more frequent, with 116 (22.6%) indicating exposure to smokers and 27 (5.3%) reporting time spent in shisha cafés. Environmental and

Table 1. *Sociodemographic characteristics of study participants (N = 513).*

Sociodemographic characteristics		Frequency *N* (%)
Gender	Female	306 (59.6)
	Male	207 (40.4)
Age (Years)	<25 years	211 (41.1)
	25-34 years	70 (13.6)
	35-44 years	101 (19.7)
	≥45 years	131 (25.5)
	Mean (SD)	33.4 (12.7)
	Range	18-70
Educational level	Secondary or less	152 (29.6)
	Bachelor's	332 (64.7)
	Postgraduate	29 (5.7)
Marital status	Single	259 (50.5)
	Married	234 (45.6)
	Widow/Divorced	20 (3.9)
Have children	Yes	234 (93.6)
	No	16 (6.4)
Job status	Unemployed	144 (28.1)
	Student	185 (36.1)
	Employee	184 (35.9)
Accommodation	City	281 (54.8)
	Village	232 (45.2)
Nationality	Saudi	499 (97.3)
	Non-Saudi	14 (2.7)
Family monthly income	<5,000 SAR	159 (31.0)
	5,000-9,999 SAR	103 (20.1)
	10,000-15,000 SAR	119 (23.2)
	>15,000 SAR	132 (25.7)

(N) Frequency, (%) Percentages.
footnote clarifying that these percentages apply to married participants only (*n* = 250), not the full sample (*N* = 513).

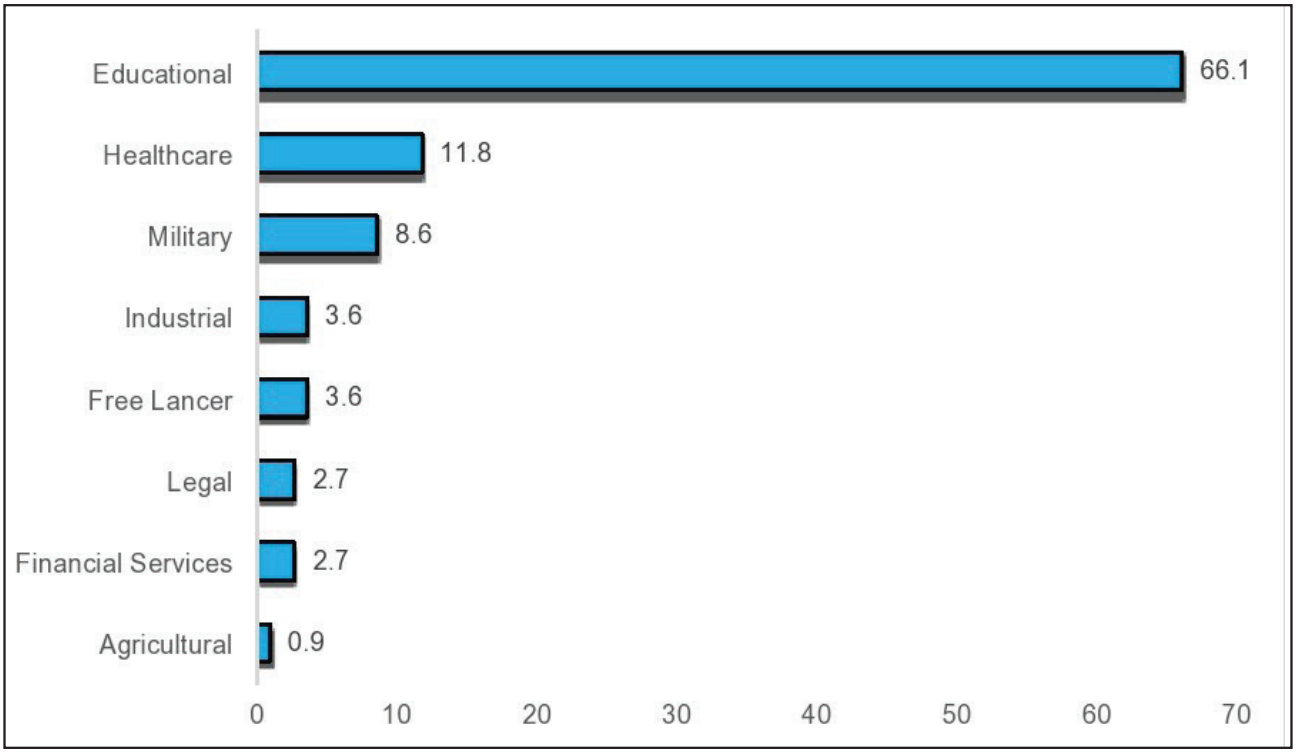


Figure 1. *Distribution of different types of employment.*

Table 2. *Smoking behaviors, environmental and clinical exposure characteristics (N = 513).*

		Frequency *N* (%)
Shisha smoking	No	490 (95.5)
	Yes	23 (4.5)
Cigarette smoking	No	490 (95.5)
	Yes	23 (4.5)
Electronic cigarette use	No	502 (97.9)
	Yes	11 (2.1)
Exposure to smokers (passive smoking)	No	397 (77.4)
	Yes	116 (22.6)
Time spent in shisha cafes	No	486 (94.7)
	Yes	27 (5.3)
Indoor biomass exposure (coal/wood)	No	489 (95.3)
	Yes	24 (4.7)
Occupational exposure (dust/fumes/chemicals)	No	447 (87.1)
	Yes	66 (12.9)
Diagnosed with COPD	No	508 (99.0)
	Yes	5 (1.0)

(N) Frequency, (%) Percentages.

occupational risk factors were less commonly reported, including indoor biomass exposure (24, 4.7%) and occupational exposure to dust, fumes, or chemicals (66, 12.9%). Nearly all participants had not been diagnosed with COPD (508, 99.0%).

Table S1 shows the level of awareness and knowledge regarding COPD among participants. Only 161 (31.4%) had heard of COPD. However, most participants correctly identified the lung as the affected organ (447, 87.1%) and recognized shortness of breath (373, 72.7%) as a key symptom. A high proportion also acknowledged smoking as a cause (468, 91.2%) and the role of smoking cessation in prevention (484, 94.3%). Despite this, several critical misconceptions were evident. More than half perceived COPD as rare (266, 51.9%), and only 192 (37.4%) correctly identified it as a lifelong disease. Additionally, 187 (36.5%) believed it could be cured with short-term antibiotics, and 299 (58.3%) did not recognize its potential to cause disability.

Figure 2 shows the distribution of COPD knowledge levels among participants. The majority demonstrated a moderate level of knowledge (358, 69.8%), while 112 (21.8%) had high knowledge, and only 43 (8.4%) exhibited low knowledge.

Table 3 shows the association between sociodemographic characteristics and COPD knowledge levels. Notably, gender showed a significant association (p = 0.010), with females having higher levels of good knowledge (74, 24.2%) compared to males (38, 18.4%), while males had a higher proportion of low knowledge (26, 12.6%). Educational level was also significantly associated (p = 0.018), with participants holding a bachelor's degree demonstrating higher knowledge (86, 25.9%) compared to other groups. Other variables, including age (p = 0.505), marital status (p = 0.336), having children (p = 0.320), job status (p = 0.072), accommodation (p = 0.734), nationality (p = 0.755), and income (p = 0.113), were not significantly associated with knowledge levels.

Table 4 shows the association between smoking behaviors, environmental exposures, and COPD knowledge levels. Cigarette smoking was the only factor significantly associated with knowledge ($p < 0.001$), with smokers demonstrating a substantially higher proportion of low knowledge (8, 34.8%) compared to non-smokers (35, 7.1%). In contrast, non-smokers had higher proportions of moderate (348, 71.0%) and high knowledge (107, 21.8%). Other variables did not show significant associations.

Table 5 shows the multivariate logistic regression analysis identifying predictors of good COPD knowledge. Gender and family monthly income emerged as significant predictors. Males had significantly lower odds of having good knowledge compared to females (aOR = 0.612, p = 0.037). In contrast, higher family income was associated with increased odds of good knowledge (aOR = 1.329, p = 0.004). Age (p = 0.190), educational level (p = 0.238), and marital status (p = 0.820) were not significantly associated with knowledge after *adjustment.*

Discussion

COPD is a major global public health concern that contributes significantly to morbidity and mortality worldwide [13]. Despite its preventable nature, awareness of COPD and its risk factors remains suboptimal, especially in the developing countries of the world [14]. Therefore, understanding the level of public awareness and associated behaviors is very important for designing effective prevention strategies. This study aimed to assess COPD awareness and its determinants among adults in the Jazan region.

Notably, a key finding of this study is that there is low overall awareness of COPD**,** with only 31.4% of participants reporting that they had heard about COPD. This finding aligned with findings from studies conducted in Saudi Arabia, where awareness levels ranged between 20%-40%. For instance, a study by Al-Otaibi et al. [15] reported limited recognition (20%) of COPD among the general population. Another study by Oliveira et al. [16] showed that only about a third of all the participants in the study, 32.5%, know or have heard about COPD. Higher awareness in Western studies may be due to stronger health promotion campaigns and better integration of respiratory education into primary care systems.

Despite limited overall awareness, participants demonstrated good recognition of major risk factors, particularly smoking, with 91.2% correctly identifying it as a cause of COPD. This finding is consistent with regional and international literature, where smoking is widely recognized as a risk factor due to extensive

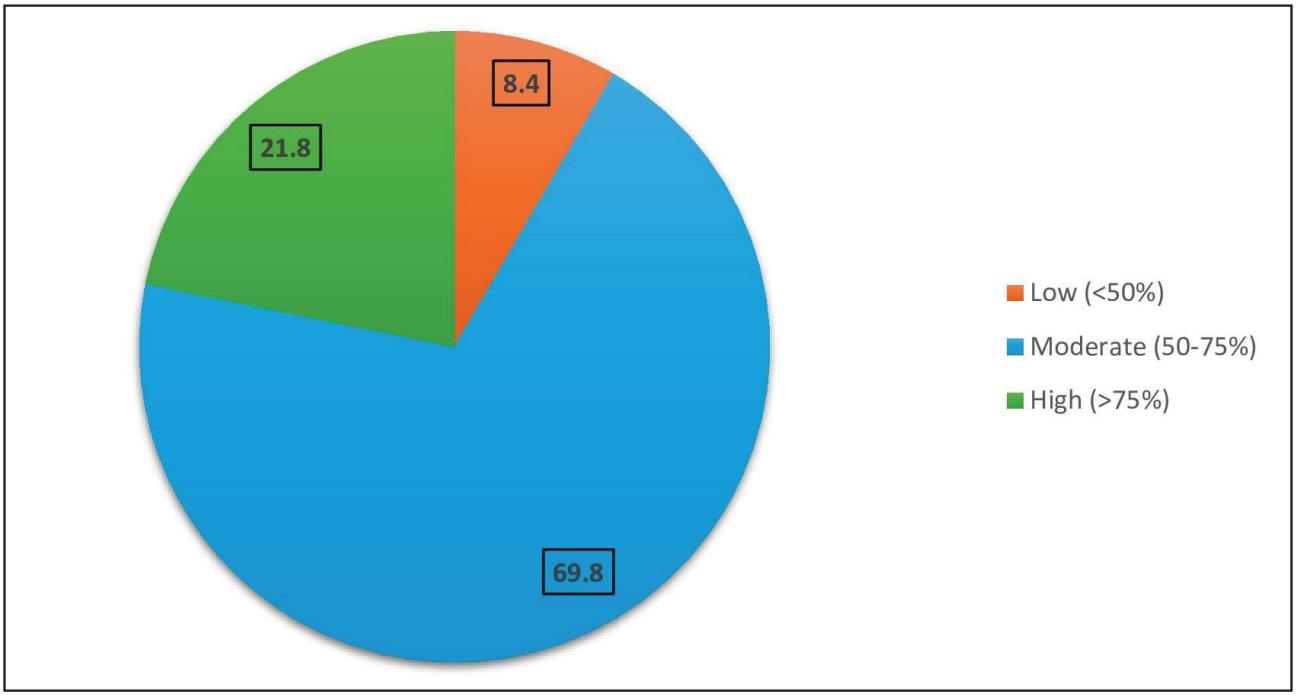


Figure 2. *Knowledge level of participants about COPD.*

Table 3. *Association between sociodemographic characteristics and COPD knowledge levels (N = 513).*

		COPD knowledge level			[a] Sig. Value
		Low *N* (%)	Moderate *N* (%)	High *N* (%)	
Age	<25 years	16 (7.6)	139 (65.9)	56 (26.5)	0.505
	25-34 years	7 (10.0)	51 (72.9)	12 (17.1)	
	35-44 years	9 (8.9)	71 (70.3)	21 (20.8)	
	≥45 years	11 (8.4)	97 (74.0)	23 (17.6)	
Gender	Female	17 (5.6)	215 (70.3)	74 (24.2)	**0.010**
	Male	26 (12.6)	143 (69.1)	38 (18.4)	
Educational level	Secondary or less	12 (7.9)	118 (77.6)	22 (14.5)	**0.018**
	Bachelor's	26 (7.8)	220 (66.3)	86 (25.9)	
	Postgraduate	5 (17.2)	20 (69.0)	4 (13.8)	
Marital status	Single	22 (8.5)	177 (68.3)	60 (23.2)	0.336
	Married	17 (7.3)	169 (72.2)	48 (20.5)	
	Widow/Divorced	4 (20.0)	12 (60.0)	4 (20.0)	
Have children	No	0 (0.0)	11 (68.8)	5 (31.3)	0.320
	Yes	20 (8.5)	167 (71.4)	47 (20.1)	
Job status	Unemployed	12 (8.3)	110 (76.4)	22 (15.3)	0.072
	Student	12 (6.5)	122 (65.9)	51 (27.6)	
	Employee	19 (10.3)	126 (68.5)	39 (21.2)	
Accommodation	City	23 (8.2)	193 (68.7)	65 (23.1)	0.734
	Village	20 (8.6)	165 (71.1)	47 (20.3)	
Nationality	Non-saudi	1 (7.1)	11 (78.6)	2 (14.3)	0.755
	Saudi	42 (8.4)	347 (69.5)	110 (22.0)	
Family monthly income	<5,000 SAR	13 (8.2)	122 (76.7)	24 (15.1)	0.113
	5,000-9,999 SAR	7 (6.8)	73 (70.9)	23 (22.3)	
	10,000-15,000 SAR	10 (8.4)	83 (69.7)	26 (21.8)	
	>15,000 SAR	13 (9.8)	80 (60.6)	39 (29.5)	

(a) Chi-Square Test.

Table 4. *Association between smoking behaviors, environmental exposure, and COPD knowledge levels (N = 513).*

		COPD knowledge level			[a] Sig. Value
		Low *N* (%)	Moderate *N* (%)	High *N* (%)	
Shisha smoking	No	38 (7.8)	344 (70.2)	108 (22.0)	0.060
	Yes	5 (21.7)	14 (60.9)	4 (17.4)	
Cigarette smoking	No	35 (7.1)	348 (71.0)	107 (21.8)	**<0.001**
	Yes	8 (34.8)	10 (43.5)	5 (21.7)	
Electronic cigarette use	No	41 (8.2)	349 (69.5)	112 (22.3)	0.137
	Yes	2 (18.2)	9 (81.8)	0 (0.0)	
Exposure to smokers (passive smoking)	No	29 (7.3)	276 (69.5)	92 (23.2)	0.143
	Yes	14 (12.1)	82 (70.7)	20 (17.2)	
Time spent in shisha cafes	No	38 (7.8)	340 (70.0)	108 (22.2)	0.124
	Yes	5 (18.5)	18 (66.7)	4 (14.8)	
Indoor biomass exposure (coal/wood)	No	42 (8.6)	339 (69.3)	108 (22.1)	0.560
	Yes	1 (4.2)	19 (79.2)	4 (16.7)	
Occupational exposure (dust/fumes/chemicals)	No	38 (8.5)	313 (70.0)	96 (21.5)	0.866
	Yes	5 (7.6)	45 (68.2)	16 (24.2)	
Diagnosed with COPD	No	43 (8.5)	353 (69.5)	112 (22.0)	0.335
	Yes	0 (0.0)	5 (100.0)	0 (0.0)	

(a) Chi-Square Test.

anti-smoking campaigns. Similarly, a study by Esam Mahmood et al. [14] reported that there is a moderate (37.4%) level of awareness of smoking as a key risk factor for COPD and its worsening. De Fatima De Oliveira Graca et al. [17] show that 27.7% aware that quitting smoking is important for decreasing the severity

Table 5. *Multivariate logistic regression analysis for predictors of good COPD knowledge.*

	B	S.E.	Sig. Value	aOR	95% CI
Age	-0.018	0.014	0.190	0.982	0.957-1.009
Gender (Male)	-0.490	0.235	0.037	0.612	0.387-0.970
Higher educational level	0.253	0.215	0.238	1.288	0.846-1.962
Marital status (married)	0.066	0.289	0.820	1.068	0.606-1.882
Higher family monthly income	0.284	0.098	0.004	1.329	1.097-1.611
Constant	-1.780	0.522	0.001	0.169	—

of COPD symptoms. However, several critical gaps are present in our study, which include less recognized risk factors, such as passive smoking (22.6%), occupational exposure (12.9%), and indoor biomass exposure (4.7%). Similar gaps have been reported in studies from rural India and Iran, where environmental and occupational exposures are often underestimated. A study by Mishra et al. [18] shows that environmental and occupational air pollution is a major risk factor for COPD in the Indian subcontinent. Feizi et al. [19] show that ageing, occupational exposure to dust and fumes, indoor and outdoor air pollutants, genetic risk factors, and especially tobacco smoking are some of the risks. This discrepancy may be explained by the stronger emphasis of public health messaging on smoking, while indirect and environmental risks receive less attention.

Notably, another important observation is the presence of significant misconceptions regarding COPD. A considerable proportion of participants believed that COPD is rare (51.9%) or curable with short-term antibiotics (36.5%), and only 37.4% correctly identified it as a lifelong disease. These findings are consistent with studies conducted in Saudi Arabia, where misconceptions about chronic respiratory diseases are common. Similarly, Almuzaini et al. [9] show that 14.8% believed that COPD is curable with short-term antibiotics, which showed a key misconception. International studies have also reported similar misunderstandings, particularly in populations with limited exposure to health education [20]. These misconceptions may contribute to delayed diagnosis and poor disease management, ultimately increasing disease burden.

Furthermore, the distribution of knowledge levels further highlights that most participants had moderate knowledge (69.8%), with only 21.8% demonstrating high knowledge. This pattern has been observed in previous studies, which showed that while basic awareness exists, comprehensive understanding remains limited. Alsubaiei et al. [21] show that the mean ± standard deviation knowledge score was 29.5 ± 4.2 out of 45 points, with most of participants falling into the moderate category (65.5%). The moderate knowledge of COPD often reflects fragmented information, where individuals recognize certain aspects (e.g., smoking risk) but lack a deeper understanding of disease progression and complications.

Notably, the association analysis revealed that female gender and higher education were linked to better knowledge in bivariate analysis. These are consistent with findings from Saudi studies, which indicated that women and more educated individuals are generally more health-aware [22]. However, in the multivariate model, education lost its significance, while income remained a strong predictor. This revealed that socioeconomic status may play a more critical role than formal education alone. Similar findings have been reported in studies from Europe, where income influences access to health information, healthcare services, and overall health literacy [23].

Notably, one of the most striking findings of this study is the disconnect between awareness and behavior. Although awareness of smoking as a risk factor was high, some participants continued to smoke, and smokers demonstrated significantly lower knowledge levels. This inverse relationship has been reported in multiple studies, such as by Sikjær et al. [24], where smokers often underestimate personal risk despite general awareness. Additionally, continued exposure to passive smoking and occupational hazards further highlights that knowledge alone does not necessarily lead to behavior change. Cultural norms, social environments, and addiction likely contribute to this gap.

Public health implications

From a public health perspective, the findings of this study have several important implications. The coexistence of moderate awareness, persistent misconceptions, and risky behaviors showed that the current awareness strategies were insufficient. Without addressing these gaps, the burden of the COPD is likely to increase, especially in the regions with high exposure to environmental and occupational risks. Therefore, early prevention of the disease is very important as COPD shares risk factors with other chronic diseases which increase its overall health impact.

Limitations

There are several limitations of this study. The cross-sectional design of this study limits causal inference between awareness and behaviors. The data were self-reported, which may introduce recall and social desirability bias, particularly for the practice of smoking. The sample predominantly consisted of educated and urban individuals, which limited the generalizability of findings to rural or high-risk occupational groups. Additionally, the study did not assess behavioral outcomes such as physical activity or diet in depth.

Future research directions

Future research should include longitudinal designs, more diverse populations, and objective measures of exposure. Furthermore, interventional studies evaluating targeted awareness programs and behavior change strategies are needed in order to bridge the gap between knowledge and practice.

Conclusion

This study shows that awareness of COPD in the Jazan population remains insufficient. Several notable misconceptions and gaps exist in the understanding of the disease progression and risk factors. The knowledge of smoking-related risks was high, but awareness of environmental and indirect exposures was limited. Factors such as gender and income influence knowledge levels about COPD. Importantly, awareness did not consistently translate into healthy behaviors. These findings show the need for targeted, multifaceted public health interventions to improve comprehensive awareness and promote effective behavior change.

List of Abbreviations

aOR	Adjusted odds ratio
CI	Confidence interval
COPD	Chronic obstructive pulmonary disease
IBM	International Business Machines Corporation
KSA	Kingdom of Saudi Arabia
NY	New York
SAR	Saudi Arabian Riyal
SD	Standard deviation
SPSS	Statistical Package for the Social Sciences
WHO	World Health Organization

Conflicts of interest

The authors declare that they have no conflict of interest regarding the publication of this article.

Funding

None.

Consent to participate

Informed consent was obtained from all participants prior to data collection. Participation was voluntary, and confidentiality and anonymity were strictly maintained, in accordance with ethical approval granted by the Standing Committee for Scientific Research at Jazan University (reference number: REC-46/03/1184).

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Supplementary content (if any) is available online.

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