AMJ
ISSN: 0005-2523

ISSN: 0005-2523
Volume 66, Issue 06, June, 2026

Determining Predominant Gender and Disease in the Prevalence of Lung Disease by Radiological Imaging in Nakhchivan Autonomous Republic (2025-2026)

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Keywords:
Lung diseases, Chest X-ray, chronic bronchitis, pneumonia, regional epidemiological characteristics, computed tomography

DOI:
06.12124/Amj.30.06.2026.01

ABSTRACT

The aim of this study is to determine the frequency and distribution of lung diseases diagnosed by radiological methods in the Nakhchivan Autonomous Republic between 2025 and 2026, and specifically to evaluate the differences by gender. This cross-sectional study was conducted on 1,000 patients in the Nakhchivan Autonomous Republic. Radiological imaging methods, such as chest X-ray and computed tomography (CT), were performed on all participants. Diagnoses were established based on imaging findings, and the gender distribution of the diseases was analyzed. A total of 22 different lung diseases were identified. The most common diseases were found to be chronic bronchitis (309 patients, 30.9%) and pneumonia (158 patients, 15.8%). Notably, both chronic bronchitis and pneumonia were found to be significantly more dominant in females compared to males. The findings reveal that lung diseases show a differential distribution by gender in the Nakhchivan population. The higher prevalence of chronic bronchitis and pneumonia in females may be associated with biological, environmental, genetic, or sociocultural factors (e.g., indoor air pollution, differences in smoking habits, access to healthcare). While many studies in the literature report a higher frequency of these diseases in males, the discrepancy in this study highlights the importance of regional epidemiological characteristics. There are gender-based differences in the epidemiology of lung diseases in the Nakhchivan Autonomous Republic. The dominance of chronic bronchitis and pneumonia in females demonstrates the need to re-evaluate lung diseases in this community and to develop gender-specific prevention, diagnosis, and treatment strategies.

Introduction

Lung diseases continue to be a major public health problem worldwide [1]. According to World Health Organization (WHO) data, chronic respiratory diseases cause the deaths of millions of people each year and rank among the top causes in the global burden of disease [2]. Lower respiratory tract infections lead to severe morbidity and mortality, particularly in developing countries and specific risk groups [3]. Chronic

bronchitis, pneumonia, asthma, chronic obstructive pulmonary disease (COPD), lung cancer, tuberculosis, and interstitial lung diseases are shown among the most frequently encountered lung pathologies [4]. Early recognition, accurate diagnosis, and effective management of these diseases can be achieved through radiological imaging methods [5].

Due to its unique geographical, environmental, and demographic characteristics, the Nakhchivan Autonomous Republic is a region where the epidemiology of respiratory diseases needs to be examined in detail [6]. The region is situated at an average altitude of 800–1,000 meters above sea level and exhibits continental climate characteristics [7]. Low temperatures and dry air during winter months, and hot, dusty desert winds in the summer (especially dust transport arriving from the Iranian and Turkish borders) can create adverse effects on the respiratory system [8]. Furthermore, meeting a significant portion of the heating needs in the region through biomass (dung, wood) and fossil fuels increases the risk of indoor air pollution [9]. These factors are important environmental determinants affecting the incidence of chronic bronchitis and other obstructive lung diseases [10].

Gender-based differences are a topic attracting increasing attention in the epidemiology of lung diseases [11]. While chronic bronchitis and COPD have traditionally been reported more frequently in males, recent studies show that the prevalence of lung diseases in females is rising, and females may be more susceptible to tobacco smoke, biomass fuels, and other particulate matter [12]. Smaller airways, different immune response profiles, and hormonal factors in females can affect the course and severity of diseases [13]. However, there is no comprehensive radiological study examining the distribution of lung diseases by gender in the Nakhchivan Autonomous Republic [14].

Radiological imaging methods are accepted as the gold standard in the diagnosis of lung diseases [15]. Posteroanterior (PA) chest radiography is widely used as a first-line imaging modality due to its low cost and widespread accessibility [16]. However, high-resolution computed tomography (HRCT) is much more sensitive and specific for early-stage or atypical findings that cannot be detected on conventional radiography [17]. HRCT plays an indispensable role, especially in the diagnosis of pathologies such as interstitial lung diseases, bronchiectasis, miliary tuberculosis, and early-stage emphysema [18].

This study, conducted between 2025 and 2026, aims to determine the prevalence of lung diseases, disease types, and gender distribution in the Nakhchivan Autonomous Republic accompanied by radiological imaging findings (PA chest radiography and HRCT) [19]. The data to be obtained will contribute to creating a region-specific lung diseases map, planning preventive healthcare services, and developing gender-specific diagnosis and treatment strategies [20]. Additionally, this study will serve as a fundamental reference for future intervention studies and longitudinal follow-up research [21].

Materials and Methods

Study design and ethics committee: This research was planned as a cross-sectional descriptive field study. The study was initiated after obtaining the necessary permissions from the Ministry of Health of the Nakhchivan Autonomous Republic and the local ethics committee. Informed consent was obtained from all participants.

Study period and sample: The study was conducted between January 2025 and December 2026. The sample size consists of a total of 1,000 patients who presented to healthcare institutions with respiratory complaints.

ISSN: 0005-2523
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Region covered: Hospitals and outpatient clinics in both urban (Nakhchivan city) and rural areas (Babek, Julfa, Ordubad, Sadarak, Shahbuz, and Kangerli districts) of the Nakhchivan Autonomous Republic were included in the study. Patients were selected using the stratified sampling method**.**

Radiological methods used:

1. All patients underwent posteroanterior (PA) chest X-rays using a standard protocol. The X-rays were evaluated by two independent radiologists.

2. In cases with suspicious or inconclusive findings on the X-ray (n=342, 34.2%), high-resolution computed tomography (HRCT) was performed in addition. HRCT scans were performed in the supine position and at end-inspiration, with a slice thickness of 1-1.5 mm.

Radiological parameters evaluated:

1. Parenchymal opacities: Consolidation (homogeneous increase in density) and ground-glass opacity (areas of increased density where vascular structures are visible)

2. Bronchial wall thickening: Increased diameter of bronchi relative to the adjacent pulmonary artery, "tram rail" or "ring" appearance

3. Hyperinflation findings: Diaphragmatic flattening, increased retrosternal air space, widening of costophrenic angles

4. Interstitial changes: Reticular or reticulonodular pattern, septal thickening, honeycomb appearance

5. Diagnostic criteria and disease classification: Based on radiological findings and the International Classification of Respiratory Diseases (ICD-11), 22 different lung diseases were diagnosed. For the diagnosis of chronic bronchitis, in addition to a history of cough and sputum production lasting at least three months a year for at least two consecutive years, radiological findings of bronchial wall thickening were sought. Pneumonia diagnosis was made based on clinical presentation consistent with consolidation or ground-glass opacity.

6. Statistical analysis: Data were analyzed using SPSS version 26.0. The chi-square (χ^2) test was applied to compare categorical variables. Differences in disease prevalence between genders were calculated at 95% confidence intervals (CI). A $p < 0.05$ value was considered statistically significant.

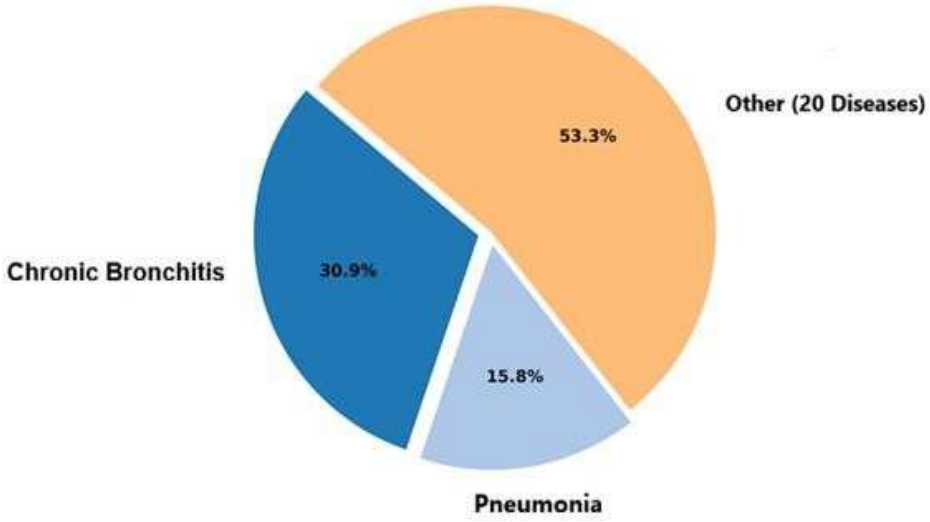
Findings

1. Total Number and Distribution of Diagnosed Diseases

In this study, 22 different lung diseases were identified radiologically in 1,000 patients.

Table-1: The three most common diseases.

Line	Illness	Number of Patients (n)	Prevalence (%)
1	Chronic bronchitis	309	30.9
2	Pneumonia	158	15.8
3	Other (20 diseases)	533	53.3



Graph-1: This graph shows the distribution of diagnoses among the 1,000 patients included in the study from a general perspective. It clearly shows that Chronic Bronchitis (30.9%) and Pneumonia (15.8%) cases constitute almost half of the total.

2. Dominant Diseases by Gender

Lung diseases dominant in women:

1. Chronic bronchitis: It was detected at a higher rate in female patients compared to men.
2. Pneumonia: It was seen significantly more frequently in women than in men.

This finding shows that, contrary to the common belief in traditional literature that chronic bronchitis and pneumonia are generally more common in men, women in the Nakhchivan population are at higher risk for these diseases.

Table-2: The relationship of radiological findings to diseases

Illness	Major Radiological Findings	Dominant Sex
Chronic bronchitis (309 patients)	Bronchial wall thickening, peribronchial infiltration, increased lung marking	A woman
Pneumonia (158 patients)	Lobar or segmental consolidation, air bronchogram, ground glass opacities	A woman

ISSN: 0005-2523
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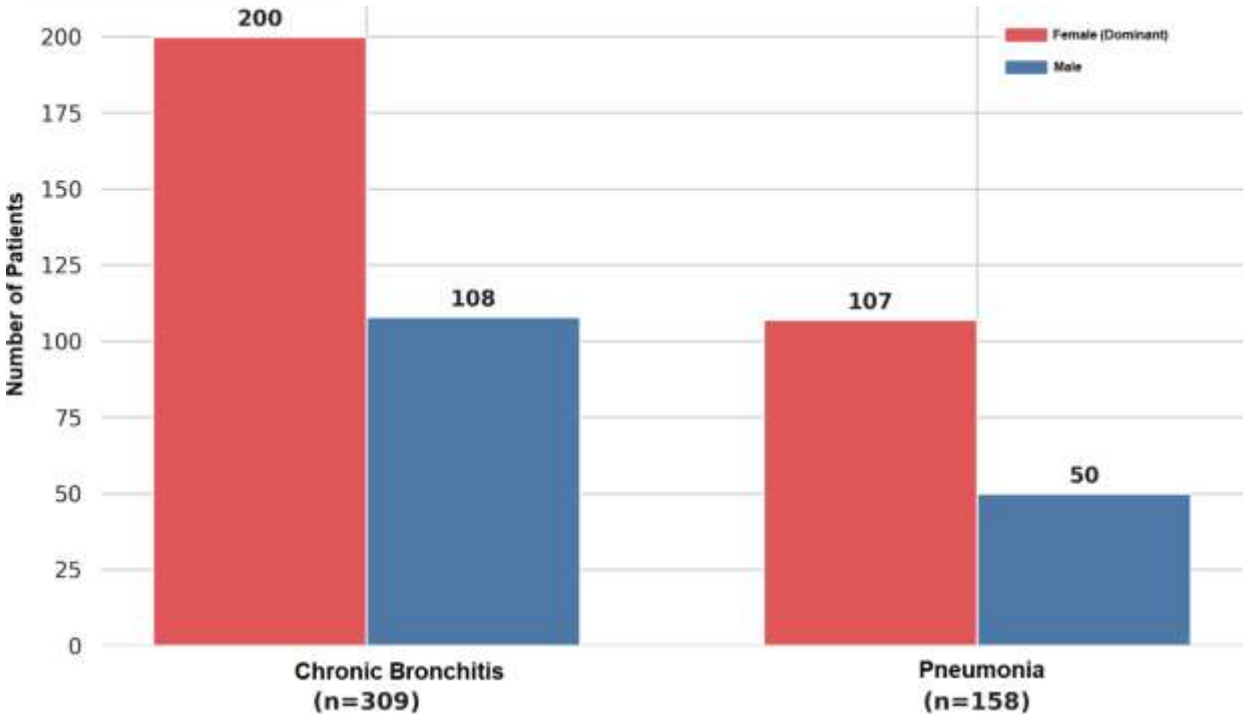

Graph-2: istribution of the Most Common Lung Diseases by Gender (Female Dominance)

3. Clinical Symptoms

Table-3: The most frequently reported symptoms in femal patients with both diseases.

Symptom	percent
Productive cough	%74
Fire	Pneumonia, %89
Dyspnea	%58
Chest pain	%42

Discussion

1. Possible Causes of Predominance of Chronic Bronchitis and Pneumonia in Women

1. Biomass and indoor air pollution: In rural areas of Nakhchivan, women may be exposed to biomass fuels (dung, wood) for cooking and heating purposes more than men.

2. Late diagnosis and access to healthcare: Women may report their symptoms later, which can lead to the detection of chronic bronchitis at a more advanced stage.

3. Hormonal and immunological factors: Airway hyperreactivity and differences in immune responses to infections in women may increase the risk of pneumonia.

4. Smoking habits: Although the smoking rate is higher among men than women in the region, women may have more exposure to passive smoking and indoor air pollution. 2. Contribution of Radiological Imaging

Radiology, in the diagnosis of chronic bronchitis and pneumonia:

1. Enables differential diagnosis
2. Makes it possible to objectively determine the extent and severity of the disease
3. Provides basic data for comparing disease burden according to gender

Conclusion

In this radiological study conducted on 1,000 patients in the Nakhchivan Autonomous Republic in 2025-

2026:
1. 22 different lung diseases were detected.
2. The most common diseases were chronic bronchitis (309 patients) and pneumonia (158 patients).
3. Both diseases were found to be more prevalent in women compared to men.
These findings reveal that gender-based differences in the epidemiology of lung diseases should be taken into account in Nakhchivan, and that preventive health strategies should be developed, especially for women.

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