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Evaluation of the Spread of Respiratory Diseases in the City of Batna Cover a Period of Five Years (2018-2023)

Sahraoui Nabil
University of Batna 2

Laidoune Abdelbaki
University of Batna 2

Abstract: Respiratory diseases pose a major public health concern in many cities worldwide, and the city of Batna is no exception. Over the past five years (2018-2023), respiratory diseases have likely been one of the primary health concerns for healthcare professionals and public health authorities in this region. This article provides an in-depth evaluation of the spread of these diseases in the city of Batna, focusing on trends, risk factors, high-risk seasons, and implications for public health and presents a comprehensive evaluation of the spread of respiratory diseases in the city of Batna over a five-year period, from 2018 to 2023. Respiratory diseases constitute a major public health issue in this urban region and have been a significant concern for healthcare professionals and authorities. The study methodology relies on extensive data collection from hospitals, health centers, and clinics in Batna, taking into account demographic, climatic, and environmental factors. Trend analysis reveals seasonal variations and significant increases in the spread of respiratory diseases. Risk factors such as air pollution, outbreaks of respiratory viruses, smoking, and housing conditions are also examined. The findings provide recommendations to improve prevention, early diagnosis, and management of respiratory diseases, with the goal of reducing their impact on the population of Batna. This study offers future perspectives to strengthen public health strategies and deepen the understanding of the mechanisms of disease propagation. By highlighting these crucial aspects, this article contributes to raising awareness among policymakers and healthcare professionals about the importance of combating respiratory diseases in this specific region.

Keywords: Respiratory diseases, Health, Disease propagation

Introduction

Respiratory diseases have long been a significant global health concern, affecting millions of people and imposing a substantial burden on healthcare systems (Jerrett et al., 2005). In urban areas, such as the city of Batna, these diseases can escalate due to various factors like pollution, population density, and lifestyle habits. Understanding the patterns and dynamics of respiratory disease propagation is vital for effective public health (planning and intervention strategies (Brunekreef & Holgate,2002).

Atmospheric pollutants can have significant adverse effects on human health, impacting various organ systems and leading to a range of health problems. Some major effects of atmospheric pollutants on health include:Respiratory issues: Air pollutants, particularly fine particulate matter (PM2.5), ozone (O3), nitrogen dioxide (NO2), sulfur dioxide (SO2), and carbon monoxide (CO), can irritate the respiratory system (Hamra, G. et al.,2014). Prolonged exposure to these pollutants can lead to conditions such as asthma, chronic obstructive pulmonary disease (COPD), bronchitis, and respiratory infections (Eisner et al., 2010). Cardiovascular problems: Air pollution has been linked to an increased risk of cardiovascular diseases, including heart attacks, strokes, and hypertension. Particulate matter and gaseous pollutants can enter the bloodstream and cause i

nflammation and oxidative stress, contributing to cardiovascular issues. Neurological effects: Some pollutants, such as lead and certain volatile organic compounds (VOCs), can negatively affect the nervous system (Dockery& Pope, C. A. (2020). Long-term exposure to these substances may impair cognitive function, cause developmental delays in children, and increase the risk of neurodegenerative diseases. Allergies and exacerbation of existing conditions: Air pollution can worsen allergy symptoms and trigger asthma attacks in susceptible individuals (Hoek, G.,et al,2013). Pollutants can irritate the airways and make people more sensitive to allergens. Cancer (Guarnieri, & Balmes, 2014) : Certain airborne pollutants, such as benzene, formaldehyde, and polycyclic aromatic hydrocarbons (PAHs), are considered carcinogenic. Prolonged exposure to these substances increases the risk of developing various types of cancer, including lung cancer. Reduced lung function: Children and adolescents exposed to high levels of air pollution may experience reduced lung growth and impaired lung function, leading to long-term health implications (Lozano et al., 2012)

This article delves into the evaluation of respiratory disease spread within the city of Batna over a comprehensive five-year period, spanning from 2018 to 2023. The study aims to shed light on the prevalence, trends, risk factors, and seasonal variations of these diseases, providing crucial insights for public health authorities and healthcare practitioners. By conducting a thorough analysis of data collected from hospitals, health centers, and clinics, along with relevant demographic, climatic, and environmental factors, this research offers an in-depth understanding of the challenges posed by respiratory diseases in the urban context of Batna.

Overview of Major Respiratory Diseases: Asthma, COPD, Lung Cancer.

Major respiratory diseases, such as asthma, chronic obstructive pulmonary disease (COPD), and lung cancer, are significant health issues that affect the airways and lungs. Here's an overview of each of these diseases:

Asthma: Asthma is a chronic disease of the airways that causes breathing difficulties. It is characterized by episodes of wheezing, coughing, shortness of breath, and a feeling of tightness in the chest. These symptoms are often triggered by allergens (such as dust, pollen, and animal dander) or irritants (such as cigarette smoke and air pollutants) (Balmes, 2019). Asthma can affect people of all ages and can be managed with medications, inhalers, and avoiding triggers.

Chronic Obstructive Pulmonary Disease (COPD): COPD is a chronic respiratory disease characterized by progressive obstruction of the airways (Lelieveld et al., 2015). The primary risk factors for COPD are smoking (both active and passive smoking) and exposure to air pollutants. Symptoms include persistent cough, excessive mucus production, difficulty breathing, and shortness of breath. COPD is a severe and progressive disease, but treatments can help slow its progression and relieve symptoms (Schikowski et al., 2015).

Lung Cancer: Lung cancer is a malignant tumor that forms in the lung tissues. It is often associated with smoking, but it can also affect individuals who have never smoked, although this is less common (Raghu et al., 2017). Symptoms may include persistent cough, coughing up blood, unexplained weight loss, and chest pain. Lung cancer is a serious disease and can spread to other parts of the body. Treatments vary based on the stage and type of cancer, including surgery, chemotherapy, radiation therapy, and immunotherapy (Di et al., 2017).

Pollution of Area of Batna:

Unfortunately, like many urban cities, Batna also faces issues of air pollution. The main sources of air pollution in this region are usually related to industrial activities, traffic emissions, power plant emissions, as well as agricultural practices and residential heating.(Cohen et al., 2017). The primary air pollutants that can be present at concerning levels in the city of Batna include:

Fine Particulate Matter (PM2.5 and PM10): These are small solid or liquid particles suspended in the air, originating from fossil fuel combustion, road dust, agriculture, and industry(Qian et al., 2015). These particles can penetrate deep into the respiratory system and cause health problems, especially for individuals with pre-existing respiratory conditions.

Sulfur Dioxide (SO2): This gas mainly comes from the combustion of sulfur-containing fossil fuels, such as coal and diesel. It can irritate the airways and worsen respiratory issues in sensitive individuals.

Tropospheric Ozone (O3): Low-level ozone is a secondary pollutant formed by the chemical reaction between nitrogen oxides (NOx) and volatile organic compounds (VOCs) in the presence of sunlight. It can cause respiratory irritation and worsen asthma and other respiratory problems.(Buist et al., 2007).

Nitrogen Oxides (NOx): These gases primarily come from vehicle emissions and industrial facilities. They can contribute to the formation of tropospheric ozone and worsen air qualit (Kelly & Fussell 2012).

Volatile Organic Compounds (VOCs): They are emitted by chemicals, solvents, paints, exhaust fumes, and other sources. In the presence of NOx, they can contribute to the formation of tropospheric ozone and poor air quality (Pope & Dockery, 2006).

Air pollution in Batna can be more pronounced during periods of hot and dry weather, when meteorological conditions can contribute to the stagnation of pollutants. Air pollution can have a negative impact on the health of the population, especially on sensitive individuals such as children, the elderly, and those with chronic respiratory problems.

To address this issue, it is essential for local and national authorities to implement effective measures to reduce pollutant emissions and improve air quality in the city of Batna. This may include promoting cleaner transportation modes, controlling industrial emissions, raising public awareness, and adopting more sustainable environmental and energy policies.

Respiratory Diseases in the city of Batna: Causes and Consequences

Respiratory diseases in the city of Batna are influenced by various causes and have significant consequences on public health. Here is an overview of the main causes and consequences of these respiratory diseases.

Causes of Respiratory Diseases in Batna:

Air pollution: Air pollution caused by industrial emissions, dense traffic, agricultural practices, and residential heating is a major cause of respiratory diseases in Batna. Fine particulate matter, nitrogen oxides, sulfur dioxide, and volatile organic compounds present in polluted air can irritate the airways and worsen existing respiratory conditions (Guarnieri, M., & Balmes, 2014).

Smoking: Active and passive smoking remains a major concern in the city of Batna. Smokers and non-smokers exposed to secondhand smoke are at risk of developing respiratory problems, such as asthma, chronic bronchitis, and obstructive lung diseases.(Raaschou Nielsen et al., . 2013)

Environmental factors: Environmental conditions, such as dry and dusty climate or occupational exposures to toxic substances, can contribute to the development of respiratory diseases among the residents of Batna.
Social and economic factors: Poor living conditions, low-quality housing, and limited access to healthcare can also play a role in the prevalence of respiratory diseases (Adeloye, et al., 2015).

Consequences of Respiratory Diseases in Batna:

Increased hospitalizations: Respiratory diseases lead to an increase in hospital admissions in Batna, putting additional pressure on healthcare services and medical resources.

Impact on quality of life: Individuals suffering from respiratory diseases may experience breathing difficulties, frequent symptoms, and a significantly reduced quality of life.

School and work absenteeism: Respiratory diseases can result in high rates of school and work absenteeism, affecting productivity and education.

Increased risk of complications: Individuals with chronic respiratory diseases are more susceptible to developing severe complications during respiratory disease outbreaks such as influenza or viral respiratory infections. To address these challenges, it is crucial to implement preventive and public health measures to reduce the causes of respiratory diseases, such as promoting clean transportation, enforcing stricter industrial

emission standards, conducting anti-smoking campaigns, and improving environmental and living conditions for the residents of Batna. A multidisciplinary approach involving local authorities, healthcare professionals, and the community is necessary to protect the respiratory health of Batna's population and enhance overall quality of life in the city.

Method

Clinical examinations and syndromic surveillance systems in addition to laboratory surveillance are tools that allow reliable statistics on respiratory diseases.The data collected per year allowed us to have an idea of the state of spread of respiratory diseases in the city of Batna and to make an evaluative approach in terms of the impact of the factors which are at the origin of the genesis of these damages.The test of the evaluation of the degree of impact of the risk factors which are important in our city, namely: pollution due to vehicles, air pollution due to discharges from neighboring factories: ceramic factories and cement factories without forget the impact of cigarettes on the health of the population because the number of smokers continues to increase from year to year.

Presentation of Survey Results:

Table 1. Distribution of the main respiratory diseases cover the period 2018-2023

Respiratory diseases/years	Asthma	COPD	Lung Cancer
2018	1223	1226	191
2019	1492	1419	212
2020	641	888	201
2021	742	867	194
2022	1910	1146	246
2023	1416	1237	273

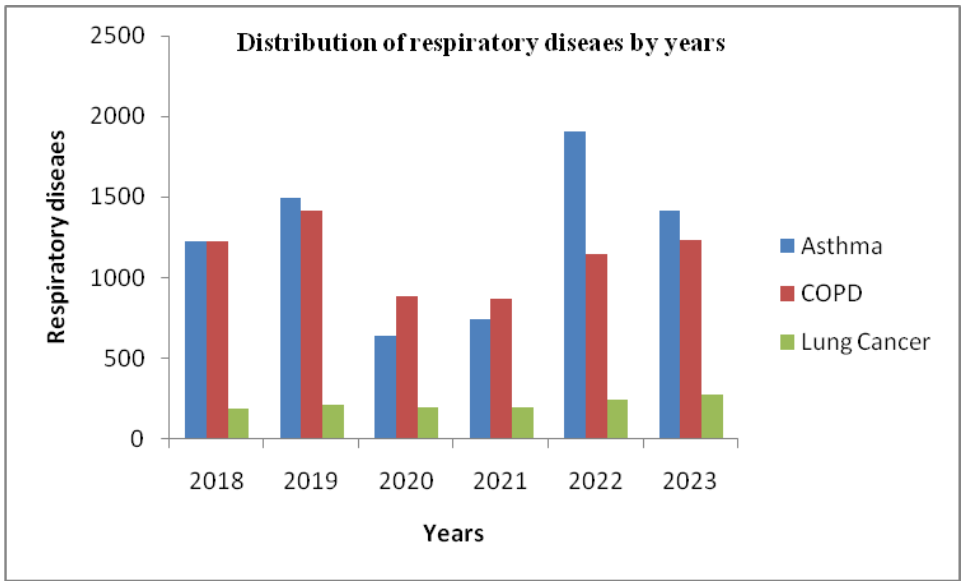

Figure 1. Graphical representation of the distribution of respiratory diseases during the period 2018-2023

Table 2. Spread of asthma by age group during the period 2018-2023

Respiratory disease(Asthma) Age group	Asthma 13-30 ans	Asthma 30-50 ans	Asthma Sup 50 ans
2018	523	425	275
2019	689	502	301
2020	315	222	104
2021	412	204	126
2022	735	699	476
2023	566	463	387

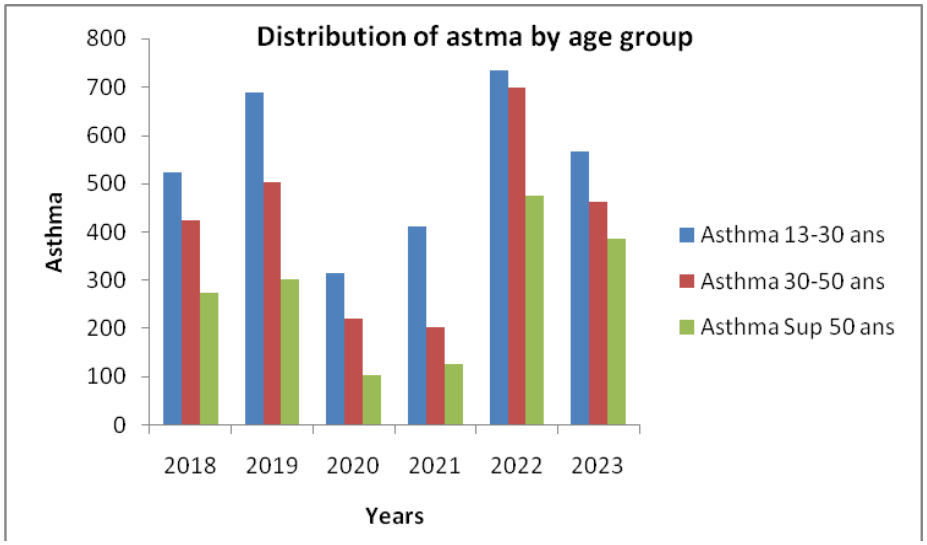

Figure 2. Graphic representation of the spread of asthma by age group during the period 2018-2023

Table 3. Spread of COPD by age group during the period 2018-2023

Respiratory disease (COPD)	COPD	COPD	COPD
Age group	13-30	30-50	Sup 50
2018	236	365	625
2019	256	412	751
2020	165	321	402
2021	145	266	456
2022	325	345	476
2023	312	356	569

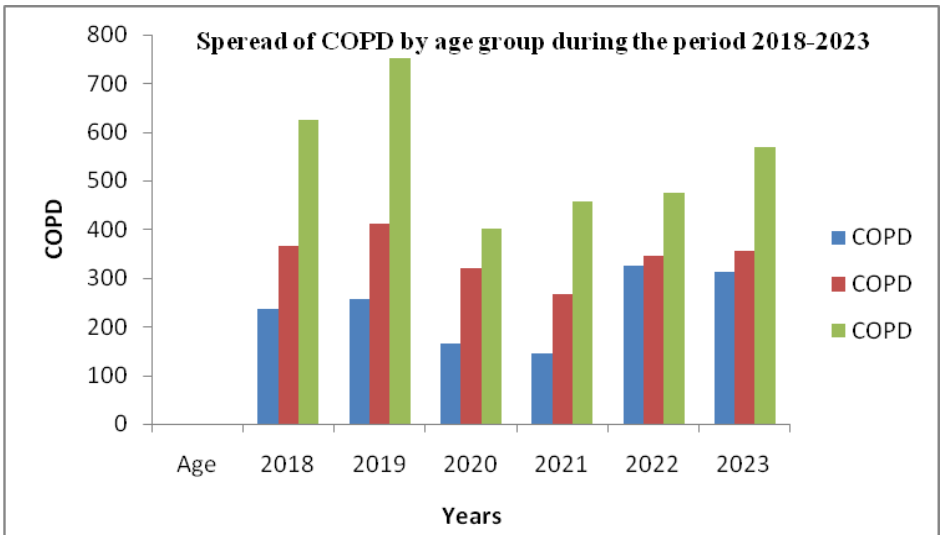

Figure 3. Graphic representation of the spread of COPD by age group during the period 2018-2023

Table 4. Spread of Lung cancer by age group during the period 2018-2023

Respiratory disease (Lung cancer)	Lung cancer	Lung cancer	Lung Cancer
Age group	13-30 years	30-50 years	Sup 50 years
2018	12	77	102
2019	13	67	132
2020	9	56	136
2021	6	45	141
2022	8	69	169
2023	8	88	177

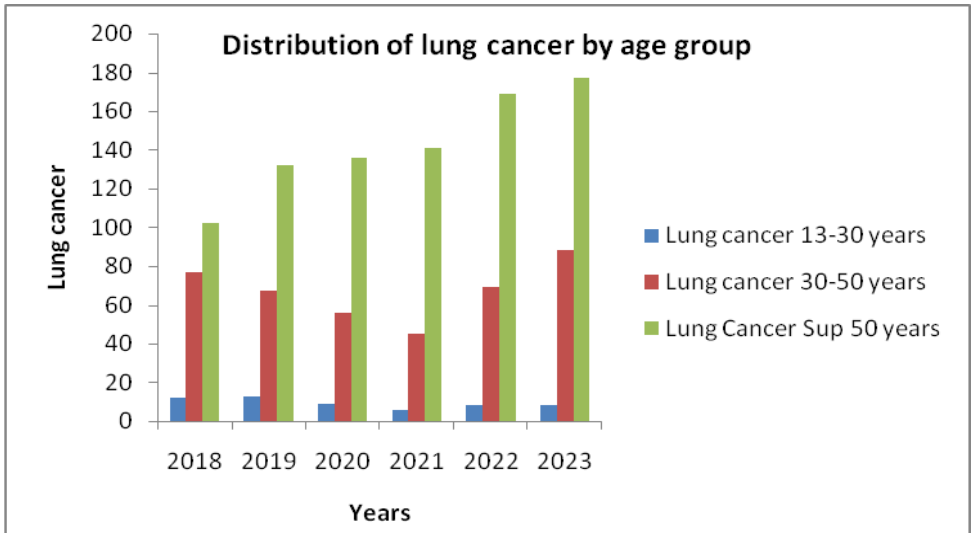

Figure 4. Graphic representation of the spread of lung cancer by age group during the period 2018-2023

Table 5. Spread of respiratory diseases by sex during the period 2018-2023

Respiratory diseases	Asthma		BPCO		Lung Cancer	
Sex	Male	Feminine	Male	Feminine	Male	Feminine
2018	864	359	1012	214	184	7
2019	1123	369	1236	183	208	4
2020	496	145	613	275	196	5
2021	587	155	625	242	188	6
2022	1645	265	1146	177	238	8
2023	1263	153	1123	114	269	4

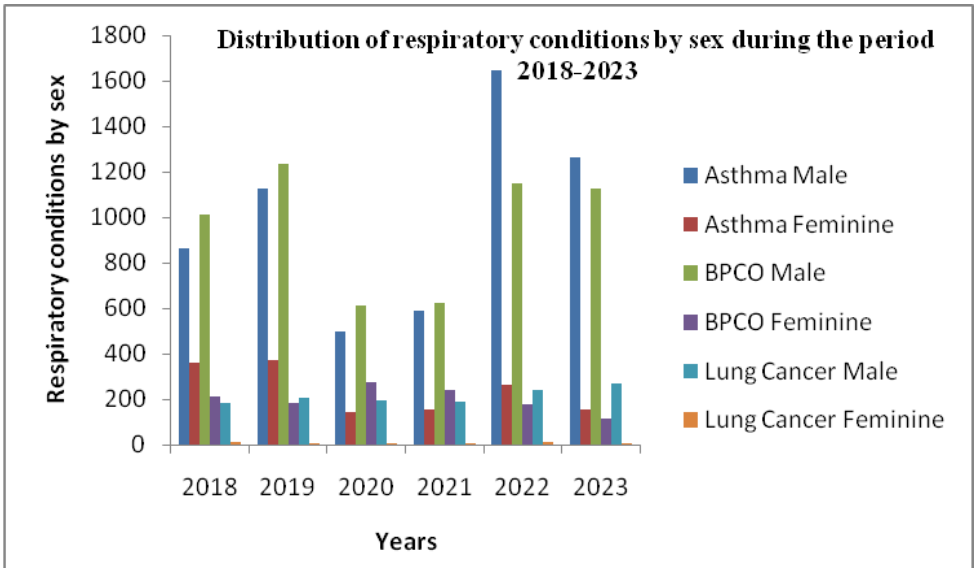

Figure 5. Graphic representation of the spread of respiratory diseases by sex during the period 2018-2023

Results and Discussion

According to the results obtained dealing with the spread of respiratory diseases during the period of 2018-2023, it is noted that the situation is alarming in view of the number of people affected and more particularly the age group 30-50 years and over. 50 years old, is this due to several risk factors which are:

The pollution rate is high since the city of Batna is surrounded by very polluting factories such as ceramics manufacturing factories and cement factories. in addition, according to statistics, the number of smokers in this age group is very high and exceeds 60%.

Confirmation illustrated by the results presented in Tables 1,2,3,4 and 5 consolidated by graphic representations, which indicate that the number of people affected by major respiratory diseases: Asthma, BPCO and Lung cancer are growing significantly while the fall in values during the years 2020-2021 are due to total containment and the closure of factories completely for two years due to COVID-19.

It should also be noted that according to the results of the spread of respiratory diseases during the period 2018-2023, we note that the female segment is very little affected by these respiratory diseases is this is mainly due to: the rate of women who smoke is negligible, exposure to pollutants is minimal, because according to our tradition the woman spends most of her time at home, something that is confirmed by the results see table and fig 5.Smoking is the main risk factor for the development of respiratory diseases, including asthma, chronic bronchitis and chronic obstructive pulmonary disease (COPD). Cigarette smoke irritates the airways and damages the lungs, which can lead to reduced breathing capacity and an increased risk of respiratory infections. Lung cancer: Smoking is the most common cause of lung cancer. Cigarette smoke contains carcinogenic substances that damage the DNA of lung cells, thus promoting the growth of cancer cell s (Pope III, et al., 2011).

Conclusion

Through our study it appears that the city of Batna is exposed to a serious problem of the spread of respiratory diseases especially among mens and more particularly among the category of 30-50 years and 50 years and over and this is mainly due the high pollution rate caused by the fumes of exhaust gases from dilapidated vehicles as well as the smoke from factories bordering the towns: ceramic factories and cement factories in addition to the high rate of smokers in the city. This study will serve as a springboard and database for attempts to resolve this scourge which causes a health disaster and a huge loss in terms of therapeutic care for this type of complicated and often irreversible disease.

Recommendations

To overcome this problem, it is imperative to take the following decisions: Imposing a depollution system on neighboring factories or else closing them, renewing old vehicles that generate a high level of pollution, carrying out an intense awareness campaign on the health risks of cigarettes and applying the new regulations prohibiting smoking cigarettes in public spaces to dissuade people from quitting smoking, without forgetting treatment in public hospitals.

Scientific Ethics Declaration

The authors, Dr Sahraoui Nabil & Dr Laaidoue Abdelbaki, declare that the scientific ethical and legal responsibility of this article published in EPSTEM journal belongs to the authors.

Acknowledgements or Notes

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Author Information

Sahraoui Nabil
University of Batna 2
Batna, Algeria
Contact e-mail: *n.sahraoui@univ-batna2.dz*

Laidoune Abdelbaki
University of Batna 2
Batna,Algeria

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