Original Research Article

Pattern and trends of respiratory diseases in an outpatient setting: a five-year review in a tertiary hospital in South-South, Nigeria

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ABSTRACT

Background: Limited information exists on the epidemiology of respiratory diseases in South-South Nigeria, especially regarding changing risk factors. This study aimed to assess the frequency and pattern of respiratory diseases in an adult outpatient clinic in a teaching hospital in South-South Nigeria.
Methods: Medical records of newly referred patients with respiratory diseases who received care at the chest clinic of Irrua Specialist Teaching Hospital from January 2018 to December 2022 were retrospectively reviewed.
Results: The study included 655 patients (mean age: 54.7±18.7 years). The majority of cases occurred in the 41-60 age group, and 55.4% were female. Non-communicable respiratory diseases accounted for 60.9% of cases, while communicable respiratory diseases accounted for 39.1%. The most common respiratory diseases observed were bronchial asthma (22.6%), tuberculosis (21.1%), chronic obstructive pulmonary disease (19.2%), pneumonia (11.1%), interstitial lung diseases (6.7%), and lung cancer (4.1%). Less common respiratory diseases included pulmonary aspergilloma (1.5%), pleural-related diseases (0.8%), hypersensitivity pneumonitis (0.8%), and obstructive sleep apnoea syndrome (0.6%). The study's annual trend showed a gradual increase in the number of respiratory cases, reaching a low point in 2020. Significant differences were found in the age and gender distribution of the top six respiratory diseases (p <0.001).
Conclusions: This study provides valuable insights into the demographic and disease patterns of respiratory diseases in an outpatient setting, informing targeted prevention and treatment measures for these conditions.

Keywords: Nigeria, Outpatient, Pattern, Respiratory diseases

INTRODUCTION

Respiratory disorders are a leading cause of mortality and disability worldwide, and they account for the highest number of primary care consultations in the United Kingdom.[1,2] The top five respiratory diseases are chronic obstructive pulmonary disease (COPD), pneumonia, asthma, tuberculosis (TB), and lung cancer. Along with the adverse effects of air pollution and climate change, sleep-disordered breathing, pulmonary hypertension, and occupational lung disorders significantly contribute to the global burden of respiratory diseases.[1]

There has been a noticeable increase in the prevalence and incidence of chronic respiratory diseases from 1990 to 2019, suggesting an increasing global burden of respiratory disease.[3] Respiratory conditions affect approximately one-sixth of the global population, and over 10% of all disability-adjusted life years can be attributed to respiratory disorders, which are second only to cardiovascular diseases, including stroke.[3-5] Additionally, at least 2.4 billion people worldwide are exposed to hazardous smoke from biomass fuel, which is often inefficiently burned in poorly ventilated indoor stoves or fireplaces.[1,6]

According to the World Health Organization, respiratory diseases were responsible for three of the top 10 causes of death in 2019 and cause over 8 million deaths each year.[7] Approximately 200 million people have COPD, which causes about 3.2 million deaths annually and is the third-leading cause of death worldwide after ischemic heart disease and stroke.[1,7] Lower respiratory infections remained the world's deadliest communicable disease, ranked as the 4th leading cause of death.[7] Deaths from cancers of the trachea, bronchi, and lungs have increased from 1.2 million to 1.8 million, ranking them 6th among the leading causes of death.[1,7] Chronic respiratory diseases are also a significant burden in sub-Saharan Africa, as evidenced by the region's high age-standardized death rates.[8] Although respiratory impairment causes disability and death across all socioeconomic groups worldwide, poverty, environmental exposures, overcrowding, and generally poor living conditions increase susceptibility to this vast array of diseases.[1]

Data collected from certain geopolitical zones in Nigeria show that respiratory diseases are responsible for 8.7% to 12% of medical admissions[9-11] and 5.4% to 17.9% of medical emergencies.[12-14] The most common respiratory conditions observed were TB, bacterial pneumonia, bronchial asthma, and COPD. A review of the burden of respiratory diseases in Nigeria conducted by Akanbi et al also identified similar leading respiratory disorders.[15]

Given the significant global and low-and-middle-income countries burden of respiratory diseases, it is crucial to monitor the changing and current patterns of respiratory diseases in our environment.[10,16] A comprehensive understanding of the risk factors and patterns of these diseases can aid in the development of effective disease management strategies. However, there is limited data available on the demography and pattern of respiratory diseases in outpatient settings, particularly in South-South Nigeria. The objective of this study was to determine the frequency and pattern of respiratory diseases among adult outpatients attending a chest clinic at a tertiary healthcare facility in Irrua, South-South, Nigeria. This information can inform appropriate interventions to alleviate the burden of respiratory illnesses, as well as facilitate appropriate planning and policy development to enhance health systems.

METHODS

This was a retrospective review conducted on adult patients referred to the chest clinic of the Irrua Specialist Teaching Hospital (ISTH) in Irrua over five years, from January 2018 to December 2022.

The ISTH is a tertiary institution with a capacity of 434 beds situated in Irrua, which serves as the administrative centre of Esan Central Local Government Area in Edo State, South-South Nigeria. It is a major referral centre not only for patients in the state but also for those from neighbouring states such as Ondo, Kogi, Delta, and beyond. ISTH is renowned for its expertise in diagnosing, managing, and controlling viral hemorrhagic fevers and emergent pathogens. Although Irrua is a rural community with mostly agrarian residents, it benefits from the presence of several tertiary educational institutions, which provide a significant number of educated and professional clients.

The chest clinic at ISTH is a weekly referral clinic that sees an average of 10-15 patients (new cases and follow-up). The clinic is managed by a consultant pulmonologist who, along with specialty resident doctors, assesses and manages patients. The clinic provides care for both communicable and non-communicable respiratory conditions. Institutional ethical approval was obtained from the Health Research Ethics Committee of ISTH. All procedures were carried out in compliance with the 1964 Helsinki Declaration and its later amendments. All data was completely anonymized.

Sample size calculation

The sample size for this study was determined using Fisher's statistical formula ($n=Z^2pq/d^2$). The calculation involved a confidence interval (Z) of 1.96, representing a 95% confidence level. The tolerable sampling error (d) was set at 0.05. The prevalence of respiratory diseases (p) was estimated to be 14.8% based on a previous study that examined medical admissions in a rural facility in Nigeria.[17] The complement of the prevalence, expressed as q (1-p), represented the proportion of the sample population not included in this study. By applying these parameters, the minimum sample size was determined to be 194. Considering a potential attrition risk of 10%, the minimum required sample size adjusted for attrition was 213.

All consecutive adult new patients who attended the chest clinic at ISTH and were diagnosed with a respiratory disease between January 2018 and December 2022 were included in the study.

Exclusion criteria

All patients diagnosed with a respiratory disease during the study period whose medical records were missing,

those with incomplete information, and those with a non-respiratory diagnosis were excluded from the study.

Data collection

The data of all consecutive new patients diagnosed with respiratory disease who attended the chest clinic at ISTH, Irrua during the study period were reviewed. Data were extracted from the clinic's register, which served as the primary source of information and included the patient's age, gender, diagnosis, and year of diagnosis. The diagnosis of respiratory disease was confirmed by a chest physician following a complete clinical and investigative review. In cases where the diagnosis was uncertain, the patient's case file was examined to establish the diagnosis.

Data analysis

The data collected were analysed using IBM Statistical Package for the Social Sciences (SPSS) version 25 for Windows (SPSS Inc., Chicago, IL, USA). Continuous variables were summarised and presented as means and standard deviations, while categorical variables were summarised as frequencies and percentages. The association between variables was analysed using Pearson's chi-square and/or Fisher's exact test. A p-value less than 0.05 was considered statistically significant.

RESULTS

During the study period, a total of 720 patients were seen in the clinic, out of which 655 were included in the study after excluding 65 patients due to incomplete data and non-respiratory diagnosis. The patients' recruitment flow chart is displayed in Figure 1.
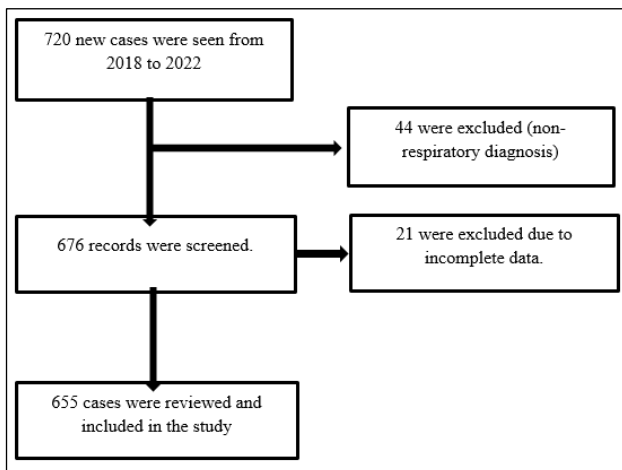

Figure 1: Patients' recruitment flowchart.

The number of cases observed annually showed a gradual increase, with a nadir in 2020. The mean age of the population was 54.7±18.7 years, and 243 (37.1%) cases were found in the age group of 41-60 years, which

represents the majority. Among the study patients, there were 363 (55.4%) females and 292 (44.6%) males, resulting in a female-to-male ratio of 1.1:1. Table 1 illustrates the demographic characteristics of the study patients.

Table 1: Demographic characteristics of the study patients.

Variable	Frequency (N = 655)	Percentages
Year of diagnosis		
2018	112	17.1
2019	131	20.0
2020	106	16.2
2021	142	21.7
2022	164	25.0
Age group (years)		
≤ 20	20	3.1
21-40	132	20.2
41-60	243	37.1
61-80	218	33.3
> 80	42	6.4
Mean±SD	54.7±18.71	
Gender		
Male	292	44.6
Female	363	55.4

Table 2: Frequency of respiratory diseases.

Respiratory diseases	Frequency (n = 655)	%
Communicable respiratory diseases	256	39.1
Non-communicable respiratory diseases	399	60.9
Bronchial asthma	148	22.6
Tuberculosis	138	21.1
Chronic obstructive pulmonary disease	126	19.2
Pneumonia	73	11.1
Interstitial lung diseases	44	6.7
Idiopathic pulmonary fibrosis-	13	2.0
Post -tuberculosis lung fibrosis-	13	2.0
Post-COVID lung fibrosis-	10	1.5
Sarcoidosis-	7	1.1
Drug induced lung fibrosis	1	0.2
Lung cancer	27	4.1
Suppurative lung diseases	19	2.9
Bronchiectasis-	13	2.0
Lung abscess-	6	0.9
Cough of undetermined origin	19	2.9
Upper respiratory tract infections	16	2.4
Allergic rhinosinusitis	16	2.4
Pulmonary aspergilloma	10	1.5
Pleural related diseases	10	1.5
Malignant effusion-	5	0.8

Continued.

Respiratory diseases	Frequency (n = 655)	%
Primary spontaneous pneumothorax-	2	0.3
Pleural plaques-	3	0.4
Hypersensitivity pneumonitis	5	0.8
Obstructive sleep apnoea syndrome	4	0.6

Non-communicable respiratory diseases accounted for 399 (60.9%) cases, while 256 (39.1%) cases were communicable respiratory diseases. Bronchial asthma (22.6%), TB (21.1%), COPD (19.2%), pneumonia (11.1%), interstitial lung diseases (ILD) (6.7%), and lung cancer (4.1%) were the top 6 respiratory diseases observed. Pulmonary aspergilloma (1.5%), pleural-related diseases (1.5%), hypersensitivity pneumonitis (0.8%), and obstructive sleep apnea syndrome (OSAS) (0.6%) were the least common respiratory diseases observed. Table 2 shows the pattern of respiratory diseases observed during the study period.

Bronchial asthma, TB, and lung cancer showed a steady increase in annual incidence, with a remarkable nadir in the year 2020, which was also reflected in the prevalence of other diseases. The incidence of bronchial asthma increased from 14.9% in 2018 to 29.1% in 2022. Pneumonia incidence appeared to be steady, with a slight increase in the year 2020, despite its generally low prevalence in the same year. The annual trend in the incidence of the top six respiratory diseases is shown in Figure 2.

The majority of bronchial asthma cases were observed in the age group of 45-64 (36.5%) and less than 45 years (35.1%). Over half (55.8%) of TB cases occurred in

patients less than 45 years old, while pneumonia and COPD predominantly accounted for 50.7% and 61.1% respectively in patients 65 years and above. The incidence of lung cancer also significantly increased among the elderly (70.2%). The differences in the age distribution of the top six respiratory diseases showed statistical significance ($p < 0.001$). Bronchial asthma (73.6%) and pneumonia (58.9%) were predominantly observed in females, while TB (55.8%) and COPD (54.8%) were more common in males. Lung cancer (51.9%) and ILD (55.4%) showed a slight male preponderance. The gender distribution of these respiratory diseases showed statistical significance ($p < 0.001$). Table 3 illustrates the demographic distribution of the top six respiratory diseases.
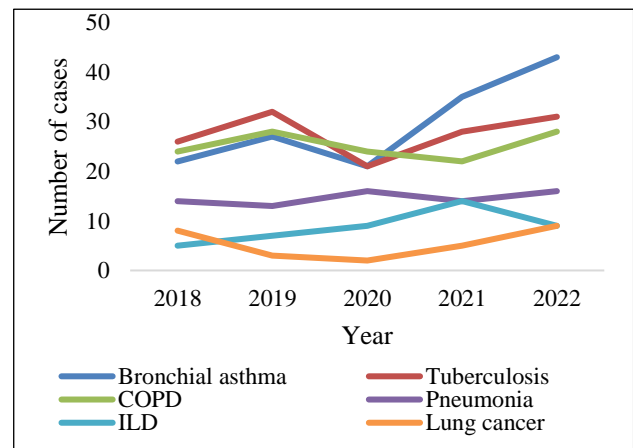
COPD: chronic obstructive pulmonary disease; ILD: interstitial lung disease

Figure 2: Annual trend in the frequency of the top six respiratory diseases.

Table 3: Demographic distribution of top six respiratory diseases.

Variables	Respiratory diseases						p - value[π]
	Bronchial asthma (N = 148) n (%)	TB (N = 138) n (%)	COPD (N = 126) n (%)	Pneumonia (N = 73) n (%)	ILD (N = 44) n (%)	Lung cancer (N = 27) n (%)	
Year							
2018	22 (14.9)	26 (18.8)	24 (19.0)	14 (19.2)	5 (11.4)	8 (29.6)	0.581
2019	27 (18.2)	32 (23.2)	28 (22.2)	13 (17.8)	7 (15.9)	3 (11.1)	
2020	21 (14.2)	21 (15.2)	24 (19.0)	16 (21.9)	9 (20.5)	2 (7.4)	
2021	35 (23.6)	28 (20.3)	22 (17.5)	14 (19.2)	14 (31.8)	5 (18.5)	
2022	43 (29.1)	31 (22.5)	28 (22.2)	16 (21.9)	9 (20.5)	9 (33.3)	
Age group (years)							
<45	52 (35.1)	77 (55.8)	3 (2.4)	12 (16.4)	8 (18.2)	1 (3.7)	< 0.001*
45-64	54 (36.5)	51 (37.0)	46 (36.5)	24 (32.9)	24 (54.2)	7 (25.9)	
≥ 65	42 (28.4)	10 (7.2)	77 (61.1)	37 (50.7)	12 (27.3)	19 (70.4)	
Gender							
Male	39 (26.4)	77 (55.8)	69 (54.8)	30 (41.1)	24 (54.5)	14 (51.9)	< 0.001*
Female	109 (73.6)	61 (44.2)	57 (45.2)	43 (58.9)	20 (45.5)	13 (48.1)	

DISCUSSION

The study analysed the demographic and disease pattern of 655 patients with respiratory diseases seen in a specialist outpatient clinic in South-South Nigeria. The age group of 41-60 years had the majority of cases (37.1%), with females comprising 55.4% of the patients. Non-communicable respiratory diseases accounted for 60.9% of cases, and bronchial asthma, TB, and COPD were the most common respiratory diseases. The incidence of bronchial asthma, TB, and lung cancer showed a steady increase, with a remarkable nadir in 2020. The age and gender distribution of respiratory diseases were statistically significant (p <0.001).

Respiratory diseases, such as TB, COPD, bronchial asthma, acute respiratory infections, and lung cancers, are major contributors to global morbidity and mortality, especially in sub-Saharan Africa.[1,15] This study found that bronchial asthma, TB, COPD, pneumonia, ILD, and lung cancer were the top six respiratory diseases, which is consistent with the global trend.[1] Previous studies in Nigeria and India have reported similar findings.[10,11,18-20] However, the incidence of upper respiratory tract infections (URTI) in this study was much lower compared to the Indian study.[20] This difference may be attributed to the disease patterns in the two countries, as URTIs are often seen in family medicine clinics in our facility. The index study also revealed that hypersensitivity pneumonitis and OSAS were the least common respiratory diseases, indicating a need for increased awareness of these relatively common but under-recognised conditions.

The study reveals a consistent rise in the annual occurrence of respiratory diseases over the study period, with a nadir in 2020, which can be attributed to the COVID-19 pandemic. The incidence of bronchial asthma, TB, and COPD follows this trend, which is also reflected in the prevalence of other diseases. Pneumonia incidence appeared to be steady, with a slight increase in 2020, despite its generally low prevalence in the same year. According to a study conducted in the United States, outpatient clinic visits decreased by almost 60% during the COVID-19 pandemic.[21]

The findings of this study are consistent with other studies that have reported an increased incidence of non-communicable respiratory diseases, especially bronchial asthma and COPD, which are leading causes of morbidity and mortality worldwide.[18,19] While active smoking remains the most established risk factor worldwide, household air pollution from biofuel and occupational risk remain prominent factors in sub-Saharan Africa.[22] Therefore, it is essential to promote health education and eco-friendly alternative sources of household cooking. Dubey et al also reported a consistent rise in the incidence of non-communicable respiratory diseases in India, supporting the importance of these diseases as significant contributors to respiratory disease morbidity and mortality worldwide.[1,20] This justifies the Global Burden of Disease Study's need to target non-communicable respiratory diseases to achieve the goal of reducing premature mortality by one-third.[23] Dubey et al.[20] also reported a consistent rise in the incidence of non-communicable respiratory diseases in India, supporting the importance of these diseases as significant contributors to respiratory disease morbidity and mortality worldwide.[1] However, studies conducted in South-West and South-East Nigeria reported communicable respiratory diseases as the dominant type.[10,11,24] These studies were limited to admitted patients, which could potentially explain the difference in observations. Therefore, while the prevalence of respiratory non-communicable diseases is on the rise, infectious diseases remain a significant contributor to the respiratory disease burden in Nigeria.

This study highlights the significance of age and gender in the incidence and distribution of respiratory diseases, with distinct variations across different age groups. The mean age of the study population was 54.7±18.71 years, and the majority of patients belonged to the age categories of 41-60 years (37.1%) and 61-80 years (33.3%). In comparison to other studies, Adeoti et al reported a similar mean age of 50.0±20.8 years, while Alasia et al and Ojuawo et al observed slightly lower mean ages of 44.91±17.03 years and 47.6±19.8 years, respectively.[11,18,19] The peak age range of patients with bronchial asthma was the middle-aged and highly productive age group, indicating a significant socioeconomic burden on society. Similarly, over 50% of TB cases were prevalent in the productive age group, consistent with previous studies.[18,19] Snow et al noted that the risk of TB infection is highest during adolescence and early adulthood, which is the productive age, highlighting the need to prioritize preventive measures.[25] COPD and lung cancer were more commonly seen in the elderly (65 years and above). COPD remains the leading cause of respiratory disease-related deaths, and it contributes significantly to frailty and geriatric medicine, as demonstrated by this study.[1,3,23,26] The differences in the age distribution of these respiratory diseases may be attributed to various factors, including environmental exposures, genetic predisposition, and comorbidities.

In this study, there was a statistically significant difference in the gender distribution of the six most common respiratory diseases. Females accounted for 55.4% of cases, while males accounted for 44.6%. Similar findings were reported by Alasia et al and Desalu et al in South-South and South-West Nigeria, respectively.[9,18] However, other studies have reported a higher proportion of male patients.[10,19,24] Bronchial asthma was more common in females, which is consistent with previous research, indicating a potential role of reproductive hormones in the reversal of male predominance at puberty.[23,26-28] Conversely, TB and COPD were more prevalent in males, consistent with previous reports in Nigeria.[10,18,19] There was a slight male

preponderance observed in ILD and lung cancer, whereas Alasia et al found a female preponderance in ILD, which they attributed to the higher incidence of rheumatic disease in females.[18] These differences in gender distribution may be attributed to differences in risk factors and exposure patterns, as well as biological differences between males and females.[29]

In recent decades, Africa, including Nigeria, has focused on implementing policies to prevent and manage communicable diseases. However, the global shift towards non-communicable diseases, as emphasized by our local study, cannot be overlooked. Therefore, policies must be put in place to address the management of these increasing non-communicable respiratory conditions. These policies should include preventive measures, health education and promotion, such as smoking cessation, embracing alternative sources of energy, and using protective gear and face masks at the workplace. These policies should also aim at reducing exposure to triggers and risk factors of respiratory diseases and retraining of health workers on these conditions. This will help to manage these ever-challenging respiratory conditions.

One limitation of this study is that the data collected only represents the outpatient clinic of the hospital and may not fully reflect the respiratory disease trends in the broader population. Additionally, since the study was conducted at a single centre, generalizing the results should be done with caution. Nevertheless, the study provides crucial insights into the pattern and prevalence of respiratory diseases in the South-South region of Nigeria, which can serve as a valuable audit and inform policy formulation.

CONCLUSION

In summary, this study provides insights into the demographic and disease patterns of respiratory illnesses among clinic attendees. Non-communicable respiratory diseases were observed to be the leading respiratory cases in the chest clinic of ISTH, Irrua, Nigeria. These findings could be valuable in designing targeted strategies for the prevention and treatment of these diseases, particularly in vulnerable populations such as the elderly and those with comorbidities. Additional research is necessary to enhance our comprehension of the underlying causes and risk factors of these respiratory diseases and their impact on overall health and well-being.

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