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Descriptive Study on Exacerbation of Respiratory Diseases Among Student Migrants in Bangalore

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Abstract

Background: The study investigates the exacerbation of respiratory diseases among student migrants in Bangalore, with a focus on the impact of air pollution, climate changes, and lifestyle factors.

Objectives: The primary objective was to assess the exacerbation of respiratory conditions among migrant students, while the secondary goal was to identify influencing factors.

Methodology: A descriptive correlational study was conducted at Acharya Institutes, Bengaluru, over six months. Data were collected using a self-designed questionnaire and analyzed statistically, employing descriptive and inferential methods such as the Chi-square test.

Results: Among previously diagnosed students, asthma was the most exacerbated condition (77.42%), while allergies were the most common symptom. In non-diagnosed migrants, symptoms like coughing and wheezing were significant. The study found a notable link between migration and reduced quality of life, increased medical assistance frequency, and reduced physical activity.

Conclusion: Migration exacerbates respiratory issues due to pollution, allergens, and lifestyle shifts. Recommendations include preventive measures like wearing masks, practicing yoga, and promoting public awareness of local air quality and respiratory health.

Keywords: Respiratory diseases, Student migrants, Exacerbation of symptoms, Quality of life, Chi-square test, Self-designed questionnaire, Descriptive correlational study

1. Introduction

Respiratory diseases or lung diseases are pathological states that affect the body and tissues, making air exchange difficulty in breathing animals. These include the condition of the respiratory system, including the trachea, bronchi, bronchioles, alveoli, pleura, pleural cavity, respiratory vessels, and muscles.

Respiratory diseases impair lung function and can be categorized into three types:

1. **Respiratory Infections**: These affect airways, causing narrowing or damage, as seen in asthma, COPD, and bronchiectasis. Symptoms include difficulty breathing, likened to "breathing through a straw."
2. **Lung Diseases**: Structural issues, like swelling or injury, restrict lung expansion, making breathing difficult. Examples include pulmonary fibrosis and sarcoidosis. Patients often describe it as "wearing

a tight vest."

3. **Pulmonary Circulatory Diseases**: These impact lung blood vessels, affecting oxygen absorption and carbon dioxide release, and may involve the heart. Pulmonary hypertension is a key example, with symptoms worsening during physical activity.[1]

Bangalore, Karnataka's capital, has been known as "Asthma City" since 2007 due to industrialization, rapid urbanization, and population growth—from 1 million in 2001 to 9.621 million in 2011. Limited evidence exists on how climate change and pollution impact elderly asthma patients in the city.[2] Asthma hospitalizations in Bengaluru often follow seasonal patterns linked to environmental allergies and air pollution. Asthma incidence has risen significantly, affecting 9% of urban children in 1979 and 30% by 2007. Known as India's "Asthma City," Bangalore's climate and high allergen concentrations contribute to the prevalence.[3] Data on respiratory disease burden in India is limited. Asthma prevalence ranges from 2.05% to 3.5%, with 55% of allergies attributed to Allergic Rhinitis. The economic impact is unclear, but COPD treatment costs were estimated at ₹35,000 billion in 2011, projected to rise to ₹48,000 billion by 2016.[4] **Asthma** is a global health problem with increasing prevalence in many countries. According to estimates of the World Health Organization (WHO), 300 million people suffered from asthma and 255,000 people died from asthma in 2005; More than 80% of asthma cases occur in low- and middle-income countries. The prevalence of asthma in India was previously estimated to be 3% (30 million patients), 2.4% of people over 15 years of age, 7 and 4% of mostly children to be around 20%. 4 An estimated 57,000 people died of asthma in India in 2004; 5 It is the leading cause of disease and death in rural India, and is expected to increase in the coming years.[5] India's economy, economy, air pollution levels, environment and culture have changed over the years. Other than the International Study of Asthma and Allergy in Children (ISAAC), no other international studies have examined the impact of these changes in asthma and weight. The ISAAC research group was re-established in 2012 as the Global Asthma Network (GAN) to estimate the current prevalence of asthma and allergic symptoms. The GAN study included some parameters not included in the ISAAC study, including the prevalence of asthma symptoms among the children's parents and the medications used to control it. The aim of this article is to analyze GAN phase 1 data from a canter in India:

1. Prevalence of asthma symptoms in children (6-7 and 13-14 years old) and their elderly parents
2. Correlation with previous ISAAC studies and the impact of environmental factors on changes in asthma symptoms in children,
3. Current medication uses for children and adults with asthma.[6]

Around 22% of Indian youth suffer from **Allergic Rhinitis**, a condition underreported due to limited epidemiological studies, especially in rural and suburban areas. Contributing factors include environmental and genetic influences, alongside new risks like proximity to garbage, traffic, overnight light exposure, and air pollution. High exposure to particulate matter (PM2.5), exceeding safe limits for 77% of the population, exacerbates health issues like asthma and heart disease. Challenges in India include the unavailability of high-quality allergen extracts, epinephrine auto-injectors, and advanced allergy training programs. [7,8,9] **Chronic obstructive pulmonary disease** (COPD) is a global health issue causing significant morbidity, mortality, and economic burden. It is linked to smoking, air pollution, genetics, and chronic conditions that influence its onset and progression.[10] **Pneumonia** is the leading cause of child mortality globally, with India accounting for 20% of deaths and a significant disease burden. From 2000 to 2015, pneumonia cases in uninfected children in India decreased from 83.8 million to 49.8 million, influenced by changes in risk factors like diet, malnutrition, immunity, and indoor air exposure.[11] Tuberculosis (TB)

remains a major global health issue, with 10.4 million new cases and 1.8 million deaths in 2015. India accounted for 2.8 million cases and 480,000 deaths, highlighting a severe burden. A study estimated 2.7 million TB patients in India, but only 1.4 million were registered for treatment in 2014.[12] **Bronchiectasis** is a chronic respiratory disease-causing cough, chest pain, and reduced quality of life. Its global incidence varies, with limited data from India. A multicenter study established India's first bronchiectasis registry, revealing key differences from European patients: Indian patients were younger (56 vs. 67 years), predominantly male (56.9% vs. 38.9%), and had lower body weight (21.5 vs. 24.8 BMI). While incidence is lower in India due to a younger population, diabetes is more prevalent.[13] **Acute respiratory infection** (ARI) is a major public health concern, especially for children under five. Globally, ARIs, primarily pneumonia, cause 20% of deaths in this age group, rising to 35-40% when neonatal pneumonia is included, resulting in 2.04 million deaths annually.[14] This study aims to understand the precautionary measures to reduce exacerbations among student migrants in Bangalore. As the data on burden of respiratory diseases in India is limited, the current study is believed to contribute for the assessment of rate of exacerbations of respiratory diseases among student migrants of Bangalore, by also analyzing the factors influencing the exacerbation of the disease.

2. Materials and Methods

This is a descriptive co-relational study; the study was conducted at Acharya institute campus. This study was conducted on students at Acharya Institutes, Bengaluru enrolled in various course programs from first year to final year with the age range 16-26.

Study tools:

A self-designed questionnaire is used in this study. The study was conducted after obtaining approval from the IEC. Subjects satisfying the inclusion and exclusion criteria was selected by the investigator. A validated questionnaire was used, and the response was recorded through google forms. The data obtained was entered into a Microsoft excel sheet and appropriate analysis was performed.

Inclusion criteria:

1. Current residents of Bangalore migrated from outer localities.
2. Students aged between 16 - 26 years.

Exclusion criteria:

1. Permanent residents of Bangalore or residing in Bangalore for more than 10 years.

Statistical Analysis:

The Chi-square test was performed to compare the relationship between standard of living and migration.

3. Results

DISTRIBUTION OF SUBJECTS BASED ON EXACERBATION OF SYMPTOMS

Table 1: distribution of subject based on exacerbation of symptoms after migration.

SL NO		SYMPTOMS	NUM-DER OF SAM-PLES	NUMDER OF EXACERBA-TIONS	PER-CENT-AGE
1		COLD	30	19	63.33%
2		COUGH	25	18	72%

3		BREATHELESS-NESS	28	20	71.42%
4		ALLERGY	2	2	100%
5		WHEEZING	27	20	74.07%

DISTRIBUTION OF SUBJECTS BASED ON EXACERBATION OF DISEASE CONDITION AFTER MIGRATION

Table 2: distribution of subjects based on exacerbation of disease condition after migration.

SL NO	DISEASE	NUMBER OF SAM-PLES	NUMBER OF EXACERBA-TION	PERCENT-AGE
1	ASTHMA	31	24	77.42%
2	PNEUMONIA	7	1	14.28%
3	ALLER-GIC RHI-NITIS	4	3	75%
4	COPD	2	1	50%
5	RESPIRATORY TRACT INFEC-TIONS	4	3	75%
6	TUBERCULO-SIS	1	0	0

DISTRIBUTION OF SUBJECTS BASED ON EXACERBATION OF SYMPTOMS

Table 3: distribution of samples based on exacerbation of symptoms after migration.

SL NO	SYMPTOMS	NUMBER OF SAM-PLES	NUMBER OF EXACERBA-TION	PERCENT-AGE
1	COLD	137	65	47.44%
2	COUGH	94	57	60.33%
3	BREATHELESS-NESS	28	16	57.14%
4	ALLERGY	4	2	50.0%
5	WHEEZING	48	28	58.33%

STATISTICAL ANALYSIS

1. PHYSICAL ACTIVITY V/S MIGRATION

Table 4: physical activity v/s migration (chi square calculation)

OB-SERVED VALUES (O)	EX-PECTED VALUES (E)	(O-E)	$(O-E)^2$	$(O-E)^2/E$
41	20.16	20.84	434.3	21.54
8	28.83	-20.84	434.3	15.06
110	130.83	-20.84	434.3	3.32
208	187.16	20.84	434.3	2.32
			TOTAL	42.2384

2. SYMPTOM EXACERBATION V/S MIGRATION

Table 5: symptom exacerbation v/s migration (chi square calculation)

OB-SERVED VALUES (O)	EX-PECTED VALUES (E)	(O-E)	$(O-E)^2$	$(O-E)^2/E$
32	18.95	13.05	170.1	8.97
17	30.04	-13.05	170.1	5.66
110	123.04	-13.05	170.1	1.38
208	194.95	13.05	170.1	0.87
			TOTAL	16.8856

2. FREQUENCY OF MEDICAL ASSISTANCE V/S MIGRATION

Table 6: frequency of medical assistance v/s migration (chi square calculation)

OB-SERVED VALUES (O)	EX-PECTED VALUES (E)	(O-E)	$(O-E)^2$	$(O-E)^2/E$
29	14.02	14.98	224.4	16.01
20	34.98	-14.98	224.4	6.42
76	90.98	-14.98	224.4	2.47
242	227.02	14.98	224.4	0.99
			TOTAL	25.8798

3. QUALITY OF LIFE V/S MIGRATION

Table 7: q quality of life v/s migration (chi square calculation)

OB-SERVED VALUES (O)	EX-PECTED VALUES (E)	(O-E)	$(O-E)^2$	$(O-E)^2/E$
40	16.55	23.45	549.6	33.2
9	32.44	-23.45	549.6	16.94
84	107.44	-23.45	549.6	5.12
234	210.55	23.45	549.6	2.61

PREVENTIVE MEASURES

Table 8: distribution of responses based on preventive measures.

SL NO	PREVEN-TIVE MEASURE	NUMBER OF RE-SPONSES	PERCENT-AGE
1	WEARING MASK AT PUBLIC PLACES	197	22.5%
2	YOGA	192	21.9%
3	FREQUENT STEAM INHA-LATION	182	20.8%
4	PROPER DIET	143	16.3%
5	MEDICA-TION	141	16.5%
6	OTHERS	22	2.5%

FACTORS INFLUENCING EXACERBATIONS

Table 9: distribution of responses based on factors influencing exacerbation.

SL NO	FACTORS INFLUENC-ING	NUMBER OF RE-SPONSE	PERCENT-AGE
1	CHANGE IN POLLUTION LEVEL	55	39.6%
2	FREQUENT CLI-MATE CHANGE	35	25.2%
	INCREASED		

3	POLLEN CONTENT	27	19.4%
4	CHANGE IN FOOD HABITS	22	15.8%

4. Discussion

In the current study, a descriptive Co relational analysis was done on a population of 367 students at Acharya institutes, Bangalore, enrolled in various course programs from first year to final year with the age range of 16-26. This study analyzed 367 migrant students aged 16-26 at Acharya Institutes, Bengaluru, categorizing them as previously diagnosed (n=49) and non-diagnosed (n=318). Among previously diagnosed migrants, asthma (77.42%) and allergic rhinitis (75%) were the most exacerbated conditions, with cold (63.33%) and pneumonia (14.28%) being the least.[15] Among previously diagnosed student migrants, allergy was the most exacerbated symptom (100%), while cold was the least exacerbated (63.33%). Other symptoms included cough (72%), breathlessness (71.42%), and wheezing (74.07%). For previously non-diagnosed migrants, cough was the most exacerbated symptom (60.33%), and allergy was the least exacerbated (50.0%). Other symptoms included cold (47.44%), breathlessness (57.14%), and wheezing (58.33%). These symptoms were categorized into upper respiratory symptoms (URS), such as congestion, sinusitis, sore throat, cough, cold, and fever, and lower respiratory symptoms (LRS), including wheezing, phlegm, shortness of breath, and chest discomfort. These conditions often arise from infections, allergens, or structural lung damage.[16] A Chi-square test revealed a significant relationship between migration and reduced physical activity among both previously diagnosed and non-diagnosed student migrants, rejecting the null hypothesis. Similarly, research by Sarah Crook et al. (1997) on COPD patients found that individuals with frequent and varied respiratory symptoms experienced greater impairment in daily activities. Increased symptom severity was clinically linked to reduced physical activity. While chest symptoms were identified as critical in determining organ failure, variations in the impact of symptom severity on physical activity among patients remain unclear. Changes in daily steps were noted to influence symptom progression.[17] A Chi-square test demonstrated a significant relationship between symptom exacerbation and migration among both previously diagnosed and non-diagnosed subjects, rejecting the null hypothesis. This was attributed to increased exposure to emerging pollutants in Bangalore. The Central Pollution Control Board reported that air pollution, including high levels of benzene and diesel exhaust particles, exacerbates respiratory diseases like asthma and COPD. Common symptoms include nasal itching, sneezing, watery eyes, runny nose, and cough, with severe cases indicating potential lung damage. Diesel exhaust particles were identified as major allergens contributing to these conditions.[16] A Chi-square test showed a significant decline in quality of life among both previously diagnosed and non-diagnosed migrants post-migration, rejecting the null hypothesis. Exacerbated respiratory ailments significantly impacted physical well-being and daily productivity. Studies reveal poor physical, social, and mental health among migrant workers in Bangalore, particularly young, single men, compared to better conditions for non-migrants with higher income and education. Factors like marital status, income, job type, and housing influence quality of life. Better living conditions, access to healthcare, security, and transportation are linked to improved quality of life, which is typically higher among non-migrant workers with stable incomes.[17] From the survey (n=877), the

most widely accepted preventive measures for respiratory diseases were wearing masks in public places (22.5%), practicing yoga (21.9%), steam inhalation (20.8%), maintaining a proper diet (16.3%), and medication (16.1%), with other measures (2.5%) including physical health and hygiene (Table 16 & Figure 8). Wearing masks was the most common choice. Studies suggest that prevention involves lifestyle changes such as avoiding smoking, maintaining a healthy weight, regular exercise, balanced diet, limiting alcohol, and minimizing environmental harm. Vaccinations and management strategies tailored to specific respiratory conditions, such as COPD, can help reduce risks and improve symptoms.[17] Survey responses (n=139) identified key factors influencing exacerbation of respiratory symptoms after migration: pollution levels (39.5%), frequent climate changes (25.2%), increased pollen content (19.4%), and changes in food habits (15.8%) (Table 17 & Figure 9). Pollution was the most significant factor, with air pollutants causing inflammation, oxidative stress, and allergic reactions by increasing immunoglobulin E levels. Cold and hot weather exacerbate asthma due to allergens and pollutants. Nitrogen dioxide, from transportation and power plants, contributes to lung inflammation, pneumonia, reduced immunity, and pulmonary edema, with both immediate and delayed effects. [18,19,20] A study by Vijaya Raghava A. et al. in Bengaluru linked NO_2 exposure to asthma by triggering eosinophil activity, inhibiting alveolar macrophages, and increasing vascular inflammation.[2] Idrees NS et al. found a positive association between pollen exposure and respiratory tract cancers, with asthma and seasonal allergic rhinitis (SAR) increasing the risk of respiratory infections. Meta-analyses confirmed links between pollen season, eosinophilia, and eosinophil cationic protein (ECP) in SAR patients, though findings varied across studies.[21]

4. Conclusion

The high prevalence of respiratory diseases among migrant students in Bengaluru necessitates urgent intervention. Environmental factors like pollution, allergens, and lifestyle changes exacerbate the issue. Preventive measures include educating students on air quality, allergens, and healthy habits, while improving air quality through stricter emission controls, tree planting, and sustainable transport. Students should adopt practices like regular exercise, proper ventilation, and mask use in polluted areas. A combined approach involving education, community engagement, and policy reforms is vital to address respiratory health challenges among migrant students.

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