CHAPTER II

EVALUATION OF RESPIRATORY ILLNESS RISKS IN A COMMUNITY-BASED STUDY WITH SPECIAL REFERENCE TO ASTHMA IN VADODARA CITY.

2.1 INTRODUCTION

Respiratory diseases are second to cardiovascular conditions in terms of mortality, incidence, prevalence and costs. The biggest contributors to respiratory death in Europe are lung cancer, pneumonia and chronic obstructive pulmonary disease (COPD). Worldwide hundreds of millions of people suffer every day from chronic respiratory ill-health. According to WHO global estimates, 300 million people have asthma; 210 million people have COPD while millions more have allergic rhinitis and other, often under-diagnosed, chronic respiratory conditions.

The spectrum of respiratory diseases includes chronic problems such as asthma and chronic obstructive pulmonary disease (COPD), environmental, occupational and interstitial lung disease.

The global burden of respiratory diseases continues to increase. Respiratory infections, particularly from tuberculosis and pneumonia, are amongst the commonest presentations of respiratory disease, while both asthma and chronic obstructive disease (COPD) continue to rise. These diseases are leading causes of morbidity and mortality in the world. Respiratory diseases in the developing world are a major burden in terms of morbidity and mortality and, particularly as related to chronic respiratory disease, are of increasing concern (Murray and Lopez, 1996). For many years, the leading cause of respiratory disease mortality has been tuberculosis, which still kills far more people than it should, given the increased efficacy of treatment and preventive regimens. However, the burden of other acute and chronic respiratory diseases, has been rising throughout the world. Respiratory diseases can be categorised into three:

1. Asthma
2. Allergic Rhinitis
3. Chronic Obstructive Pulmonary Disease.

Asthma is considered a multi-factorial disease with different phenotypes, affecting an estimated 300 million people worldwide (WHO, 2008). Since the pathogenesis of asthma is not fully understood most definitions of asthma are based on practical consequences. The Global Initiative for Asthma (GINA) has defined asthma as: "A chronic inflammation disorder of the airways in which many cells and cellular elements play a role. The chronic inflammation is associated with airway hyper responsiveness that leads to recurrent episodes of wheezing, breathlessness, chest tightness, and coughing, particularly at night or in the early morning. These episodes are usually associated with widespread, but variable, airflow obstruction within the lung that is often reversible either spontaneously or with treatment".

Clinical definitions (GINA, 2009).

In clinical work, asthma is often defined by the presence of asthmatic symptoms, i.e. wheeze, or shortness of breath together with objective measures of lung function (Wenzel, 2006). The more general definition of asthma can be divided into different phenotypes, related to both the severity of the symptoms, trigger factors, and patterns of inflammation (Wenzel, 2006).

In epidemiological studies, asthma is most often defined based on questionnaires and less commonly by clinical investigations. The definitions may vary by aim and design, and are dependent on available data. During the 1990s, two large multicentre surveys, the *European Respiratory Health Survey (ECRHS)* (Burney, 1994) and the *International Study of Asthma and Allergies in Childhood (ISAAC)* (Asher, 1995), were conducted using standardized questionnaires. The ISAAC study focused on the prevalence of asthma among children, and included the question *"Have you ever had asthma"*, which has been used in many studies all over the world. The use of questionnaires has many practical and economical advantages, as well as weaknesses in relation to the clinical validity. Several studies of prevalence have attempted to validate respiratory questionnaires versus clinical investigations, or by evaluating response agreement through repetition of the same questionnaire (Burney *et al.*, 1989 and Toren *et al.*, 2002).

Rhinitis and asthma often coexist, and the concept of *"one airway, one disease"* has been used to highlight the possibility that both diseases could be due to the same underlying inflammation (Grossman, 1997). There are several different definitions of rhinitis. The general definition presented by the ARIA-workshop (Allergic Rhinitis and its Impact on Asthma) is "an inflammation of the lining of the nose characterized by nasal symptoms including anterior or posterior rhinorrhoea, sneezing, and nasal blockage and/or itching of the nose. These symptoms

occur during two or more consecutive days for more than 1 hour on most days" (Bousquet *et al.*, 2008).

Different definitions of rhinitis have been used in epidemiological studies, mostly by relating to specific symptoms such as *"runny or stuffed nose"* and *"attacks of sneezing without having a cold"* (Toren *et al.*, 2002), *"nasal allergies including hay fever"* (Radon *et al.*, 2008 and Shabaan *et al.*, 2008), or the diagnosis of rhinitis (Lee *et al.*, 2003). Allergic rhinitis is the most prevalent phenotype, and differentiates from nonallergic rhinitis by a positive test for atopy or allergy (Quillen *et al.*, 2006), but has also been defined by questions regarding allergy and hay fever. Typically, one-fourth of people with rhinitis have the non-allergic phenotype (Molgaard *et al.*, 2007).

Rhinitis is one of the most common chronic diseases among adults. The prevalence of rhinitis has, in accordance with asthma, increased during the last decades, which is expected, since both allergic and non allergic rhinitis have proven to be strong risk factors for asthma (Shabaan *et al.*, 2008). Studies have shown that up to 80% of individuals with asthma also have rhinitis (Greisner, 2000 and Leynaert *et al.*, 2004).

COPD is a leading cause of morbidity and mortality both in the USA and globally (Chen *et al.*, 1999 and Mannino, *et al.*,2002). The current definition of COPD, established by the Global Initiative on Chronic Obstructive Lung Disease (GOLD) and recently adopted, in large part, by the American Thoracic Society (ATS) and the European Respiratory Society (ERS), states that COPD is a ''preventable and treatable disease state characterised by airflow limitation that is not fully reversible'' (Pauwels *et al.*, 2001 and Celli *et al.*, 2004).

The predominant risk factor for COPD in the developed world is cigarette smoking (Doll *et al.*, 2004 and Mannino, 2002).Other factors may also be important in some individuals, including occupational or environmental exposures to dust, gases, vapours or fumes (Trupin, 2003); exposure to biomass smoke (Smith and Mehta, 2003); malnutrition (Romieu and Trenga, 2001); genetic predisposition (Shaheen *et al.*, 1995; Silverman and Speizer 1996; Lomas and Silverman, 2001; Mayer and Newman, 2001); increased airways responsiveness(Sparrow *et al.*, 1988 and O'Byrne and Postma, 1999) and asthma (Ulrik and Backer 1999 and Mayer *et al.*, 2002).

Asthma and COPD (Chronic Obstructive Pulmonary Disease), which includes emphysema and chronic bronchitis, are common respiratory ailments that can affect people for many years. Asthma can affect people at any point in their lives, whereas COPD more often impacts seniors. Asthma and COPD also can coexist in the same individual. It is important to understand the similarities and differences between the diagnosis, treatment and long-term outcome of asthma and COPD (Smart, 2001).

Globally, COPD by 2020 is expected to rise to the 3rd position as a cause of death and at 5th position as the cause of loss of disability adjusted life years (DALYs) according to the baseline projections made in the Global Burden of Disease Study (GBDS). The largest increase in the tobacco related mortality is estimated to occur in India, China and other Asian countries (Murray and Lopez, 1997).

COPD in India has been recognized and investigated with the help of small surveys conducted in different populations for the last 40 yr. Prevalence rates varying from about 2 to 22 per cent in men and from 1.2 to 19 per cent in women have been shown in different reports (Reddy and Gupta, 2004). Unfortunately, the numbers of published reports are rather small (Jindal, 2006). Of the few studies which were reported in the last three decades, the COPD prevalence was reported about twice as common in men than women with a mean smoking association of over 82 per cent (Bhattacharya, 1975; Joshi *et al.,* 1975; Radha *et al.,* 1977; Thiruvengadam, 1977; Vishwanathan and Singh, 1977; Nigam *et al.,* 1982 Malik, 1986 and Pande and Khilnani, 1997).

In India, precise studies are not available to estimate respiratory health related disease burden in rural areas, to help proper area-specific public health interventions and to increase accountability on public health spending. Reliable data on mortality and morbidity are scarce in general; they are almost nonexistent in the vast rural area. Paucity of this adequate data makes the understanding of the public health situation more complex, but one can use cause of death analysis that may reveal the sickness load in the country. But the data from death registration sources are neither reliable nor complete; good percent of cases will go unregistered out of which only 10% of deaths are medically certified. But some sources like Survey of Causes of Death (SCD) do reveal interesting findings that may very well be true and used for international comparisons (Bhatt, 1991). Keeping the above points in view, the present study

was undertaken to fill some of the lacunae in the prevalence of respiratory illness in general and asthma in particular to have the prevailing situation of the asthmatics in Vadodara city. Once the trend of the illness is surveyed it will help us in further understanding the triggering factors as well its co-relation with the meteorological factors.

2.2 MATERIALS AND METHODS:

An approach for Identifying Persons with Respiratory Illness is either by:

1. Clinical evaluation which is influenced by diagnostic criteria; may miss less severe cases.
2. Questionnaire history of diagnosis which is affected by patterns of contact with medical care and diagnostic practices.
3. Questionnaire history of symptoms which is nonspecific and influenced by the frequency of other disease.

However, for epidemiologic studies, questionnaires remain the most readily applied method for identifying persons with the disease. Hence, the questionnaire history of the symptoms which is non-specific and influenced by the frequency of other disease was chosen for the present studies. A standardized and validated study-questionnaire in consultation with the chest physician was made. The questionnaire was also translated into local language.

The questionnaire used in the study had been aimed at collecting information on the respiratory symptoms and for establishing the prevalence of asthma, COPD and Rhinitis. As far as the questionnaire administration was concerned, random sampling was done for a population of 1000 of which only 792 responded correctly as required in the questionnaire. Further, the specific criteria of age, sex, education and occupation were taken into consideration. The age groups were broadly classified as 1-20 years; 21 to 40; 41 to 60; and 61 and above. The survey was done in 2008 and conducted over approximately 12 months. For purpose of distribution analysis, descriptive parameters such as the means, standard deviation and percentage were used. Gender and age were used to create the subgroups for the entire study population. Prevalence of the asthma, rhinitis and COPD and individual respiratory symptoms in the identified groups were calculated in percentages as the number

of subjects categorized as having asthma, rhinitis of COPD divided by the total number of subjects.

Responses to the questionnaires were stored in the computer using the epidemiological software EpiInfo. Analysis was performed using this software as well as SPSS for windows. Comparisons between groups were carried out using one way ANOVAs, also to get 95% confidence interval for mean lower bound and upper bound limit.

Asthma was diagnosed if the respondent answered "Yes" to one of the following questions:

1. Having suffered from Asthma/Using inhaled or oral bronchodilators?
2. Are you having wheezing/ chest tightness?

Rhinitis was diagnosed if the respondent answered" Yes" to one of the following questions.

1. Are you having running nose?
2. Are you having itchy nose, mouth and eye?
3. Are you having sneezing?

COPD was diagnosed by the presence of cough with expectorants for more than one month in a year i.e. "yes" to the following questions:

1. Do you usually cough first thing in the morning?
2. Do you usually bring out phlegm from your chest in the morning/ sometimes regularly?

Prototype of questionnaire used for sampling is as given below:

Dt: .....

1. Name : .....
2. Address :

.....

.....

.....

3. Phone: .....
4. Gender: .....
5. Date Of Birth: .....
6. Age : .....
7. Occupation:.....
   (a.) Total hrs. of working:.....
   (b.) Do you encounter an asthma attack when exposed to above mentioned environment? (Y/N)
   (c.) Your mode of transport: .....
8. Age of asthma onset: .....
9. Please tick (√) the relevant symptoms and its reason for asthma attack:

Symptoms	Y/N
Lungs	
Wheezing	
Shortness of breadth	
Chest tightness	
Cough	
Upper Respiratory	
Itchy nose, mouth, eye	
Stuffy nose	
Runny nose	
Sneezing	
Snoring	
Mouth breathing	
Sore itchy throat	
Sinus pain	
Sleeping problems	

Reason	Y/N
Outdoor	
Temp. change	
Wind	
Weather	
Indoor	
Dust	
Perfume	
Animal	
Smoke	
Mold	
Work place	
Hobbies	
Foods	
Milk	
Nuts	
Cold drinks	
Cold food	
Any Other Food – name it	
Drugs	
Asprin	
Penicillin	
Sulfa	
Any Other Drug – name it	
Contact	
Wool	
Cosmetics	
Others	
Emotion	
Laughing	
Exercise	
Cold / flu	

10. List the medicines taken:

11. Do you use the peak flow meter? Yes ☐ No ☐

12. In which season(s) your asthma is triggered the most?

Pre Summer	☐	Pre Monsoon	☐	Pre Winter	☐
Summer	☐	Monsoon	☐	Winter	☐
Post Summer	☐	Post Monsoon	☐	Post Winter	☐

13. In which part of the day you face the asthma attacks generally?

Early morning	☐	Morning	☐	Afternoon	☐
Late Afternoon	☐	Evening	☐	Late evening	☐
Night	☐	Mid night	☐		

14. Environmental Social history:

(a.) Hobbies: .....

(b.) Living in a house or an apartment? .....

(c.) Are you frequently exposed to any pets? .....

(d.) Do you or anyone at home smokes? .....

(e.) Do you miss your work/school due to illness?.....

15. Family history: Please fill in as relevant.

	Father	Mother	Brother	Sister	Children	Father's parents	Mother's parents
Asthma							
Sinus problem							
Any other Respiratory problem (mention)							

16. Are you suffering from any kind of allergic diseases? Yes ☐ / No ☐

If yes, please specify: .....

17. Do you have an asthma action/management plan? Yes ☐ / No ☐

18. Any remarks from your side :

.....

.....

.....

Signature : .....

૧. નામઃ . . . . . તારીખઃ . . . . . .

૨. સરનામુઃ . . . . . .

. . . . . .

. . . . . .

૩. ફોનઃ . . . . . ૪. સ્ત્રી કે પુરુષઃ . . . . . .

૫. જન્મ તારિખ અને વર્ષ : . . . . . ૬. ઉમરઃ . . . . . .

૭. વ્યવસાય : . . . . . .

૧. કુલ કેટલા કલાક કામ કરો છો ? . . . . . .

૨. કામ કરતી વખતે શું તમને શ્વાસો - શ્વાસ ની બીમારી નડે છે ? . . . . . .

૩. તમારા આવા-જવા નું વાહનઃ . . . . . .

૮. તમને શ્વાસો - શ્વાસ ની તકલીફ કયારથી છેઃ. . . . . .

૯. તમને શ્વાસો - શ્વાસ ની તકલીફ ચાલુ થતી વખતે શું અનુભવ થાય છે, તે જણાવશો. સાચા જવાબ ને ચિન્હ (√) લગાવોઃ

ફેફસા પર	પહેલા	ત્યારે	પછી	શ્વાસનળી પર	પહેલા	ત્યારે	પછી
શ્વાસ લેતા વખતે અવાજ આવે ?				નાકમાં ચળ આવે ?			
શ્વાસ લેવામા તકલિફ થાય ?				નાક ભારે લાગે ?			
છાતી ભારી લાગે ?				નાક વેહવા લાગે ?			
કફ થાય ?				છિંક આવે ?			
				મોઢા થી શ્વાસ લો છો ?			
				અંદર ગળામાં ચળ આવે ?			
				રાતના ઊંઘ ન આવે ?			

૧૦. તમારે શ્વાસો - શ્વાસ ની તકલીફ કયા કારણસર થાય છે ?

તાપમાન માં ફેરબદલ ના લીધે ?	ધૂળ ઊડે ત્યારે ?	દૂધ પીવાથી ?	ઊન થી ?	દુઃખી હો છો ત્યારે ?
હવા ના લીધે ?	સુગંધ ના લીધે ?	માસ ખાવા થી ?	સૌંદર્ય પ્રસાધનો થી ?	હસવા થી ?
હવામાન ના લીધે ?	પશુ કે પક્ષી ના લીધે ?	બદામ ખાવા થી ?		કસરત કરવા થી ?
	ધૂળ થી ?			શરદી થી ?

૧૧. શ્વાસો - શ્વાસ ની તકલીફ માટે તમે કઇ જાત ની દવા કરો છો ?

૧. એલોપેથી ૨. હોમ્યોપેથી ૩. આયુર્વેદિક ૪. નેચ્રોપેથી

૧૨. તમે શ્વાસો - શ્વાસ ની તકલીફ થતી વખતે જે દવાઓ લેતા હો, તેના નામ આપવાઃ

૧૩. શું તમારી પાસે પીક ફ્લો મિટર છે ? (હા / ના)

૧૪. કઇ ઋતુ માં તમને શ્વાસો - શ્વાસ ની તકલીફ થાય છે ?

પ્રારંભીક ઊનાળો	પ્રારંભીક વરસાદ	પ્રારંભીક શિયાળો
ઊનાળો	વરસાદ	શિયાળો
ઊનાળા ના અંતીમ સમયે	વરસાદ ના અંતીમ સમય	શિયાળા ના અંતીમ સમય

૧૫. દિવસના કયા ભાગમાં તમને દમ ની બિમારી થાય છે ?

વેહલી સવાર	સવાર	બપોર	મોડી બપોર	સાંજે
મોડી સાંજ	રાત્રે	મોડી રાત	દિવસમાં કયારેય પણ	

૧૬. પર્યાવરણીય સામાજીક વિગત :

૧. તમારા શોખ : .....

૨. તમે ફ્લેટ માં રહો છો ? .....

૩. તમે કે તમારા ઘરે કોઇ સિગરેટ પીવે છે ? .....

૧૭. તમારા પરિવારની જાનકારી :

	પિતા	માતા	ભાઇ	બહેન	છોકરા	છોકરી	પિતા ના ઘરે કોઇ	માતા ના ઘરે કોઇ
શ્વાસો - શ્વાસ ની તકલીફ								
સાઇનસ છે								
કોઇ પર પ્રકારની શ્વાસ ની તકલીફ છે								

૧૮. તમને કોઇ પ્રકારની એલર્જી છે ? (હા / ના)

અગર છે તો એનુ વર્ણન કરો: .....

૧૯. તમારે શ્વાસો - શ્વાસ ની તકલીફ શું આમાંથી કોઇ પર કારણસર વધુ થાય છે ?

૧. દોડવા થી ૨. કસરત કરવા થી ૩. કોઇ પર રમત થી

૨૦. શું તમારા ડોકટરે તમને શ્વાસો - શ્વાસ ની તકલીફ થી બચવા માટેના કોઇ ઊપાયો આપ્યા છે ? (હા / ના)

અગર હા, તો એનુ વર્ણન કરો: .....

સુચનો: .....

.....

.....

તમારી સહી : .....

2.3 RESULTS AND DISCUSSIONS:

The sample comprises of individuals from 5 years up to over 87 years. (Table – 2.1). The male female ratio ranged from 1.58 for rhinitis followed by 1.39 for COPD and 0.99 for asthma. Wherein the gender distribution was found almost equal only for asthma in the study population.

Table 2.1: Age wise Prevalence of Respiratory Illness in Collected Samples.

Age	Male			Female		
	COPD	Rhinitis	Asthma	COPD	Rhinitis	Asthma
1 - 20	61	62	17	49	41	12
21 - 40	42	58	29	23	21	35
41 - 60	52	26	42	41	26	52
> 61	11	9	33	6	10	23

The age-wise distribution showed preponderance for COPD between age group 10- 25 and 50–60 years for both male and female subjects. In case of rhinitis prevalence for the age group was found between 1 – 20 in both male and female. As far as asthma is concerned prevalence was found in the age groups 50 - 60 in case of females and 60 – 70 in case of males. (Figure – 2.1 to 2.3).

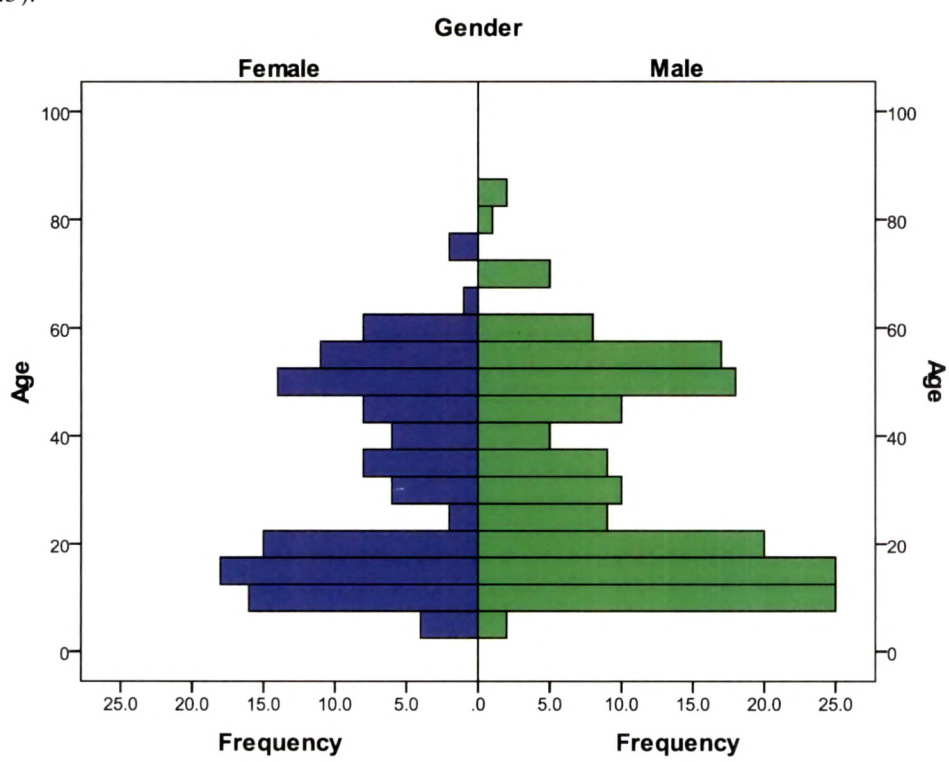

Figure 2.1: Occurrence of COPD in the Collected Sample

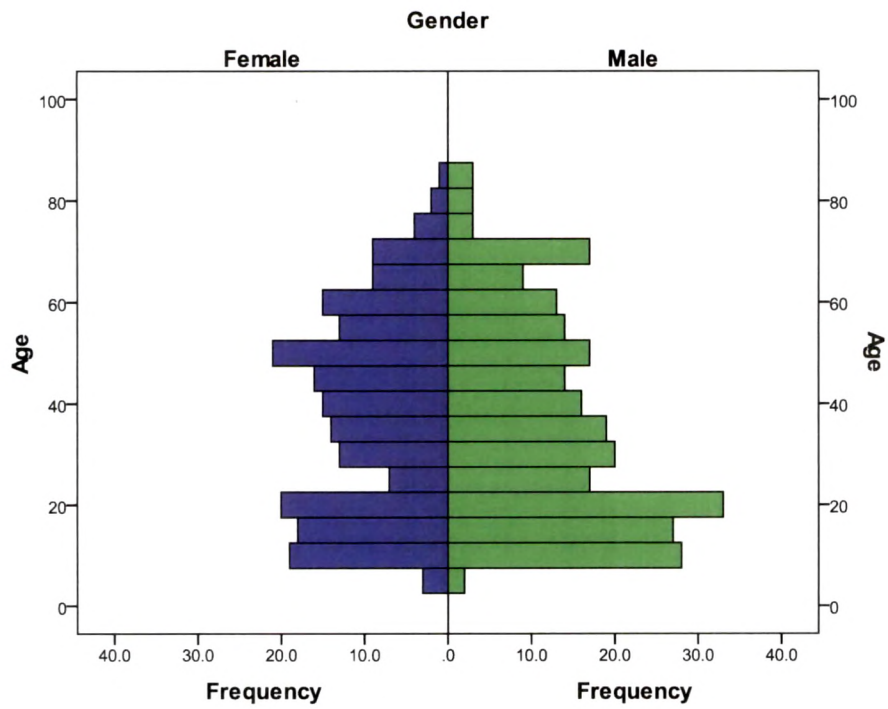

Figure 2.2: Occurrence of Rhinitis in the Collected Sample.

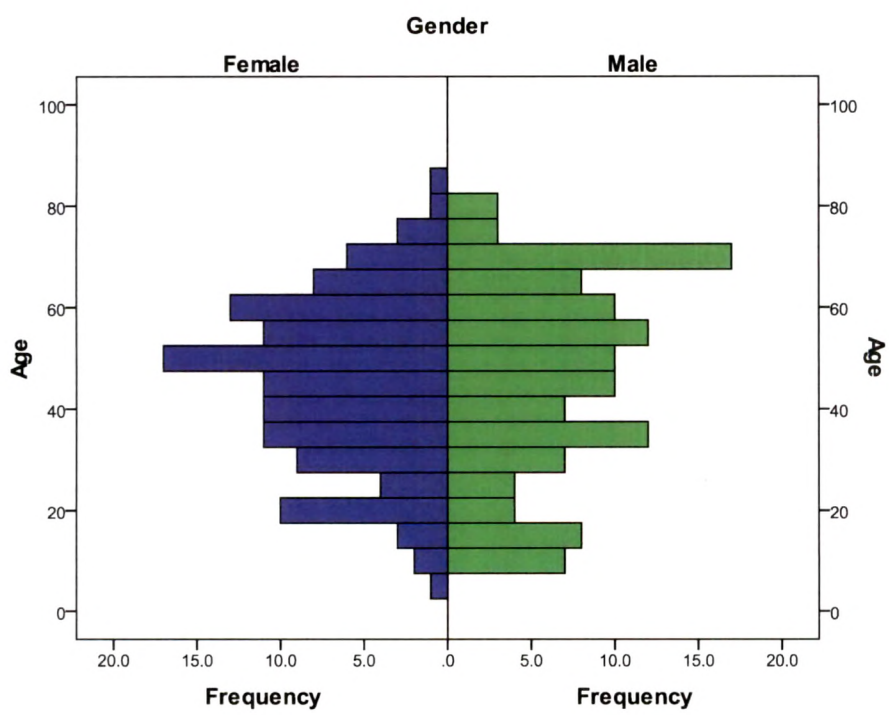

Figure 2.3: Occurrence of Asthma in the Collected Sample.

The subjects were grouped into categories based on their broad areas of occupation. The gender wise occupation distribution and prevalence of respiratory illness are shown in (Table – 2.2) and were grouped as students, housewives, labourers, farmers, and service, retired and business categories. A majority of the females group belonged to housewife, students and service category whereas; males mainly belonged to student, service and labourer category.

Table 2.2: Gender wise Occupation and Frequency of Respiratory illness

Occupation	Females			Males		
	Frequency	Percent	Cumulative Percent	Frequency	Percent	Cumulative Percent
Business	5.00	1.45	2.32	27.00	6.04	7.38
Farmer	15.00	4.35	6.67	16.00	3.58	10.96
Housewife	109.00	31.59	38.26	--	--	--
Laborer	15.00	4.35	42.61	71.00	15.88	26.85
Retired	3.00	0.87	43.48	16.00	3.58	30.43
Service	73.00	21.16	64.64	135.00	30.20	60.63
Student	122.00	35.36	100.00	176.00	39.37	100.00
Total	345.00	100.00	--	447.00	100.00	--

Prevalence data for the respiratory illness/ symptoms enquired through the questionnaire are summarised in Table – 2.1. One or more of the eight symptoms enquired were elucidated in 79.2% respondents. There was a large variation between individual symptoms among male and female, In particular the frequency of shortness of breath in females and cough in males was notably high (Table – 2.3 and 2.4).

Table 2.3: Respiratory illness among respondents of Vadodara city

Symptoms	Females		Males	
Wheezing	118	17.7%	115	13.7%
Shortness Of Breath	124	18.6%	123	14.6%
Chest Tightness	116	17.4%	112	13.3%
Cough	119	17.9%	166	19.8%
ItchyNose,Eye,Throat	47	7.1%	84	10.0%
Stuffy Nose	14	2.1%	27	3.2%
Runny Nose, Eye	62	9.3%	104	12.4%
Sneezing	66	9.9%	109	13.0%

Table 2.4: One Way ANOVA for Observed Respiratory Symptoms In Vadodara City.

Observation			Mean	Std. Deviation	95% Confidence Interval for Mean		Between- Component Variance
					Lower Bound	Upper Bound	
Wheezing	Total		0.0489	± 0.0610	0.0482	0.0497	0.0012
	Model	Fixed Effects		± 0.0507	0.0483	0.0495	
		Random Effects			0.0394	0.0585	
Shortness of Breath	Total		0.0506	± 0.0614	0.0499	0.0513	0.0012
	Model	Fixed Effects		± 0.0509	0.0500	0.0512	
		Random Effects			0.0410	0.0602	
Chest tightness	Total		0.0492	± 0.0611	0.0485	0.0500	0.0014
	Model	Fixed Effects		± 0.0489	0.0486	0.0498	
		Random Effects			0.0390	0.0595	
Cough	Total		0.0284	± 0.0524	0.0278	0.0290	0.0018
	Model	Fixed Effects		± 0.0314	0.0280	0.0288	
		Random Effects			0.0167	0.0402	
Itchy nose	Total		0.0210	± 0.0467	0.0204	0.0215	0.0005
	Model	Fixed Effects		± 0.0408	0.0205	0.0215	
		Random Effects			0.0146	0.0274	
Stuffy nose	Total		0.0044	± 0.0231	0.0042	0.0047	0.0001
	Model	Fixed Effects		± 0.0210	0.0042	0.0047	
		Random Effects			0.0017	0.0072	
Running nose	Total		0.0223	± 0.0478	0.0217	0.0229	0.0007
	Model	Fixed Effects		± 0.0406	0.0218	0.0228	
		Random Effects			0.0152	0.0294	
Sneezing	Total		0.0261	± 0.0508	0.0255	0.0267	0.0006
	Model	Fixed Effects		± 0.0447	0.0256	0.0267	
		Random Effects			0.0193	0.0329	

There is evidence showing an increased prevalence of respiratory illness throughout the world during the last half of the 20th century (Woods *et al.*, 2001; Braback *et al.*, 2004 and Urritia *et al.*, 2007). Millions of people around the world suffer from chronic respiratory diseases, particularly from asthma and COPD. These diseases may account for more than 400 million individuals globally. (Udvadia, 2007 and Jindal, 2010) However, data regarding chronic respiratory disease risk factors, burden and surveillance are either scarce or unavailable in most developing countries. Several independent studies have shown that questionnaire has strong measurement properties, both as an evaluative and as a discriminative instrument (Juniper *et al.*, 2000; Daly and Taylor, 2004; Juniper *et al.*,2005; 2006; Ehrs *et al.*, 2006 and Delclos *et al.*, 2007). There is a paucity of data on respiratory illness in general and COPD, Rhinitis and Asthma in particular. In the present study an attempt is made to find out the prevalence of respiratory illness in Vadodara city. This is the first of its kind of the studies in the city.

In spite of causing a major impact on the quality of life (QOL) in Indian patients, allergic rhinitis is rarely given the importance it deserves (Shah and Pawankar, 2009). Diseases like allergic rhinitis with a current incidence rate of 26 per cent in India and its associated disease asthma with 10-12 per cent incidence rate are on rise in India and other developing countries. The disease has not been given its due in India as evidenced by the lack of data. Untreated allergic rhinitis causes asthma and diseases of the sinuses (Pawankar *et al.*, 2009). The combination of allergic rhinitis symptoms with itchy-watery eyes has been found to be a useful measure of the prevalence of allergic rhinitis. Prevalence of asthma and allergic diseases in school children from Pune and Nagpur has been reported by Salvi (2007) and the occurrence is much higher than the National average. In the present study the male to female ratio was found to be more in Rhinitis followed by COPD and was almost same for asthma. Out of the identified patients for total respiratory illness in the city, it was observed that in males the prevalence of COPD was 38%, Rhinitis 35% and Asthma 27% respectively. In case of females, however it was found to be a reverse trend where it was 36% Asthma, 35% COPD and 29% Rhinitis respectively. Out of all the three illness it was found that prevalence of rhinitis was higher in the age group of 1 – 20 years (42% in Females and 40% in Males), in age group 21 – 40 years prevalence of Asthma was higher in females (29%) and Rhinitis was higher in males (37%), in age group 41 – 60 years, prevalence of Asthma was higher in both males (35%) and Females (42%). For the age group 61 and above it was found that

occurrence of Asthma again was higher in both males (27%) and females (19%). The rate of observed prevalence of rhinitis in age group 1 – 20 years is higher than that of 39.7% detected in Brazilians for the same age group by the International Study of Asthma and Allergies in Childhood (ISAAC) study in Brazil (Sole *et al.,* 1998; 2001). This result is consistent with the observation that the disease is common in childhood, peaks in the early 20s, and then decreases. Our findings are similar with those reported by many studies worldwide in which there is predominance in the female sex, attributed to a greater cough reflex sensitivity of the female airway, the impact of hormones on the airway, and physiological differences between men and women in airway reactivity to allergens. Geographical variations in the prevalence of allergic rhinitis may be attributable to differences in environmental factors that influence an individual's genetic susceptibility to developing this disease, in addition to variations in methodologies and age groups studied. Age and gender differences in all the three illness has been reported in the present studies; as far as rhinitis is concerned our results are in agreement with the survey conducted by (Paramesh, 2008; Broms *et al.,* 2009; De Bot *et al.,* 2009) where they have reported the sex and gender difference in the occurrence of rhinitis in the rapidly urbanised area. There is an increased prevalence and severity of asthma in metropolitan cities and this has a direct correlation with urbanization and environmental pollution as reported by Paramesh (2002) in Bangaluru city. Agarwal *et al.,* (2006) have also showed significant positive correlations of the pollutants with COPD but not with asthma. In the present studies also we have got the higher % of COPD compared to asthma. Another cross-sectional studied by Chhabra *et al.,* (2001) for Delhi city have also shown a strong correlation with age and gender, however, they have also taken the socio-economic backrounds into consideration.Vadodara being the industrial hub of the state, the reported number of the positive cases for the respiratory illness is but obvious. As reported by Deb (1998), urbanization is responsible for a higher incidence of respiratory illness compared with the rural area. A review of population studies from India by Jindal *et al.,* (2001) have also estimated the national burden of respiratory illness; however they have compared it with smoking as the main criteria. In the present study an attempt is made to find the frequency of three respiratory illnesses with a gender based occupation. As far as females are concerned highest frequency was observed in students followed by housewives. In case of males it was again observed to be maximum in student community followed by the service group, in other words it is the age as well as the occupation that are important trigger factors responsible for prevalence of the illness. Our observations are in

agreement with the work of Chen *et al.,* (2006) in Taiwan and work done by Chattopadhyay *et al.,* (2005) in Calcutta.

As stressed earlier, the largest obstacle in comparing prevalence estimates across two or more field studies relates to methodological differences in study design, disease definition, and data analysis. The biggest challenge in any epidemiological study aiming at prevalence estimation is the choice of definition of disease. Based on the need, setting, and available resources, investigators have used different definitions of asthma in the past. This partly accounts for the high variability in prevalence estimates reported earlier. In this study, we have employed a definition that incorporated a set of questions with high sensitivity and another with high specificity.

The literature is scarce on COPD prevalence and associated factors in Vadodara city. As there are no population-based studies, and there are increasing cases of COPD in Vadodara, it demands a study to acquire and analyze the prevalence of this disease so as to develop future counter measures against this disease. COPD is projected to rank fifth in 2020 in terms of worldwide burden of disease. Moreover, COPD is still not recognized as a major public health problem in either developed or developing countries. The survey resulted in a representative sample of a large metropolitan area with a high response rate. To the best of our knowledge, this is the first Vadodara population-based study on COPD prevalence and associated factors based on questionnaire based study, including over 700 individuals. By showing a strong positive association between COPD and age as well as gender difference in the occurrence of COPD, our data reinforces the need for closer attention to this health problem as COPD may be one of the leading causes of morbidity and mortality among these subjects in the near future.

From the preliminary survey pertaining to prevalence of respiratory illness in Vadodara one can conclude that there exists a definite good percentage of population suffering from respiratory illness. However, as the studies are done for a short duration and also by random sampling, there are possibilities of underestimation of the observed figure in the occurrence of the disease. The true level of under diagnosis is likely to be less than our reported figures as the diagnosis of likely asthma, made on the basis of questionnaire response alone, will in some cases be reversed after clinical assessment. There are a number of possible reasons for the levels of under diagnosis found, including under presentation of symptoms by the respondents. However, as the major aim of the present study was to find out the prevalence of

the respiratory illness in Vadodara city, our main goal is to have a probable dependence of the prevalence of asthma with the pollutants and the meteorological factors.

2.4 CONCLUSION

With the aim of finding the impact of interactions between meteorological parameters and pollutants on the urban population our aim in the present study was to evaluate the risk of respiratory illness in the community with special reference to asthma. Questionnaire being the most preferred approach for identifying the individuals with Respiratory Illness in the city, the questionnaire history of the symptoms which is non-specific and is influenced by the frequency of other disease was chosen for the present studies. A standardized and validated study-questionnaire in consultation with the chest physician was made and it was also translated into local language. Random sampling was done for a population of 1000 of which only 792 responded correctly as required in the questionnaire. Further, the specific criteria of age, sex, education and occupation were taken into consideration. The age groups were broadly classified as 1-20 years; 21 to 40; 41 to 60; and 61 and above. The survey was done in 2008 and conducted over approximately 12 months. Out of the identified patients for total respiratory illness in the city, it was observed that in males the prevalence of COPD was 38%, Rhinitis 35% and Asthma 27% respectively. In case of females, however it was found to be a reverse trend where it was 36% Asthma, 35% COPD and 29% Rhinitis respectively. Out of all the three illness it was found that prevalence of rhinitis was higher in the age group of 1 – 20 years (42% in Females and 40% in Males), in age group 21 – 40 years prevalence of Asthma was higher in females (29%) and Rhinitis was higher in males (37%), in age group 41 – 60 years, prevalence of Asthma was higher in both males (35%) and Females (42%). For the age group 61 and above it was found that occurrence of Asthma again was higher in both males (27%) and females (19%).