CHAPTER III

METHODOLOGY OF
THE PRESENT STUDY
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This Chapter provides an explication of the study in the light of its aims and objectives, the research methods chosen, as well as a description of each step of the epidemiological and quantitative research process undertaken.

3.1 CONCEPTUAL FRAMEWORK

According to the aims and objectives of the present study, the researcher intends to establish the association between independent and dependent variables that belong to conceptual framework as shown in figure 10.

![Diagram showing the association between risk factors and respiratory health effects]

**Figure 10**: The association between risk factors and respiratory health effects.
3.2 RESEARCH METHODOLOGY

3.2.1 Definition of Variables

3.2.1.1 Definition of asthma

According to International Study of Allergies and Asthma in Childhood (ISAAC), asthma is defined in the context of the response to three questions:

(i) Wheezing or whistling in the chest in the past 12 months, and
(ii) Chest sounded wheezy during or after exercise in the past 12 months, and
(iii) Dry cough at night, apart from a cough associated with a cold or chest infection in the past 12 months.

Or if the answer to the following question was “Yes”

(iv) Has your child ever had asthma?

3.2.1.2 Definition of COPD by questionnaire

As noted from the burden of obstructive lung disease (BOLD), COPD is defined as:

The answer of the following question was “Yes”

(i) Has a doctor or other health care provider ever told you that you have chronic obstructive pulmonary disease (COPD)?

3.2.1.3 Definition of COPD by spirometry

As for the Global Initiative for Chronic Obstructive Lung Disease (GOLD), COPD is defined as:

(i) A post-bronchodilator (PB) FEV₁/FVC <70%.
3.2.1.4 Definition of lung oxidative stress

As for the exhaled CO breath concentrations in the normal range is 0 to 3 ppm, lung oxidative stress is defined as: the exhaled CO breath concentrations more than 3 ppm.

3.2.1.5 Study variables

I- Demographic variable

- Age in years.
- Height in centimeters.
- Weight in kilograms.

II- Socioeconomic variables

- Education (uneducated, primary, secondary, graduation and post-graduation)
- Occupation of women (housewife, laborer, office-based and professional)
- Occupation of husband (not working, laborer, office-based, professional and no husband)
- Annual income was adapted to Indian and Thai economic condition and categorized into 5 groups – low (< 30,000 Rupees/yr), lower to upper middle (30,000 – 50,000 Rupees/yr), middle (50,000 – 1.5 million Rupees/yr), middle to higher (1.5 -5 million Rupees/yr) and high level (> 5 million Rupees/yr).

III- Indoor environmental factors

- Type of house
• House type (India – kutch house, semi pucca house, apartment and bungalow, Thailand - 1 floor wood house, 1 floor cement house, 2 floors cement house and building > 2 floors)

• House area was estimated in square feet.

• Number of rooms (1, 2, 3 and > 3)

• Type of roof (leaves/grass, wood, tiles, metal sheets and brick stone).

• Type of house wall (leaves/grass, wood, mud, metal sheets and brick stone).

• Number of windows (1, 2, 3, 4, 5 and > 5)

• Type of kitchen
  • Separate kitchen (yes, no)
  • Pattern of kitchen (indoor-partition, indoor non-partition and open air).

  • Kitchen area was estimated in square feet

• Kitchen ventilation
  • Number of windows (no window, 1, 2, 3 and > 3)
  • Exhaust fan use in the kitchen (yes, no)

• Type of cooking fuel (LPG, kerosene and biomass fuel)

• Duration of cooking
  • Average hours spent for cooking/day (< 1, 1-2 and > 2)
  • Average time spent for cooking/day (once, twice and > 2)
  • Average years spent for cooking (< 5, 5-10, 10-15 and > 15)
- Average cooking fuel use/month (LPG in kgs, kerosene in litres and biomass fuel in kgs per month)
- Smoking status of husband, wife and other members in family (non-smoking, ex-smoker and current smoker)
  - Number of cigarettes for ex-smoker and current smoker (< 5, 5-20, > 20 bids/cigarettes)
  - Number of years for smoking of current smoker in years
- Dampness of wall at house wall, bathroom and outside home (yes, no)

IV- Nutritional factors
- Type of diet (vegetarian, non-vegetarian)
- Fruit intake (never, < 3 times/month, 1-2 times/week, 3-4 times/week and every day)

3.3 RESEARCH TOOLS

The research instruments in the study consist of three instruments which are respiratory health questionnaire, spirometry and exhaled breath CO monitor.

3.3.1 Respiratory Health Questionnaire

The questionnaire has used the validated respiratory health questionnaires from ISAAC (International Study of Asthma and Allergic in Childhood) and BOLD (The burden of obstructive lung disease) questionnaires which have been used in multinational studies. The questionnaire is composed of questions with minimum optional choice which cover six different kinds of questions; demographic characteristics, socioeconomic status,
indoor environmental factors, nutritional factors, core questionnaire for asthma and core questionnaire for COPD.

The ISAAC and BOLD questionnaires were incorporated into the Respiratory Health Questionnaire to help in the diagnosis of asthma and COPD respectively. The additional questions that captured potential risk factors associated with asthma and COPD were designed in consultation with the research supervisor of the present study and discussions with other colleagues. The researcher has then conducted a pilot study to understand the ease of use of this questionnaire and any translation problems (see pilot study, item 3.7).

The final questionnaire was translated from English to Hindi, Marathi, and Thai language and back translated into English again by Indian and Thai language experts for ensuring the validity. Appropriate amendments were carried out as required.

During the language translation, the researcher took the assistant of an Indian woman who worked as a co-worker to help the researcher in collecting data from Indian subjects. She was trained how to find out the randomly selected homes, to approach the participant (introduction, explanation of the objectives, informed consent form signing), and to ask all questions in the questionnaire in a training session for one week at Chest Research Foundation (CRF), Pune by the CRF official who is a supervisor of field workers on CRF projects.

3.3.2 Spirometry

After Ethics committee permission, the researcher and the co-worker were given training and practice the research tools for 1 month during 1-31 August 2008 by pulmonary function test (PFT) technicians and expert physicians CRF. The training was
given on all of the steps of spirometry performing including breath exhaled CO monitoring.

For spirometry training, step by step training started with spirometry work-shop at CRF, then spirometry sessions by CRF physician team for taking basic knowledge of respiratory system and respiratory health effects assessment, and spirometry performance and breath exhaled CO monitoring observing in the field work (Vadu village). The next step was height and weight measuring and then spirometry performing. Before spirometry performing, the researcher and the co-worker were required to study the precaution of this test and then started learning and practice with both types of spirometry, volumetric and flow measuring spirometers. The last step was learning about interpretation and repeatability and acceptability of the spirometric results. After finishing research tools training the quality of training by the director and CRF colleagues ensured that the good quality of spirometry reports including exhaled breath CO monitoring would be correctly maintained. In the field work, Indian participants were covered by the co-worker under the researcher's supervision. The steps of spirometry performing and collecting spirometric results in field work are shown in Figure 11-12.

After the researcher and the co-worker had found out the randomly selected home, they met and ensured eligibility to participate after explanation of the purpose of the study. The participant was given the subject information sheet to read. Answers were given to any questions that the participant may have. After obtaining the written consent form, the questionnaire was administrated. A pre-post bronchodilator spirometry performance was done by participant after exhaled breath CO monitoring for which the seven steps were as follows:
**Step One** - In all the subjects who agreed to take part in the study were measured of vital parameters such as age, height, and weight including race and sex into the spirometry machine to give the accurate predicted values and the test was performed.

**Step Two** - Participant must hold mouth piece between the lips to create a good air tight seal.

**Step Three** - Then breathe in and out 2 or 3 times at normal pace.

**Step Four** - Then participant must inhale as much air possible and expire as fast and as hard as possible until no breath is left.

**Step Five** - Inspire rapidly again to maximum capacity.

**Step Six** - All participants have to perform spirometry for 3 times of acceptable results that the results are reproducible if there is less than 200ml variation in FEV₁ and FVC between the two best blows.

**Step Seven** - After giving a short-acting bronchodilator (Salbutamol 200 mg by Rotahaler). Spirometry was performed 15-30 minutes later to test for bronchodilator reversibility.

After finishing data collection, the participant was thanked.

However, the important step is the spirometry calibration that was done weekly.

![Image of Rotahaler and Rotacaps](image)

**Figure 11:** A & B - Rotahaler® and C - Rotacaps®
3.3.3 Breath Exhaled Carbon Monoxide Monitor

A hand held, pocket sized Exhaled breath CO monitor; Vitalograph®, UK (see fig 9 in Chapter II), sensitive to CO levels from 0 – 99 ppm with accuracy of ± 3 ppm, was used to measure exhaled breath carbon monoxide concentrations in the subjects. Each subject was asked to inhale and take in as much breath as they could, hold this breath in for 10 seconds and then blow or exhale out into the CO monitor through the mouthpiece. Three readings were taken each time and the highest one of the three readings was used for analysis. Mean values were used in all calculations. The Figure 13 shows exhaled breath CO monitoring in India.

Figure 13: Exhaled breath CO monitoring in India.
3.4 ETHICAL ASPECTS OF THE STUDY

The study would not commence until a written approval was obtained. After designing the research protocol, informed consent form and subject information sheet including translated documents in three languages as mentioned in research tools. The original and translated documents had submitted to the Independent Ethics Committee of Chest Research Foundation, Pune for getting approval. The ethic committee has given the researcher a little recommendation. The study was conducted according to guidelines laid down by good clinical practice (see appendix I) and then the field work was started and data was completed in complete confidentiality. The process of Ethic committee approval is shown in Figure 14.

Figure 14: Process of Ethic committee approval
3.5 RESEARCH DESIGN

3.5.1 Research Strategy

This was a woman population-based by multistage random sampling of above 18 years of age in India and Thailand.

3.5.2 Study Population

All females above 18 years of age residing in and around Pune district, India and Chiang Mai province, Thailand.

3.5.3 Study Locations

According to the purpose of the study, the researcher defined the socioeconomic strata in accordance with the types of areas. Five different locations, three from India and two from Thailand were selected; in and around University of Pune, India, Muang district, Thailand represented urban non-slum women from moderate to high socioeconomic status, Yerawada slum, India represented low socioeconomic status and Vadu village, India, Saraphi district, Thailand represented rural women from low to moderate socioeconomic status.

3.5.4 Sample Size Estimation

The present study used formula for infinite population correction for proportions as cooking fuel type used both in India and Thailand to calculate a sample size. It was
assumed that its proportion would be 50% for population with LPG used for cooking and 50% for those non-LPG used for cooking as shown in Equation 1.

Cochran\(^{184}\) developed the Equation 1 to yield a representative sample for infinite population correction for proportions.

\[ Z^2 = \text{the abscissa of the normal curve or } 1.96 \]

\[ n_0 = \text{sample size} \]

\[ e = \text{the desired level of precision} \]

\[ p = \text{the estimated proportion} \]

\[ q = 1 - p \]

The Equation 1 is valid where \( n_0 \) is the sample size, \( Z^2 \) is the abscissa of the normal curve that cuts off an area at the tails (1 - equals the desired confidence level, e.g., 95% and it will be 1.96 for 95% confidence level), \( e \) is the desired level of precision, \( p \) is the estimated proportion of an attribute that is present in the population, and \( q \) is 1-\( p \). The value for \( Z \) is found in statistical tables which contain the area under the normal curve. A 95% degree confidence corresponds to \( \alpha = 0.05 \). Each of the shaded tails in the following figure has an area of \( \alpha/2 = 0.025 \). The region to the left of \( Z_{\alpha/2} \) and to the right of \( Z = 0 \) is 0.5 - 0.025, or 0.475. In the Table of the Standard Normal (Z) Distribution, an area of 0.475 corresponds to a Z value of 1.96. The critical value is therefore \( Z_{\alpha/2} = 1.96 \).

Thus, the sample size is

\[
 n_0 = \frac{Z^2pq}{e^2} = \frac{(1.96)^2(0.5)(0.5)}{(0.05)^2} = 384
\]

Actually, the sample size should be 384 cases or 77 cases per one study location. Nonetheless, the researcher has required reducing to 75 cases per one study location, because of the limitation of budget.
3.5.5 Sample Selections

As per sample size calculation, 375 women were required for this study. Stratified sample selection was used to select the study subjects in three steps according to the approximate percentage of cooking fuel types used as shown in Table 6. The three steps of stratified sample selection were as follows:

**Step One** - 375 women were equally divided into 5 locations as the socioeconomic status; three in India (75 urban non-slum, 75 urban slum and 75 rural women) and two in Thailand (75 urban and 75 rural women) since there is no slums in Thailand.

**Step Two** - The researcher selected sub-areas by simple random and purposive sampling process;

**In India:**
(i) Urban non slum area was selected from five out of forty buildings (after survey the buildings around University of Pune).

(ii) Rural area was selected from one out of twenty two sub-villages that names ‘Sanaswadee’ because it was available for cooking fuel type used data from Chest Research Foundation.

(iii) The communes in urban slum area was selected all since it was available for cooking fuel type used data from Chest Research Foundation also.

**In Thailand:**
(i) Urban area was selected from one out of eleven sub-districts.

(ii) Rural area was selected from one out of ten sub-districts. The researcher has taken population database from Muang and Saraphi districtal health center.

**Step Three** - After obtaining the number of subjects in each cooking fuel type used (Table 6);
In India: (i) Urban non-slum homes were selected first with simple random sampling by even number of address (2, 4, 6,...) and then subjects were selected in criteria one home : one woman which the most urban non-slum women used only LPG for cooking (75 LPG users).

(ii) Urban slum subjects were randomly selected from population database (previous survey from Chest Research Foundation, see appendix III) as different types of cooking fuels (37 LPG users, 23 kerosene users and 15 biomass fuel users).

(iii) Rural subjects were randomly selected from population database (previous survey from Chest Research Foundation, see appendix III) as different types of cooking fuels (19 LPG users, 19 kerosene users and 37 biomass fuel users).

In Thailand: (i) Urban subject selection with simple random sampling from population database by software system (see appendix III) as different types of cooking fuels which the most urban women used only LPG for cooking (75 LPG users).

(ii) Rural selection with simple random sampling from population database by software system (see appendix III) as different types of cooking fuels (37 LPG users and 38 biomass fuel users).

However, the researcher had conducted the last 6 months population database for decreasing immigration and death of sample in Thailand and also obtained the cooking fuel type used data in rural area, on account of the lack of this data, co-operation with head of villages was sought to survey before selecting subject as shown in Figure 15.
Table 6: Approximate percentage of cooking fuel types used in India and Thailand

<table>
<thead>
<tr>
<th>Area</th>
<th>Cooking fuel type</th>
<th>Total (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LPG n (%)</td>
<td>Kerosene n (%)</td>
</tr>
<tr>
<td>India*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban non-slum</td>
<td>75(100)</td>
<td>-</td>
</tr>
<tr>
<td>Urban slum</td>
<td>37(50)</td>
<td>23(30)</td>
</tr>
<tr>
<td>Rural</td>
<td>19(25)</td>
<td>19(25)</td>
</tr>
<tr>
<td>Total (n)</td>
<td>131</td>
<td>42</td>
</tr>
<tr>
<td>Thailand**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>75(100)</td>
<td>-</td>
</tr>
<tr>
<td>Rural</td>
<td>37(50)</td>
<td>-</td>
</tr>
<tr>
<td>Total (n)</td>
<td>112</td>
<td></td>
</tr>
</tbody>
</table>

* Data from previous survey by Chest Research Foundation
** Data from International Household Survey Network (2006). In Chiang Mai province, urban households used only LPG for cooking.

Figure 15: Stratified sample selection

Note: CRF – Chest Research Foundation  LPG – Liquefied petroleum gas  BMF – Biomass fuel
3.6 INCLUSION AND EXCLUSION CRITERIA

3.6.1 Inclusion Criteria

Females above 18 years of age without spirometry precaution and can communicate with Hindi, Marathi, English or Thai language.

3.6.2 Exclusion Criteria

Male, children, and females below 18 years of age.

3.7 PILOT STUDY

The instruments (questionnaire, spirometry) were pilot tested with 10 subjects (each five from urban and rural area) in Chiang Mai province, Thailand. The pilot samples were randomly chosen sampling from population database by software system as samples on the basis of their availability in participating in the pilot study. Initially, the researcher fixed on appointment with the head of villages in urban and rural area at districtal hall on monthly meeting day who kindly co-operated in informing the subjects with study objectives, processing and appointment date. After one week, before going to subject’s homes the researcher contacted the head of villages to confirm subjects and direct the researcher to subject’s homes and the samples, however would not immediately participate in spirometry with bronchodilator test until the researcher succeeded to explain to the subjects that this test could not be harmful for their health. The survey took approximately 30 minutes for the subjects to complete, and no difficulties with vocabulary or terminology for questionnaire were reported. In the first sample subject, the researcher completed spirometry performing under supervision of a colleague who
was a Saraphi physical therapist with spirometry expert. The pilot study made the researcher understand that more explanation and willing participation including good demonstration were very important in collecting data successfully and then the researcher used this method in whole field work.

The reliability of questionnaire for pilot study was .8191, which is high reliability (the high reliability: the coefficient alphas are between .8 - .9)\textsuperscript{185} as shown in Table 7.

### Table 7: Reliabilities for ‘Respiratory Health Questionnaire’ (RHQ)

<table>
<thead>
<tr>
<th>N of cases</th>
<th>N of items</th>
<th>Coefficient alphas</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>72</td>
<td>.8191</td>
</tr>
</tbody>
</table>

#### 3.8 DATA COLLECTION

First, the researcher started to collect data in Thailand (October – December 2008) since exhaled breath CO monitor was not available to collect data in India. A letter from the director of Chest Research Foundation, Pune, requesting for spirometry supporting to collect data in Saraphi and Muang district were sent to the director of Saraphi hospital (see appendix I) and then data collection in India started later (January – March 2009).

The researcher started collecting data with two instruments, questionnaire and spirometry, in Thailand since there was no breath exhaled CO monitor in Chiang Mai province. Saraphi district was the first study location and next was Muang district, Thailand, Yerawada slum, Pune University and Vadu village respectively in India. Data collecting started with subjects after explaining to them the purpose of the study and they were invited to participate. A written informed consent was signed after answering all their queries. They then were administered a questionnaire. Spirometry then was performed using the EasyOne ndd\textsuperscript{®} ultrasonic spirometer in India and
MicroLabII® ultrasonic spirometer in Thailand before and after administration of inhaler salbutamol (Rotahaler & Rotacap). Breath exhaled carbon monoxide was measured in the last step (only in India) and then participants were given thanks for their co-operation. Most study subjects were given nice detailed explanation. There was willing participation of subjects in Thailand and both in India. The work of data collecting in India was carried out with the assistance of an Indian co-worker under supervision of the researcher. In Thailand, the researcher had collected all the entire (fig 16-20).

**Figure 16**: Photograph of participant from Muang district, Chiang Mai province

**Figure 17**: Photograph of participant from Saraphi district, Chiang Mai province
Figure 18: Photograph of participant from University of Pune

Figure 19: Photograph of participant from Yerawada slum, Pune

Figure 20: Photograph of participant from Vadu village, Pune
3.9 DATA MANAGEMENT

3.9.1 Data Coding

Before raw data was entered into the computer it was coded. Coding involved labeling the responses in a unique and abbreviated way (often by simple numerical codes). This made data entry easier.

3.9.2 Data Input

After coding, the data was submitted to the data management cell in Chest Research Foundation for double data entry. Data was entered directly from the questionnaire into the computer by two research assistants, using the Epi Inf. Software (version, 3.4.3). Each of the two sets of 100 questionnaires, breath exhaled CO levels and spiromgrams were compared and checked by Epi Info software. This was for ensuring accuracy and reducing bias.

3.9.3 Missing Data

If the questionnaire was incomplete, the researcher called back the parents to get the necessary information. But some of them did not know about that question and some did not like to answer the question. In such cases, data was considered as missing data and therefore it was not considered for analysis.

3.10 DATA ANALYSIS

Data was analyzed using Excel and SPSS (11.5) software
Statistics test used for the study, were:

(i) Descriptive statistics
(ii) Chi square test
(iii) Odds ratio with 95% confidence interval
(iv) Independent-samples t-test
(v) One-way ANOVA
(vi) Two-way ANOVA

3.10.1 Descriptive Statistics

The cross-sectional population comprised of women above 18 years of age in India and Thailand. Response rates, demographic, socioeconomic, indoor environmental, and nutritional data were determined by dividing the number of questionnaires returned by the total number of questionnaires administered and multiplying then by 100 to determine a percent (%) distribution.

The prevalence of respiratory symptoms, asthma, COPD, and lung oxidative stress in the study population were determined by the number of subjects with completed questionnaire items pertaining respiratory symptoms, asthma, COPD and lung oxidative stress.

3.10.2 Chi Square Test

Chi square test is a test that uses the chi-square statistics to test the fit between a theoretical frequency distribution and a frequency distribution of observed data for which each observation may fall into one of several classes. This study had used Chi square test to examine the association between prevalence of respiratory symptoms,
asthma, COPD, and lung oxidative stress and independent variables, like indoor environmental factors, socioeconomic status, and nutritional factors.

3.10.3 Odds Ratio with 95% Confidence Interval

Odds Ratio with 95% confidence interval was for estimating the association of risk factors with respiratory symptoms, asthma, COPD and lung oxidative stress.

It is quite common to use a somewhat different sort of statistic to compare rates of incidence of some characteristic between two populations.\(^{187}\)

In this study, the association between respiratory symptoms/diseases and risk factors were obtained using an estimated odds ratio (OR) from 2 x 2 contingency tables. An odds ratio estimates the association between 2 dichotomous variables, typically with one variable being the “symptom/disease” (respiratory symptoms; cough, phlegm, wheeze and breathlessness, asthma, COPD, and lung oxidative stress) and one factor being an “exposure” (risk factors for respiratory symptom/disease). The odds ratio (OR) is constructed as follows:

\[
\text{OR} = \frac{\text{Odds of disease among exposed subjects}}{\text{Odds of disease among unexposed subjects}}
\]

From this proportion, it can be seen that the odds ratio will be 1 if the odds of disease are similar among exposed and unexposed subjects. Odds ratios greater than 1 indicate an increased disease risk among exposed subjects; whereas odds ratios less than 1 indicate that the exposure reduces disease risk, that is, it is “protective”. 
3.10.4 Independent-Samples t-test

The independent-samples t-test or two-samples t-test is a popular statistical method used to test the difference of means between two sample groups. Described the appropriate use of the independent-sample t-test as follows:

An independent-sample t-test is the most commonly used type of t-test. The purpose of an independent-sample t-test is to compare the means of two different groups of scores. The independent-sample t-test can be useful under three conditions: (1) the particular variable is measured on an interval or ratio scale, (2) the populations of two samples are shown in a normal distribution, and (3) the variances of the populations represented by the two samples are assumed to be equal. This study had used independent-samples t-test to examine the difference of the mean score in % predicted for FEV₁, FVC, PEFR and FEF₂₅-₇₅% between two countries and different types of areas (urban and rural area) and cooking fuels (LPG and biomass fuel users) in Thailand.

3.10.5 One-way ANOVA (Analysis of Variance)

The One-way analysis of variance (One-way ANOVA) can be employed to test whether or not two or more demographics have the same mean. One-way analysis of variance assumes that the sample data sets have been drawn from populations that follow a normal distribution with constant variance. Furthermore, One-way ANOVA includes Post Hoc means comparisons which are comparison subsequently compares all possible pairs of population means in the ANOVA experiment to determine which mean (or means) are significantly different. Therefore, the differences between mean score in % predicted for FEV₁, FVC, PEFR and FEF₂₅-₇₅% and exhaled breath CO levels of
different types of areas and cooking fuels between India and Thailand were tested by One-way ANOVA.

3.10.6 Two-way ANOVA (Analysis of Variance)

Two way analysis of variance (ANOVA) is a widely used statistical technique for studying the effect that independent (or controlled-by-the-experimenter) variables which in this study are type of area and cooking fuel, called factors, have on a dependent (or response) variable which in this study is mean score in % predicted for FEV₁, FVC, PEFR and FEF²₅₋₇₅. Two-way analysis of variance experiments have two independent factors each of which have two or more levels. Two-way ANOVA tests for significant differences among the factor level means within a factor and for interactions among the factors. Hence, the differences of mean score in % predicted for FEV₁, FVC, PEFR and FEF²₅₋₇₅ based on different types of areas and cooking fuels between India and Thailand were tested by Two-way ANOVA.

The third Chapter is on the research methodology used for the present study. The Chapter begins with the presentation of conceptual framework and of the independent and dependent variables. The items of the Questionnaire are explained. The three tools of research are Questionnaire, Spirometry and Breath exhaled CO monitor. After discussing the ethical aspects and the research design, the selection of sample subjects is explained. The procedure of data collection and the pilot study are discussed with photographs and other graphic material. The Chapter presents the procedures of data management and data analysis. In all, 375 respondents were answered the questions in the questionnaire and taken the tests conducted. Of these 225 respondents are from India
and 150 respondents are from Thailand. The areas to which respondents belong and the type of fuel used by them for cooking are significant in the present study.