The present investigation has been summarized in the form of thesis which is scripted in following chapters as introduction, historical account, materials and methods, observations, discussion, summary, conclusion and references.

The use of biomass fuel for cooking and heating is common in developing countries like India. Present investigation was conducted in rural areas around Meerut, Uttar Pradesh. In studying area the use of biomass fuel as the primary cooking fuel in 80% of households. Biomass smoke contains hundreds of chemical compounds, like carbon dioxide, carbon monoxide, particulate matters, derivatives of benzene like benzopyrene, formaldehyde etc. These components are released from the combustion of agriculture crop residues, wood, coal and cattle dung cake. This Exposure of biomass smoke causes indoor air pollution which consequently produces chronic bronchitis, chronic obstructive pulmonary disease, cataract, and blood related disease in concern rural population.

Indoor air pollution is a major public health problem in developing countries. Present study refers to rural integrated women health in villages. The aim of this study was to find out association with pollution and health and between social factors viz. age, sex, rural area and income etc. Indoor air pollution from biomass fuels have been implicated as for tuberculosis infection, anemia, cataract,
cancer and other diseases and death. Persistent indoor air pollution exposures in these regions cause tuberculosis as a major health risk. We undertook a systematic study to assess the association between these exposure and the risk of infection, disease and death.

The findings of present investigation showed that biomass fuel smoke is associated with an increased risk of tuberculosis infection, decrease immunity of the body, cough disease, cataract, liver dis-function, kidney disorder and anemia. In the present study we found much more alterations in haematological, biochemical and immunological parameters in rural women which use biomass fuel for cooking and other domestic works in comparison to LPG using women (control) for cooking.

The present study was undertaken to know the immune responses and modulation in various haematological and biochemical parameters occurring in women.

**Haematological study:**

Haemoglobin, total RBC, Platelets count and packed cell volume values decrease significantly in exposed women resulting, hypoxic secondary polycythaemia i.e. mild secondary types associated with erythrocytosis which is a compensatory mechanism in this case as seen in poor oxygenation and pulmonary arteriosclerosis.
The total leucocyte counts increase slightly in biomass user women. The decrease in TLC count is due to acute and chronic infection of lungs and kidneys which cause pulmonary mechanism and leads to increase of white blood cells. The red cell indices MCV and MCHC increase and decrease significantly in biomass user women. A variation in these values of red cell indices is directly co-related with decrease and increase in total RBC, haemoglobin concentration and PCV values causing secondary hypoxic polycythaemia in women. Significant elevations are found in the neutrophils, eosinophils and monocytes in biomass user women.

**Biochemical study:**

The serum total protein decreased significantly in biomass user women. The decrease in serum total protein is due to the respiratory inflammation accompanied with epithelial cell injury by biomass fuel exposure causing leakage of protein from serum to the site of pulmonary injury leading to decrease in serum total protein in women.

The serum total albumin and globulin decreased non-significantly in biomass smoke exposure. This may be correlated with pulmonary injury in women due to inhalation of biomass fuel smoke.

The serum acid phosphatase increased significantly in biomass user women. However, the alkaline phosphatase was significantly decreased. These values are correlated with hypoxic in biomass user women. The alteration in serum alkaline
and acid phosphatase activity are attributed to damaging effect of biomass smoke exposure on liver cells resulting in impaired liver function in women.

The SGPT and SGOT increased significantly in biomass fuel smoke exposed women of 36-50 and 51-65 age group. An increase in SGPT and SGOT in the indication of biomass fuel smoke damage to hepatocytic membrane causing impaired liver function and also co-related with decrease in serum total protein in exposed women.

The serum creatinine increased significantly in biomass fuel smoke exposed women of all age groups. This value may be correlated with kidney dis-function in women due to inhalation of biomass smoke.

The blood glucose increased significantly in biomass fuel user women. An increase blood glucose level is due to the inhalation of biomass smoke which caused tissue injury and stress condition which stimulate hyper glycaemia in women.

The serum cholesterol increased significantly in biomass fuel smoke exposed women of all age groups. This may be correlated with disfunction of lungs due to inhalation of toxic gasses and leads to energy metabolism.

*Immunological study:*
Present study revealed significant elevation in the level of IgM, IgG, IgA and nonsignificant decrease in IgE antibodies showing allergic response in biomass fuel smoke exposed women.

**Lung function test:** The observations on physiological responses of the lungs revealed that the smoke exposed women of old age (50-65 years) found effected with COPD. Sputum samples were also diagnosed in pathology laboratory and some women of Group –C found Tuberculosis positive.

**Diagnosis of hypertension:** It was diagnosed by recording of blood pressure and observations revealed that the systolic and diastolic blood pressure found elevated of smoke exposed women of group-B and group –C (40-65 years age).

**Conclusion:**

1. Present observations point out that the use of biomass fuel for cooking is most common in villages approximately 90% rural population in India.

2. Poor socio-economic status with poor education are associated with poor knowledge of effects of indoor air pollution, inadequate and delayed availability of health care. Poverty also results in poor nutrition and low body weight which also affect the immune system of women.

3. Present observations showed weakness and cough problems which are mostly associated with low income rural people group.
4. Pulmonary tuberculosis showed high prevalence in villages. Population suffering from pulmonary tuberculosis had a significant association with income, age and habitat.

5. The present investigation reveals a very interesting feature that these women which used biomass fuels show restlessness. This fact confirms that women having RBCs with reduced surface area/volume ratio coupled with reduction in RBCs number remain in a very disadvantageous condition in respect to respiratory efficiency.

6. The observed haematological manifestations in women due to indoor air pollution are suggestive of pernicious and macrocytic anemia as a result of vitamin deficiency.

7. Important aspect has emerged from the present study that indoor air pollution induced hypersensitivity reaction to haematological, biochemical and immunological parameters probably due to toxic effects of biomass smoke which produce toxic effects on biological system.

8. The alteration in biochemical constituent show disturbed carbohydrate, proteins, fats and amino acid metabolism. These are the main source of energy.

Hypoglycemia and hyper cholesteamia condition occurs in biomass exposure women.

Biomass fuel smoke pollution is a major public health hazard for large number of the world's poorest, most vulnerable people and may be responsible for a similar proportion of the global burden of disease. The greatest contribution to this burden results from women, due to acute lower respiratory tract infections. It is important to extend and strength particularly for most common and serious condition including lower respiratory tract infections, tuberculosis, asthama, fever and chronic obstructive pulmonary disease to quantify exposure.

The present study reveals that inflammatory actions due to indoor air pollution particularly on haemopoietic system cause thrombocytopenia, hypoxic polycytopenia and leucopenia in women and disturb the metabolic activity by significant alternation of serum and values which is an indication of extensive pulmonary injury and impaired liver function.