Chapter 6

SUMMARY OF CONCLUSIONS

Air pollution has been consistently linked with ill-health in both developed and developing countries\(^1\). Historically, however, public health attention has focused mainly on the risks from outdoor air pollution. Indeed, the first estimate of the global burden of disease from air pollution only addressed the impact from outdoor sources\(^2\). Even today, most research continues to emphasize outdoor air pollution, which is not surprising given that vehicular and industrial emissions in urban areas of the developing world are rising at alarming rates, and recent evidence indicates that outdoor air pollutants could have marked effects, even at low ambient levels. Yet despite being somewhat neglected, indoor air pollution may pose a far greater health risk than outdoor air pollution, since people's exposure to many important pollutants from indoor sources exceed their exposure to these pollutants from outdoor sources.

Although outdoor sources often dominate air pollution \textit{emissions}, indoor sources frequently dominate air pollution \textit{exposures}. Exposure is a function of both the pollutant concentration in an environment, and the person-time spent in the environment. Since most people spend the majority of their time in homes, schools and workplaces, human exposure to air pollution is largely a function of pollutant levels in indoor settings (which can arise from outdoor sources, and vice-versa). In many populations, exposures to major pollutants from indoor sources can be higher than exposures to pollutants from outdoor

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Over the past two decades, the hazards of indoor air pollution, particularly those associated with traditional/biomass fuel use in developing countries, have been documented by a growing body of literature. The full scale of this environmental health problem is clear when the high pollutant concentrations from biomass fuel use are combined with the large amount of time people spend indoors. In particular, few activities involve as much person-time as cooking. Women responsible for preparing meals, and the young children they care for, are most heavily exposed to indoor air pollution from SFU. Older children and men may also spend significant time indoors, although their activity patterns are less generalisable. Access to clean fuels is lowest among poor households (in this case the study talks about only urban area excluding rural evidences), inadequate access to clean fuels. The economic burden of disease from health problems associated with prolonged biomass fuel use is likely to be most alarming in these situations. This is a situation where policy-makers should intervene and therefore a sound understanding of the dynamics of IAP and its effect on ARI is essential. The disease burden estimates provide an indication of the health gains that could be achieved by targeted action against the specific risk factor. This study also helps to prioritize actions and direct the policy makers to the population groups at highest risk.

A summary of the conclusions is given below that would allow a better understanding of the situation in the Indian urban slums.

The two slums under observation are located in distant corners of the city. When drawing conclusive ideas of both these it can be said that Kusumpur Pahari is a better off slum than Shahadra. The reason can be found in the data as well as the observations made during the field work. As far as sex

4 Albalak R. (1997), 'Cultural Practices and Exposure to Particulate Pollution from Indoor Biomass Cooking Effects on Health and Nutritional Status among the Aymara Indians of the Bolivian Highlands', University of Michigan
ratio of the sample population is concerned both slums have a higher value than that of the state value for the slums, even though Shahadra is a little better than Kusumpur. When looking at the caste structure it was seen that Scheduled caste population is more in the sample than any other caste with Kusumpur Pahari having a higher percentage than Shahadra. Brahmin population is the least in either of the slums. Households with 3 to 5 members are the most in Shahadra while Kusumpur Pahari has larger families of 6 to 8 members. The number of people educated upto high school and above is more in Shahadra than in Kusumpur. Yet it is strange that with better education Shahadra has larger percentage of non-workers than Kusumpur. Among the workers the largest percentage is employed in hawking and vending but in Kusumpur the portion of unskilled menial labourers is higher. Yet both the slums show a similarity when it comes to per-capita income where it is found that majority of the people have a per-capita monthly income of Rs 101-200. Kuchha housing structures are more to be found in Shahadra than Kusumpur where at least one aspect (like either the roof or wall is concrete) of the tenement is made of some pucca material. Most households in Shahadra has no separate kitchen, preferring to cook inside their one room structures as compared to Kusumpur, where, though the percentage of households with no separate kitchen is quite large, it is not as large as Shahadra. As for the type of cooking fuel used is concerned wood shavings are used by a larger percentage in Kusumpur than Shahadra where the majority of the households use dung. Even combination fuel usage like wood shavings and kerosene, wood shavings and plastic are more in Shahadra than in Kusumpur. As far as the Socio-economic status is concerned it is seen that the largest percentage of households in Shahadra fall under the lowest category of SES, i.e. Class I, while it is just the opposite for Kusumpur, where the largest percentage of households belong to the highest and best category i.e. class V.
Looking at the locational advantages and disadvantages it is found that Kusumpur by dint of its location in the rich neighbourhood has a more positive attitude than Shahadra. The location of Shahadra, midst industrial pollution and demolition has lowered the status of this slum. It is imperative that the mental set up and physical well being is affected in different proportions by these locational influences.

The analysis of morbidity from all sorts of diseases with particular reference to ARI gives a picture of the morbidity rates exiting in the two slums. It is very apparent at the onset that overall Kusumpur is by far more affected by ARI as well as by other diseases than Shahadra. It is only when one looks at the inside picture that it is found Shahadra is more prone to Morbidity from other diseases than Kusumpur Pahari, though Morbidity from ARI is the maximum as compared to morbidity from other diseases. Women are found to be more prone to all categories of diseases.

Among the acute problems of ARI it is found that breathlessness a chronic factor in Kusumpur Pahari while in Shahadra it is fever. Asthma is virtually absent from both the slums. For the 0 – 5 age group cough with phlegm reigns supreme in Kusumpur and it is fever for their counterparts in the other slum. Pneumonia is not present in this group in either of the slums. For the 16 – 30 year olds, which is the 1st group in the reproductive age, in Kusumpur; the problem is of fever and dry cough. For the same age group, in Shahadra, it is breathlessness. The women in this age group is more affected in Kusumpur while the 31 – 45 age group is more affected in Shahadra. The male child on the other hand, is more ill with cough with phlegm in Kusumpur while fever is seen to make the male child most ill in Shahadra. The 2 – 3 year old males in Kusumpur is the most hit among all the males in the other ages, while in Shahadra, male babies are most ill in the ages between 1 – 2 years.
The chronic problems of ARI are more serious and have a longer staying time. Shahadra is more affected by chronic problems than Kusumpur Pahari. Asthma is found to be the single most important disease here. Both the slums show Asthma as the reigning problem followed by chronic throat troubles in Kusumpur and virulent forms of fever in Shahadra. Females in both the slums are mostly affected by some form of fever or the other while for the males, in Kusumpur it is throat troubles and asthma in Shahadra. Pleurisy is seen only among the women. More males are affected in Shahadra than Kusumpur Pahari. Male children Belonging to the ages 3 – 4, are more ill in Kusumpur while 2 – 3 and 4 -5 year olds are more ill in Shahadra. In both the slums women are more affected than the female children. It is also found that the male children are more ill than their opposite sex for either of the slums. Otitis Medea, Pleurisy and COPD are also present, albeit in few cases only.

Socio-economic conditions, too, show that morbidity is high in households living in semi pucca houses, with no separate kitchen using traditional fuels in both the slums. At the same point of time is also seen that better of households have also show morbidity from ARI. The reason for this could be attributed to other factors for which this study has not accounted for, namely the confounding factors. A couple of these confounding factors could be ventilation, nutritional status and locational factors.

Shahadra, with its low psychosomatic conditions would naturally show an inclination towards disease and ill being, whereas for Kusumpur there could be other factors at work. Kusumpur shows a greater inclination to acute illnesses, while Shahadra is more ill from chronic infections. Chronic illness are more there essentially because the inhabitants of this slum is more worried about their basic existence and loosing their livelihoods than taking preventive and curative measures at the outset. Moreover living in such a
high polluting area with access to very few basic amenities acute diseases soon turn to chronic manifestations. Kusumpur on the other hand, has the problem of ventilation, especially in the poor households. Ventilation in the form of windows is also limited but not completely absent. But for the other households, it is certainly a cause of problem. Moreover, households are so tightly placed against each other that diffusion of air is also almost absent from Kusumpur.

When looking at the actual linkages existing between some variables (which can be regarded as proxy variable) Both the slums have quiet a substantial level of morbidity be it from the ARI group of diseases. When trying to find a relationship between morbidity and ARI a lot of factors have been taken into account. Some of these factors are not ones which can be held to be solely responsible for the onset of ARI but nonetheless help in augmenting it. Location of the kitchen, Type of fuel used, Type of building material, Socio economic Status, all go a long way in contributing to the augmentation or increase in severity of the disease. Both the slums have majority of the households living in tenements without a separate kitchen. From previous research it has been found that structures with such attached kitchens are found to contribute positively and significantly to the pollution level within the household. Moreover a significant number of these households which have no separate kitchen also use biomass fuel for cooking. Even in households that use cleaner fuels if the kitchen is not separate, there is indoor air pollution, therefore in such households where there is no clean fuel nor a separate kitchen, the amount of pollutants emitted is unimaginable. Added to this problem is the type of building material. Most tenements are kuchha structures using plastics and the likes, which when heated, emit polyhydrocarbons which cause tremendous damage to health. All these factors coupled with moderate levels of RSP and high levels of CO are a dangerous combination. This fact bears evidence when the linkages when
explored. Both Kusumpur Pahari and Shahadra show an alarming morbidity rate of ARI in households with no separate kitchen. The male children seem to be more affected than the females (meaning women and girl children) in this type of households in both the slums. As far as fuel use is concerned it is that both the sexes of both the slums return the highest morbidity rate of ARI from use of biomass fuel. The links between housing and health is nothing new and this case is borne out by the fact that houses with semi pucca and kuccha structures show a higher morbidity rate of ARI. Male children suffer more than females in Kusumpur Pahari among those living in Kuccha structures but in Shahadra this is just the opposite where females are seen to suffer more in this type of housing. In semi pucca structures the scene is a bit different. In Males are falling preys to ARI more in semi pucca structure than females in Kusumpur while in Shahadra females are more affected than males. Looking at the SES categories is found that for both the slums the 3rd category (a relative better class) have both the sexes showing the highest morbidity rate of ARI. So it can be concluded that money or a little education does not change practices of life if awareness is not present.

To understand the causal relation between ARI and different factors, bivariate correlation is used. The result shows that there is a strong positive as well a significant effect of RSP and CO on ARI in Kusumpur Pahari. For Shahadra, though there is a relation but it is not significant as it is strongly suspected that there are other factors, mainly outdoor pollution, that is creating the high morbidity rate of ARI. The Logit regression on the other hand, for Kusumpur Pahari, safely concludes that those households that have no separate kitchen, using unprocessed biomass fuels belonging to the 3rd class of socio-economic status with high levels of RSP/TSP (both non cook and cook time) and low levels of CO emissions have a pretty high chance of contracting ARI. For Shahadra, the logit results are a not much different as it was found that all male children living in households without separate kitchen belonging to SES status II using biomass fuel, exposed to moderate
and high levels of RSP/TSP have a very chance of falling ill from ARI; though they show no adverse effect of exposure to any level of CO.

Keeping the above situation in mind the study lays down some recommendations for the policy makers. The first effort, therefore, must be to get the state to commit a much larger share for the health sector from existing resources. Additional revenues specifically for health budgets may be collected on the lines of a profession tax in some states which funds employment programmes; levies and cesses for health could be collected by local bodies; employers in the organised sector must be made to contribute for health care services; those with a capacity to pay like organised sector employees, the middle and rich peasantry (so far completely untaxed), and other self-employed, must do so through insurance and other pre-payment programmes.

In a vast and varied country like India no single system can work. What we need is a combination of social insurance for the poor (premium paid by the state), employment related insurance for the organised sector employees, voluntary insurance for other categories who can afford to pay, and tax and related revenues. Further, payments at the point of provision of care must be eliminated as they are usually unfavourable to patients. Payments must be made to providers by a monopoly buyer/s of health services who can also command certain standard practices and maintain a minimum quality of care; payments could be made in a variety of ways such as capitation or fixed charges for a standard regimen of services, and fee-for-service as per standardised rates.

The above changes, though feasible, are not going to be easy to achieve. The government does not view health care as a major political concern and hence does not see the need for any drastic reforms in the health sector. The private health sector is happy with the government’s unconcern about the manner in
which it operates. Yet there is hope because pressures are building up from below. The Consumer Protection Act delivered the first shock to the private health sector thereby forcing a realisation that they cannot ride roughshod over their clients. The government too needs to be administered such shock therapy; this may be just round the corner.

There remains a need for a longer-term strategy to ensure a more sustainable supply of energy to urban poor areas as the rural poor continue to migrate to the cities. To date there has been very limited development in this field, and there are few mature, viable sustainable energy technologies readily available, in particular for cooking. To achieve a sustainable energy supply in urban areas, innovations need to be investigated, and the most effective ones then scaled up. LPG and cleaner biomass fuels will in the long run be just a transition towards full sustainability in a proper planned manner.

Some mitigating options that could be explored and which have not been mentioned in the IEP are that energy needs to be put at the heart of poverty reduction strategies and it should be made a part of the five year plans; that the government needs to provide options in the form of soft loans or subsidies or grants or even free distribution of connections (stoves and burners) to the urban poor to facilitate the shift to clean household fuel; the government if unable to shoulder the responsibility of making fuel accessible to the poor, they should rope in private partner and make it mandatory for them to shoulder some social responsibilities; another option could be to rope in the poor themselves and make them responsible stakeholders in the switch recommended.

**Major Findings**

- Breathlessness, fever and dry cough are most frequent occurring ARI problems among women
- Asthma and throat infections are generally chronic in nature be it among women or children
Women in the age group of 16 to 45 years are found to be most susceptible.

Male babies below the age of 3 years are more prone to ailments than female babies.

Acute illnesses are more frequent causes of morbidity in Kusumpur while Chronic problems plague Shahadra more.

Most households live in tenements without a separate kitchen and a significant number of them use biomass fuel.

Morbidity rate is alarming in households without separate kitchen.

3rd category of SES more prone to ARI ailments.

Kusumpur Pahari is better off than Shahadra in terms of health as it shows greater morbidity from acute illnesses than chronic ones.

The Logit regression on the other hand, for Kusumpur Pahari, safely concludes that those households that have no separate kitchen, using unprocessed biomass fuels belonging to the 3rd class of socio-economic status with high levels of RSP/TSP (both non cook and cook time) and low levels of CO emissions have a pretty high chance of contracting ARI.

Switching to cleaner fuels more cost effective for the slums dwellers in the long run even though initial star up costs are high. Therefore government intervention is a must at the initial stage.

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The government does not view health care as a major political concern and hence does not see the need for any drastic reforms in the health sector. The private health sector is happy with the government's unconcern about the manner in which it operates.
• There remains a need for a longer-term strategy to ensure a more sustainable supply of energy to urban poor areas as the rural poor continue to migrate to the cities.