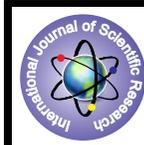


Air Pollution and their Effect on Human Health in Morena City, Madhya Pradesh


Environment
KEYWORDS :
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ABSTRACT

The immediate environment of man comprises of air on which depends all forms of life. Apart from supplying the life giving oxygen, air and atmospheric conditions serve several functions. The human body is cooled by the air contact, the special sense of hearing and smell function through air transmitted stimuli, disease agents may be conveyed by air pollution of air by dust, smoke, toxic gases and chemical vapours has resulted in sickness and death. Man's adventure into outer space has broadened our concept of air environment. Human beings need a continuous supply of air to exist. The requirement for air is relatively constant (about 10-20m³ per day). The study on air pollution and their effects on human health have a special consideration today. Western countries have conducted several studies in this area, but there are only a few studies in developing countries like India. In this backdrop, a study on air pollution and their effects in Morena city of M.P. has been undertaken. The study area has been divided into three zones namely, residential, commercial and industrial, based on livelihood patterns in order to compare the health impacts in different human activity areas resulting from various types of pollution. The data shows an increasing trend in respiratory diseases with decreasing air quality. The hospital records also support the results obtained from the field study. The industrial effluent gases and low indoor air quality plays a key role in the industrial area, while vehicular pollution and congested housing patterns are the main factors in other zones. The children and elderly are the main victims of the respiratory diseases.

Introduction

The key to man's health lies largely in his environment. In fact, much of man's ill-health can be traced to adverse environmental factors such as air pollution, water pollution, soil pollution, and insect vectors of human diseases which pose a constant threat to man's health. Often man is responsible for the pollution of his environment through urbanization. Industrialization and other human activities. In 1972 the UN conference on the human environment focused world wide attention on the environmental hazards that threaten human beings. To facilitate work in this area WHO has compiled a wide ranging survey of environmental hazards to human health.

Man has already controlled a number of factors in his environment as food, water, housing, clothing, sanitation. These controllable factors are those included in the standard of living. It is the control of these factors that has been responsible for considerable improvement in health of the people during the past century in the developed countries. However, man's mastery over his environment is not complete. As old problems are being solved, new problems are arising. Air pollution is of growing concern in many urban centres. Industrial growth has given rise to the problem of environmental pollution by industrial wastes. Advances in nuclear technology have produced the problem of radio active pollution of the environment.

The purpose of environmental health is to create and maintain ecological conditions that will promote health and thus prevent disease. The national air quality monitoring programme, sponsored by the central pollution control board (CPCB) since 1999, has generated data base over last 14 year in 10 major Indian city named Ahmedabad, Mumbai, Kolkata, Delhi, Hyderabad, Jaipur, Kanpur, Kochi, Chennai, Nagpur. The programme facilitates evaluation of long term air quality trends for health related criteria pollutants such as inhalable dust, Sulphur dioxide, nitrogen dioxide, lead, hydrogen sulphide, ammonia and PAH. The trend analysis showed that suspended particulate matter (SPM) exceeds the CPCB standards in all cities most of the time through the year.

The present study is an effort to assess the air quality and its consequences in different parts of the Morena city, within varying activity zones.

Materials and Methods:

Morena district is one of the 50 districts of the central Indian state of Madhya Pradesh. The name, Morena is derived from the mor + raina means the place where peacock is enormously found. Morena, which has an identity of being home to perhaps the largest number of peacocks in the India. The district is part of Chambal Division. The town of Morena is the district and divisional headquarters. The district has a widely dispersed population of 1,965,137 as of 2011. Morena is fifth district in state in density of population after Bhopal, Indore, Jabalpur, Gwalior.

Data collection has been done by the 'Questionnaire method', covering various households. All aspects of environment of each household, like socio-economic status, indoor air pollution, vehicular pollution, industrial pollution, sanitation, quality of drinking water and diseases like respiratory, gastrointestinal, eye diseases, skin problems, water/vector borne diseases, cancer, cardiovascular and miscellaneous ones have been taken into consideration. Children's health assessment has also given special attention. For the documentation of information regarding specific health end points such as respiratory ailments, infectious diseases, cardiovascular problems and cancer, the secondary data were collected from various health centers, which belongs to the area under study.

Results and discussion :

Industrial Zone

The Industrial zone selected for this study is the KS Oil Ltd., Parag Oil Ltd. and Singh Oil Industries in Morena City in covering AB Road, Near Rishi Galav College And Sale tax Barrier where Mustard oil Cake of mustard. Many toxic and harmful effluent is the produce by these factories. People in the industrial zone showed respiratory problems, watery discharge from eyes, skin problems and increased incidence of oral cancer compared to other areas under the study. Many residential houses are situated very near to the effluent discharge point of the industry. During the summer season they are subjected to severe dust problems because of the dry soil from the effluent flowing region. Analysis of data shows an 8.3% of increase in Respiratory diseases compared to other areas. The respiratory disease includes tuberculosis, wheezing, coughing and hyperactivity of the respiratory canal. The result of diseases in industrial zone is shown in (Figure 1)

Prevalence of Diseases in Industrial Zone

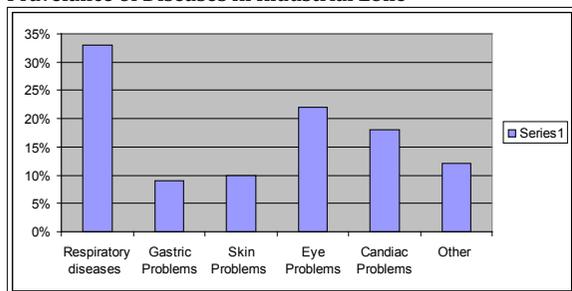


Figure 1

The level of atmospheric pollution at any one time depends upon meteorological factors. The vertical diffusion of pollutants depends upon the temperature gradient. More than 100 substances which pollute air have been identified the important ones are CO, CO₂, H₂S, SO₂, SO₃, NO₂, etc. It has been reported that long-term exposure to air pollutants such as nitrogen dioxide and particulate matter can cause reduced lung growth in children and the effects are more pronounced in areas where air pollution is higher.(Carol Potera,2003). The Lung cancer incidences are also common in this area, which may be related to their habits like drinking, smoking and chewing. *Indoor air quality in industrial zone* Indoor air quality has equal importance as that of ambient air quality. Indoor smoke from solid biofuels is one of the top ten health risks identified by WHO (Anne,2003). People in developing countries face health risks from indoor pollutants, such as sulphur and nitric oxides and arsenic compounds, due to greater exposure to open fires, or to the burning of biomass, coal or wood as fuel. Indoor pollution, is a potent threat to women and children who spend more time indoors, causing respiratory disorders, and is also linked to heart and lung disease based mortality. Biomass burning is very dangerous especially under unventilated conditions as it produces gases as well as dust particles of carbon, polyaromatic hydrocarbons, trace metals, sulfur etc (ICMR,2001). About 10 - 30 mg/m³ Polynuclear Aromatic Hydrocarbons (PAHs) were detected in burning wood (Mohanraj and Azeez,2003). A study from India and Nepal demonstrated that cardiovascular diseases are more common among women who have been exposed to indoor pollutants (WHO,2011). Indoor air pollution is strongly related to the socio-economic status of the people. In the Industrial zone, most people belong to low - middle and low classes, with *Kaccha* houses. And 30.9% of people are depending only on wood as the energy source and about 55.6% of them are using mixed fuel (wood and LPG) under unventilated conditions. Environmental tobacco smoke is also an indoor air pollutant in this area. Indoor air pollution results in a wide spectrum of diseases like acute lower respiratory tract illness, upper respiratory tract infections, Chronic Obstructive Pulmonary Disease (COPD), pneumoconiosis, cataract and adverse pregnancy outcome (Majid Ezzati, Daniel M Kammen,2002). Exposure to moulds (*Cladosporium* and *Aspergillus*) in the indoor environment can cause an increased risk on allergic sensitization (Beate *et al*,2002). The increased risk of respiratory and lung cancer diseases may be the result of the cumulative effects of indoor and outdoor pollution, which needs more research in these aspects. Children are particularly vulnerable to environmental toxins. The children in this zone are suffering from high respiratory and malnutrition problems, because they have disproportionately heavy exposure to environmental toxicants affecting their metabolic pathways, especially in the first months after birth. They undergo rapid growth and development and their developmental processes are easily disrupted. Because children have more years of life ahead than most adults, they have more time to develop chronic diseases triggered by early exposures (William *et al*,2003). Indoor air pollution, global climate change, persistent organic pollutants, lead and pesticides are the major threats for children. Worldwide, 900 million children are being reported as debilitated by environmental diseases.

Commercial Zone

Urbanization has been one of the most striking developments of the 20th century. Sources of urban air quality depend mainly on vehicular density. World wide, more than 5000 million urban residents are exposed to health threatening levels of air pollution (UNEP,2000). Dust problem is severe in many cities, which carry carcinogenic and pathogenic components causing diseases. The concentration of Suspended Particulate Matter (SPM) in mega cities like Mumbai, Delhi and Calcutta exceeded by more than 100 per cent of the limits of WHO. According to Central Pollution Control Board (CPCB), ambient air Polynuclear Aromatic Hydrocarbons (PAHs) in Delhi ranged between 9.4 - 60.9 ng/m³ during.1999 - 2000. Higher values are recorded in winter. Unfortunately there are no standards for PAHs in India while in Germany and France has limits of 1,3 and 0.7 ng/m³ for benzo (a) pyrene, respectively (Mohanraj and Azeez,2003). In this study, the commercial area includes the market place (Hanuman chauraha area), bus and railway station, the centre of all commercial activities. The people of this area belong to low middle and middle class, with average literacy. Most of them are purely vegetarians and keep away from smoking and drinking habits. Like any other city, the vehicular exhaust and dust from various other commercial activities remains as a bane here also. Other environmental problems noticed in this area are solid waste disposal, wastewater stagnation and congested houses. The vehicular exhaust contains NO_x, CO, PAHs SO_x and carbon soot particles, which have some direct effects on human health. PAHs like benzo (a) pyrene has certain carcinogenic property, which is a well established fact. Similarly other components also play a key role in activating many respiratory diseases like asthma, bronchitis, COPD, and pneumoconiosis (a non-neoplastic condition), especially for those who are already asthmatic. They can contribute to cardiac problems also (Fig.2). The dust released from various sources has its own characteristics (size, shape, chemical composition etc.), and act as a carrier of many pollutant heavy metals, gases and vapors to the lungs, where they either deposited or penetrated into other tissues, which can produce a spectrum of diseases ranging from a simple cold to deadly diseases like cancer. The lung cancer incidents are increasing in most of the metropolitan cities like Delhi, Mumbai etc.

Disease Prevalence in Commercial zone

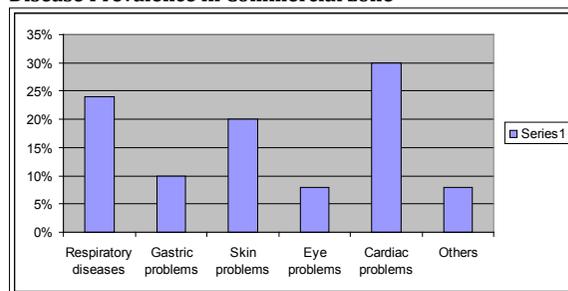


Figure 2

Wastewater stagnation is a common phenomenon in the commercial zone. The throwing of solid waste to the wastewater canals helps to clog the system, and encourages mosquito breeding. The flow of wastewater in canals is disrupted in many parts of the city. This reflects in the comparatively high prevalence of vector diseases like filariasis. The solid waste dumping in the market places can create a lot of health problems, both directly and indirectly. As the major part of the solid waste comes under biodegradable, the dumping of this waste creates an anaerobic condition under which gases like hydrogen sulphide (H₂S), methane (CH₄) are released. The leachate from the dumping site can contaminate soil and water bodies, and indirectly affects human health. Dumping sites act as a source for bioaerobials like fungi and bacteria. The primary pollutants like H₂S, under favorable conditions, converted to H₂SO₄ can be carried by the dust particles to the lungs and produce inflammation of the lining of the lungs. This can cause breathlessness and may be fatal. These acidic dust particles can act as a solvent for the ac-

cumulated dust particles in the lungs and can cause lung tissue damage and other related diseases. Insoluble particles deposited in the airways, or lungs, may also penetrate the deeper lung tissue where they may stay for years and can cause damage to the other tissues of the body. The inhaled organic dust can cause pneumoconiosis (non-neoplastic condition). Congested houses are a peculiarity of this zone. Air circulation is very less and this leads to accumulation of dust, sourced from various human activities, inside the houses. Use of mosquito repellents under this unventilated conditions can contribute to indoor air pollution and many of the respondents reported allergic respiratory and skin problems by the use of mosquito repellents.

Residential Area

The residential area covers two-third of the Morena city. Therefore a random sampling is carried out in order to cover almost all the areas of residential activity. The residential zone has its own peculiarities. It comprises of a mixed population in aspects like socio-economic conditions and dietary habits. The educational status stands in a high position compared to other zones. Most of the people are concerned about the environmental problems, they are trying to keep their environment clean and this helps to keep away vector and waterborne diseases. Here indoor air pollution from bio-fuels is not a serious problem as most people have switched on to LPG (Liquid Petroleum Gas) system. And the housing pattern in this area helps maximum air circulation. The people of this zone are mainly non-vegetarians and depend on packaged foods. Diseases like cardiac problems; obesity and breast cancer are common in this area, which have a close relationship with dietary habits (Fig.3). Breast cancer incidents are relatively high in this zone and also other forms of cancer like stomach, kidney, lung, uterus, blood and brain are reported from this zone. The people also report some kinds of photo allergic skin problems. Here dust problems and also solid waste problems are not as severe as in the commercial zone. But they are facing difficulties in disposing of household garbage. Almost all people are burning the garbage, composed of plastic, garden litter, pesticide bottles, etc in their courtyard. The burning of these materials will produce Dioxin Like Compounds (DLCs), which are very hazardous to health. Dioxin is a known carcinogen especially for lymphomas and lung cancer. Recent epidemiological studies suggest a possible association between dioxin like compounds and diabetes in the human population (Rene & Bunce 2002). By burning the household garbage all people are exposed to small but measurable levels of DLC. This chronic exposure may hasten the onset of adult diabetes in

adult susceptible individuals. This is a very important area for consideration and suitable measures are warranted in order to assess the health risks associated with it in the study area.

Disease Prevalence in Residential Zone

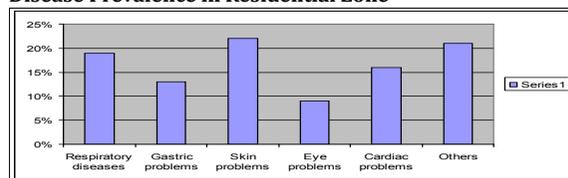


Figure 3

There are some pockets of floating population in the residential and industrial zone, where low-income, illiterate people live as a colony. They have common toilets and drinking water facilities. These slums are usually situated along the banks of wastewater streams, and are using that water for many of their domestic purposes like bathing, washing etc. Such places may act as a source of vector and water borne diseases. Again these wastewater streams are dumping places for solid wastes and its degradation results in hazardous products formation, which along with the other factors like tobacco smoke is a major environmental problem in this area. The scarcity of pure water, poor sanitation and above all, poverty related malnutrition problems could have a synergistic effect on the health of these people.

Conclusion

The present study has shown that each demographic zone has its own environmental problems, as reflected in specific diseases. In the industrial zone, air pollution related respiratory problems is of a high order. In the commercial zone cardiac and vector-borne diseases, related to environmental hazards like waste water stagnation, dust and solid waste problem, are high and in residential zone diseases like breast cancer, cardiac problems and obesity, related to their dietary habits are reported to dominate. Poverty acts as a catalyzing agent both directly and indirectly, in all environmental and related health problems. An exclusive study on the sources and sinks of pollutants, its reaction mechanisms, antagonistic and synergistic effects on human health, short and long term effects etc are very essential to manage the risks associated with the degradation of environmental quality, particularly in urban areas

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