

Assessment of Impact of Environmental Pollution on Human health in the city of Jodhpur, Rajasthan - *R.C. Sharma, Vinod Joshi, A.K. Dixit, S.P. Yadav, R. Fotedar, P.K. Anand, H.S. Rumana and P.C. Sharma*

Date of Commencement: **April, 2004**

Duration: **Two year**

Status: **Ongoing**

Objectives

1. To assess the magnitude of environmental pollution analyzing air, water and solid waste pollutants by seasonal and periodic sampling.
2. To collect information on incidence and prevalence rates for specific health end points such as respiratory ailments, infectious diseases, cardiovascular diseases and cancer.
3. To formulate a design for rational mitigation strategies for the environmental management for the area based on the health risks assessment, economic costs and community perceptions.

Rationale

Pollution increases not only due to increase in population with decrease in the available living space for each person but also because of continuously increasing per capita consumeristic demands. An estimated 3 million people die each year because of air pollution. This figure represents about 5% of the total 55 million deaths per annum in the world. According to WHO air pollution causes 8 00 000 premature deaths from lung cancer, cardiovascular and respiratory diseases worldwide, in addition to increased incidence of chronic bronchitis, acute respiratory illness, exacerbation of asthma and coronary disease, and impairment of lung function. Worldwide approximately 1.1 billion people do not have access to safe water and 2.4 billion lack basic sanitation. Approximately 3.1 % of deaths and 3.7 % of DALYs worldwide are attributable to unsafe water, sanitation and hygiene. In India, magnitude of the problem is significantly high. According to a study economic loss due to pollution was estimated 9715 million US \$ / year or 4.53 % of GDP that include 5710 million US \$ / year from water pollution, 1310 million US \$ / year from air pollution and 1642 million US \$ / year from soil pollution in terms of premature deaths, physical disability, restricted activity days etc. It is estimated that the hazardous wastes generated in India is about 4.4 million tons per annum. The most polluting of them are the city sewage and industrial waste.

In Jodhpur city a large number of people suffer from respiratory and diarrheal diseases. Out of 6027 cases, about 61.12 % cases of diarrheal diseases and 25.16 % cases of respiratory diseases have been reported from the city (2003-2004, CMHO Office, Jodhpur). The city of Jodhpur, the second largest city in the state, has registered 21% decadal population growth. It has more than 3 lakh of registered vehicles contributing to air pollution with more than 10 000 industrial units. The city has no proper sewerage system. Inadequate maintenance of the

existing system causes the problem of water borne pollution, which is reflected through some 60% of water borne diseases cases registered every year.

Magnitude of impact of pollution on health in the city remains unknown due to lack of studies on the problem. Owing to increasing pollution in the city, it has become necessary to study the impact of it on human health.

In the present study, to assess the impact of air, water and solid waste on human health, attempts are being made to find out the current magnitude of environmental pollution in respect to it's meteorological conditions and also for assessment of health problems associated with environmental pollution. The present study is expected to reveal the status of pollution-associated health problems but also form a baseline data for further detailed investigation on health impact assessment. This study will also be helpful for extrapolation of the scenario and for formulation of mitigation strategies.

Progress of the Work

Selection of study areas and classification as per attributes:

For assessment of environmental pollution on human health, the Jodhpur city, which has 60 wards, is divisible into different zones with respect to different types of pollution i.e. air, water and solid hazardous, socio-economic and cultural behaviour and topographical conditions. Study sites from within zones are selected to represent them statistically also. The detail map of selected study sites in the city has been shown in the fig. -1.

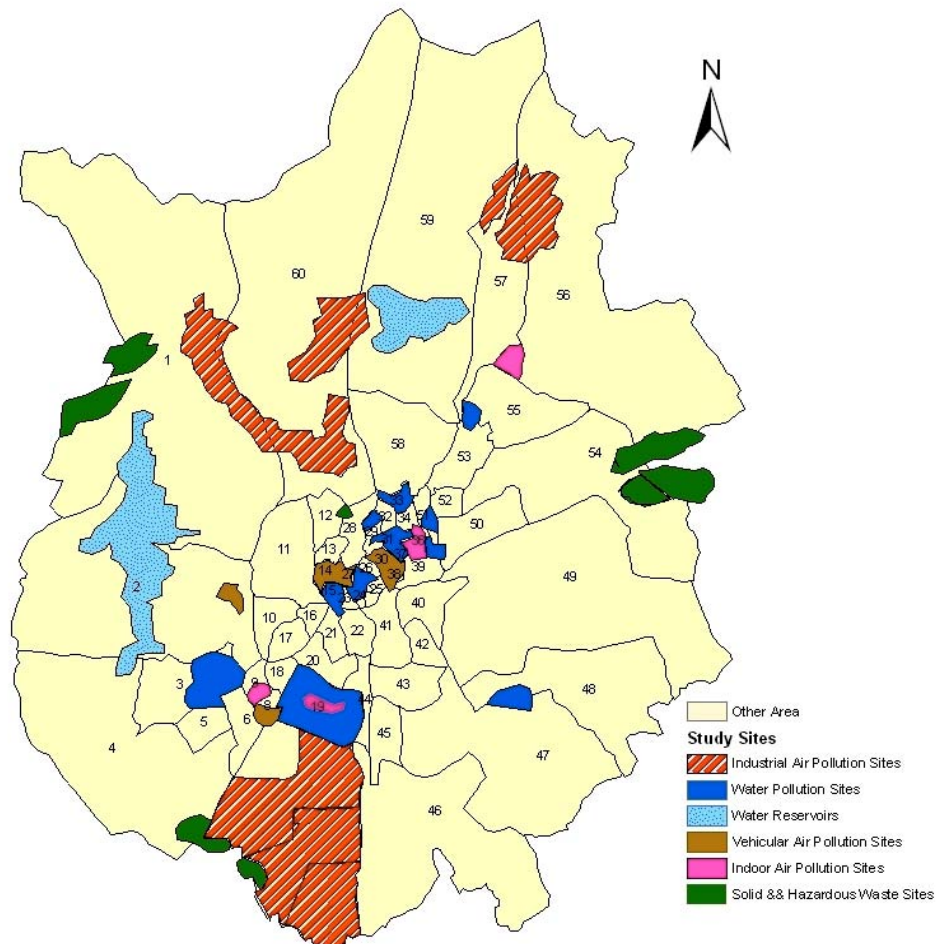


Figure-1 : Ward map of the Jodhpur city showing different study sites

For air quality assessment different study sites were selected for analysis of vehicular, industrial and indoor (residential) air pollution. For vehicular pollution analysis the study sites were selected on the basis of intensity of traffic at the site and area specific details. For industrial pollution assessment the sites are selected from the main industrial areas of the city on the basis of type of industries and industrial effluent. For indoor air quality assessment various sites were selected on health, on the basis of type of fuel used for indoor activities and in-house conditions.

The study sites selected for air pollution are:

For vehicular air pollution assessment:

Category 1: congested commercial sites with heavy vehicular load

1. Jalori gate: site-I
2. Khanda Phalsa: site-II
3. Katla Bajar: site-III
4. Sojati gate: site-IV

Category 2: less congested sites with moderate to heavy vehicular load

1. New Sadak circle: site-V
2. Paota circle: site-VI
3. Pal link road: site-VII
4. Akalia circle: site-VIII

For industrial air pollution assessment:

Category 1: textile / timber / Guar gum industries-

1. Basni phase-I: site-I
2. Basni phase-II: site-II

Category 2: metal / engineering industries-

1. Light Industrial Area: site-III
2. Heavy Industrial Area: site-IV

Category 3: export promotion zone- Boranada Ind. Area phase I,II,III&IV : site- V

Category 4: handicrafts/ oil mills/ Guar gum/ textile- Mandore Ind. Area: site- VI

Category 5: minerals/ stone extraction- Soor sagar Industrial Area: site- VII

For indoor air pollution assessment:

Category 1: Congested area with maximum use of LPG- 1. Bamba Mohalla: site-I

Category 2: Maximum use of kerosene/wood/coal- 1. Chandana Bhakor: site-II

Category 3: Spacious area with maximum use of LPG- Shashtri Nagar: site-III

Category 4: Mixed dwelling with mixed use of fuels- Massooria : site-IV

Category 5: Slum area - Sansi basti (Mandore): site- V

Similarly for water pollution assessments the study sites are selected on the basis of type of water source used, condition of public water distribution network and its proximity with sewerage network, socio-economic and cultural conditions and topographic conditions.

The study sites of various categories are:

Category 1: congested area: The category is further subdivided on the basis topographic conditions;

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|------------------|---------------------------------|-----------------------------|
| a) High slope – | 1. Kolari Mohalla: site-I, | 2. Umaid Chowk: site-II |
| b) Middle slope- | 1. Bhim ji Ka Mohalla: Site-III | 2. Jalap mohalla: site-IV |
| | 3. Hathiram ka Odha: site-V | 4. Jalorion ka Vas: site-VI |
| c) Foothill - | 1. Jalori gate: site-VII | 2. Merti gate: site-VIII |

Category 2: well planned area:

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|----------------------------|-------------------------------------|
| 1. Shashtri nagar: site-IX | 2. Chaupasani Housing Board: site-X |
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Category 3: slum areas:

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|----------------------------|-----------------------|
| 1. Pabupura basti: site-XI | 2. Bhadasia: site-XII |
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Category 4: large water reservoirs, ground water resources as step wells and hand pumps

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|--|-----------------------------------|
| 1. Rajiv Gandhi canal: site-I | 2. Kailana lake: site -II |
| 3. Chaupasani water filter plant: site-III | 4. Balsamand lake: site -IV |
| 5. Balsamand filter plant: site -V | 6. Kolari Mohalla: site-VI |
| 7. Bhimji Ka Mohalla: site VII | 8. Jalap Mohalla: site-VIII |
| 9. Jalori gate: site-IX | 10. Sojati gate: site-X |
| 11. Merti gate: site XI | 12. Hathi Ram ji Ka Oda: site-XII |
| 13. Jalorion ka Vas: site-XIII | 14. Umaid choulk: site-XIV |

For solid and hazardous waste pollution assessment some study sites are selected on the basis of quality and quantity of solid waste and type of human exposure.

The various study areas selected are:

Category 1: Municipal solid waste dumping area

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| 1. Banar : site-I | 2. Badli : site-II |
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Category 2: Industrial effluents used in agricultural practices-

Salawas/Sangria: site-IV

Category 3: City sewerage water used in agricultural practices- Banad : site-V

Sample Collection:

The samples were collected from the respective sites identified in Jodhpur. The sampling of air, water and solid hazardous waste were timed as to capture the seasonal variations of winter, summer and rainy seasons. Simultaneously surveillance of human health is done by filling up a health schedule through on spot clinical examination of individual family members of the selected households from a study site.

The study plan is described as below-

1. During winter season sampling will be done between the periods from mid of November 2004 to mid of February 2005.
2. In summers data will be collected from mid of the month of April to July 2005.
3. In rainy season sampling will be done from mid of July 2005 to mid of October month 2005.

Observations

The samples collected were examined for physico-chemical and bacteriological parameters separately for air, water and solid wastes to study the impact on human health. The preliminary observations of the data collected during winter seasons are given in table 1-8. The meteorological data is also given in the table-9. Tables10-12 depicts the health survey data obtained. Based on the present analysis of the samples for the given parameters (table-1-9), the results for different sites (localities) in the city are analyzed. The values of the parameter recorded together with their ranges are provided. However, a trend of environmental health and its impact on human health cannot be understood until a picture in totality is projected. The work is continued.