International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438

Impact of Industrial Pollution on Human Health in Yamuna Nagar, Haryana

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Abstract: ***Human health is very closely linked to environmental quality. The basic objective of this study was to identify the common health problems with status and level of typical population (target group), which are residing near industrial areas in Yamuna Nagar Haryana. The results of the present study are based on the information obtained by taking help of questionnaire, focus group discussion and observation, from three different areas i.e. around sugar mill, paper mill and thermal power plant. The results of the survey in this study showed that the main pollution sources in the city were industries (78%), followed by traffic (18%) and domestic (3%). The major type of pollution which inhabitants faced in study area was noise (31%), followed by water (26%), air (26%) and land (17%). As general respiratory problems were found to be more prevalent in paper mill zone; and asthma and fever were found to be in higher extent in thermal power plant and sugar mill zone respectively. The most prevalent common and allergy problem in all industrial areas was found to be headache and eye irritation respectively; and the most prominent diseases in present study were found to be asthma, fever and malaria.***

Keywords: human health, sugar mill, paper mill, thermal power plant, diseases, Yamuna Nagar

1. Introduction

Control of pollution is important for its damaging effects on human health and social welfare. Assessing health damage caused by pollution is important as it provides an impetus for pollution control as well as a means for evaluating the benefits of specific pollution control policy. Human health is very closely linked to environmental quality, as the Etiology of most of the human diseases being related to the status of the living environment of man (Bency et al., 2003). According to statistics, 25% of all preventable illnesses are caused by detrimental environmental factors (UNEP, United Nations Children's Fund, WHO, 2002). Owing to the lack of monitoring, it is difficult to define exactly the environmental pollution caused by industrial activities (Gjika *et al.*, 2000). Industries turn out wastes which are peculiar in terms of type, volume and frequency depending on the type of industry and population that uses the product (Adekunle *et al.*, 2008). The pollution potential of industrial waste is far greater than that of domestic waste. Contaminated air, soil, and water by industrial effluents are associated with disease burden (WHO, 2002) and this could be the reason for the current shorter life expectancy in developing countries (WHO, 2003) when compared with developed nations. Pollutants affect human health in several ways. These include direct irritation of target organs or metabolic changes within cells.

The basic objective of this study was to identify the common health problems with status and level of typical population (target group), which are residing near industrial areas (sugar mill, paper mill and thermal power plant) in Yamuna Nagar Haryana. Yamuna Nagar is the second big industrial city of Haryana. Population explosion, uncontrolled urbanization and industrialization caused a high rate of waste generation in Yamuna Nagar. There are many industries like paper mill, sugar mill, distillery, cement, metal industries, ply wood etc. The problem of pollution is severe due to paper mill (Yadav *et al*., 2010), sugar mill and thermal power plant (Sharma *et al*., 2013; Sharma and Chaudhry, 2013). The results of the present study are based on the information obtained by taking help of questionnaire, focus group discussion and observation, from three different areas i.e. around sugar mill, paper mill and thermal power plant.

2. Materials and Methods

2.1 Study Area

Yamuna Nagar district of Haryana located in north – eastern part of Haryana state with total geographical area 1756 sq.km lies between 29º 55': 30º 31' north latitudes and 77º 00': 77º 35' east longitudes, comprises 4% of total area of state. Population explosion, uncontrolled urbanization and industrialization caused a high rate of waste generation in Yamuna Nagar. The location map of study area is shown in Fig 1.1.

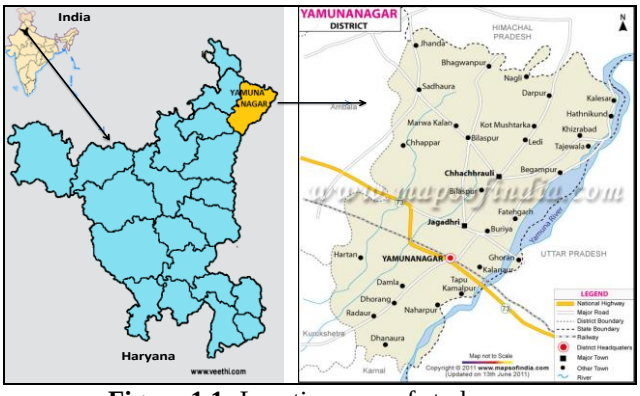

Figure 1.1: Location map of study area

The study sites selected within the city were three industrial vicinity areas Sugar mill, Paper mill and thermal power plant (Fig. 1.2).

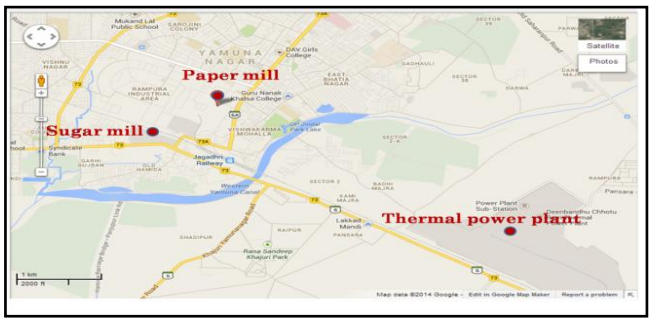

Figure 1.2: Selected industrial sites in study area

2.2 Research Method

To characterize the health status and common problems related to pollution the information of the populations residing near industrial area on prevalence of symptoms, prevalence of diseases and health concerns was analysed in March 2013. The information was collected by a door-to-door interview, using a questionnaire or respondents were interviewed on spot and then the questionnaires were filled out. The objective of the questionnaire was to inquire about the industrial pollution problems and diseases and the impact of discharged wastewater on public health. The data collected consists of a sample size of 150 in total (50 were interviewed in each industry surrounding). Questionnaire was prepared with different quarries regarding socioeconomic status, drinking water source, pollution source, industrial pollution, timing of pollution, common and allergic health problems and diseases like respiratory, water borne etc. were taken into consideration. The level of complaints for the studied symptoms was expressed by the study participants using a scale of: 0 = never; 1 = sometimes; 2 = often; 3 = very often.

3. Results and Discussions

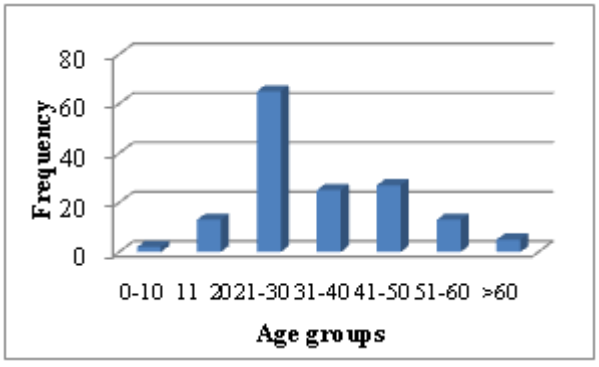

Figure 1.3: Age groups of studied population `

3.1 Sources of Pollution

The zones selected for this study was the industrial areas, where a large number of small and large scale factories and mills produced the toxic effluents and gases in the surrounding area. The results of the survey in this study showed that the main pollution sources in the city were industries (78%), followed by traffic (18%) and domestic (3%) (Fig.1.4). According to the respondents the maximum pollution problems in the city were from sugar mill (30 %) followed by paper mill (22%), starch mill (21%) and thermal power plant (19%) (Fig.1.5). According to some people (8%) the pollution problem was also due to pharmaceuticals and ply wood mills present in the study area. From the data generated by survey it was found that 82% of respondents feel this pollution every day, however only 5% mentioned that the pollution occurs mainly twice a week. The level of pollution was found to be much higher in day time (57%) compared to early morning (35%) and night time (17%).

3.2 Types of pollution

On the basis of survey it was found that the major type of pollution which inhabitants faced in study area was noise (31%), followed by water (26%), air (26%) and land (17%) as presented in Figure (1.6). Approximately 47% of respondents feel noise and 45% feel bad odour from the industries all the time. In sugar mill area the problem of noise pollution was noticed maximum (82%) followed by water (64%) and air (26%). However people residing near paper mill (62%) and thermal power plant (42%) responded more for air pollution problems. Water pollution was found to be maximum in surrounding of sugar mill followed by paper mill. The least percentage of water pollution was found to be in thermal power plant area. Solid waste generation was found to be comparatively high in paper mill surroundings (36%) followed by sugar mill (32%) and thermal power plant (9%). Due to high generation of solid waste near paper mill the problem of rodents, flies and mosquitoes were also found to be more in paper mill (50%) area, followed by sugar mill (32%) and thermal power plant (22%) area.

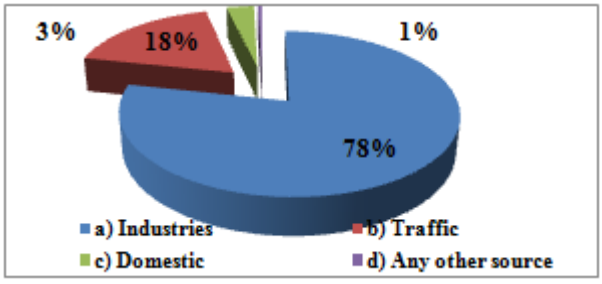

Figure 1.4: Main sources of pollution in study area

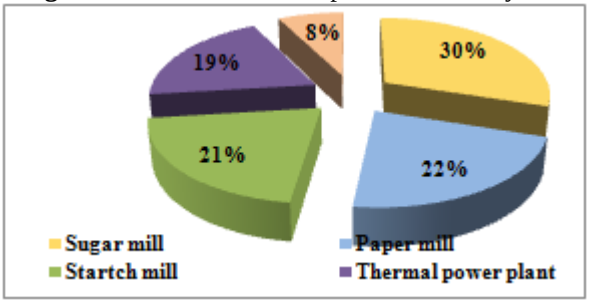

Figure 1.5: Extent of Pollution from different industries

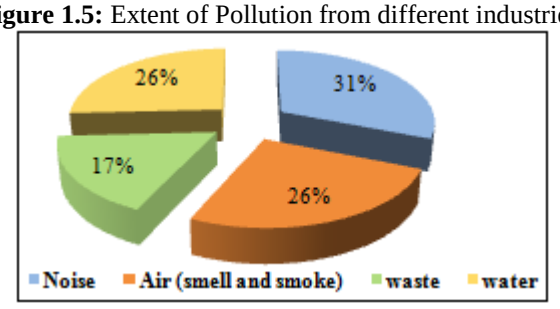

Figure 1.6: Main types of pollution problems near industrial zones

3.3 Common problems and allergic disorders

The results of this study showed that the industrial pollution had an impact on the health of the community also. The most prevalent common problem in all industrial areas was found to be headache (58%), followed by irritation (21%), dust fall (14%) and dryness (7%) (Fig 1.7). And the most prevalent allergic disorder observed was eye irritation (39%) followed by skin rashes (23%), sneezing (22%), cough (11%), nose block (4%) and hyperacidity (1%) (Fig 1.8).

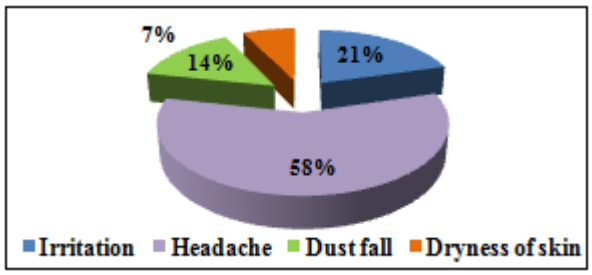

Figure 1.7: Prevalence of common problems in industrial zone

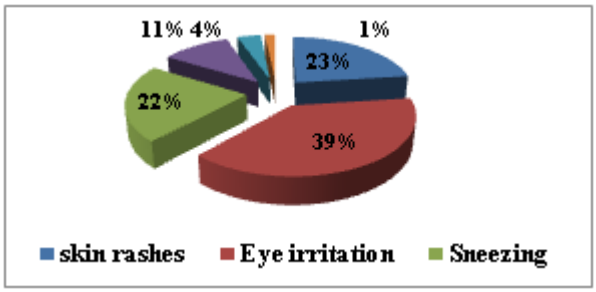

Figure 1.8: Prevalence of allergic disorders in industrial zone

From all the industrial areas common problems in respondents were found to be more (75%) followed by disease problems (40%) and allergic disorders (35%). Comparative analysis of respondents of all the three industries showed that in sugar mill area the problems of diseases and allergic disorder were more compared to paper mill and thermal power plant area.

3.4 Diseases

The most prominent disease in present study was found to be asthma (36%). Approximately 29% peoples responded for fever problem and 10% peoples mentioned the problem of malaria, respiratory and digestive problems to them due to pollution (Fig 1.9). By comparing all of three industries the problem of Asthma was found to be very much high in respondents near thermal power plant (74%) followed by sugar mill (38%) and paper mill (10%). However, malaria and fever type of illness were observed more in sugar and paper mill area (Table 1.2).

Table 1.2: Different health problems in industrial zones

		Allergic disorders to respondents				
	Sugar mill		Paper mill		Thermal power plant	
Complaint	Total no. of respondents	percentage	Total no. of respondents	percentage	Total no. of respondents	percentage
Skin rashes	22	44	15	30	4	8
Eye irritation	29	58	20	40	22	44
Sneezing	15	30	15	30	10	20
Cough	4	8	16	32	0	0
Nose block	0	0	7	14	0	0
Hyperacidity	0	0	3	6	0	0
		Illness to respondents				
	Sugar mill		Paper mill		Thermal power plant	
Complaint	Total no. of respondents	percentage	Total no. of respondents	percentage	Total no. of respondents	percentage
Respiratory diseases	1	2	15	30	10	20
Asthma	19	38	5	10	37	74
Cancer	3	6	0	0	1	2
Fever	27	54	17	34	5	10
Malaria	6	12	9	18	2	4
Digestive problems	12	24	3	6	1	2
		Perceived common illness in community				
	Sugar mill		Paper mill		Thermal power plant	
Complaint	Total no. of respondents	percentage	Total no. of respondents	percentage	Total no. of respondents	percentage
Malaria	33	66	26	52	30	60
Diarrhea	19	38	19	38	6	12
Cholera	3	6	2	4	0	0
Fever	36	72	37	74	9	18
Typhoid	4	8	8	16	2	4
other	3	3	3	6	0	0

Approximately 49% of respondents mentioned that these allergies and diseases occurred repetitively to them. However the maximum reoccurrence of diseases / allergies were found to be in paper mill area followed by thermal and sugar mill area. Due to this pollution respondents in paper mill (42%), sugar mill (20%) and thermal power plant (16%) mentioned that they have to visit the doctor frequently. Besides general allergic problems; headache, fever, malaria, asthma and cold were noticed more in the middle age group respondents in all industrial zones; however in old age respondents the problems of digestion, respiratory, and asthma were found to be more prominent.

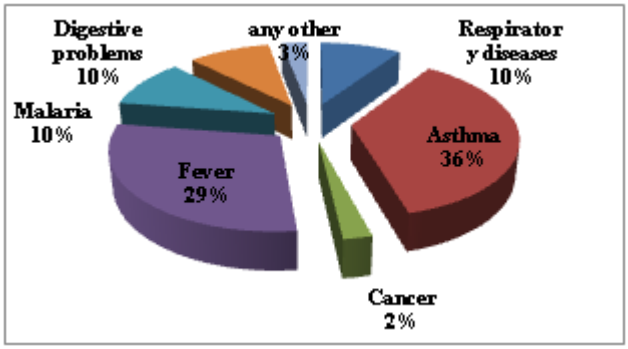

Figure 1.9: Prevalence of different diseases in industrial zone

The most prevalent diseases in whole community according to respondents were water borne diseases mainly malaria (38%) and fever (34%), followed by diarrhea (18%), typhoid (6%) and cholera (2%) (Fig.1.10). Similar kind of diseases from industrial area was also reported by Reddy and Behera (2005); Sujatha et al., (2013). Though people do not drink the polluted water directly, they get exposed to the toxic chemical water while working in the industry, taking bath, washing clothes and also through food chain etc. These water borne diseases spread through mosquitoes and bacterial infection from stagnant water bodies mainly present in vicinity of sugar and paper mill area in this study. Many community members believe that these problems are a result of an increase in the number of industrial units in the area. It is their opinion that effluent entering the surface water bodies in the area, is reducing the quality of water and as a result they are unable to use it for the purposes for which it was used in the past, such as bathing and washing cattle etc. Most of the respondents from all industrial area mentioned that the main cause of these diseases to them was due to shifting to this area or living in this area (Fig. 4.11).

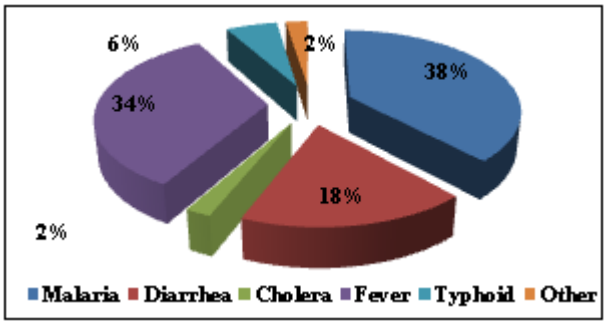

Figure 1.10: Common illness in the community near industrial zones

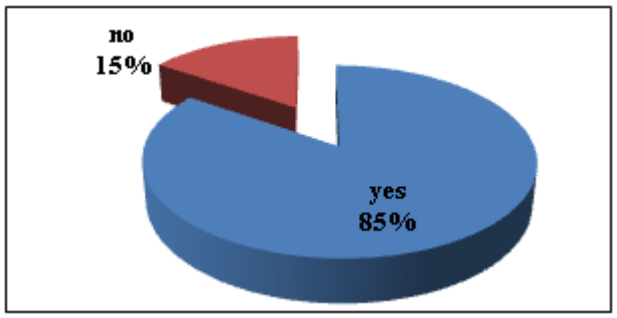

Figure 1.11: Cause of diseases due to shifting / living in industrial zone

4. Conclusion

Results revealed that the three different areas had different health and environmental problems. As general respiratory problems were found to be more prevalent in paper mill zone; and asthma and fever were found to be in higher extent in thermal power plant and sugar mill zone respectively. Air pollution problems were found to be more in thermal power plant however; water problems were more prevalent in sugar and paper mill zones (Table 1.2). 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.

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