

Original Research Article

Public perceptions towards air and water pollution in industrial areas of Himachal Pradesh, India

Deepesh Barall*, Salig R. Mazta, Sunita, Shashi P. Thakur, Jyotsna Jhingta

Department of Community Medicine, Dr YSPG Medical College and Hospital, Nahan, District Sirmour, Himachal Pradesh, India

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*Correspondence:

Dr. Deepesh Barall,

E-mail: deepeshradha2728@yahoo.co.in

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ABSTRACT

Background: Industrialization carries with it the seeds of environmental damage and has always entailed some serious population health challenges. Reforms initiated seems to be not sufficient. There was a felt need to identify people's perspective on industrial pollution and its health hazards in the seriously polluted areas of Himachal Pradesh.

Methods: We designed a qualitative study on the perceptions of people towards air and water pollution due to the industrial activities. Eight focus group discussions were convened to extract the public opinion.

Results: The narratives of participants formed five broad thematic areas. It emerged that they have experienced the change in the climate of the area and relied more on their senses to assess their exposure and in identifying sources of pollution. It was endorsed that industries pollute mainly during the night hours. They were of opinion that the overpopulation due to immigration leading to overcrowding and unhygienic sanitation practices have also contributed adversely to their health. There is a general understanding that industry contribute more to these problems than individual. The level of health awareness needs to be raised through extensive IEC activities.

Conclusions: The contribution of the industries to the environmental degradation has been perceived by the people. Multi sectoral approach is the need of the hour with more stringent laws and accurate monitoring mechanism and due importance to the views of the general public should be given in the policies and planning.

Keywords: Focus group discussions, Health hazards, Industrial air and water pollution, Public perceptions, Qualitative study

INTRODUCTION

Industrialization carries with it the seeds of environmental damage. The economic and socio-cultural growth has always entailed some serious population health challenges. All developing areas endure the 'four Ds' of disruption, deprivation, disease and death during their journey of industrialization.¹

Estimates indicate that the proportion of the global burden of disease associated with environmental pollution hazards ranges from 23 percent (WHO 1997) to 30 percent.^{2,3} This burden occurs predominantly in

developing countries with 65% in Asia alone.⁴ In the year 2016, In India, 9.4% of total burden of diseases and 7.4% of total deaths were attributed to water sanitation and hygiene.⁵

Industrialization leads to migration of people from rural areas to urban regions leading to overpopulation and overcrowding thus resulting to poor health practices due to congestion and development of slums.⁶ Our industrial structure has changed since the economic reforms. However, environmental reforms initiated to curb the negative impact of changing industrial pattern on environment seems to be not sufficient. Therefore, there

was a felt need for analysing the environmental impacts of industrial sector. The developing industrial towns in the hilly state of Himachal Pradesh are located along the border with the neighbouring state of Haryana and Punjab and were selected under the directions of honourable National Green Tribunal to frame the action plan for these areas.⁷ The residential clusters in these towns is in close proximity to the industrial establishment with diverse manufacturing units and constant traffic flow, in fact with the reputation of having the largest truck union in the Asia. The local population of these areas is markedly exceeded by the migrant population from other states thereby oversaturating the existing health and sanitation services and facilities. The area is governed through the urban and rural local bodies with limited services and manpower. The areas are also characterized by housing standards believed to raise the levels of exposure to both air and water pollution. The houses are designed or modified to accommodate the maximum keeping at stake the required basic living standards. The local residents are more educated and relying on economic activities that are more stable, while the migrant population, being less educated are indulged in nonskilled work and pre occupied with the earnings to survive their livelihood keeping aside the health and education concern of their family. The communities were located in close proximity to major pollution sources and face environmental challenges.

Objective

Objectives of the study were to identify the people's perspective on industrial pollution and its health hazards in the seriously polluted industrial area of Himachal Pradesh.

METHODS

Study design

We designed a qualitative study on the perceptions of people living in these areas towards air and water pollution due to the industrial activities.

Study area

Seriously polluted areas (SPAs) in the state of Himachal Pradesh. It included the industrial area of Parwanoo with population close to 20,000 including 8,758 (census 2011) and floating population and Baddi with 29,911 in district Solan and Kala Amb with population of 6,695 (census 2011) with floating population of 10000 in district Sirmour.

Study duration

The duration of the study was Six months from June 2019 to November 2019.

Methodology

The study was designed as an exploratory study in a context of non-existent data on people's perceptions towards environmental pollution in our state. The focused group discussions were conducted till the saturation in the viewpoints were achieved with 10-15 participants for each focused group discussion. A total of eight FGDs were conducted.

We employed an emergent design in which we analysed the data from the first set of discussions in the Kala Amb area and improved the questions in the FGD guide based on our experience. The discussions were therefore conducted in stages to improve upon the guide as desired necessary. In the first round at Kala Amb area, three groups were convened. The second round of three discussions were convened at Baddi and third round at Parwanoo with two discussions. With the help of community mobilizers, the participants were randomly selected to represent whole of the area to ensure homogeneity. Informed consent was taken from all the participants. During recruitment, they were provided with full disclosure including the purpose and procedure of the study. They were assigned numbered tags which were used as identifiers during the discussions to keep their identity undisclosed.

The discussions were conducted in Hindi language. However, participants were allowed to express themselves in language of their comfort including Hindi, Punjabi, English or local Pahari language. The FGDs were moderated by the co-investigator and one person took notes. We conducted the discussions in an accessible venue in the centre of the locality. On average, the FGDs took 40-60 minutes to achieve the saturation of ideas or viewpoints and were video recorded and later transcribed and translated into English.⁸ Records of the FGD session were analysed to reach a consensus about the final outcome and results of the FGD session.⁹

The transcribed discussions were transferred to NVivo 9 to organize the data for analysis and interpretation. Coding was done based on recurring themes that were identified through reading of transcripts or observations of recurrent issues raised by participants. Some broad themes identified through review of literature formed the basis of the interview guide prior to the discussions. Some of these themes were retained in the final analysis while new ones formed based on participants' responses. This was achieved during the transcription process as well as through further reading of the transcribed discussions and analysis of the coded data. Thematic analysis was used because of its appropriateness in selecting the most recurrent perceptions.

RESULTS

The discussions were held separately with the group of adult women, Panchayati raj members and local social

activists, NGO workers and educationists. It was done because the higher educational and awareness level of some members might over cast the members of other group affecting their active participation in the discussion.

The median age of the participants was 39 years with IQR from 31 to 46 years. It was 38.5 years for female and 40 years for male participants with IQR from 30-60 years and 33-56 years respectively (Table 1).

Table 1: Age and gender wise distribution of participants.

Age group (in years)	Female		Male	
	No.	Percent	No.	Percent
18-24	6	8.11	1	2.70
25-29	10	13.51	3	8.11
30-34	10	13.51	7	18.92
35-39	14	18.92	6	16.22
40-44	16	21.62	7	18.92
45-49	7	9.46	2	5.41
50-54	5	6.76	1	2.70
55-59	5	6.76	2	5.41
60 and above	1	1.35	8	21.62
Total	74		37	

Except for the exclusive women groups (one each in all of the three study areas), the participants were of mixed gender as there was no anticipated personal information that would be withheld in the presence of the opposite sex. Taken together, the representation of the female participants was twice of the male participants (Table 2).

Table 2: Gender wise distribution of participants in each FGD session.

FGD sessions	Female		Male	
	No.	Percent	No.	Percent
Baddi 1	16	21.62	0	0.00
Baddi 2	12	16.22	5	13.51
Baddi 3	4	5.41	6	16.22
Kala Amb 1	11	14.86	0	0.00
Kala Amb 2	3	4.05	12	32.43
Kala Amb 3	2	2.70	12	32.43
Parwanoo 1	17	22.97	0	0.00
Parwanoo 2	9	12.16	2	5.41
Total	74		37	

The difference of participants in their age, level of education and employment status was preferred to ensure a diversity of opinions (Figure 1 and 2).

90% of the participants were married and were living in the study area for a considerable period ranging from 3 years to 50 years (Figure 3).

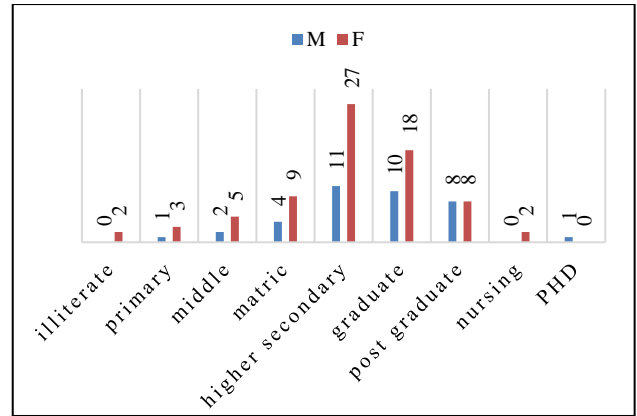


Figure 1: Gender wise education status of participants.

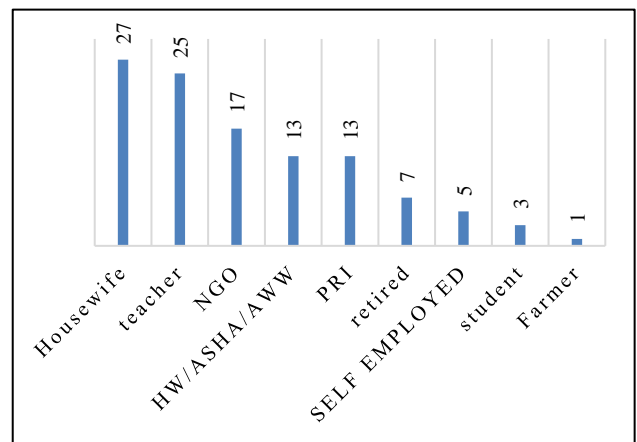


Figure 2: Occupational status of participants.

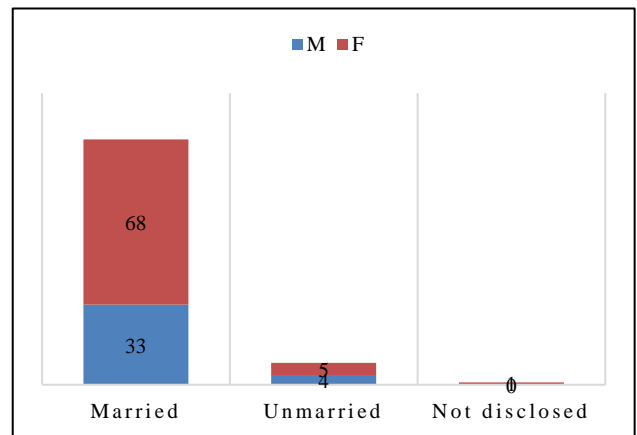


Figure 3: Marital status of participants.

The results from the narratives of participants formed five broad thematic areas. These included pollutions have led to the changes in the environment; sensing air pollution; whom to be held responsible; health hazards; and what is required to be done?

The results were structured into sections according to the thematic areas identified.

Pollution has led to the changes in the environment

We sought to learn about participants' thoughts regarding the changes in the environment. It emerged that the residents have experienced the changes in the climate of the area. While participants could not document the actual rise in temperature but many have expressed that the days have become much hotter over these years expressed through the following excerpt:

"It (temperature) must have risen by at least 5 degrees above normal".

"The rainfall has also changed and often gets too much low and that too very untimely".

The surface water and underground water has also reduced in both quantity and quality as expressed below.

"Just touching the water can surely make you ill".

"Factories have sucked whole of ground water through multiple borewells".

Some opined that change in environment can be seen with the change in the flora and fauna of the area. They cited examples of honey bee and vultures which are rarely seen nowadays. Birds have migrated and wild animal count of the area has decreased. The production of the fruits and vegetables has reduced and even what is produced is now of low quality.

Sensing pollution

During the discussions, it was apparent that participants relied more on their senses to assess their exposure to pollution and in identifying sources of pollution. Sensory perception of pollution was stressed throughout the discussions with participants using terms such as seeing a cloud of dust, ash and smoke covering the area expressed with a verbatim.

"The cloud of smoke is really scary in the early morning at 4 am".

Feel of extreme heat waves as expressed in verbatim.

"The heat of furnaces up to the road is such as you are feeling the heat of scorching sun even in an AC room".

White deposition over the drinking water and in storage vessels, discoloured surface streams as expressed through:

"The colour of water is such as if stained with turmeric" or "The river looks black".

Pungent smells from factories and dumpsites and soot falling on people and buildings expressed as:

"It's all the layer of black dust over the house and dried clothes in the morning".

This brings to the fore the apparent reliance on the senses to inform perceptions on sources and individual exposure.

Whom to be held responsible?

There were strong opinions towards who was responsible for the pollution in the community with most attributing the state of water and air to industries and some felt it as a mixed responsibility of industries and the residents.

They expressed that the establishment of industries has led to deforestation in the area which is hardly replenished through the plantation drives. Some expressed that the standard proportion norms for maintaining the greenery around the industry is not followed. The participants expressed that the polluted water from the industries are drained through ill maintained drains which are often blocked and overflowing ultimately polluting the surface water sources and main rivers of the area. It was expressed through verbatim:

"Water is coming out of the drains from company, makes the river dirty".

They were of strong opinion that the machines installed for water purification, effluent treatment plants (ETPs) are either not used to their potential or of suboptimum requirements, expressed through the verbatim:

"I don't think that the machine is used regularly".

It was endorsed by most that industries pollute mainly during the night hours, expressed through the following excerpts.

"They keep the waste [water] for the day in a chamber and release at night which is noticed only when the fishes or cattle die in the morning".

"Company release it (waste water) in night, who will see".

"All the junk is burnt at night, anything from tin, scrap that lead to only smoke".

"Some factories even burn cow dung cakes at night.

Those with mixed opinion expressed that the overpopulation due to immigration have also contributed with overcrowding and unhygienic sanitation practices, expressed through following verbatim.

"Many of them do not have toilets, everyone goes to the river (Markanday)".

"Where 20 toilets are required, they have just 2".

Several participants held the garbage dumpsite as nuisance adding to the pollution with the following quote.

“Heaps (of dumped waste) are lying there, in the centre of village also”.

Some expressed the ignorance and lack of awareness among the immigrant people is also playing the role in augmenting the pollution adversities, appeared in the following verbatim.

“People keep staying at home during illness, seek the doctor only once it gets higher and by that time, have already infected other members”.

Health hazards to the people

The participants expressed that the pollution has adversely affected the health of the people, may it be the general physical growth in children who are seen nowadays, having short height and thin stature expressed through the verbatim.

“Previously (children) used to attain good height, now something stops (their height) at 3 and a half feet, and never grow”.

Or the increased rates of acquiring the infectious diseases. It was expressed that certain diseases are now commonly seen including the skin disease, premature greying and hair loss, eye problems, kidney stone diseases, breathing problems and knee joint problems. Most of them expressed increased incidences of water and vector borne illnesses during the season including typhoid, diarrheal diseases, jaundice, malaria, dengue etc. They also expressed the increase in the rate of cancer detection among the local inhabitants. All these opinions were reflected through these verbatims.

“Most in school have throat problems due to dust, (children) are always coughing. Everyone above 50 (years) have breathing problem. If not all, at least 80 percent have the skin disease”.

“Last year, not less than 20 patients of cancer were from my panchayat only”.

What is required to be done

They expressed to have a deficit in planning that has led to the setting up of polluting Industries near the population expressed as below.

“Company were settled with no planning at all”.

Although on probing, they were of mixed opinion whether it was industries or the people who had followed lately and has led to the present-day scenario with inhabited areas in the close vicinity of the industries. They expressed that in future the rules should be strictly

implemented not to allow them to intermix through verbatim:

“Rules should be followed strictly”.

They were of the unanimous opinion that the industries should abide by their ecology preservation rules strictly expressed as:

“At least 70/30 rule should be followed by the company”.

And should bear the first hand responsibility to a large extent for the provision of healthy accommodation with basic sanitation facilities for the workers and their families. The participants opined that the local governing body must be given some responsible and accountable role to inspect and monitor the industrial activities at least related to waste disposal with adequate powers to fine for any violation expressed in the verbatim:

“Amount of fine by the panchayat (village governing body) should be raised”.

They expressed that the industries should install latest equipment to treat the waste air and water before release into the environment expressed as:

“Smoke from companies should be filtered before release and height of chimney (exhaust) should be higher”.

“Machine (ETP) should be correctly used and water reused after filter”.

The participants did accept their own responsibility in maintaining the personal and domestic hygiene through proper disposal of home and agricultural waste and keeping the optimum house standards before letting it out to the immigrant workers, expressed through the verbatim:

“One should keep cleanliness by himself and then his surrounding”.

There is a general understanding that individual actions can affect air and water quality, but all of them felt that industry contribute more to these problems than do individual homeowners. It was understood by all that the level of health awareness needs to be raised through extensive IEC activities to avoid harmful effect of pollution expressed through the verbatim:

“It is most important to make the people aware and informed first”.

DISCUSSION

This study explored the general perception and understanding among residents in the seriously polluted industrial areas about environmental pollution due to

industries and its associated health hazards. The residents had many identifiable instances to prove the changes in the environment and its effects. These findings were similar to qualitative study conducted in the two slums at Nairobi.¹⁰

Air pollution were mainly attributed to the dust and fumes from industrial furnaces, vehicular emissions and garbage dumpsites. Combustion of the poor-quality fuels or materials like rubber tyres was cited to be a major contributor of smoke and soot, while industrial discharge was the major contributor to the water pollution. All these activities were observed to be carried out mainly during the night hours when the monitoring mechanism are least active or unavailable. Similar findings were observed by Howel et al regarding the important role of neighbourhood characteristics in shaping public perceptions.¹¹

People's perceptions on pollution were informed by their sensory experience. Sensory perceptions have been reported as important in informing perceptions of sources and exposure.^{12,13} The reliance on sensory perceptions, although raises a concern for other pollutants that are not clearly visible or odorous and might be ignored with fatal consequences e.g. carbon monoxide and toxic heavy metals.

There was a feeling that many of the activities carried out by residents, such as injudicious dumping of waste and poor housing standards with lack of sanitation facilities, were also adding to the pollution but of a scale that was smaller in importance as compared to the major pollution from the industries. This shift of responsibility to other entities has been reported in other studies as a mechanism adopted by individuals to distance themselves from any direct contribution to the problem at hand.¹⁴ We found that many of the local resident were unwilling to attribute pollution to their place of residence as compared to other areas. This can be attributed to the attachment they have to their place of residence and the informal nature of the settlements of the immigrant families. Also, they were in obvious advantage in terms of access to services compared to the underprivileged immigrants. The presence of a 'halo effect' would be an important attribute to keep in mind in the programs aimed at reducing pollution.¹⁵ This is because local residents identify their communities as less contributing to the pollution; a fact that might make them less acceptable to the programs/interventions to address the issue. The residents had other important issues in their life, still the pollution in their area was one of the matters of foremost concern to them similar to the review by Saksena.¹⁶

Further, there was an apparent feeling of lack of support to the people so that they could do anything to reduce the levels of pollution. Therefore, the authorities must first address these barriers to ensure that they effectively implement pollution control and other environmental protection initiatives.

Limitations of the study was that the industrial and municipal workers as one of the group of participants would have added more information on the status and level of exposure to pollution.

CONCLUSION

The people in industrial areas of Himachal Pradesh have experienced the adverse effects of the environmental pollution due to industrialisation. The contribution of the industries in the environmental degradation is also perceived by the local people. It also makes us understand the people's perspective on extent of health impacts of the pollution. The study findings should alarm the existing system to get prepared before any catastrophic eventualities creeps in. It also advocates for timely institution of promotive and preventive measures with more serious and accountable vigour to have a better future with healthy life of the people and healthy environment. Multi sectoral approach is the need of the hour. More stringent laws and accurate monitoring mechanism needs to be incorporated. Above all, the policies and planning should give due importance to the viewpoints of the general public.

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Conflict of interest: None declared

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