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HEALTH HAZARDS IN AND AROUND RISPINA RIVER, KEDARPUR, DEHRADUN; A CASE STUDY

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Abstract

The current study shows the effect of pollution and contamination in the health status of families in and around the Rispana river. Rispana is one of the highest polluted rivers in Dehradun which is affecting the health status of the people. The present study was conducted with the aim of studying the causes of pollution in Rispana and the resultant health hazard along with the social economic losses of the locality. Study was divided into two round surveys. First survey was done in the core zone of Rispana in Deepnagar and Mussoorie Dehradun Development Authority (MDDA) colony at the 50-meter distance from River where total 120 families were questioned, 60 from each side. Second survey was done in buffer zone at 50-meter aerial distance from where first survey ended. In the second survey also the total 120 families, 60 from each side were taken for the study. Comparison between core and buffer zone showed that the people in core zone (around Rispana) have more diseases and higher economic losses due to illness as compared to the buffer zone (Distant from Rispana).

Keywords: Rispana River, Water pollution, Health hazard, Economic

Introduction

In India, water pollution is a serious problem as pollution in river has reached to a critical level. India has three important river systems, Ganga, Indus in north and Brahmaputra in east suffering from the premier pollution level (Vrushal, 2018; Schmidt et al. 2017). All these river systems are contributing towards water pollution. It is being observed that the second highest mismanaged amount of plastic debris is carried into the sea by river Indus, whereas Ganga and Brahmaputra river collectively carry the sixth highest Plastic debris into the sea (Vrushal, 2018). Out of the total water available on mother earth, only 2.7 percent is fresh water and other 97.3 per cent is saline water. Out of this available fresh water, only 0.0003 percent water exists in form of river (Hopwood et al. 2005; Giddings et al. 2002). India has more than 70% fresh water is in the form of liquid. Surface water resource has been exploited in such a way that now it has become unfit for the consumption (Dwivedi, 2017; Agarwal and Srivastava 1984). The surface water resource which is present in form of lake, river, pond etc. are been contaminated by biological, toxic, sewage discharge, industrial effluents, agricultural runoff, organic, and inorganic pollutants (Ebenstein, 2012; Dasgupta 2004). In many cases, these sources have been rated unsafe for human consumption, domestic use and as well as for other activities, such as irrigation and industrial needs. The quality of water has been degraded and many rivers or ponds are being dried. In1995, the Central Pollution Control Board (CPCB) identified severely polluted stretches on 18 major rivers in India (Dasgupta, 2004). When these river stretch to the urban areas, then these areas return the rivers with contamination and pollutant. Every river in India gets polluted when it passes through any metropolitan city, urban area or small town (Dwivedi 2017). Among many rivers in India, Rispana river lies in Dehradun, Uttarakhand, is also one of the most polluted seasonal rivers (Figure1).

Figure 1:- The current status of Rispana river.

The Rispana is seasonal river which comes from the small spring at downhill of Mussoorie near Rajpur (Negi, 1991). Rispana drains out from the centre part of Doon valley in Garhwal. It flows along a south-westerly course and also moves towards the eastern side outskirts of Dehradun city and then drain in the Song river and further they merge into holy river Ganga (Negi, 2003). The Rispana has always played a vital role in while boasting about the Heritage of Dehradun (Figure 2).

Figure 2:- Nehru & Indira walk by a stream in Doon Valley.
Courtesy: Mr. Lokesh Ohri and Make a Difference by Being the Difference (NGO)

Figure 3:- The People are enjoying picnic in Rispana River
Courtesy: Mr. Lokesh Ohri

Rispana was home to small fishes and people used to go for picnic on the banks of river (Figure 3). These river banks acts as a barrier and a channel to rainwater of the Doon valley during the heavy rainfall. But now these river banks are turned more into a liquid and solid waste dumping yard even after being so much significant and important to the city. At present status of Rispana is in absolutely unfavorable situation. The urbanization with increasing population, job securities and increasing industries in and around Dehradun or even in Tarai areas with respect to topographical constraints with fast life style has also increased the health hazard like hypertension and diabetes and lack of job opportunities for every educated youth. The cause of permanent destruction of indigenous forests (woodlands) have been observed due to infrastructure requirements Bharti et al. 2014. After the formation of new state, Dehradun has been announced as an interim capital in 2000, took rapid urbanization (Peeyush, and Goyal 2014) because of heavy migration from upper reaches of Himalayan villages which brought drastic change in the form of roads, new colonies and other infrastructures. Against of it valley has to pay the cost of its esthetical beauty, deforestation, agriculture land convert to concrete building, quarries, extortion of its natural wealth, and creation of slum colony. This type of slum colony is also present in the bank side of Rispana. On other hand the rapid urbanization and shortage of space in Doon valley, which further forced to various

organization and departments have started their construction of offices, universities/ colleges to the outskirts of Dehradun areas (Naithani and Patwal 2014). This result there has brought a rapid change in the land use and land cover pattern of fringes connecting urban and rural areas (Naithani and Patwal 2014). The Rispana has rapid change from last three decades. The Rispana has just become a dumping site for the colony from where Rispana passes. The domestic waste, commercial waste of small shop and garbage is directly thrown in the Rispana. The unimaginable quantity of metallic waste is also encroached to the all over the banks of the Rispana (Figure 4).

Figure 4:- *Different type of waste in Rispana River.*

The colony around Rispana has suffered from many serious health problems. The one side of Rispana is known as green belt and other is slum area which is basically an unauthorized colony. The slums are producing effluents and other pollutants in the Rispana. Many families have domesticated the cow, pig, goat, hens and duck in the river bed. (Figure 6) Dairy dung is also been dumped in the river by the dairy owner which makes the river uglier. The one more important factor is, that at the banks of Rispana there are number of shops, small hotels and restaurant, small fast food lorry.

Figure no 6:- Shelters of domestic animals in Rispana

These merchants do not have the proper arrangement for disposal of plastic as well as raw and rotten food product. They continuously disposed of the plastic bags, disposal cup, plates and non- perishable material in the Rispana. All these factors and others are the causes which have led the Rispana to get polluted (Figure 8). The river bed of Rispana is becoming more critical and fragile as the number of jeep, trucks and car are being parked. Near Rispana Bridge many taxi union and travelling companies has parked their taxi, trucks and jeep on the beds of Rispana which are making Rispana more and more polluted and drastic in every passing day. In Dehradun increasing slum colony are also contributing towards the eradication of the river. Unplanned urbanization, unawareness and lack of education amongst the citizens about environment degradation have also led to turmoil in the water bodies in Dehradun. The waste water from household directly falls in the Rispana. It may be a seasonal river but the Rispana serves as a valve to disperse rainwater during the rainy season as explained above, it is one amongst the only outlets for rainwater in the town and also is a part of the Ganga Basin therefore needs to be protected in every way. Rispana plays a vital part when it comes to saving the city from getting engulfed with rainwater. Such extreme levels of filth are not only hazardous to the environment but it can also cost the slum dwellers their lives. The encroachments on the river beds with high amounts of toxins can cause a threat to the lives of these people.

Figure no 8:- The solid waste which is thrown by nearby household.

Study Area

The area lies between to 30^0 16' 35.15" N to 78^0 02' 42.90" E and 30^0 17 '01.79" N to 78 03 04.71 E (Figure 10). The geologically of the Rispana is a seasonal and quaternary sediments of Doon valley. The previous studies and status shows that the area was full of local indigenous species. The river was in regular flow because of regular interval precipitation in Doon valley as per weather condition. The level of the river can high and lower which was totally depend on the precipitation. The study area was the colony, of Deepnagar and MDDA from where the Rispana passes. In this area the health status of families was tartan. The periphery was set at 1 meter to 50 meters of distance from the Rispana to the road and this periphery was same for the both the sides, Deepnagar as well as MDDA. Further we have extended our boundary to 50 meters more aerial distance to compare the health status of the family with the people near to the bank of Rispana.

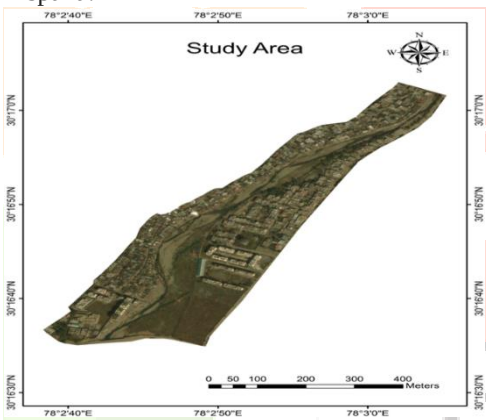


Figure no 9:- The study area in and around Rispana River.

Material and Methods

The study was conducted in the families of Deepnagar and MDDA colony of Dehradun city in Uttarakhand state of India. Study was divided in two round surveys. Total 240 families were taken into account in this study. In first round 120 families from Deepnagar and MDDA, 60 each side and second round survey, 120 families was considered, 60 from both the side, at the aerial distance 50 meters more from the first survey. As to compare the health status of person lives near the Rispana and other who live far from the River. The study was subject to different class status, age groups, occupations and distance from the Rispana. Every person health status in the family was record in the data sheet. The persons who belong to this area were taken into account. A general question was asked which were related to their health and issues of Rispana. The study was performed by house to house survey. After taking the verbal consent, each individual was subjected to personal interview and examination. The information was collected on the basis of the two-year health status. In which all the disease in family and number of visits to is noted down in the data sheet. Each visit to the houses ensured the examination of the socio-economic status, environmental conditions, and participation of each member in the family whether he or she belong to different age group. The Performa consisted of the personal details, demographic details and findings of the physical examination. Other possessions which were study that the type of waste in Rispana, drainage of waste water, use of Rispana, domesticated animals, wastes disposal by houses and presence of the agents in the house which transmit the disease. The hygiene of the small hotels and fast food lorry around Rispana was calculated. The government policy and facilities are also being checked that it is beneficial in case of Rispana and health status of the person living near the Rispana. For verification, photographs were also taken in concern.

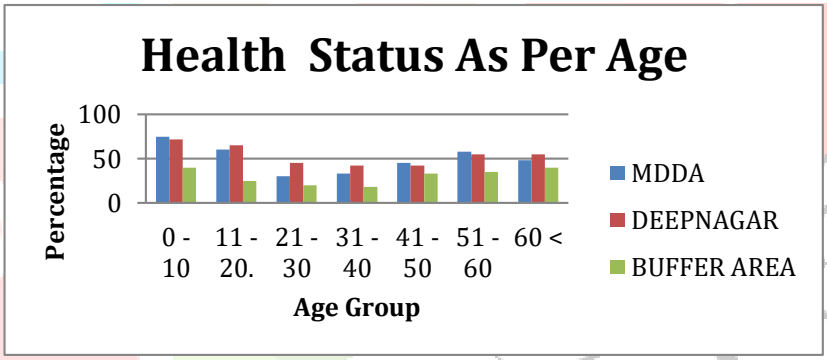
Result

During the survey total 240 families were questioned at two different parameters which have different area and atmosphere. The question was same for all the families. The results show that the issues of illness and health issues were more in colony near Rispana as compared with other families who are far away from the river. Illness was very common in both the parameters, but Diarrhea, allergy, Dysentery. Cholera, typhoid, food poisoning, conjunctivitis was common and higher in Deepnagar and MDDA colony near Rispana. We have also found that there were some cases of malaria and dengue in past one year near Rispana. While the second survey area we hardly found 1 case of malaria (Table 1).

Type Diseases	MDDA	Deepnagar	Buffer Area (50 mt aerial distance
Fever	36	43	18
Diarrhea	18	28	3
Allergy	19	28	1
Dysentery	12	22	9
Dengue	3	6	0
Malaria	5	7	1
Cholera	14	18	3
Food poisoning	9	15	4
Conjunctivitis	16	23	2

Table1. Disease chart area wise.

The people near Rispana are directly co-related to their health related problems to the present condition of Rispana. The children are more venerable to the disease and infection. In the study area we have found that there are some parks in MDDA colony and no park in Deepnagar for children to play. Parks in MDDA are over crowed and 2 parks is just 5 to 10-meter distance from Rispana. Some children get space in parks, but many children do not get sufficient space to play in the park. These children of MDDA colony and Deepnagar are forced to play at the side of Rispana and they are continuously in touch with highly toxic waste, polluted water and disease carrying agents in Rispana. The study has found that the children who play near Rispana suffer more allergy problems and eye infection. As the growing age of people, the 60's and above get more prone to repeated infection and disease. Some people to this group are totally depended on the medicine which increases the economic loss for the family (Graph 1).



Graph 1:- The graph shows the health status in age group wise.

During the survey, economic loss in health care near Rispana was same for all of the classes, whether one belongs to lower economic class, middle class or upper economic class. All of the classes spend at least 5% to 15 % of their annual income (Fig.10). But difference is in the service which they take up for health care, as lower economic class goes to government hospital and upper class goes to private hospital. On other hand the area which was far from Rispana does not have this much expenditure on their health care. But their expenditure for health care varied from above parameter. As they do not have same health issues where as they suffer from chronic illness such as hyper tension, diabetes, thyroid etc. (Fig.12).

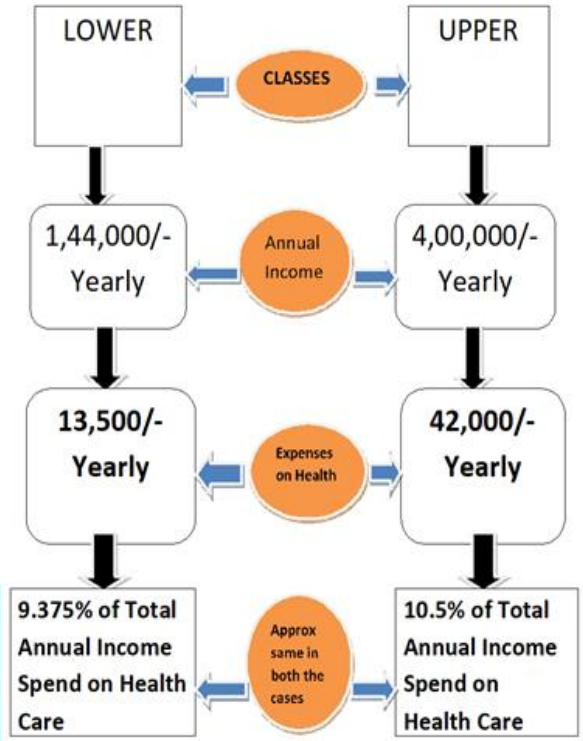


Figure 10. Expense on health care in percentage of their annual income bases

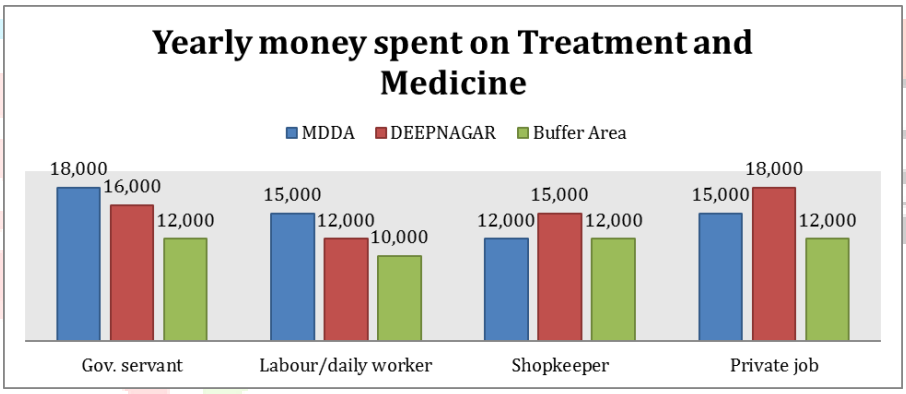


Figure 12. Expenditure by people according to area and classes wise.

In this study, we have also collected the sample of waste which is present in the Rispana. The type of waste which was present are plastic polybag, clothes, raw food of hotels, rotten vegetable, glasses, sewage drainage, domestic waste, grease oil, old iron, junkyard, animal dung, etc. we have found that the slum area of Deepnagar families has domesticated the animal husbandry in the bed of Rispana. They use these cattle for their economic growth. They consume cow milk as well as sells milk to other families in the locality. The animals which are being domesticated by slum people are; Cow, Goat, Pigs, Ducks, Hens. These are also consumed by the families as they are source of protein and sell these animals to butcher for money. The animals cover the river bed area, the owner brings the rotten vegetable, fruit and food left in the kitchens of hotels, restaurants, and then these food products are directly brought in the river bed for animals to feed. The small fast food stall, small hotel, small shopkeeper, throws their wastes directly in the river so pigs can feed on it, but they also throw the plastic plates and disposal glasses directly in the river. The study shows that domesticating of animals and practices of feeding make Rispana very unhealthy, unhygienic and unfavorable environment.

In the study area the Deepnagar slum directly drainage their bathroom pipe in the Rispana. These house hold does not have sewage line or sewage pit in some of the houses. In every 5 meter there was a pipe which directly drains out in the river (Figure 13). Another part was in MDDA colony and as well as in Deepnagar, the “drains” do not have proper outlet. The water in these drains remains there only resource and during overflow direct run into the Rispana. They do not have any proper drainage systems. This increases the number of mosquitoes. (Figure 14)

Figure 13. Straight outlet of human excreta

Figure 14:- The waste directly drains out in the Rispana River without treatment.

During the survey we have found a place where toilet is built in the Deepnagar which is directly above the river. This is an open toilet, and directly drainage in the Rispana River. The distance of toilet from Rispana is less than 1 meter. A study was conducted which showed that near more than 100 people pee daily in that toilet. The toilet urine directly passes in the Rispana. (Figure 15).

Figure 15:- Toilet built directly above the Rispana River.

Discussion

It was found that the condition is very drastic the people have to live with lot of pain and foul smelling every time. The Majority of people have complained to government about the policies regarding Rispana and they believe that the present status of Rispana is only because of government. The flue like symptoms, fever, allergic, typhoid, Diarrhea, eye infection, dysentery, Food Poisoning were common in Deepnagar Slum and MDDA colony. We have noted some cases of Malaria and Dengue in the colony. During the survey we have found Mosquitoes, housefly, cockroaches in the houses. At the time of survey, the people also told us that there is rat in their house and these rat comes from the waste dump in Rispana. The waste which is present in the Rispana has organic wastes like vegetable, fruit, wasted food, human excreta, animal dung, etc. This waste lead to germination of the house flies. During the survey we found that each and every house there is house fly. The housefly, (Musca domestica), is one of the widely distributed and most common and insects found all over the world. House flies are recognized as carriers of easily transferring the communicable diseases and contaminate utensils and food (Manandhar and Gokhale 2017; Foteddar 2001). These are considered important mechanical vector for number of fungi, protozoa, pathogenic, metazoan, bacteria, metazoan, and viruses. Flies collect pathogens on their mouth and legs when females lay eggs on decomposing organic matter such as garbage, animal corpses and feces (Bahrndorff 2017; https://www.orkin.com/flies/house-fly/house-fly-and-disease/). House flies carry diseases on their legs and the small hairs that cover their bodies. House flies carry diseases on their legs and the small hairs that cover their bodies. Pathogens are transfer by house flies only matter of second to human, animal food or surfaces which they touch. Houseflies also transmit diseases by regurgitates and feces. Before feeding on the solid food mature house flies use their saliva to liquefy it

(https://www.orkin.com/flies/house-fly/house-fly-and-disease/).During this process, they transfer the pathogens first collected by landing on off al (Luther1951; Olsen 1998).

1	*Escherichia coli (E.coli)*	6	*Citrobacter spp*
2	*Shigella, (shigellosis)*	7	*Coagulase negative*
3	*Staphylococcus aureus*	8	*Klebsiella spp*
4	*Enterococcus*	9	*Staphylococcus spp (13-15)*
5	*Salmonella*	10	*Proteus mirabilis*

Table 2. Bacteria carried by House fly

1	*Bacillary Dysentery*	8	*Food poisoning/gastroenteritis*
2	*Anthrax*	9	*Conjunctivitis (epidemic)*
3	*Leprosy*	10	*Para typhoids*
4	*Cholera*	11	*Diptheria (cutaneous)*
5	*Typhoid fever*	12	*Tuberculosis*
6	*Yaws* [16-17]	13	*Poliomyelitis*
7	*Trachoma (Virus disease)*		

Table 3. Diseases spread by House fly:

Some of the most common diseases spread by house flies are Cholera, diarrheal, typhoid, and dysentery, yaws, and anthrax. The eggs of parasitic worms are also being transmitted by the house flies (Foteddar 2001; *https://www.orkin.com/flies/house-fly/house-fly-and-disease/*). Many other researchers studied on Musca domestica acts as transport vector hosts (Issa 2019).

During the survey each and every person has some problem related to their family health issues. But it was found that the children are more vulnerable to the disease and their rate of getting ill and infection is very common. The condition of Rispana is very terrible and color of water is turn into black. The person who lives near Rispana spend more money as compares with other people who live far from the river. The slum or unauthorized colony drains their waste water or sewage water directly in the Rispana which make the river more and more polluted. An unauthorized public toilet is built directly above the bank of Rispana in side of Deepnagar. The health status of the families is not so well and people have to compromise with their health issues, and to live there for their whole life as there is no option left.

The result clearly had shown us that pollution level of Rispana is very high and on other hand the surrounding parameter and its environment of Rispana is not healthier for the people health. The health status of family is not better than other areas family those who are not in touch with Rispana environment. The major contribution in pollution to Rispana is by the commercial as well as the domestic activity. There is no proper management seen on the ground in case of disposal of waste water. People find easier way, as they directly drain out their waste water in Rispana. These people do not know that these activities increase the health problem and environment pollution in Rispana. No one is far behind in contributing the pollution in Rispana and it becomes very easy to blame each other for the condition of Rispana. The increase in diseases transmitting agent has proved a bad impact on human health, as the person who is in more contact with Rispana its Environment have got abundant with disease, illness which is directly related to their economic losses in their family. The impact of Rispana on the health is equally seen in all classes of society. The results without any doubt have proved that the people who live far away from the Rispana have better health status as compared to the people near Rispana. On the one hand people shows full respect to Rispana and feel guilty about the condition of Rispana but on other they throw garbage, plastic, domesticate animals waste, drainage bathroom, toilet pipes, and waste water of house. The animals which are domesticated in river bed for economic growth of family in slum, this activity has increased more pollution and made Rispana a perfect dumping yard by bringing waste food product directly in the river bed. This is main reason for growth of housefly, rat etc. The people also wait for monsoon, so they do not contribute in cleaning, and have full faith in monsoon to clean the river. In monsoon when the level of water raised in Rispana the whole waste, garbage's, plastic products is drained out. The drained waste water further mixes with Song River; Rispana is a tributary to river Song. Then afterward river song joins river Ganga in between Rishikesh and Haridwar. The Rispana is perfect place for the housefly germination and each and every house suffers from it. The cockroaches, rats are also very common in the houses. The stall of fast food items is surrounded by the housefly. These fast food, juice corner are directly above the Rispana River. The green bridge joins the Deepnagar and MDDA to each other and these places is very much polluted as the market area starts from here only. For convince there was a toilet directly above the Rispana and very near to market where the fast food stall is there. In our survey we have found many cases of food poisoning. The person who eat this fast food we have asked them generally, so the result was that around 40% people have suffered from food poisoning cases in once or more from past two years. But people still have this type of unhygienic food activity. The children become more venerable because of their eating habits and they play near the bank of Rispana due to inadequate space in the parks. As per the discussion with doctors of Doon hospital Dehradun, they clearly indicate that if current scenario of Rispana will be same and if there is no improvement in future is seen then there must be increase in number of health hazard.

Conclusion

The dun valley has experienced the environmental destruction during the last three decades. The above study brings us to a conclusion that the level of water pollution in Rispana River is very high. The people living in the areas closer to Rispana are more prone to illness in comparison to who are residing in the areas which are far from Rispana River. The people around Rispana are facing the pollution which ultimately is resulting into many diseases. The Cholera, diarrhea, fever, illness, typhoid, infection, food poisoning is very common to the person who lives in the surrounding areas of Rispana River. About 5% to 15 % of the annual income of these people living in the closer vicinity of Rispana has been spent on health care where the people from far flung areas are better positioned when it comes to illness and the money spent on illness. There must be a proper planned map and a perfect design for land use pattern in Doon valley, and there must be guidelines for all other activity in order to have a good quality of life and healthy urban environment. This particular area need to plan for suitable disposal areas for urban wastes water as well as the household. The waste water or sewage drainage must be diverted to sewerage treatment plants for the long and pollution free life of Rispana River.

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