



## Research Paper

### Study on the impact of water pollution on human health based on questionnaire vicinity of Son River at Nawalpur

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Received: 28/07/2021

Revised: 06/08/2021

Accepted: 16/08/2021

**Abstract:** The Lead, Mercury, Iron and Copper concentrations in the water were higher than permissible limits. Copper (Cu) is one of the metal, which are essential to human health. It's presence in the aquatic environment may be due to accumulation of domestic and agricultural wastes, Cu is found in highest concentration in winter whereas lowest in rainy season. The concentration of Zn in this site is under permissible limit. It is an essential mineral of importance to both plants and animals. In this study, lead levels were above the recommended limits (0.01ppm) for water. Pb is a toxic element, which has no significant biological function and shows their carcinogenic effects on aquatic biota and humans even at low exposures. Pb exposure is known to cause musculo-skeletal, renal, ocular, neurological, immunological, reproductive and developmental effects. Mercury is a highly toxic element that is found both naturally and as an introduced contaminant in the environment. The concentration of Hg in water is highest than prescribed limits by WHO (0.006), Indian Council of Medical Research (mg/l) and BIS, IS:

10500- Desirable (mg/l) (0.001ppm). According to Indian standards Fe and Cu concentrations are also higher than desirable limits. In present study mining, fertilizers, domestic waste products are main reasons of heavy metal contamination, which is responsible for the many health hazards in population living across the River.

Keywords: water pollution, heavy metal

#### Introduction:

Navalpur village is located in Sohagpur Tehsil of Shahdol District in central India. It is 15 km away from Shahdol. Shahdol is the districts headquarter of Navalpur village. According to 2011 census, the village code of Navalpur village is 501313. The Navalpur is the gram panchayat of Navalpur village. The total geographical area of village is 1081.6 hectares and has a total population of 1,909 peoples and about 444 houses.

The River Son from the Satpura hills of Amarkantak passes through Anuppur, Amlai, Biruhli, Navalpur, Diyapiper, Kshir Sagar and Masiraghat and finally reaches to Deolond where a multipurpose dam is

constructed by the Government of Madhya Pradesh in collaboration of Govt. of India namely Bansagar dam.

The river Son receives heavy metals from coal found in the earth naturally, through drainage of Amarkantak thermal power station, Chachai, Orient Paper mill, Chachai, fertilizers and Anthropogenic activities pollute the water of Son River and its fauna as well, specially fishes which are being used as food by the villagers.

### Materials and Methods:

Heavy Metal Analysis in water of study site: - heavy metals Cu, Zn, Pb, Fe and Hg concentration measured using the Atomic Absorption Spectrophotometer (AAS model ELICO, SL-168) the obtained results were expressed as ppm.

For collecting information regarding impact of water pollution on human health in study sites, we did survey based on questionnaire. Questionnaire was based on health problems caused by metal pollution. During survey people have been divided into four categories.

1. Who were using only water
  2. Who were using only fish
  3. Who were using both water and fish
  4. Who were not using both water and fish
- As our observations explained metal pollution in water and fish in these sites therefore drinking this water and using fish as a food were not safe. That is why we designed questionnaire comprising questions related to health problems caused by heavy metal, especially from Mercury and Lead. Many health problems caused by heavy metals have explored by many researchers as Alrumman SA (2016), Briggs D (2003), Bibi S (2016), Khan N (2013), Pawari MJ (2015), Juneja T (2013), Khan MA (2011), Owa FD (2013), Kamble SM (2014), Ho YC (2012), Desai N (2014), Jabeen SQ (2011), Yonglong Lu (2015), Khurana I (2008), Ebenstein AY

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### Questionnaires:

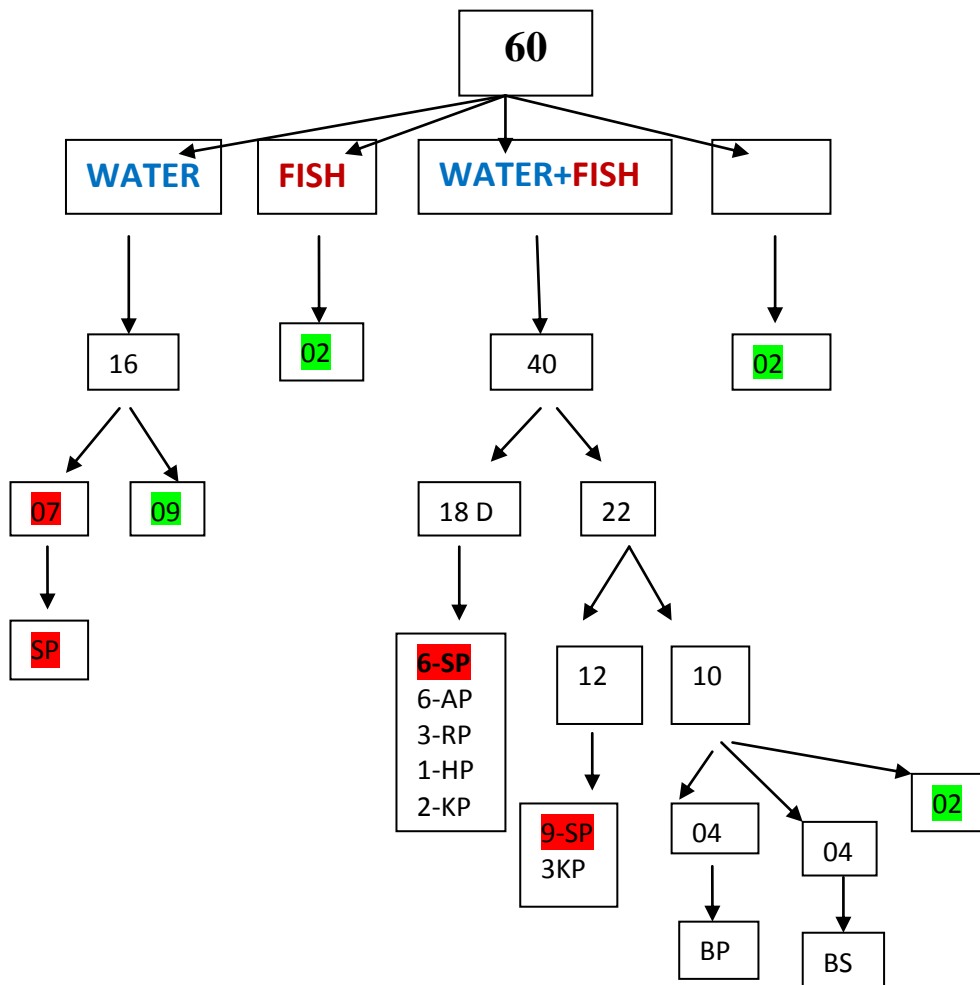
1. Name
2. Age
3. Occupation
4. How many years have you been living here?
5. Do you use the water here?
6. If yes, for what work?
7. Do you drink this water too?
8. Do you think this water is not drinkable?
9. If yes, why?
10. Do you also eat the fish of this river?
11. If yes, how many days in the week?
12. Do you have these health problems?
  1. Skin problems
  2. Cardiovascular disease
  3. Vitiligo disease
  4. Respiratory illness
  5. Joint pain
  6. Abdominal pain
  7. Reduced vision
  8. Burning sensation in the limbs
  9. Cancer
  10. Blood pressure
  11. Anemia
  12. Diabetes
  13. Sterility
  14. Miscarriage
  15. Kidney problem
13. Is there any health problem that is more visible in the people here?

### Result and Discussion:

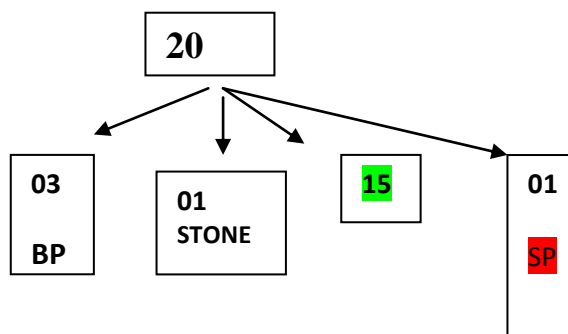
The Lead, Mercury, Iron and Copper concentrations in the water were higher than permissible limits. Copper (Cu) is one of the metal, which are essential to human health. It's presence in the aquatic environment may be due to accumulation

of domestic and agricultural wastes, Cu is found in highest concentration in winter whereas lowest in rainy season. The concentration of Zn in this site is under permissible limit. It is an essential mineral of importance to both plants and animals. In this study, lead levels were above the recommended limits (0.01ppm) for water. Pb is a toxic element, which has no significant biological function and shows their carcinogenic effects on aquatic biota and humans even at low exposures. Pb exposure is known to cause musculo-skeletal, renal, ocular, neurological, immunological, reproductive and

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**Figure showing distributions of people according to health issues near Sone River at Nawalpur**



**Figure showing distributions of people according to health issues away from the Sone River at Nawalpur**

**Table showing mean ( $\pm$ SD) concentrations of heavy metals (ppm) in water collected from Navalpur Son River, Shahdol division**

Heavy Metals	Cu	Zn	Fe	Pb	Hg
Summer	0.792 $\pm$ 0.002	0.138 $\pm$ 0.000	0.711 $\pm$ 0.001	2.338 $\pm$ 0.000	1.040 $\pm$ 0.003
Rainy	0.703 $\pm$ 0.001	0.014 $\pm$ 0.002	0.621 $\pm$ 0.003	1.635 $\pm$ 0.000	1.003 $\pm$ 0.010
Winter	0.851 $\pm$ 0.000	0.134 $\pm$ 0.014	0.702 $\pm$ 0.000	2.879 $\pm$ 0.001	1.032 $\pm$ 0.001
Permissible limits	2	NG	No Guideline	0.01	0.006
IS(2012)	0.05	5.0	0.3	0.01	0.001

We asked questions to 60 (17-69Age) people living on the bank of river and 20(19-65Age) living away from the river. We found following results

1. People living near Son River at Navalpur were belonging to mostly Baiga tribe (60%) and others (40%).
2. They were not much educated and working as a labor, Driver and Farmer.
3. Among 60 people 16 people were using water for domestic work only. Among 16, 07 people were suffering from Skin problems as itching, discoloration and 09 people were found healthy.

4. Among 60 only 02 people were not using water, they were using only fish as food in 1 or 2 days within 15 days and they had not any health problem.

5.40 people among 60 were found, using water and fish both. In which 18 people were using water for drinking also and we observed that among 18, 06 people were suffering from Skin problems and 06 from Abdominal pain whereas 03 had respiratory problem, 01 had heart problem and 02 people were suffering from kidney impairment.

6. Among 40, 22 people were using water for other work (washing, bathing, planting, and cooking) except drinking and fish as food about 5 days in a week. In these people, 09 people had Skin problem specially itching and 03 were kidney patient, 04 were suffering from blood pressure, 04 from burning sensation in limbs and only 02 had no health issues.

7. Only 02(19, 17 year students) among 60 were not using water as well as fish in daily life and they had not any health issues.

8. In this site 75% people were suffering from health problems only 25% were found healthy.

9. It was also observed that 20 other people living away from the river and were not using water and fish for any work. We found that only 01 person was suffering from skin problem, 01 had stone problem and 03 were suffering from blood pressure. Only 15 people were healthy.

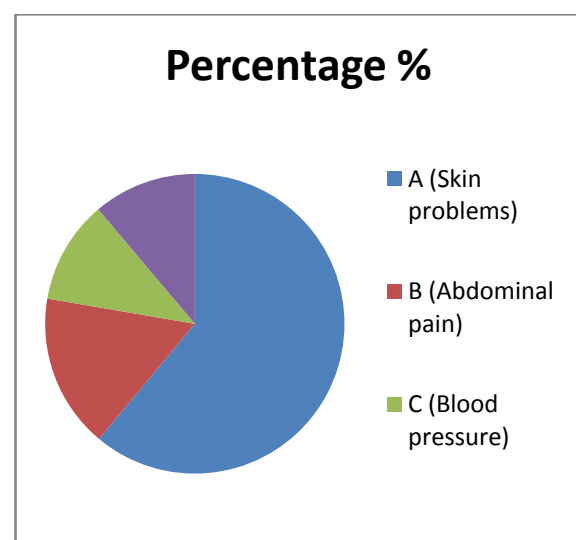
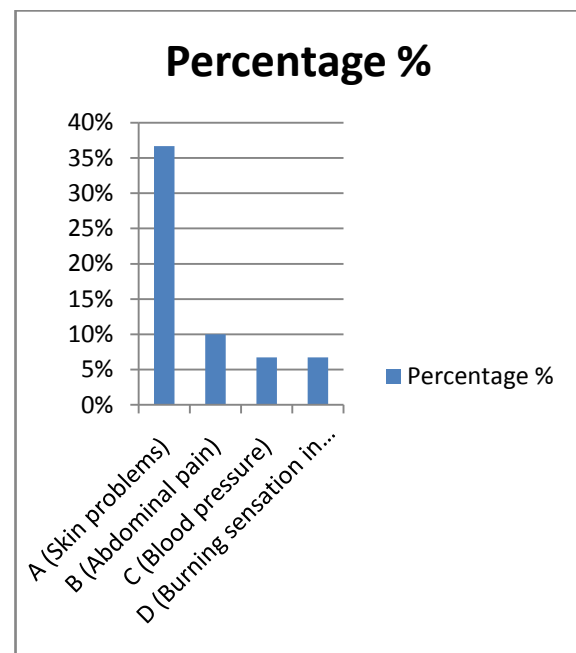
People, who were using water and fish in any form, 36.67 % of these were suffering from Skin problems, 10% people had abdominal pain, 6.7 % people suffering from blood pressure, 05% Kidney problem, 1.7% Heart problem and 6.7% people were suffering from burning sensation in limbs.

**Conclusion:**

Peoples using water and food in any form, 36.67 % of these are suffering from Skin problems as Itching, discoloration and black patches with 10% people had abdominal pain and 6.7 % people suffering from blood pressure, 05% Kidney problem, 1.7% Heart problem and 6.7% burning sensation in limbs.

Health Problems	Percentage %
A (Skin problems)	36.67 %

B (Abdominal pain)	10%
C (Blood pressure)	6.7 %
D (Burning sensation in limbs)	6.7%
E (Kidney problem)	05%
F (Heart problem)	1.7%



According to results we can say that these health problems specially related to skin may caused by water pollution because all peoples who were using water for drinking, Bathing and fish as a food they were found suffering from skin, abdominal and other health problems whereas peoples who were not using water and fish in daily routine they had not these permanent health issues.

So, as previous researchers Alrumman SA (2016), Briggs D (2003), Bibi S (2016), Khan N (2013), Pawari MJ (2015), Juneja T (2013), Khan MA (2011), Owa FD (2013), Kamble SM (2014), Ho YC (2012), Desai N (2014), Jabeen SQ (2011), Yonglong Lu (2015), Khurana I (2008), Ebenstein AY (2008), Halder JN (2015), Ahmad SM (2014), Corcoran E (2010), Nel LH (2009), Ullah S (2014), Krishnan S (2006), Currie J (2013), Ahmed T, Scholz F (2013), Salem HM (2000), Chowdhury S (2015), Ballester F (2000) have proved that metals especially mercury and Lead pollution is responsible for the Skin, abdominal problems, Cardiovascular problems, respiratory problems in human. In our Study we also found about same cases and this is alarming condition, now the authorities should think about it and take appropriate action.

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