

Arsenic Contamination in Groundwater of the Majha Belt of Punjab, India, and its Probable Carcinogenic and Non-Carcinogenic Health Hazards

Hardev Singh Virk^{1,*}, Srijita Ghosh²

Abstract

Arsenic is widespread in India. Majha belt of Punjab State, comprising districts of Amritsar, Gurdaspur and Tarn Taran, is reported facing a crisis situation due to high levels of arsenic in its groundwater. ICAR (Indian Council of Agricultural Research) has reported arsenic beyond safe limit in 13 districts of Punjab. Sample analysis was done using standard protocol in the sophisticated laboratory of DWSS (Department of Water Supply and Sanitation) in Mohali using ICP-MS (Inductively Coupled Plasma Mass Spectrometer). Highest arsenic contamination was found in the groundwater of Amritsar district which has 325 habitats with As contamination varying from 11 to 111 ppb, followed by Gurdaspur having 218 habitats with As variation 11-85 ppb, and Tarn Taran with 107 habitats having As variation 12-83 ppb, respectively. High levels of arsenic in groundwater are attributed to both geogenic and anthropogenic sources. Anthropogenic sources include intensive agricultural practices based on use of fertilisers, herbicides, and weedicides. The values of average daily dose (ADD), hazard quotient (HQ) and cancer risk (CR) of Arsenic in groundwater of Majha belt districts of Punjab are calculated using standard formulation developed by US Environmental Protection Agency (US EPA). The average value of hazard quotient (HQ) for children and adults in Amritsar district is estimated to be 11.13 and 8.0, respectively. The HQ values for all the 650 habitations surveyed in the Majha belt of Punjab are greater than 1, which is a probable risk for inhabitants for developing adverse carcinogenic and non-carcinogenic health hazards. The predicted values for cancer induction in children and adults of Amritsar district are 500 and 360 per million, respectively. Mitigation of arsenic in groundwater is an urgent need of the Majha belt.

Keywords: Groundwater, arsenic, Health hazards, Cancer risk, Mitigation

INTRODUCTION

Arsenic occurrence and distribution in groundwater of different states of India (Figure 1) have been of wide interest since 1980s [1–3]. The groundwater contamination due to heavy metals and other trace elements in Punjab has been investigated by the present author [4–8]. Health risk analysis due to Fluoride and Arsenic in groundwaters of Patiala and Roopnagar districts, respectively, has been reported recently [9, 10]. In this paper, our focus of study is contamination of groundwater due to Arsenic (As) and its probable carcinogenic and non-carcinogenic health hazards in the Majha belt of Punjab comprising districts of Amritsar, Tarn Taran and Gurdaspur (Figure 2).

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An extensive study of Arsenic contamination in groundwater of both the Indian and Pakistani Punjab was undertaken by scientists of both countries in a collaborative research project funded by Columbia University, NY, USA [11]. However, there is no epidemiological study on health hazards of As in the Majha belt of Punjab. No conclusive evidence for source of As contamination of Punjab groundwater is available. Author [5–7] and some other investigators [12–14] have reported As beyond the permissible limit of 10 ppb in groundwater of Punjab.

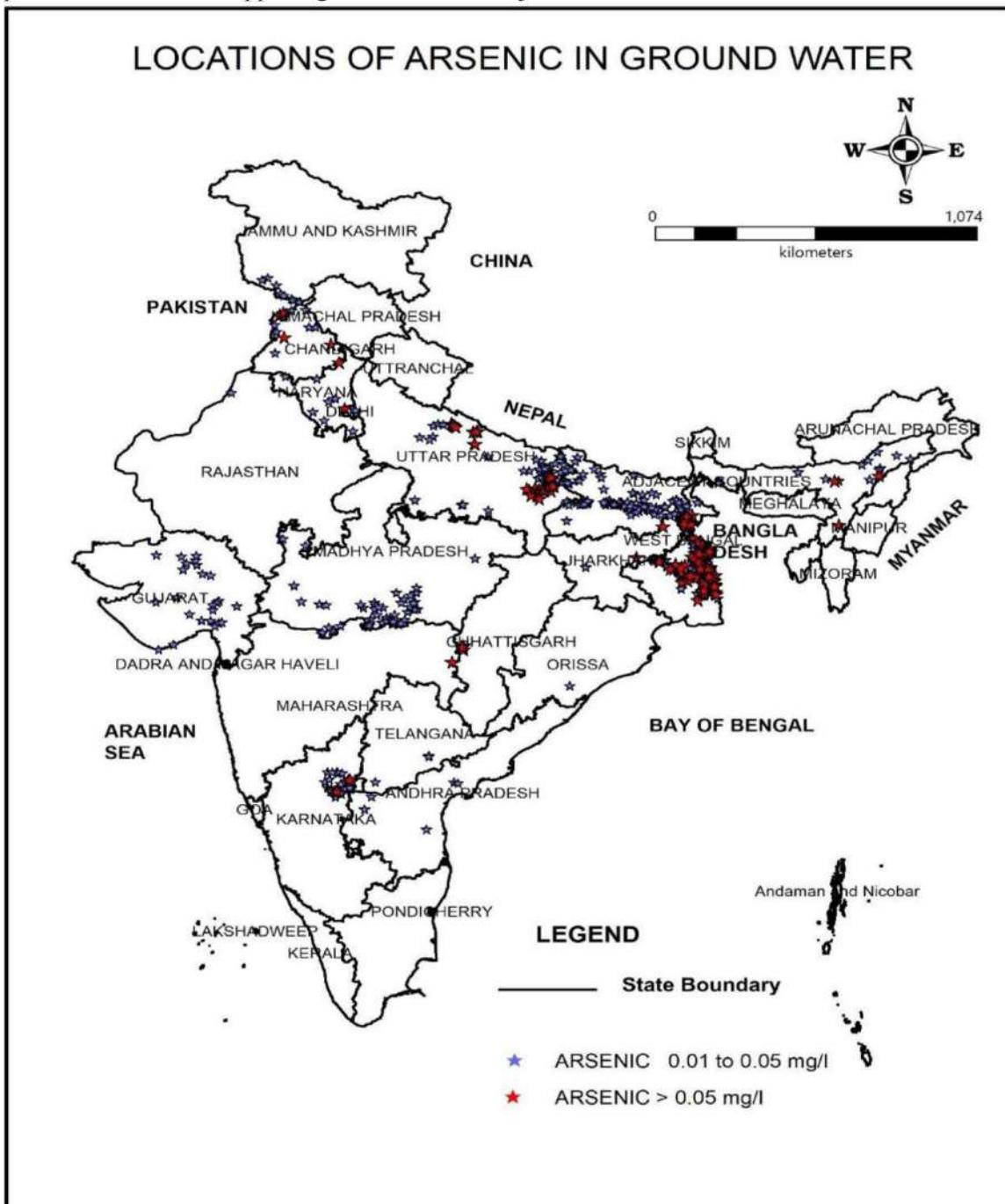


Figure 1. Arsenic concentration in groundwater of different states of India [1].

Arsenic is known to exist in the form of a metalloid, which possesses characteristics of both a metal and a non-metal. It is widely distributed in the soil, water, air, and rocks. Inorganic As is most prevalent

in nature and its high toxicity is the cause of major health hazards. Its reaction with oxygen in the air, water, or soil can produce various compounds [15], among which trivalent arsenite and pentavalent arsenate are important ones.

Arsenic in drinking water has been detected at concentrations greater than 10 µg/L, the WHO (World Health Organization) limit, in several countries including Argentina, Australia, Bangladesh, Cambodia, Chile, China, Hungary, India, Lao People's Democratic Republic, Mexico, Myanmar, Nepal, Pakistan, Peru, Thailand, United States, and Vietnam [16]. Since 2016, the US Environmental Protection Agency (EPA) and the WHO set the Maximum Contaminant Level (MCL) for As in drinking water as 10 ppb (1 ppb = 1 µg/L) [17]. Human health is exposed to great risk if arsenic is ingested in drinking water for a long time [18]. The largest mass poisonings of a population in history took place in Bangladesh due to groundwater contamination with naturally occurring inorganic As [19]. An estimated 160 million people live in countries of the world which have levels of As higher than the safe limit in drinking water [20]. The physical characteristics of arsenic, especially when ingested through drinking water, make it difficult to be noticed.

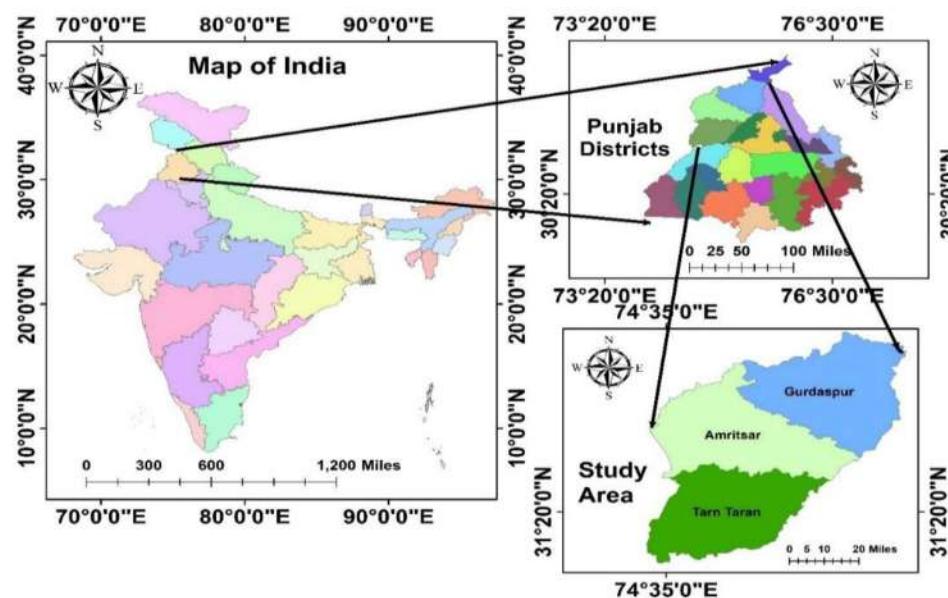


Figure 2. Indian map showing districts of Amritsar, Gurdaspur and Tarn Taran in the Majha belt of Punjab State.

Reviews of carcinogenic and non-carcinogenic health effects of Arsenic have been published [20–22]. Arsenic ingestion is responsible for various types of cancers, namely, skin and several types of internal cancers, including bladder, kidney, liver, prostate, and lung [23–27]. Several other diseases are caused by arsenic, for example, skin lesions, hypertension, ischemia, some endemic peripheral vascular disorders, diabetes, severe arteriosclerosis, neuropathies, and many types of cancer [28–31]. It is estimated that daily consumption of 1.6 litres of water with inorganic arsenic (50 µg/L) can cause cancer related deaths in the range of 21/1,000 [32].

There is sufficient evidence of carcinogenicity of As to humans, as a consequence, As has been classified as a class I human carcinogen by the International Agency of Research on Cancer (IARC) due to its high carcinogenicity in humans. Despite evidence in humans, As - related carcinogenicity [33] fails to replicate the observed effects based on animal models, hampering the progress in the field of cancer research.

MATERIALS AND METHODS

Geographical Location

Punjab is situated in the northern part of India in between latitudes 29.30° North to 32.32° North and longitudes 73.55° East to 76.50° East. It is divided geographically into three regions, Malwa, Majha, and Doaba. The rivers Sutlej and Beas are the primary freshwater sources in the region and form boundaries of three sub-regions. Punjab has common boundaries with the states of Himachal Pradesh and Haryana on the north and east, respectively, and Rajasthan in the south. Punjab also forms a common boundary with Pakistan on the western side.

The characteristics of soil affect the infiltration, percolation, and groundwater recharge capacity of the region. Higher recharge rate has higher groundwater contamination potential from surface contaminants. The groundwater level in various districts of Punjab is recorded beyond 60 mbgl (meter below ground level) [34]; this is due to the overexploitation in the absence of alternate sources. The groundwater level in Punjab has declined drastically in past few decades.

Majha belt of Punjab: Amritsar, Gurdaspur and Tarn Taran districts

Amritsar district [35] is located in northern part of Punjab state and lies between 31° 28' 30" to 32° 03' 15" north latitude and 74° 29' 30" to 75° 24' 15" east longitude (Figure 2). Total area of the district is 2647 sq. km. Major canal in the area is Upper Bari Doab canal which give rise to various branches as Lahore Branch, Kasur branch etc. Gurdaspur and Tarn Taran are adjoining districts of Amritsar. In fact, Tarn Taran is recently carved out of Amritsar district.

Gurdaspur district [36] is in the north of Punjab and shares its boundary with Pakistan, Jammu and Kashmir, and Himachal Pradesh states. Rivers Ravi and Beas surround it from both sides. It covers an area of 3513 sq. km. and forms a part of upper Bari Doab area. Physiographical area is divided into three units, i.e., Siwalik Hills lying in NE of the district, Kandi Zone lying immediately southwest of foothill zone of Siwalik hills, and Alluvial plains lying southwest of Kandi.

Tarn Taran district [37] lies between 31° 05' to 31° 30' 05" north latitude, and 74° 30' to 75° 15' 05" east longitude. It has a geographical area of 2449 sq. km. It is bounded by Amritsar district in the north, Kapurthala district in the east, Pakistan in the west, and Ferozepur district in the south. The area is occupied by alluvial plains and is drained by the Patti Nadi which flows from northeast to southwest and drain water to the river Sutlej. It covers an area of 2583 sq.km. The district has two types of soils; saline and alkaline.

Geomorphology and Soil type

Amritsar district [35] is part of Indo-Gangetic alluvium. It is surrounded by Ravi and Beas rivers. Ravi river forms international border with Pakistan and flows in north-west of the district. Beas River flows in the eastern part of the district. The nature of soils show variation in the western part from coarse loamy, calcareous soils to fine loamy, calcareous in the central part of the district. But both parts of district are well drained by rivers and streams.

Gurdaspur district [36] can be divided into three geomorphological types-Hilly area, Piedmont zone and alluvial plain. The hilly area of district in the north is part of Siwalik range consisting of mainly clays and clay with boulders. Dhar Kalan block belongs to the hilly terrain and comprises pebbles, and cobbles drained from the Siwalik along with sand and gravel. The alluvial plain is sand intercalated with little clays deposited by main dry rivers of Ravi and Beas.

Tarn Taran district [37] area of Majha belt is also part of the Indo-Gangetic alluvial plain of Quaternary age. The exploratory drilling in the area has revealed that the ground water is fresh up to 500m depth. Ground water occurs in alluvium comprising silt, clay, and sand, under water table conditions and the same occurs in semi confined to confined conditions in deeper granular zones. Groundwater level shows a variation in the area from 11 m to 19 m below land surface.

Sample collection and Analysis

Standard protocol was used for sample collection and analysis as described by the author [38]. Arsenic data used for our investigation is derived from Annual Water Quality Report of DWSS for the year 2021–22 [39].

ARSENIC CONTAMINATION IN GROUNDWATER AND PROBABLE HEALTH HAZARDS

Arsenic contamination in groundwater of the Majha belt of Punjab demands immediate attention due to its health hazards. Punjab Agriculture University (PAU) scientists took the lead to estimate Arsenic in groundwater and canal waters in Majha belt of Punjab [12]. Indian Council of Agriculture Research (ICAR) has reported arsenic beyond safe limit in 13 districts of Punjab [40]. There is lack of epidemiological studies of health hazard effects of Arsenic in groundwater on the population in Punjab.

Long term exposure to Arsenic dissolved in water can cause poisoning as it is acutely toxic and can lead to several health problems. A Multistage Model based on an epidemiological study has been used to calculate cancer risk by Tseng [41]. It has been reported that long-term exposure to Arsenic in drinking water, probably more than 0.01 mg/L, causes increased risks of cancer of skin, lungs, bladder, and kidney [21].

Carcinogenic Health Hazards of Arsenic

Carcinogenic health hazards of Arsenic have been partially discussed in Introduction. Arsenic can induce almost all type of cancers in human body by its ingestion through groundwater. Long term exposure even at low concentration is harmful to human body. Epidemiological investigations have reported various health effects caused by chronic exposure to low concentrations of arsenic [21].

Arsenic is the only carcinogen known to cause cancer through respiratory exposure and gastrointestinal exposure [42]. International Agency for Research on Cancer (IARC) [43] registered arsenic as a carcinogenic in the 1980s. Arsenic exposure and carcinogenicity studies were conducted in the United States, Taiwan, Bangladesh, India, Argentina, and Chile to further examine the associated health risks [44]. Several hypotheses regarding the carcinogenicity of inorganic arsenic compounds have been suggested; nevertheless, the biomolecular mechanisms are poorly understood. Nine different hypotheses regarding the toxic mechanism behind arsenic have been suggested, including induced chromosome abnormalities, oxidative stress, altered DNA repair, altered DNA methylation patterns, altered growth factors, enhanced cell proliferation, promotion/progression, suppression of p53, and gene amplification [21].

Non-Carcinogenic Health Hazards of Arsenic

Arsenic results in numerous diseases that have been also confirmed by repeated epidemiological investigations which include dermal effects, cardiovascular effects, respiratory effects, gastrointestinal effects, endocrinological effects (diabetes mellitus), neurological effects, reproductive and developmental effects, cancer effects, and other effects [22, 45]. American Cancer Society reports the following health effects due to long and short-term exposure to Arsenic [46]:

- High levels of arsenic can cause a sore throat and irritated lungs due to breathing.
- Symptoms of high levels of swallowing of arsenic are nausea, vomiting, diarrhea, muscle weakness and cramping, skin rashes, and other problems.
- High levels of exposure to arsenic can be fatal.
- Exposure to lower levels of arsenic over longer periods of time can cause skin changes, liver and kidney damage, and a shortage of red and white blood cells, which can lead to fatigue and an increased risk of infections.

Childhood accumulation of arsenic may induce neurobehavioral abnormalities during puberty, and neurobehavioral changes as an adult [47]. Arsenic exposure is responsible for the incidence of diabetes of type 2 occurring in obese individuals aged 40 years or older. It was reported in Taiwan that the incidence rate of diabetes for residents exposed to a high level of arsenic in drinking water was 2 to 5

times higher than it was in unexposed subjects [45, 48]. The incidence of various skin disorders because of arsenic exposure has also been studied. A study conducted in Bangladesh reported melanosis and keratosis occurred in 36 of 167 residents (13.9%) exposed to drinking water with low concentrations (10 µg/L) of arsenic [49]. Lee et al. [50] reported that arsenic might affect thrombocytes, which play an important role in cardiovascular diseases. Pregnancy complications because of arsenic exposure from drinking water have been reported from India [51].

Worldwide an estimated 200 million people are exposed to inorganic Arsenic in drinking water above the WHO recommended guideline of 10 µg/L, causing different effects on human health. Chronic arsenic exposure activates different molecular mechanisms such as oxidative stress, inflammation, and cytotoxicity that affect structures and functions of different organs and systems producing several noncarcinogenic disorders. The serious and diverse health effects produced by chronic arsenic exposure in several populations highlight the need to implement urgent preventive policies to reduce the inorganic Arsenic exposure to the levels recommend by WHO, mainly in developing countries [22].

Health-risk Assessment of Arsenic

Risk assessment is defined as the process of estimating the probability of occurrence of any given magnitude of adverse health effects over a specified time-period [52]. It is a function of hazard risk and exposure time. Risk level is represented in terms of a carcinogenic or non-carcinogenic health risk. We calculated these risk factors for Arsenic in groundwater of Rupnagar district of Punjab [10].

The two principal toxicity risk factors are the slope factor (SF) used for carcinogenic risk characterization and the reference dose (RefD) used for non-carcinogen risk characterization [53, 54]. A health-risk assessment has been made in the study area on basis of calculation of average daily dose (ADD in mg/kg/day) of the As-rich water. ADD was calculated using the formula [55, 56] given below:

$$\text{ADD} = C \times IR \times ED \times EF / BW \times AT$$

where, C, is As concentration (mg/L=ppm) in groundwater, IR, average daily intake rate which is assumed to be 2 L/day and 3.45 L/day for children and adults, respectively [57]. ED, exposure duration which is assumed to be 10 years for children and 70 years for adults; EF, exposure frequency which is 365 days/year; BW average body weight which is assumed to be 25 kg and 60 kg for children and adults, respectively; AT, average time which is 25,550 days i.e. (70 x365) days for adults and 3650 days, i.e. (10 x365) days for children [55, 57].

The non-carcinogenic risk for the consumers of As-rich groundwater in the study area was calculated as hazard quotient (HQ). HQ is defined as the ratio of ADD and RefD, where RefD for As is 3×10^{-4} mg/kg/day [58].

HQ > 1 indicates potential non-carcinogenic health risk to the consumers whereas HQ < 1 is considered as safe for consumers of drinking water [53].

The carcinogenic risk or cancer risk (CR) for the consumers of As-rich groundwater in the study area is calculated as the product of ADD and SF where the value of SF for oral carcinogenic As is 1.5 mg/kg/day [55].

RESULTS

Health risk assessment due to groundwater Arsenic contamination has been reported in case of children and adults by some workers [10, 59]. Our purpose of study is to evaluate both carcinogenic and non-carcinogenic health hazards for the population of Majha belt of Punjab. The Arsenic content of groundwater in three districts of Majha belt, namely, Amritsar, Gurdaspur and Tarn Taran are recorded as supplementary data in Appendix. Amritsar district has 325 habitats with groundwater As contamination varying from 11 to 111 ppb, Gurdaspur has 218 habitats with As variation 11-85 ppb, and Tarn Taran has 107 habitats with As variation 12-83 ppb, respectively. All these habitats record As

higher than the safe limit of 10 ppb by WHO. A histogram (Figure 3) represents the peak values of As in these districts vis a vis WHO value.

The average daily dose, ADD; hazard quotient, HQ and cancer risk, CR, for the consumers of As-rich groundwater for all the three districts of Majha belt are listed in Appendix (Supplementary data). ADD depends upon the toxicity of heavy metals and it is a function of magnitude, frequency, and duration of human exposure to potentially toxic metal in the environment [58]. Non-carcinogenic risk is measured in terms of hazard quotient (HQ) and carcinogenic or cancer risk in terms of the product of ADD and SF, defined under section Health-risk Assessment of Arsenic.

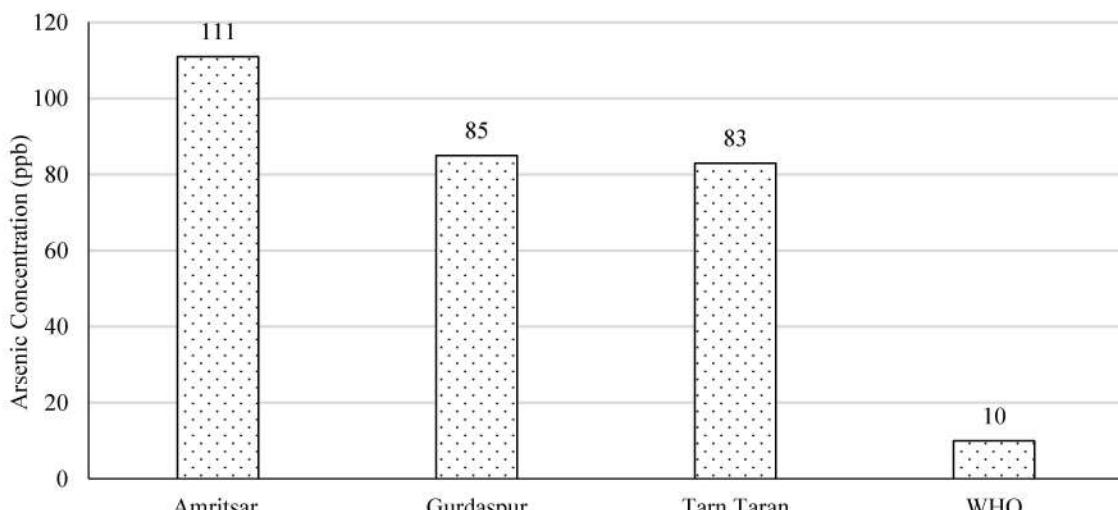


Figure 3. Arsenic concentration in groundwater of Majha belt vis a vis WHO value.

DISCUSSION

Table 1 gives a summary of all three parameters, i.e., ADD, HQ, and CR. Depending upon variation of Arsenic values, these parameters also vary from minimum to maximum. The average HQ for children and adult consumers in Amritsar district is 11.13 and 8.0, respectively. For Gurdaspur and Tarn Taran districts, HQ values are lower than Amritsar district. However, the HQ values calculated for all 650 habitations surveyed in the Majha belt are greater than 1, which establishes that all the consumers of As-rich groundwater in the study area are at high potential of risk for developing non-carcinogenic adverse health effects. The health risk is more pronounced for the children in comparison to adults. The average values of cancer risk (CR) for both the children and adults for Amritsar district are 5.00E-3 and 3.60E-3, respectively. It translates into 500 and 360 cancer cases per million for children and adults, respectively, which is extremely high compared with national and global values. The values for other two districts are slightly lower than Amritsar.

Table 1. The values of average daily dose (ADD), hazard quotient (HQ) and cancer risk (CR) of Arsenic in groundwater of Majha belt districts of Punjab.

Parameter	Amritsar			Gurdaspur			Tarn-taran		
	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
ADD children (mg/kg/day)	9.00E-04	8.90E-03	3.30E-03	8.80E-04	6.80E-03	2.60E-03	9.60E-04	6.60E-03	2.50E-03
ADD adult (mg/kg/day)	6.00E-04	6.40E-03	2.40E-03	6.30E-04	4.90E-03	1.90E-03	7.00E-04	4.80E-03	1.80E-03
HQ children	2.93	29.6	11.13	2.93	22.67	8.67	3.2	22.13	8.21
HQ adult	2.11	21.28	8	2.11	16.29	6.23	2.3	15.91	5.9
CR children	1.32E-03	1.33E-02	5.00E-03	1.30E-03	1.02E-02	3.90E-03	1.44E-03	9.96E-03	3.69E-03
CR adult	9.50E-04	9.57E-03	3.60E-03	9.50E-04	7.30E-03	2.80E-03	1.04E-03	7.16E-03	2.65E-03

Rapant and Kremova' [60] reported the cancer risk as high as 10E-4 (10^{-4}), or 100 people per million population in Slovakia, caused by Arsenic in groundwater. Carlson-Lynch et al. [61] have published their commentary on the approaches adopted for Arsenic risk assessment and challenging the use of CR criteria.

Arsenic correlation was determined with crop pattern and groundwater level in our study of Rupnagar district [10]. The source of Arsenic was linked to drainage system of river Sutlej. Our study does not attempt to determine such correlations. However, it is anticipated that As-enhancement in the Majha belt may be linked to drainage system of Sutlej, Beas and Ravi rivers which form boundaries of the districts of Majha belt. All these rivers form part of Indus River basin of Punjab. High levels of arsenic are attributed to both geogenic and anthropogenic sources. Anthropogenic sources include intensive agricultural practices based on use of fertilisers, herbicides, and weedicides.

What is the source of Arsenic in the groundwaters of Majha belt? It needs to be investigated further by correlation of Arsenic with other trace elements in groundwater. Heavy metal contamination is potentially a significant problem in several community and agricultural areas because agrochemicals, including plant nutrients and fertilizers can lead to dramatic increases in the concentrations of heavy metals in the water and soil [62].

Mitigation of Arsenic is on top priority of Punjab government in the Majha belt. Reports of mitigation measures have been published by the author [5, 7] and DWSS [38] in the recent past. Considering high costs of technologies being proposed for mitigation, DWSS has opted for using surface water for drinking purposes available from irrigation channels/canals as a cost-effective measure. There is an urgent need for undertaking an epidemiological survey of the villages/habitations showing Arsenic anomalies in groundwater being used for drinking.

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APPENDIX I: SUPPLEMENTARY DATA

Table 1. Arsenic content in groundwater, ADD, HQ and CR values for Amritsar district.

S.N.	Amritsar District	Heavy Metal	ADD $\times 10^3$ (mg/kg/day)		HQ		CR $\times 10^3$	
			Arsenic (ppm)	ADD Child	ADD Adult	HQ Child	HQ Adult	CR Child
1	Khatrai Kalan		0.11	8.88	6.38	29.60	21.28	13.32
2	Khera Bala Chak		0.11	8.88	6.38	29.60	21.28	13.32
3	Bath		0.09	7.52	5.41	25.07	18.02	11.28
4	Khatrai Khurd		0.09	7.52	5.41	25.07	18.02	11.28
5	Urdhan		0.09	7.20	5.18	24.00	17.25	10.80
6	Vachhoya		0.09	6.96	5.00	23.20	16.68	10.44
7	Dalam		0.09	6.88	4.95	22.93	16.48	10.32
8	Odhar		0.09	6.80	4.89	22.67	16.29	10.20
9	Chak Kamal Khan		0.08	6.64	4.77	22.13	15.91	9.96
10	Boharwala		0.08	6.56	4.72	21.87	15.72	9.84
11	Majhi Meun		0.08	6.48	4.66	21.60	15.53	9.72
12	Khanowal		0.08	6.40	4.60	21.33	15.33	9.60
13	Trehan		0.08	6.40	4.60	21.33	15.33	9.60
14	Dharamkot		0.08	6.16	4.43	20.53	14.76	9.24
15	Saurian		0.08	6.16	4.43	20.53	14.76	9.24
16	Mahaddipur		0.08	6.00	4.31	20.00	14.38	9.00
17	Bhalla Pind		0.07	5.92	4.26	19.73	14.18	8.88
18	Jhanjoti		0.07	5.92	4.26	19.73	14.18	8.88
19	Gorey Nangal		0.07	5.84	4.20	19.47	13.99	8.76
20	KotliAmb		0.07	5.84	4.20	19.47	13.99	8.76
21	Kuralian		0.07	5.84	4.20	19.47	13.99	8.76
22	Bhagupur Uttar		0.07	5.76	4.14	19.20	13.80	8.64
23	Mandian Wala		0.07	5.76	4.14	19.20	13.80	8.64
24	Makam		0.07	5.76	4.14	19.20	13.80	8.64
25	Daburji		0.07	5.68	4.08	18.93	13.61	8.52
26	Kot Kesar Singh		0.07	5.68	4.08	18.93	13.61	8.52

27	Kotla Gujran	0.07	5.68	4.08	18.93	13.61	8.52	6.12
28	Maure	0.07	5.68	4.08	18.93	13.61	8.52	6.12
29	Alam Pur	0.07	5.60	4.03	18.67	13.42	8.40	6.04
30	Chuchakwal	0.07	5.60	4.03	18.67	13.42	8.40	6.04
31	Karial	0.07	5.60	4.03	18.67	13.42	8.40	6.04
32	Bhilowal Pakka	0.07	5.52	3.97	18.40	13.23	8.28	5.95
33	Dial Bharang	0.07	5.52	3.97	18.40	13.23	8.28	5.95
34	Jassar	0.07	5.52	3.97	18.40	13.23	8.28	5.95
35	Makowal	0.07	5.52	3.97	18.40	13.23	8.28	5.95
36	Ucha Qila	0.07	5.44	3.91	18.13	13.03	8.16	5.87
37	Awan Lakha Singh	0.07	5.36	3.85	17.87	12.84	8.04	5.78
38	Khusupura	0.07	5.36	3.85	17.87	12.84	8.04	5.78
39	Muzafarpura	0.07	5.36	3.85	17.87	12.84	8.04	5.78
40	Gujjarpura	0.07	5.28	3.80	17.60	12.65	7.92	5.69
41	Aliwal	0.07	5.20	3.74	17.33	12.46	7.80	5.61
42	Bhure Gill	0.07	5.20	3.74	17.33	12.46	7.80	5.61
43	Mehlan Wala	0.07	5.20	3.74	17.33	12.46	7.80	5.61
44	Nanoke	0.07	5.20	3.74	17.33	12.46	7.80	5.61
45	Hardo Rattan	0.06	5.12	3.68	17.07	12.27	7.68	5.52
46	Kandowali	0.06	5.04	3.62	16.80	12.08	7.56	5.43
47	Kiampura	0.06	5.04	3.62	16.80	12.08	7.56	5.43
48	Madhu Chhang	0.06	5.04	3.62	16.80	12.08	7.56	5.43
49	Mohar	0.06	5.04	3.62	16.80	12.08	7.56	5.43
50	Wadala Viram	0.06	5.04	3.62	16.80	12.08	7.56	5.43
51	Viram	0.06	5.04	3.62	16.80	12.08	7.56	5.43
52	Mattiya	0.06	4.96	3.57	16.53	11.88	7.44	5.35
53	Rokhey	0.06	4.96	3.57	16.53	11.88	7.44	5.35
54	Sullodin	0.06	4.96	3.57	16.53	11.88	7.44	5.35
55	Talwandi Bhangwan	0.06	4.88	3.51	16.27	11.69	7.32	5.26
56	Bachiwind	0.06	4.80	3.45	16.00	11.50	7.20	5.18
57	Chak Allah Baksh	0.06	4.80	3.45	16.00	11.50	7.20	5.18
58	Makhanpura	0.06	4.80	3.45	16.00	11.50	7.20	5.18
59	Rai	0.06	4.80	3.45	16.00	11.50	7.20	5.18
60	Chak Fateh Khan	0.06	4.80	3.45	16.00	11.50	7.20	5.18
61	Chhina Karam Singh	0.06	4.80	3.45	16.00	11.50	7.20	5.18
62	Jastarwal	0.06	4.80	3.45	16.00	11.50	7.20	5.18
63	Lalian	0.06	4.80	3.45	16.00	11.50	7.20	5.18
64	Sanguna	0.06	4.80	3.45	16.00	11.50	7.20	5.18
65	MohanBh andarian	0.06	4.80	3.45	16.00	11.50	7.20	5.18
66	Panj Grain	0.06	4.80	3.45	16.00	11.50	7.20	5.18
67	Awan near Ramdas	0.06	4.80	3.45	16.00	11.50	7.20	5.18
68	Jeoke	0.06	4.80	3.45	16.00	11.50	7.20	5.18
69	Loharka Khurd	0.06	4.80	3.45	16.00	11.50	7.20	5.18
70	Chakaul	0.06	4.72	3.39	15.73	11.31	7.08	5.09

71	Hetanpura	0.06	4.72	3.39	15.73	11.31	7.08	5.09
72	Longo Mahal	0.06	4.72	3.39	15.73	11.31	7.08	5.09
73	Manj	0.06	4.72	3.39	15.73	11.31	7.08	5.09
74	Abadu Maure Khurd	0.06	4.64	3.34	15.47	11.12	6.96	5.00
75	Chaharpur	0.06	4.64	3.34	15.47	11.12	6.96	5.00
76	Kamalpura	0.06	4.64	3.34	15.47	11.12	6.96	5.00
77	Raipur Khurd	0.06	4.64	3.34	15.47	11.12	6.96	5.00
78	Talwandi	0.06	4.64	3.34	15.47	11.12	6.96	5.00
79	Bohlian	0.06	4.56	3.28	15.20	10.93	6.84	4.92
80	Isapur	0.06	4.56	3.28	15.20	10.93	6.84	4.92
81	Abusaid	0.06	4.48	3.22	14.93	10.73	6.72	4.83
82	Chawinda Khurd	0.06	4.48	3.22	14.93	10.73	6.72	4.83
83	Manawala	0.06	4.48	3.22	14.93	10.73	6.72	4.83
84	Dhariwal	0.06	4.40	3.16	14.67	10.54	6.60	4.74
85	Mulakot	0.06	4.40	3.16	14.67	10.54	6.60	4.74
86	Mattey Nangal	0.06	4.40	3.16	14.67	10.54	6.60	4.74
87	Mudh Bhilowal	0.06	4.40	3.16	14.67	10.54	6.60	4.74
88	Whichla Qila	0.06	4.40	3.16	14.67	10.54	6.60	4.74
89	Abadi Sunder	0.06	4.40	3.16	14.67	10.54	6.60	4.74
90	Babat Ahilsin	0.06	4.40	3.16	14.67	10.54	6.60	4.74
91	Indira Colony	0.06	4.40	3.16	14.67	10.54	6.60	4.74
92	Miran Kot Khurd	0.06	4.40	3.16	14.67	10.54	6.60	4.74
93	Ko Sidhu	0.05	4.32	3.11	14.40	10.35	6.48	4.66
94	Mohleyke	0.05	4.32	3.11	14.40	10.35	6.48	4.66
95	Pairewal	0.05	4.32	3.11	14.40	10.35	6.48	4.66
96	Bhangwan	0.05	4.24	3.05	14.13	10.16	6.36	4.57
97	Dala	0.05	4.24	3.05	14.13	10.16	6.36	4.57
98	Sidhwan	0.05	4.24	3.05	14.13	10.16	6.36	4.57
99	Hasan Pura	0.05	4.24	3.05	14.13	10.16	6.36	4.57
100	Jauns	0.05	4.24	3.05	14.13	10.16	6.36	4.57
101	Thathi	0.05	4.24	3.05	14.13	10.16	6.36	4.57
102	Ugar Aulakh	0.05	4.24	3.05	14.13	10.16	6.36	4.57
103	Variah	0.05	4.24	3.05	14.13	10.16	6.36	4.57
104	Veroke	0.05	4.24	3.05	14.13	10.16	6.36	4.57
105	Kotla	0.05	4.16	2.99	13.87	9.97	6.24	4.49
106	Chak Misri Khan	0.05	4.16	2.99	13.87	9.97	6.24	4.49
107	Dial Bhatti	0.05	4.16	2.99	13.87	9.97	6.24	4.49
108	Dial Pura	0.05	4.16	2.99	13.87	9.97	6.24	4.49
109	Nasar	0.05	4.16	2.99	13.87	9.97	6.24	4.49
110	Hardo Putli	0.05	4.16	2.99	13.87	9.97	6.24	4.49
111	Sohian Kalan	0.05	4.16	2.99	13.87	9.97	6.24	4.49
112	Pandher	0.05	4.08	2.93	13.60	9.78	6.12	4.40
113	Dhanoa Kalan	0.05	4.08	2.93	13.60	9.78	6.12	4.40
114	Modey	0.05	4.08	2.93	13.60	9.78	6.12	4.40

115	Harrar Khurd	0.05	4.00	2.88	13.33	9.58	6.00	4.31
116	Othian	0.05	4.00	2.88	13.33	9.58	6.00	4.31
117	Rakh Othian	0.05	4.00	2.88	13.33	9.58	6.00	4.31
118	Thatha	0.05	4.00	2.88	13.33	9.58	6.00	4.31
119	Balagan	0.05	3.92	2.82	13.07	9.39	5.88	4.23
120	Harar Mutsil Bhure Gill	0.05	3.92	2.82	13.07	9.39	5.88	4.23
121	Bhalot	0.05	3.84	2.76	12.80	9.20	5.76	4.14
122	Dhadal	0.05	3.84	2.76	12.80	9.20	5.76	4.14
123	Bhakha Hari Singh	0.05	3.68	2.65	12.27	8.82	5.52	3.97
124	Bhandal	0.05	3.68	2.65	12.27	8.82	5.52	3.97
125	Samrai	0.05	3.68	2.65	12.27	8.82	5.52	3.97
126	Sultan Mahal	0.05	3.68	2.65	12.27	8.82	5.52	3.97
127	Barar	0.05	3.68	2.65	12.27	8.82	5.52	3.97
128	Lopoke	0.05	3.68	2.65	12.27	8.82	5.52	3.97
129	Bhagupur Bet	0.05	3.60	2.59	12.00	8.63	5.40	3.88
130	Kotli Dasondi	0.05	3.60	2.59	12.00	8.63	5.40	3.88
131	Johal	0.05	3.60	2.59	12.00	8.63	5.40	3.88
132	Kohala	0.05	3.60	2.59	12.00	8.63	5.40	3.88
133	Nangal Panuan	0.05	3.60	2.59	12.00	8.63	5.40	3.88
134	Sahliwal	0.05	3.60	2.59	12.00	8.63	5.40	3.88
135	Audhar	0.04	3.52	2.53	11.73	8.43	5.28	3.80
136	Chogawan	0.04	3.52	2.53	11.73	8.43	5.28	3.80
137	Bhilowal Kekezian	0.04	3.44	2.47	11.47	8.24	5.16	3.71
138	Bhindi Aulakh	0.04	3.44	2.47	11.47	8.24	5.16	3.71
139	Bhindi Aulakh Khurd	0.04	3.44	2.47	11.47	8.24	5.16	3.71
140	Bhindi Saidan	0.04	3.44	2.47	11.47	8.24	5.16	3.71
141	Burj	0.04	3.44	2.47	11.47	8.24	5.16	3.71
142	Chhanna	0.04	3.44	2.47	11.47	8.24	5.16	3.71
143	Vehra	0.04	3.44	2.47	11.47	8.24	5.16	3.71
144	Pandori	0.04	3.44	2.47	11.47	8.24	5.16	3.71
145	Panju Rai	0.04	3.44	2.47	11.47	8.24	5.16	3.71
146	Bhullar	0.04	3.36	2.42	11.20	8.05	5.04	3.62
147	Tapiala	0.04	3.36	2.42	11.20	8.05	5.04	3.62
148	Chak Bala	0.04	3.36	2.42	11.20	8.05	5.04	3.62
149	Dalla Rajputan	0.04	3.36	2.42	11.20	8.05	5.04	3.62
150	Nawan Dala	0.04	3.36	2.42	11.20	8.05	5.04	3.62
151	Gurala	0.04	3.36	2.42	11.20	8.05	5.04	3.62
152	Nawan Pind	0.04	3.28	2.36	10.93	7.86	4.92	3.54
153	Mulah Behram	0.04	3.28	2.36	10.93	7.86	4.92	3.54
154	Bhadiar	0.04	3.28	2.36	10.93	7.86	4.92	3.54
155	Rangarh	0.04	3.28	2.36	10.93	7.86	4.92	3.54
156	Ranike	0.04	3.28	2.36	10.93	7.86	4.92	3.54
157	Gaggo Mahal	0.04	3.20	2.30	10.67	7.67	4.80	3.45
158	Ludhar	0.04	3.20	2.30	10.67	7.67	4.80	3.45

159	Maidi Kalan	0.04	3.20	2.30	10.67	7.67	4.80	3.45
160	Sammowal	0.04	3.20	2.30	10.67	7.67	4.80	3.45
161	Dhattal	0.04	3.20	2.30	10.67	7.67	4.80	3.45
162	Dahurian	0.04	3.12	2.24	10.40	7.48	4.68	3.36
163	Malakpur	0.04	3.12	2.24	10.40	7.48	4.68	3.36
164	Rudala	0.04	3.12	2.24	10.40	7.48	4.68	3.36
165	Dhupsari	0.04	3.04	2.19	10.13	7.28	4.56	3.28
166	Nanakpura Theh	0.04	3.04	2.19	10.13	7.28	4.56	3.28
167	Channa	0.04	3.04	2.19	10.13	7.28	4.56	3.28
168	Dujowal	0.04	3.04	2.19	10.13	7.28	4.56	3.28
169	Hamza	0.04	3.04	2.19	10.13	7.28	4.56	3.28
170	Ramdass Rural	0.04	3.04	2.19	10.13	7.28	4.56	3.28
171	Pandori Waraich	0.04	3.04	2.19	10.13	7.28	4.56	3.28
172	Bajwa	0.04	2.96	2.13	9.87	7.09	4.44	3.19
173	Lawen	0.04	2.96	2.13	9.87	7.09	4.44	3.19
174	Buey Nangali	0.04	2.96	2.13	9.87	7.09	4.44	3.19
175	Harar Kalan	0.04	2.96	2.13	9.87	7.09	4.44	3.19
176	Kotli Jamait Singh	0.04	2.96	2.13	9.87	7.09	4.44	3.19
177	Lakhuwali- 2	0.04	2.96	2.13	9.87	7.09	4.44	3.19
178	Thoba	0.04	2.96	2.13	9.87	7.09	4.44	3.19
179	Chartewali	0.04	2.88	2.07	9.60	6.90	4.32	3.11
180	Dinewali	0.04	2.88	2.07	9.60	6.90	4.32	3.11
181	Bhoma	0.04	2.88	2.07	9.60	6.90	4.32	3.11
182	Mallu Nangal	0.04	2.88	2.07	9.60	6.90	4.32	3.11
183	Sahliwal	0.04	2.88	2.07	9.60	6.90	4.32	3.11
184	Dhariwal	0.04	2.80	2.01	9.33	6.71	4.20	3.02
185	Dudrai	0.04	2.80	2.01	9.33	6.71	4.20	3.02
186	Kala Afghana	0.04	2.80	2.01	9.33	6.71	4.20	3.02
187	Ghalib	0.04	2.80	2.01	9.33	6.71	4.20	3.02
188	Balarwal	0.04	2.80	2.01	9.33	6.71	4.20	3.02
189	Kallewal	0.04	2.80	2.01	9.33	6.71	4.20	3.02
190	Salempura	0.03	2.72	1.96	9.07	6.52	4.08	2.93
191	Tera Rajputan	0.03	2.72	1.96	9.07	6.52	4.08	2.93
192	Daya Nand Nagar	0.03	2.72	1.96	9.07	6.52	4.08	2.93
193	Nangli	0.03	2.72	1.96	9.07	6.52	4.08	2.93
194	Chak Dogran	0.03	2.64	1.90	8.80	6.33	3.96	2.85
195	Nag Kalan	0.03	2.64	1.90	8.80	6.33	3.96	2.85
196	Tanana	0.03	2.64	1.90	8.80	6.33	3.96	2.85
197	Dhanoa Khurd	0.03	2.64	1.90	8.80	6.33	3.96	2.85
198	Hardo Rattan Khurd	0.03	2.64	1.90	8.80	6.33	3.96	2.85
199	Bakraur	0.03	2.56	1.84	8.53	6.13	3.84	2.76
200	Barlas	0.03	2.56	1.84	8.53	6.13	3.84	2.76
201	Saidpur Khurd	0.03	2.56	1.84	8.53	6.13	3.84	2.76
202	Abadi Rampura	0.03	2.56	1.84	8.53	6.13	3.84	2.76

203	Naushera	0.03	2.56	1.84	8.53	6.13	3.84	2.76
204	Saidpur	0.03	2.48	1.78	8.27	5.94	3.72	2.67
205	Hoshiar Nagar	0.03	2.48	1.78	8.27	5.94	3.72	2.67
206	Khaira	0.03	2.48	1.78	8.27	5.94	3.72	2.67
207	Latuwali Andharnam	0.03	2.40	1.73	8.00	5.75	3.60	2.59
208	Chota Chack	0.03	2.40	1.73	8.00	5.75	3.60	2.59
209	Shahura	0.03	2.40	1.73	8.00	5.75	3.60	2.59
210	Daria Mussa	0.03	2.40	1.73	8.00	5.75	3.60	2.59
211	Motla	0.03	2.40	1.73	8.00	5.75	3.60	2.59
212	Sadhpur	0.03	2.40	1.73	8.00	5.75	3.60	2.59
213	Jathaul	0.03	2.40	1.73	8.00	5.75	3.60	2.59
214	Ladhewal	0.03	2.40	1.73	8.00	5.75	3.60	2.59
215	Neshta	0.03	2.40	1.73	8.00	5.75	3.60	2.59
216	Bauli Ramdas	0.03	2.32	1.67	7.73	5.56	3.48	2.50
217	Chaimiri	0.03	2.32	1.67	7.73	5.56	3.48	2.50
218	Machhi Nangal	0.03	2.32	1.67	7.73	5.56	3.48	2.50
219	Raipur Kalan	0.03	2.32	1.67	7.73	5.56	3.48	2.50
220	Gharindi	0.03	2.32	1.67	7.73	5.56	3.48	2.50
221	Mohawa	0.03	2.32	1.67	7.73	5.56	3.48	2.50
222	Abadi Loharka	0.03	2.24	1.61	7.47	5.37	3.36	2.42
223	Adliwal	0.03	2.24	1.61	7.47	5.37	3.36	2.42
224	RabWali	0.03	2.24	1.61	7.47	5.37	3.36	2.42
225	Wachoa Singh	0.03	2.24	1.61	7.47	5.37	3.36	2.42
226	Bishamber pura	0.03	2.24	1.61	7.47	5.37	3.36	2.42
227	Achint Kot	0.03	2.24	1.61	7.47	5.37	3.36	2.42
228	Khurmanian	0.03	2.24	1.61	7.47	5.37	3.36	2.42
229	Gaggar	0.03	2.16	1.55	7.20	5.18	3.24	2.33
230	Nassoke	0.03	2.16	1.55	7.20	5.18	3.24	2.33
231	Shahzada	0.03	2.16	1.55	7.20	5.18	3.24	2.33
232	Taragarh Ram Pura	0.03	2.16	1.55	7.20	5.18	3.24	2.33
233	Attari	0.03	2.16	1.55	7.20	5.18	3.24	2.33
234	Rajatal	0.03	2.16	1.55	7.20	5.18	3.24	2.33
235	Ghoga	0.03	2.08	1.50	6.93	4.98	3.12	2.24
236	Kotla Tarkhana	0.03	2.08	1.50	6.93	4.98	3.12	2.24
237	Nag Khurd	0.03	2.08	1.50	6.93	4.98	3.12	2.24
238	Ram Diwali Hinduan	0.03	2.08	1.50	6.93	4.98	3.12	2.24
239	Bhakna Kalan	0.03	2.08	1.50	6.93	4.98	3.12	2.24
240	Bhangwan	0.03	2.00	1.44	6.67	4.79	3.00	2.16
241	Borewal Kang	0.03	2.00	1.44	6.67	4.79	3.00	2.16
242	Talla	0.03	2.00	1.44	6.67	4.79	3.00	2.16
243	Chogawan	0.03	2.00	1.44	6.67	4.79	3.00	2.16
244	Gujja Peer	0.02	1.92	1.38	6.40	4.60	2.88	2.07
245	Dial Rangarh	0.02	1.92	1.38	6.40	4.60	2.88	2.07
246	Galowali	0.02	1.92	1.38	6.40	4.60	2.88	2.07

247	Kolowal	0.02	1.92	1.38	6.40	4.60	2.88	2.07
248	Kotla Saidan	0.02	1.92	1.38	6.40	4.60	2.88	2.07
249	Daddian	0.02	1.84	1.32	6.13	4.41	2.76	1.98
250	Panju Kalal	0.02	1.84	1.32	6.13	4.41	2.76	1.98
251	Roopowali Kalan	0.02	1.84	1.32	6.13	4.41	2.76	1.98
252	Roopowali Khurd	0.02	1.84	1.32	6.13	4.41	2.76	1.98
253	Dande	0.02	1.84	1.32	6.13	4.41	2.76	1.98
254	Kaunke	0.02	1.84	1.32	6.13	4.41	2.76	1.98
255	Maluwal	0.02	1.84	1.32	6.13	4.41	2.76	1.98
256	Teju Chak	0.02	1.84	1.32	6.13	4.41	2.76	1.98
257	Abadi Chandigarh	0.02	1.76	1.27	5.87	4.22	2.64	1.90
258	Muglani Kot	0.02	1.76	1.27	5.87	4.22	2.64	1.90
259	Boparai Kalan	0.02	1.76	1.27	5.87	4.22	2.64	1.90
260	Boparai Khurd	0.02	1.76	1.27	5.87	4.22	2.64	1.90
261	Chak Bazid	0.02	1.76	1.27	5.87	4.22	2.64	1.90
262	Kakkar	0.02	1.76	1.27	5.87	4.22	2.64	1.90
263	Kotla Khurd	0.02	1.76	1.27	5.87	4.22	2.64	1.90
264	Qila	0.02	1.76	1.27	5.87	4.22	2.64	1.90
265	Sapari Wind	0.02	1.76	1.27	5.87	4.22	2.64	1.90
266	Abadi Behgowali	0.02	1.76	1.27	5.87	4.22	2.64	1.90
267	Abadi Chhina	0.02	1.76	1.27	5.87	4.22	2.64	1.90
268	Makhan Windi	0.02	1.76	1.27	5.87	4.22	2.64	1.90
269	Bhutan Pura	0.02	1.68	1.21	5.60	4.03	2.52	1.81
270	Lahori Mal	0.02	1.68	1.21	5.60	4.03	2.52	1.81
271	Roran Wala	0.02	1.68	1.21	5.60	4.03	2.52	1.81
272	Roran Wala Khurd	0.02	1.68	1.21	5.60	4.03	2.52	1.81
273	Anaitpura	0.02	1.60	1.15	5.33	3.83	2.40	1.73
274	Dadupura	0.02	1.60	1.15	5.33	3.83	2.40	1.73
275	Budha Theh	0.02	1.60	1.15	5.33	3.83	2.40	1.73
276	Chetanpura	0.02	1.60	1.15	5.33	3.83	2.40	1.73
277	Dallah Mallian	0.02	1.60	1.15	5.33	3.83	2.40	1.73
278	Dhing Nangal	0.02	1.60	1.15	5.33	3.83	2.40	1.73
279	Kot Razada	0.02	1.60	1.15	5.33	3.83	2.40	1.73
280	Kotla Suraj Lohar	0.02	1.60	1.15	5.33	3.83	2.40	1.73
281	Jattan	0.02	1.60	1.15	5.33	3.83	2.40	1.73
282	Passian	0.02	1.60	1.15	5.33	3.83	2.40	1.73
283	Jhita Khurd	0.02	1.60	1.15	5.33	3.83	2.40	1.73
284	Nathupur	0.02	1.60	1.15	5.33	3.83	2.40	1.73
285	Chak Sikander	0.02	1.52	1.09	5.07	3.64	2.28	1.64
286	Loharka	0.02	1.52	1.09	5.07	3.64	2.28	1.64
287	Nizampura	0.02	1.52	1.09	5.07	3.64	2.28	1.64
288	Harsa Chhina	0.02	1.52	1.09	5.07	3.64	2.28	1.64
289	Kaler Mangat	0.02	1.52	1.09	5.07	3.64	2.28	1.64
290	Heir	0.02	1.52	1.09	5.07	3.64	2.28	1.64

291	Loharka Kalan	0.02	1.52	1.09	5.07	3.64	2.28	1.64
292	Athwal	0.02	1.44	1.04	4.80	3.45	2.16	1.55
293	Chawinda Kalan	0.02	1.44	1.04	4.80	3.45	2.16	1.55
294	Nurpur	0.02	1.44	1.04	4.80	3.45	2.16	1.55
295	Dudhala	0.02	1.44	1.04	4.80	3.45	2.16	1.55
296	Mehnian	0.02	1.44	1.04	4.80	3.45	2.16	1.55
297	Rakh Devidas Pura	0.02	1.44	1.04	4.80	3.45	2.16	1.55
298	Ibban Kalan	0.02	1.44	1.04	4.80	3.45	2.16	1.55
299	Wadha Chack	0.02	1.36	0.98	4.53	3.26	2.04	1.47
300	Dubar Basti	0.02	1.36	0.98	4.53	3.26	2.04	1.47
301	Kotla Kazian	0.02	1.36	0.98	4.53	3.26	2.04	1.47
302	Gunnwal	0.02	1.36	0.98	4.53	3.26	2.04	1.47
303	Sidhwan	0.02	1.36	0.98	4.53	3.26	2.04	1.47
304	Jahangir	0.02	1.36	0.98	4.53	3.26	2.04	1.47
305	Begewal	0.02	1.28	0.92	4.27	3.07	1.92	1.38
306	Gallowali	0.02	1.28	0.92	4.27	3.07	1.92	1.38
307	Naranjan Pura Fatuwal -Harijan Basti	0.02	1.28	0.92	4.27	3.07	1.92	1.38
308	Muradpura	0.02	1.28	0.92	4.27	3.07	1.92	1.38
309	Kuralian	0.02	1.20	0.86	4.00	2.88	1.80	1.29
310	Bhaini Rajputan	0.02	1.20	0.86	4.00	2.88	1.80	1.29
311	Bharowal	0.02	1.20	0.86	4.00	2.88	1.80	1.29
312	Daoke	0.02	1.20	0.86	4.00	2.88	1.80	1.29
313	Adda Ramdas	0.01	1.12	0.81	3.73	2.68	1.68	1.21
314	Malagiri	0.01	1.12	0.81	3.73	2.68	1.68	1.21
315	Umarpura	0.01	1.12	0.81	3.73	2.68	1.68	1.21
316	Bahoru	0.01	1.12	0.81	3.73	2.68	1.68	1.21
317	Mandiala	0.01	1.12	0.81	3.73	2.68	1.68	1.21
318	Bhangali Khurd	0.01	1.04	0.75	3.47	2.49	1.56	1.12
319	Guijer Pura	0.01	1.04	0.75	3.47	2.49	1.56	1.12
320	Kohali	0.01	1.04	0.75	3.47	2.49	1.56	1.12
321	Ramana Chak	0.01	1.04	0.75	3.47	2.49	1.56	1.12
322	Channan Singh Wala	0.01	0.96	0.69	3.20	2.30	1.44	1.04
323	Mehta	0.01	0.96	0.69	3.20	2.30	1.44	1.04
324	Bhakna Khurd	0.01	0.96	0.69	3.20	2.30	1.44	1.04
325	Ganze Di Basti	0.01	0.88	0.63	2.93	2.11	1.32	0.95

Table 2. Arsenic content in groundwater, ADD, HQ and CR values for Gurdaspur district.

S.N.	Gurdaspur District	Heavy Metal	ADD x 10 ³ (mg/kg/day)		HQ		CR x 10 ³	
			Habitation	Arsenic (ppm)	ADD Child	ADD Adult	HQ Child	HQ Adult
1	Lala Nangal		0.09	6.80	4.89	22.67	16.29	10.20
2	Doger		0.08	6.40	4.60	21.33	15.33	9.60
3	Talwandi Bhaktha		0.08	6.16	4.43	20.53	14.76	9.24
								6.64

4	DaduYod	0.08	6.16	4.43	20.53	14.76	9.24	6.64
5	Talwandi Jhurian	0.07	5.76	4.14	19.20	13.80	8.64	6.21
6	Hayat Nagar	0.07	5.76	4.14	19.20	13.80	8.64	6.21
7	Peeran Bagh	0.07	5.76	4.14	19.20	13.80	8.64	6.21
8	Badowal Khurd	0.07	5.68	4.08	18.93	13.61	8.52	6.12
9	Mangal Sen	0.07	5.60	4.03	18.67	13.42	8.40	6.04
10	Salimpura Afgana	0.07	5.60	4.03	18.67	13.42	8.40	6.04
11	Khokhar	0.07	5.28	3.80	17.60	12.65	7.92	5.69
12	Dharowali	0.07	5.20	3.74	17.33	12.46	7.80	5.61
13	Nurpur	0.07	5.20	3.74	17.33	12.46	7.80	5.61
14	Taruwali	0.07	5.20	3.74	17.33	12.46	7.80	5.61
15	VeelaTeja	0.07	5.20	3.74	17.33	12.46	7.80	5.61
16	Awan	0.06	5.04	3.62	16.80	12.08	7.56	5.43
17	Sarafkot	0.06	5.04	3.62	16.80	12.08	7.56	5.43
18	Kotla	0.06	4.80	3.45	16.00	11.50	7.20	5.18
19	Kotli Upplan	0.06	4.72	3.39	15.73	11.31	7.08	5.09
20	Alawal Wala	0.06	4.72	3.39	15.73	11.31	7.08	5.09
21	Mallewal	0.06	4.72	3.39	15.73	11.31	7.08	5.09
22	Dhande	0.06	4.64	3.34	15.47	11.12	6.96	5.00
23	Bomb	0.06	4.64	3.34	15.47	11.12	6.96	5.00
24	Dhadiala Nat	0.06	4.56	3.28	15.20	10.93	6.84	4.92
25	Pattibeh Rampur	0.06	4.56	3.28	15.20	10.93	6.84	4.92
26	Mulowali	0.06	4.56	3.28	15.20	10.93	6.84	4.92
27	Mansur Abadi	0.06	4.40	3.16	14.67	10.54	6.60	4.74
28	Mangian	0.05	4.32	3.11	14.40	10.35	6.48	4.66
29	Mohlowali	0.05	4.32	3.11	14.40	10.35	6.48	4.66
30	Pabarali	0.05	4.32	3.11	14.40	10.35	6.48	4.66
31	Mansandwal	0.05	4.32	3.11	14.40	10.35	6.48	4.66
32	Shampura	0.05	4.32	3.11	14.40	10.35	6.48	4.66
33	Singhpura	0.05	4.32	3.11	14.40	10.35	6.48	4.66
34	NikoSarai	0.05	4.16	2.99	13.87	9.97	6.24	4.49
35	Nangal	0.05	4.00	2.88	13.33	9.58	6.00	4.31
36	Shikar Machhian	0.05	4.00	2.88	13.33	9.58	6.00	4.31
37	Dhande	0.05	3.92	2.82	13.07	9.39	5.88	4.23
38	Sadhanwal i	0.05	3.92	2.82	13.07	9.39	5.88	4.23
39	Rupowali	0.05	3.84	2.76	12.80	9.20	5.76	4.14
40	Talwandi Rama	0.05	3.84	2.76	12.80	9.20	5.76	4.14
41	Khana Chamaran	0.05	3.76	2.70	12.53	9.01	5.64	4.05
42	Khode Bet	0.05	3.76	2.70	12.53	9.01	5.64	4.05
43	Gharkian	0.05	3.76	2.70	12.53	9.01	5.64	4.05
44	Samrai	0.05	3.76	2.70	12.53	9.01	5.64	4.05
45	Tarpalla	0.05	3.76	2.70	12.53	9.01	5.64	4.05
46	Dharam	0.05	3.60	2.59	12.00	8.63	5.40	3.88
47	Megha	0.05	3.60	2.59	12.00	8.63	5.40	3.88

48	Veroke	0.05	3.60	2.59	12.00	8.63	5.40	3.88
49	Abadi Rampur	0.04	3.52	2.53	11.73	8.43	5.28	3.80
50	Chitorgarh	0.04	3.52	2.53	11.73	8.43	5.28	3.80
51	Shamsherpur	0.04	3.52	2.53	11.73	8.43	5.28	3.80
52	RaiMal	0.04	3.36	2.42	11.20	8.05	5.04	3.62
53	Rauwal	0.04	3.36	2.42	11.20	8.05	5.04	3.62
54	Sangtuwal	0.04	3.36	2.42	11.20	8.05	5.04	3.62
55	Kahlanwali	0.04	3.28	2.36	10.93	7.86	4.92	3.54
56	Khalilpur	0.04	3.28	2.36	10.93	7.86	4.92	3.54
57	Pakho Ke Dera Baba Nanak	0.04	3.28	2.36	10.93	7.86	4.92	3.54
58	Ali Nangal	0.04	3.28	2.36	10.93	7.86	4.92	3.54
59	Kotha	0.04	3.20	2.30	10.67	7.67	4.80	3.45
60	Patti Mahal	0.04	3.20	2.30	10.67	7.67	4.80	3.45
61	Thetharke	0.04	3.20	2.30	10.67	7.67	4.80	3.45
62	Ghanike Bet	0.04	3.12	2.24	10.40	7.48	4.68	3.36
63	Athwal	0.04	3.12	2.24	10.40	7.48	4.68	3.36
64	Gur Chack	0.04	3.04	2.19	10.13	7.28	4.56	3.28
65	Haruwal	0.04	3.04	2.19	10.13	7.28	4.56	3.28
66	Haveli Kalan	0.04	3.04	2.19	10.13	7.28	4.56	3.28
67	Lukmania	0.04	3.04	2.19	10.13	7.28	4.56	3.28
68	Kathiala	0.04	3.04	2.19	10.13	7.28	4.56	3.28
69	Ratta	0.04	3.04	2.19	10.13	7.28	4.56	3.28
70	Alowal	0.04	3.04	2.19	10.13	7.28	4.56	3.28
71	Jagowal Jattan	0.04	3.04	2.19	10.13	7.28	4.56	3.28
72	Khussar Tahli	0.04	2.96	2.13	9.87	7.09	4.44	3.19
73	Metla	0.04	2.96	2.13	9.87	7.09	4.44	3.19
74	Mansur	0.04	2.96	2.13	9.87	7.09	4.44	3.19
75	Mehta	0.04	2.96	2.13	9.87	7.09	4.44	3.19
76	Nikki Thetherke	0.04	2.96	2.13	9.87	7.09	4.44	3.19
77	Udhowali Khurd	0.04	2.96	2.13	9.87	7.09	4.44	3.19
78	Rangar Nangal	0.04	2.88	2.07	9.60	6.90	4.32	3.11
79	Athwal	0.04	2.88	2.07	9.60	6.90	4.32	3.11
80	Jourian Kalan	0.04	2.88	2.07	9.60	6.90	4.32	3.11
81	Phako Ke Mahmran	0.04	2.88	2.07	9.60	6.90	4.32	3.11
82	Chandu Nangal	0.04	2.88	2.07	9.60	6.90	4.32	3.11
83	Jourian Khurd	0.04	2.88	2.07	9.60	6.90	4.32	3.11
84	Agwan	0.04	2.88	2.07	9.60	6.90	4.32	3.11
85	Balim	0.04	2.88	2.07	9.60	6.90	4.32	3.11
86	Barila Kalan	0.04	2.88	2.07	9.60	6.90	4.32	3.11
87	Khaddar	0.04	2.88	2.07	9.60	6.90	4.32	3.11
88	Naharpur	0.04	2.88	2.07	9.60	6.90	4.32	3.11
89	Abdal	0.04	2.80	2.01	9.33	6.71	4.20	3.02
90	Khokar	0.04	2.80	2.01	9.33	6.71	4.20	3.02

91	Lodhi Nangal	0.04	2.80	2.01	9.33	6.71	4.20	3.02
92	Manjian Wali	0.04	2.80	2.01	9.33	6.71	4.20	3.02
93	Padde	0.04	2.80	2.01	9.33	6.71	4.20	3.02
94	Daburji	0.03	2.72	1.96	9.07	6.52	4.08	2.93
95	Gawara	0.03	2.72	1.96	9.07	6.52	4.08	2.93
96	Nabi Nagar	0.03	2.72	1.96	9.07	6.52	4.08	2.93
97	Tapala	0.03	2.72	1.96	9.07	6.52	4.08	2.93
98	Arli Bhan	0.03	2.56	1.84	8.53	6.13	3.84	2.76
99	Malakpur	0.03	2.56	1.84	8.53	6.13	3.84	2.76
100	Qadian	0.03	2.40	1.73	8.00	5.75	3.60	2.59
101	Talwandi Goraya	0.03	2.40	1.73	8.00	5.75	3.60	2.59
102	Alisher	0.03	2.32	1.67	7.73	5.56	3.48	2.50
103	Amipur	0.03	2.32	1.67	7.73	5.56	3.48	2.50
104	Kot Mohan Lal	0.03	2.32	1.67	7.73	5.56	3.48	2.50
105	Gola Dhola	0.03	2.24	1.61	7.47	5.37	3.36	2.42
106	Rattar Chhattar	0.03	2.24	1.61	7.47	5.37	3.36	2.42
107	Barila Khurd	0.03	2.16	1.55	7.20	5.18	3.24	2.33
108	Chanduwa dala	0.03	2.16	1.55	7.20	5.18	3.24	2.33
109	Dhidowal	0.03	2.16	1.55	7.20	5.18	3.24	2.33
110	Alawalpur	0.03	2.16	1.55	7.20	5.18	3.24	2.33
111	Mir Kachana	0.03	2.16	1.55	7.20	5.18	3.24	2.33
112	Rura	0.03	2.16	1.55	7.20	5.18	3.24	2.33
113	Bariar	0.03	2.08	1.50	6.93	4.98	3.12	2.24
114	Gazi Nangal	0.03	2.08	1.50	6.93	4.98	3.12	2.24
115	Bakhatpur	0.03	2.08	1.50	6.93	4.98	3.12	2.24
116	Azampur	0.03	2.08	1.50	6.93	4.98	3.12	2.24
117	Lopa	0.03	2.08	1.50	6.93	4.98	3.12	2.24
118	Pakeewan	0.03	2.08	1.50	6.93	4.98	3.12	2.24
119	Rossey	0.03	2.08	1.50	6.93	4.98	3.12	2.24
120	Kalanour	0.03	2.00	1.44	6.67	4.79	3.00	2.16
121	Aujla	0.03	2.00	1.44	6.67	4.79	3.00	2.16
122	Bhangwan	0.03	2.00	1.44	6.67	4.79	3.00	2.16
123	Mastkot	0.03	2.00	1.44	6.67	4.79	3.00	2.16
124	Sahur	0.03	2.00	1.44	6.67	4.79	3.00	2.16
125	Dargabad	0.02	1.92	1.38	6.40	4.60	2.88	2.07
126	Dolowal	0.02	1.92	1.38	6.40	4.60	2.88	2.07
127	Chhod	0.02	1.92	1.38	6.40	4.60	2.88	2.07
128	Kamalpur	0.02	1.92	1.38	6.40	4.60	2.88	2.07
129	Mallia Wala	0.02	1.92	1.38	6.40	4.60	2.88	2.07
130	Jangla	0.02	1.84	1.32	6.13	4.41	2.76	1.98
131	Nanak Chack	0.02	1.84	1.32	6.13	4.41	2.76	1.98
132	Bharial	0.02	1.84	1.32	6.13	4.41	2.76	1.98
133	Kot Mian	0.02	1.84	1.32	6.13	4.41	2.76	1.98
134	Chhakri	0.02	1.84	1.32	6.13	4.41	2.76	1.98

135	Kunjar	0.02	1.84	1.32	6.13	4.41	2.76	1.98
136	Madhar	0.02	1.84	1.32	6.13	4.41	2.76	1.98
137	Mugal	0.02	1.84	1.32	6.13	4.41	2.76	1.98
138	Narwan	0.02	1.84	1.32	6.13	4.41	2.76	1.98
139	Patti Azaib Singh	0.02	1.84	1.32	6.13	4.41	2.76	1.98
140	Shakri	0.02	1.76	1.27	5.87	4.22	2.64	1.90
141	Khushipur	0.02	1.76	1.27	5.87	4.22	2.64	1.90
142	Hakimpur	0.02	1.76	1.27	5.87	4.22	2.64	1.90
143	Pairuwal	0.02	1.76	1.27	5.87	4.22	2.64	1.90
144	Panwan	0.02	1.76	1.27	5.87	4.22	2.64	1.90
145	Sarai	0.02	1.76	1.27	5.87	4.22	2.64	1.90
146	Basant Kot	0.02	1.68	1.21	5.60	4.03	2.52	1.81
147	Dhianpur	0.02	1.68	1.21	5.60	4.03	2.52	1.81
148	Shah Samash	0.02	1.68	1.21	5.60	4.03	2.52	1.81
149	Amargarh	0.02	1.68	1.21	5.60	4.03	2.52	1.81
150	Bohar wadala	0.02	1.68	1.21	5.60	4.03	2.52	1.81
151	Choura	0.02	1.68	1.21	5.60	4.03	2.52	1.81
152	Kukar	0.02	1.68	1.21	5.60	4.03	2.52	1.81
153	Sahari	0.02	1.68	1.21	5.60	4.03	2.52	1.81
154	Khajala	0.02	1.60	1.15	5.33	3.83	2.40	1.73
155	Kala Afgana	0.02	1.60	1.15	5.33	3.83	2.40	1.73
156	JogiChima	0.02	1.60	1.15	5.33	3.83	2.40	1.73
157	Jagowal Bedian	0.02	1.60	1.15	5.33	3.83	2.40	1.73
158	Lakhan Kalan	0.02	1.60	1.15	5.33	3.83	2.40	1.73
159	Lakhan Khurd	0.02	1.60	1.15	5.33	3.83	2.40	1.73
160	Pindi Sadian	0.02	1.60	1.15	5.33	3.83	2.40	1.73
161	Choura Khurd	0.02	1.60	1.15	5.33	3.83	2.40	1.73
162	Kamalpur Jattan	0.02	1.60	1.15	5.33	3.83	2.40	1.73
163	Bal	0.02	1.52	1.09	5.07	3.64	2.28	1.64
164	Alli Nangal	0.02	1.52	1.09	5.07	3.64	2.28	1.64
165	Jeewan Nangal	0.02	1.52	1.09	5.07	3.64	2.28	1.64
166	Malogil	0.02	1.52	1.09	5.07	3.64	2.28	1.64
167	Rudiana	0.02	1.52	1.09	5.07	3.64	2.28	1.64
168	Chhohan	0.02	1.52	1.09	5.07	3.64	2.28	1.64
169	JeoJuly	0.02	1.52	1.09	5.07	3.64	2.28	1.64
170	Shale Chack	0.02	1.52	1.09	5.07	3.64	2.28	1.64
171	Choranwali	0.02	1.44	1.04	4.80	3.45	2.16	1.55
172	Bhandwan	0.02	1.44	1.04	4.80	3.45	2.16	1.55
173	Nano Harni	0.02	1.44	1.04	4.80	3.45	2.16	1.55
174	Shahpur	0.02	1.44	1.04	4.80	3.45	2.16	1.55
175	Wadhala Banger	0.02	1.44	1.04	4.80	3.45	2.16	1.55
176	Badowal Kalan	0.02	1.36	0.98	4.53	3.26	2.04	1.47
177	Kotli Harchanda	0.02	1.36	0.98	4.53	3.26	2.04	1.47
178	Randhwara Colony	0.02	1.36	0.98	4.53	3.26	2.04	1.47

S.N.	Tarn Taran District	Heavy Metal	ADD x 10 ³ (mg/kg/day)	HQ	CR x 10 ³
179	Chack Nurowali	0.02	1.36	0.98	4.53
180	Alar Pindi	0.02	1.36	0.98	4.53
181	Aluana	0.02	1.36	0.98	4.53
182	Hardochhani	0.02	1.36	0.98	4.53
183	Qazipur	0.02	1.36	0.98	4.53
184	Bhaini Milwan	0.02	1.28	0.92	4.27
185	Chamiari	0.02	1.28	0.92	4.27
186	Awan	0.02	1.28	0.92	4.27
187	Chotepur	0.02	1.28	0.92	4.27
188	Damodar	0.02	1.20	0.86	4.00
189	Kot Majlas	0.02	1.20	0.86	4.00
190	Saidpur Khurd	0.02	1.20	0.86	4.00
191	Pabarali Khurd	0.01	1.12	0.81	3.73
192	Sanghera	0.01	1.12	0.81	3.73
193	Addi	0.01	1.12	0.81	3.73
194	Bhopur Afgana	0.01	1.12	0.81	3.73
195	Kalupur	0.01	1.12	0.81	3.73
196	Rura Butter	0.01	1.12	0.81	3.73
197	Dugri	0.01	1.12	0.81	3.73
198	Qadian Wali	0.01	1.12	0.81	3.73
199	Thaman	0.01	1.12	0.81	3.73
200	Bishankot	0.01	1.12	0.81	3.73
201	Chikri	0.01	1.12	0.81	3.73
202	Kotla Muglan	0.01	1.12	0.81	3.73
203	Uppal	0.01	1.12	0.81	3.73
204	Dorangla	0.01	1.04	0.75	3.47
205	Jande	0.01	1.04	0.75	3.47
206	Madhepur	0.01	1.04	0.75	3.47
207	Rajpur Chib	0.01	1.04	0.75	3.47
208	Ghani Ke Bangar	0.01	0.96	0.69	3.20
209	Kot Khajana	0.01	0.96	0.69	3.20
210	Gujjar Pura	0.01	0.96	0.69	3.20
211	Kular	0.01	0.96	0.69	3.20
212	Shahpur Goraya	0.01	0.96	0.69	3.20
213	Boparai	0.01	0.96	0.69	3.20
214	Nadala	0.01	0.88	0.63	2.93
215	Nangal Dala	0.01	0.88	0.63	2.93
216	Shahpur Afgana	0.01	0.88	0.63	2.93
217	Jagatpur Kalan	0.01	0.88	0.63	2.93
218	Tanda	0.01	0.88	0.63	2.93

Table 3. Arsenic content in groundwater, ADD, HQ and CR values for Tarn Taran district.

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Except Journals Official Website.

	<i>Habitation</i>	<i>Arsenic (ppm)</i>	<i>ADD Child</i>	<i>ADD Adult</i>	<i>HQ Child</i>	<i>HQ Adult</i>	<i>CR Child</i>	<i>CR Adult</i>
1	Mianwal	0.08	6.64	4.77	22.13	15.91	9.96	7.16
2	Ghurkwind	0.08	6.08	4.37	20.27	14.57	9.12	6.56
3	Jhuggian Kalu	0.07	5.92	4.26	19.73	14.18	8.88	6.38
4	Bhahuwal	0.07	5.76	4.14	19.20	13.80	8.64	6.21
5	Kot Bhudha	0.07	5.76	4.14	19.20	13.80	8.64	6.21
6	Surwind	0.07	5.68	4.08	18.93	13.61	8.52	6.12
7	Wara Telian	0.07	5.68	4.08	18.93	13.61	8.52	6.12
8	Balehar	0.07	5.20	3.74	17.33	12.46	7.80	5.61
9	Algon Khurd	0.06	5.12	3.68	17.07	12.27	7.68	5.52
10	Algon Kalan	0.06	4.88	3.51	16.27	11.69	7.32	5.26
11	Bainka	0.06	4.88	3.51	16.27	11.69	7.32	5.26
12	Wara Sher Singh	0.06	4.80	3.45	16.00	11.50	7.20	5.18
13	Gandiwind	0.06	4.48	3.22	14.93	10.73	6.72	4.83
14	Leian	0.06	4.48	3.22	14.93	10.73	6.72	4.83
15	Shukar Chak	0.06	4.48	3.22	14.93	10.73	6.72	4.83
16	Bur Chand	0.05	4.32	3.11	14.40	10.35	6.48	4.66
17	Kale	0.05	4.32	3.11	14.40	10.35	6.48	4.66
18	Sandran	0.05	4.32	3.11	14.40	10.35	6.48	4.66
19	Bhojeke	0.05	4.24	3.05	14.13	10.16	6.36	4.57
20	Mari Nau Abad	0.05	4.24	3.05	14.13	10.16	6.36	4.57
21	Hawelian	0.05	4.08	2.93	13.60	9.78	6.12	4.40
22	Chhana Sirja Mirja	0.05	4.08	2.93	13.60	9.78	6.12	4.40
23	Thatha	0.05	4.00	2.88	13.33	9.58	6.00	4.31
24	Jhuggain Pir Baksh	0.05	3.76	2.70	12.53	9.01	5.64	4.05
25	Radhalke	0.05	3.76	2.70	12.53	9.01	5.64	4.05
26	Abadi	0.05	3.68	2.65	12.27	8.82	5.52	3.97
27	Dhariwal	0.04	3.52	2.53	11.73	8.43	5.28	3.80
28	Puhla	0.04	3.44	2.47	11.47	8.24	5.16	3.71
29	Kalanjar Uttar	0.04	3.20	2.30	10.67	7.67	4.80	3.45
30	Sarai Valtoha	0.04	3.12	2.24	10.40	7.48	4.68	3.36
31	Chichrewal	0.04	2.96	2.13	9.87	7.09	4.44	3.19
32	Dhagana	0.04	2.80	2.01	9.33	6.71	4.20	3.02
33	Shahid	0.04	2.80	2.01	9.33	6.71	4.20	3.02
34	Gajjal	0.04	2.80	2.01	9.33	6.71	4.20	3.02
35	Bhikhiwind	0.03	2.72	1.96	9.07	6.52	4.08	2.93
36	Kot Dharam Chand Khurd	0.03	2.56	1.84	8.53	6.13	3.84	2.76
37	Asal Uttar	0.03	2.40	1.73	8.00	5.75	3.60	2.59
38	Amirke	0.03	2.40	1.73	8.00	5.75	3.60	2.59
39	Gillpun	0.03	2.40	1.73	8.00	5.75	3.60	2.59
40	Kalsian	0.03	2.40	1.73	8.00	5.75	3.60	2.59
41	Kasel Havellian	0.03	2.40	1.73	8.00	5.75	3.60	2.59

42	Pandori	0.03	2.24	1.61	7.47	5.37	3.36	2.42
43	Sakhira	0.03	2.16	1.55	7.20	5.18	3.24	2.33
44	Dial Rajputtan	0.03	2.16	1.55	7.20	5.18	3.24	2.33
45	BanglaRai	0.03	2.08	1.50	6.93	4.98	3.12	2.24
46	Talwandi	0.03	2.08	1.50	6.93	4.98	3.12	2.24
47	Manihala JaiSingh	0.03	2.08	1.50	6.93	4.98	3.12	2.24
48	Darazke	0.03	2.00	1.44	6.67	4.79	3.00	2.16
49	Mamanke	0.03	2.00	1.44	6.67	4.79	3.00	2.16
50	ManekeJand	0.03	2.00	1.44	6.67	4.79	3.00	2.16
51	Daleke	0.02	1.92	1.38	6.40	4.60	2.88	2.07
52	Khara	0.02	1.92	1.38	6.40	4.60	2.88	2.07
53	Mannan	0.02	1.92	1.38	6.40	4.60	2.88	2.07
54	Pandori Sidhwan	0.02	1.92	1.38	6.40	4.60	2.88	2.07
55	Bhura Kohna	0.02	1.76	1.27	5.87	4.22	2.64	1.90
56	Jawanda Kalan	0.02	1.68	1.21	5.60	4.03	2.52	1.81
57	Bagel Singh Wala	0.02	1.68	1.21	5.60	4.03	2.52	1.81
58	Makhi Kalan	0.02	1.68	1.21	5.60	4.03	2.52	1.81
59	Abadi Amarkot	0.02	1.68	1.21	5.60	4.03	2.52	1.81
60	Mehmudpura	0.02	1.68	1.21	5.60	4.03	2.52	1.81
61	Sidhwan	0.02	1.68	1.21	5.60	4.03	2.52	1.81
62	Bhaildhiwala	0.02	1.60	1.15	5.33	3.83	2.40	1.73
63	Johald haiwala	0.02	1.60	1.15	5.33	3.83	2.40	1.73
64	Khela	0.02	1.60	1.15	5.33	3.83	2.40	1.73
65	Bhathal Seja Singh	0.02	1.60	1.15	5.33	3.83	2.40	1.73
66	Wariah	0.02	1.60	1.15	5.33	3.83	2.40	1.73
67	Dode Sodhian	0.02	1.60	1.15	5.33	3.83	2.40	1.73
68	DuhalNau	0.02	1.52	1.09	5.07	3.64	2.28	1.64
69	Kals	0.02	1.52	1.09	5.07	3.64	2.28	1.64
70	Mastgarh	0.02	1.52	1.09	5.07	3.64	2.28	1.64
71	Bhangala	0.02	1.44	1.04	4.80	3.45	2.16	1.55
72	Maluwal	0.02	1.44	1.04	4.80	3.45	2.16	1.55
73	Mughal Chak	0.02	1.44	1.04	4.80	3.45	2.16	1.55
74	Gorkha	0.02	1.44	1.04	4.80	3.45	2.16	1.55
75	Walipur	0.02	1.44	1.04	4.80	3.45	2.16	1.55
76	Bhadal	0.02	1.36	0.98	4.53	3.26	2.04	1.47
77	Lakhna	0.02	1.36	0.98	4.53	3.26	2.04	1.47
78	Kaler	0.02	1.28	0.92	4.27	3.07	1.92	1.38
79	Bhattal Bhaike	0.02	1.28	0.92	4.27	3.07	1.92	1.38
80	Choudhariwala	0.02	1.28	0.92	4.27	3.07	1.92	1.38
81	Kheda	0.02	1.28	0.92	4.27	3.07	1.92	1.38
82	Nand Pur	0.02	1.28	0.92	4.27	3.07	1.92	1.38
83	Thathian Mahantan	0.02	1.28	0.92	4.27	3.07	1.92	1.38
84	Bhaini Mattuan	0.02	1.28	0.92	4.27	3.07	1.92	1.38
85	Gill Waraich	0.02	1.28	0.92	4.27	3.07	1.92	1.38

86	Lalu Ghuman	0.02	1.28	0.92	4.27	3.07	1.92	1.38
87	Pandori Hassan	0.02	1.28	0.92	4.27	3.07	1.92	1.38
88	Singhpura	0.02	1.28	0.92	4.27	3.07	1.92	1.38
89	Chohla Sahib	0.02	1.20	0.86	4.00	2.88	1.80	1.29
90	Chutala AbadiHarijan	0.02	1.20	0.86	4.00	2.88	1.80	1.29
91	Durgapur Garbi	0.02	1.20	0.86	4.00	2.88	1.80	1.29
92	Raipur Balim	0.02	1.20	0.86	4.00	2.88	1.80	1.29
93	Ahmedpura	0.01	1.12	0.81	3.73	2.68	1.68	1.21
94	jamalpur	0.01	1.12	0.81	3.73	2.68	1.68	1.21
95	Dadehar Sahib	0.01	1.12	0.81	3.73	2.68	1.68	1.21
96	Bhoian	0.01	1.12	0.81	3.73	2.68	1.68	1.21
97	Jhander Mahapurkhan	0.01	1.12	0.81	3.73	2.68	1.68	1.21
98	Rahal Chahal	0.01	1.12	0.81	3.73	2.68	1.68	1.21
99	Chamba Khurd	0.01	1.04	0.75	3.47	2.49	1.56	1.12
100	Kot Mohd. Khan	0.01	1.04	0.75	3.47	2.49	1.56	1.12
101	Sur Singh	0.01	1.04	0.75	3.47	2.49	1.56	1.12
102	Dilawalpur	0.01	0.96	0.69	3.20	2.30	1.44	1.04
103	Waring	0.01	0.96	0.69	3.20	2.30	1.44	1.04
104	Ballian Wala	0.01	0.96	0.69	3.20	2.30	1.44	1.04
105	Daudpura	0.01	0.96	0.69	3.20	2.30	1.44	1.04
106	Dibipura	0.01	0.96	0.69	3.20	2.30	1.44	1.04
107	Harbanspura	0.01	0.96	0.69	3.20	2.30	1.44	1.04