Gender disparities in the prevalence of undernutrition in India: the unexplored effects of drinking contaminated water

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ONLINE APPENDIX

Auxiliary data and data sources

The data on fertilizer consumption in India at the district level is provided by ICRISAT (International Crop Research Institute for Semi-Arid Tropics) for the year 2015. We use data on three fertilizers that are commonly used across India, namely, nitrogen (N), phosphate (P) and potassium (K), each measured in units of kilograms. Data for the year 2015 on minimum temperature and maximum temperature (in degrees Celsius), measured at the district level, is obtained from the India Meteorological Department, Ministry of Earth Sciences, Earth System Science Organization, Government of India. Data for other groundwater contaminants including fluoride, lead and nitrate are sourced from the Central Ground Water Board. The units of measurement for fluoride and nitrate is milligrams per litre (mg/L), and micrograms per litre for lead (ug/L). The level of these contaminants in groundwater is aggregated at the district level from block level data.

Table A1. Clayey soil and district level characteristics

	Clayey soil	N
Groundwater and soil contaminants		
Arsenic	0.010	261
	(0.004)	
Iron (mg/liter)	0.043	261
	(0.019)	
Lead (ug/liter)	0.009	261
	(0.053)	
Fluoride (mg/liter)	0.345	261
	(0.462)	
Nitrate (mg/liter)	-0.007	261
	(0.005)	
Nitrogen (kilogram/hectare)	0.000	261
	(0.000)	
Phosphorus (kilogram/hectare)	0.000	261
	(0.000)	
Potassium (kilogram/hectare)	-0.000	261
	(0.000)	
Weather		
Rainfall (millimeters)	-1.008	174
	(0.449)	
Maximum temperature (degree Celsius)	-0.004	110
	(0.049)	
Minimum temperature (degree Celsius)	0.081	95
	(0.055)	
Demographic and economic factors		
Rice production (million tons)	-461.73	261
	(460.85)	
Wheat production (million tons)	-140.88	261
	(371.22)	
Literacy	0.091	259
	(0.060)	
Gender ratio (per 1000 females)	0.002	259
	(0.015)	
Monthly per capital expenditure	797.2	261
	(503.7)	
Male labor participation (agriculture)	-0.000	253
	(0.000)	
Female labor participation (agriculture)	-0.000	253
	(00)	

Notes: The table reports the coefficient on clayey soil, from the regression of reported district level variables on the percentage of clayey soils in a district with state fixed effects. Standard errors are clustered at the district level.

Table A2. First stage regression

	Arsenic (microgram/liter)
Clayey soil (sub)	0.008
	(0.001)
First stage F-statistics	74.01
Observations	88,106

Notes: Standard errors clustered at the PSU level. Independent variable is defined as percentage of clayey soil present in district. Regressions include state fixed effects and district level controls for sex ratio, health facilities, rainfall, literacy, iron, rice and wheat production and MPCE. Individual level controls (age, age square and gender), maternal controls (mother's age, mother's education, maternal anemia (severe, moderate, mild, non-anemic), mother's standardized height for age (HAZ) and weight for height (WHZ) and family background controls (religion, caste, family size, wealth index and place of residence).

Table A3. Robustness check: controlling for male/female labor force participation in agriculture (IV estimates)

	HAZ (IV) (3)	WAZ (IV) (6)
Arsenic*girl*BO2	-0.413	-0.439
	(0.290)	(0.210)
Arsenic*girl*BO3	-0.610	-0.577
	(0.296)	(0.220)
Arsenic	-0.312	-0.403
	(0.307)	(0.229)
Birth order 2	-0.015	-0.013
	(0.030)	(0.022)
Birth order 3	0.058	0.050
	(0.040)	(0.029)
Girls	0.086	0.026
	(0.028)	(0.021)
Individual controls	Yes	Yes
Maternal controls	Yes	Yes
Family background controls	Yes	Yes
District level controls	Yes	Yes
Observations	84,504	84,504

Notes: Standard errors clustered at the PSU level. Instrument for arsenic is defined as the percentage of clayey soil present in a district. Regressions include state fixed effects and district level controls for male and female labor force participation rate in agriculture, sex ratio, health facilities, rainfall, literacy, iron, rice and wheat production and MPCE. Individual level controls (age, age square), maternal controls (mother's age, mother's education, maternal anemia (severe, moderate, mild, non-anemic), mother's standardized height for age (HAZ) and weight for height (WHZ) and family background controls (religion, caste, family size, wealth index and place of residence). Also includes all double interaction terms.

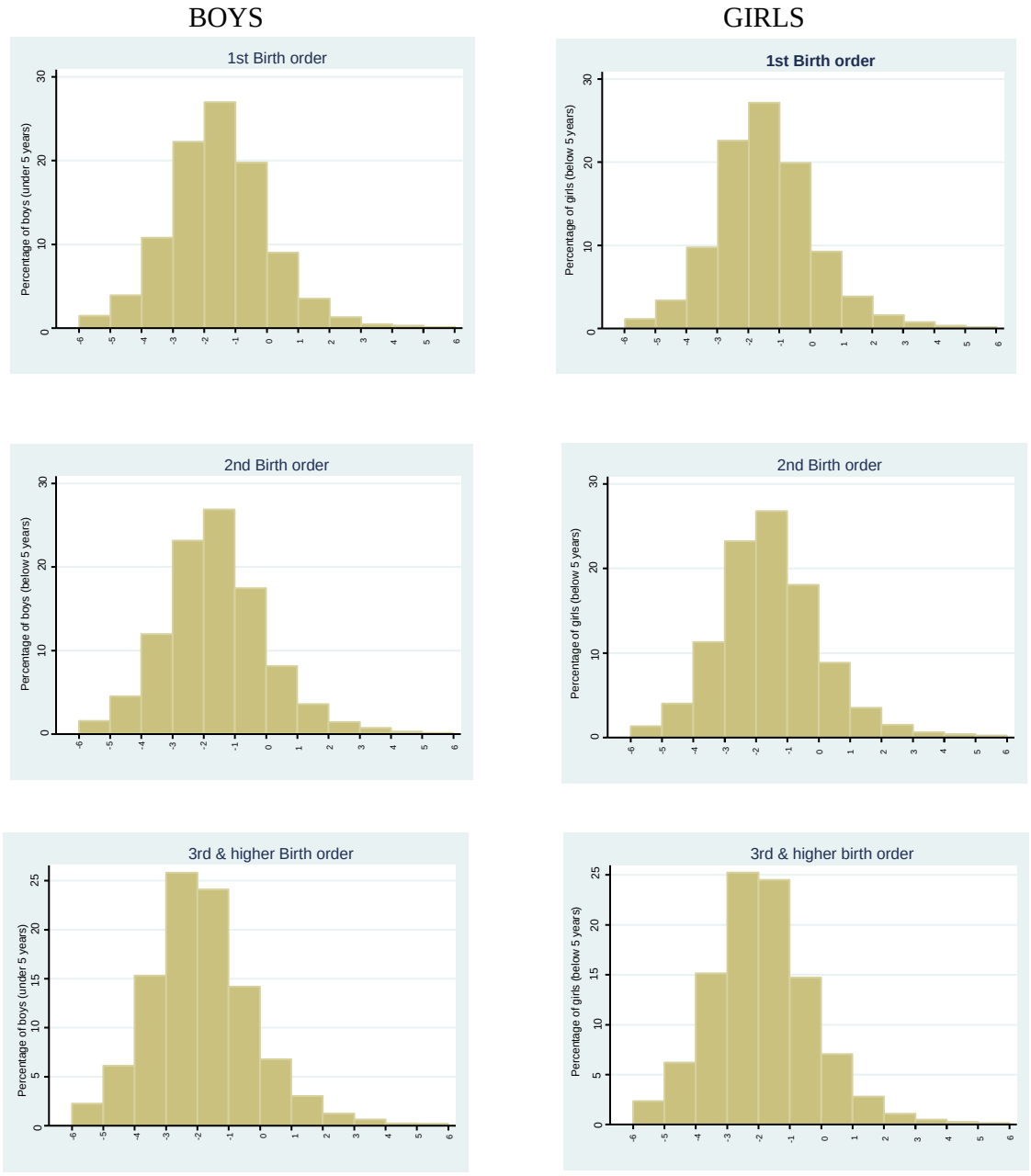

Figure A1. Histogram for height-for-age (z scores) for boys and girls, by birth order.

Notes: The above figure shows percentage of boys and girls whose z scores for height-for-age (z scores) decrease with increasing birth order, as represented on the horizontal axis. As per guidelines issued by the World Health Organization (2017), children whose z scores are below -2 and above -3 indicates moderate stunting and z scores below -3 indicates severe stunting.

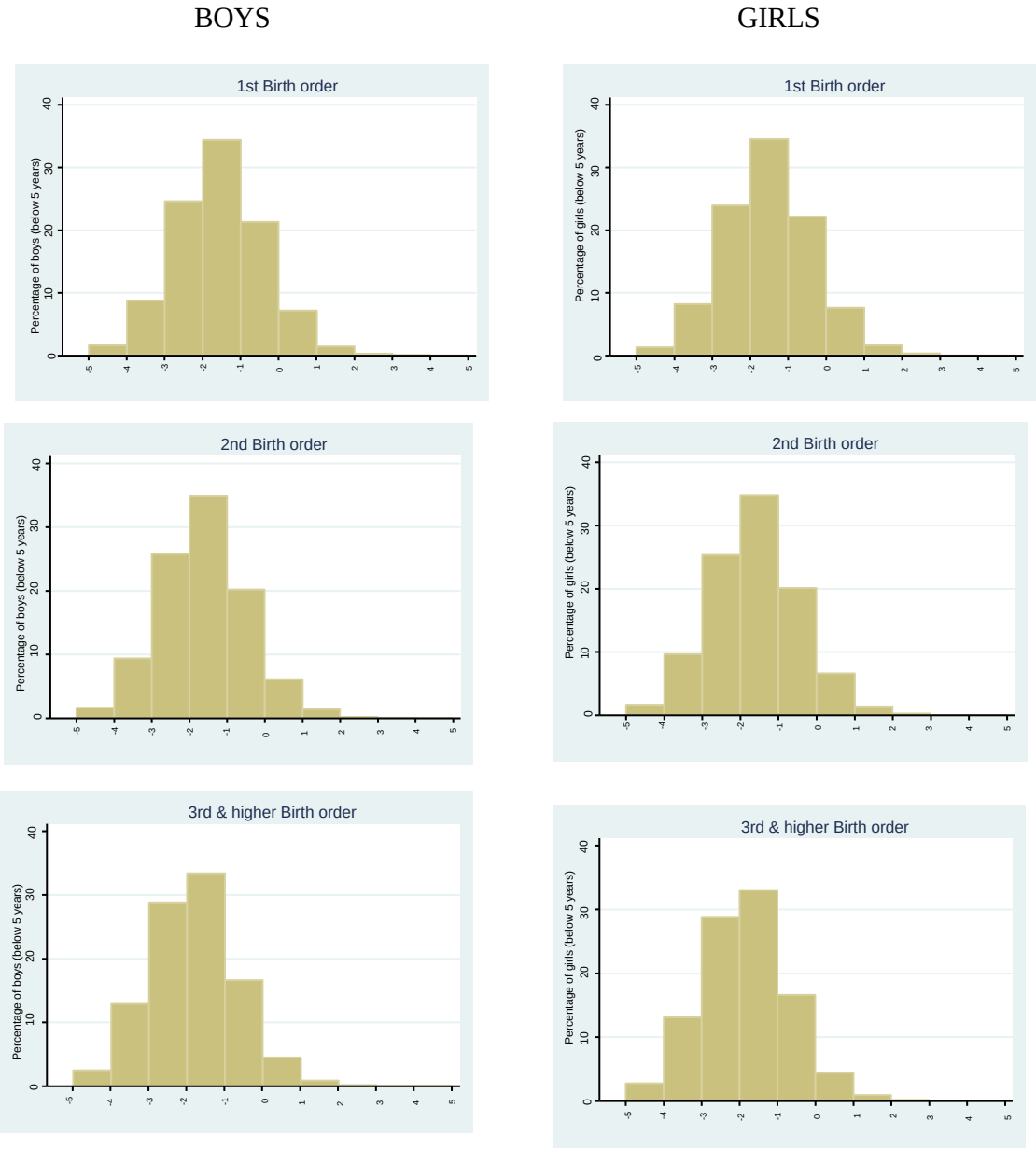

Figure A2. Histogram for weight-for-age (z scores) for boys and girls, by birth order.

Notes: This figure shows the percentage of boys and girls whose z scores for weight-for-age (z scores) decrease with increasing birth order, as represented on the horizontal axis. As per guidelines issued by the World Health Organization, children whose z scores are below -2 and above -3 indicates moderate underweight and z scores below -3 indicates severe underweight.

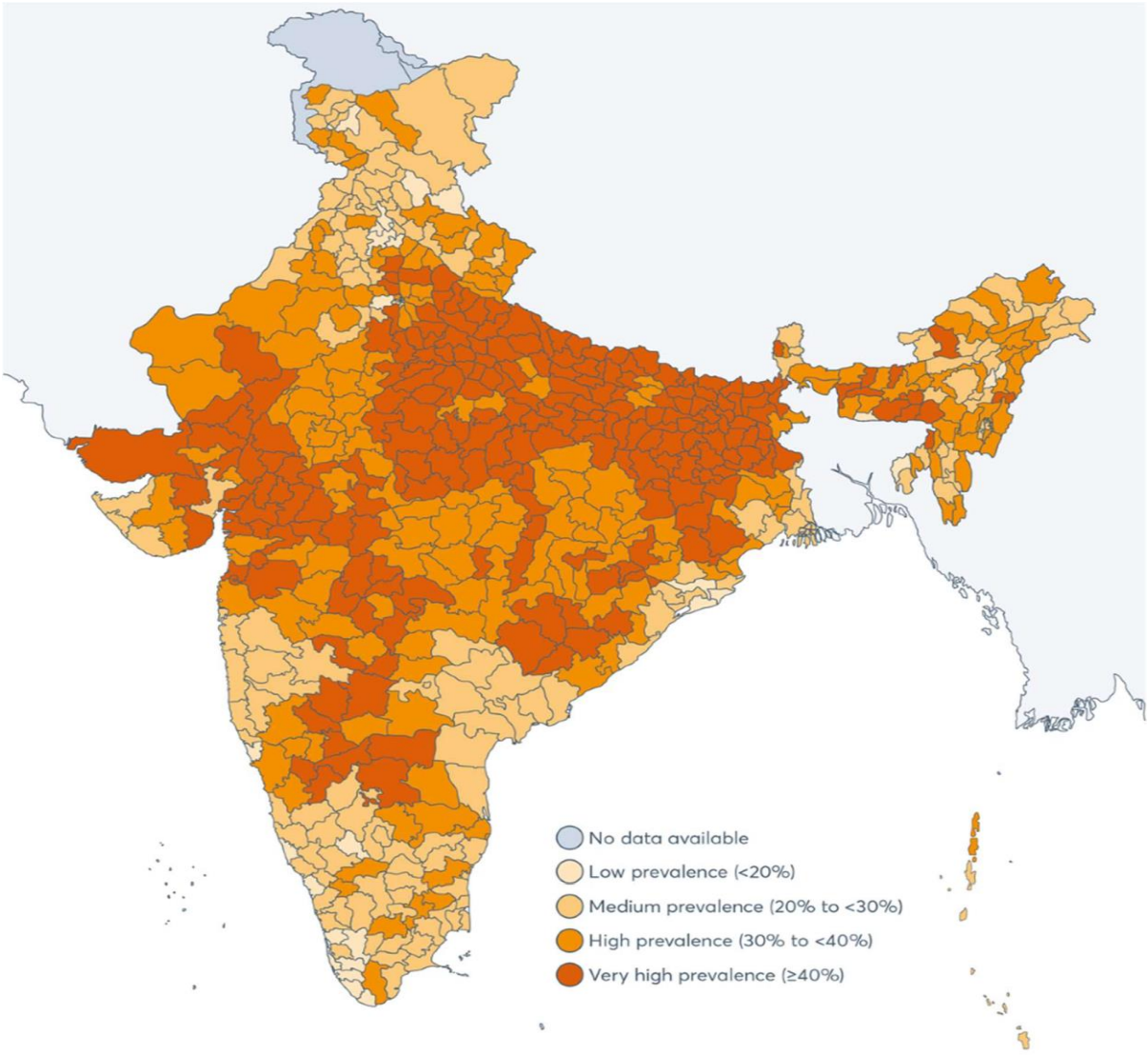

Figure A3. Prevalence of stunting across districts of India.

Source: Menon *et al*., 2018

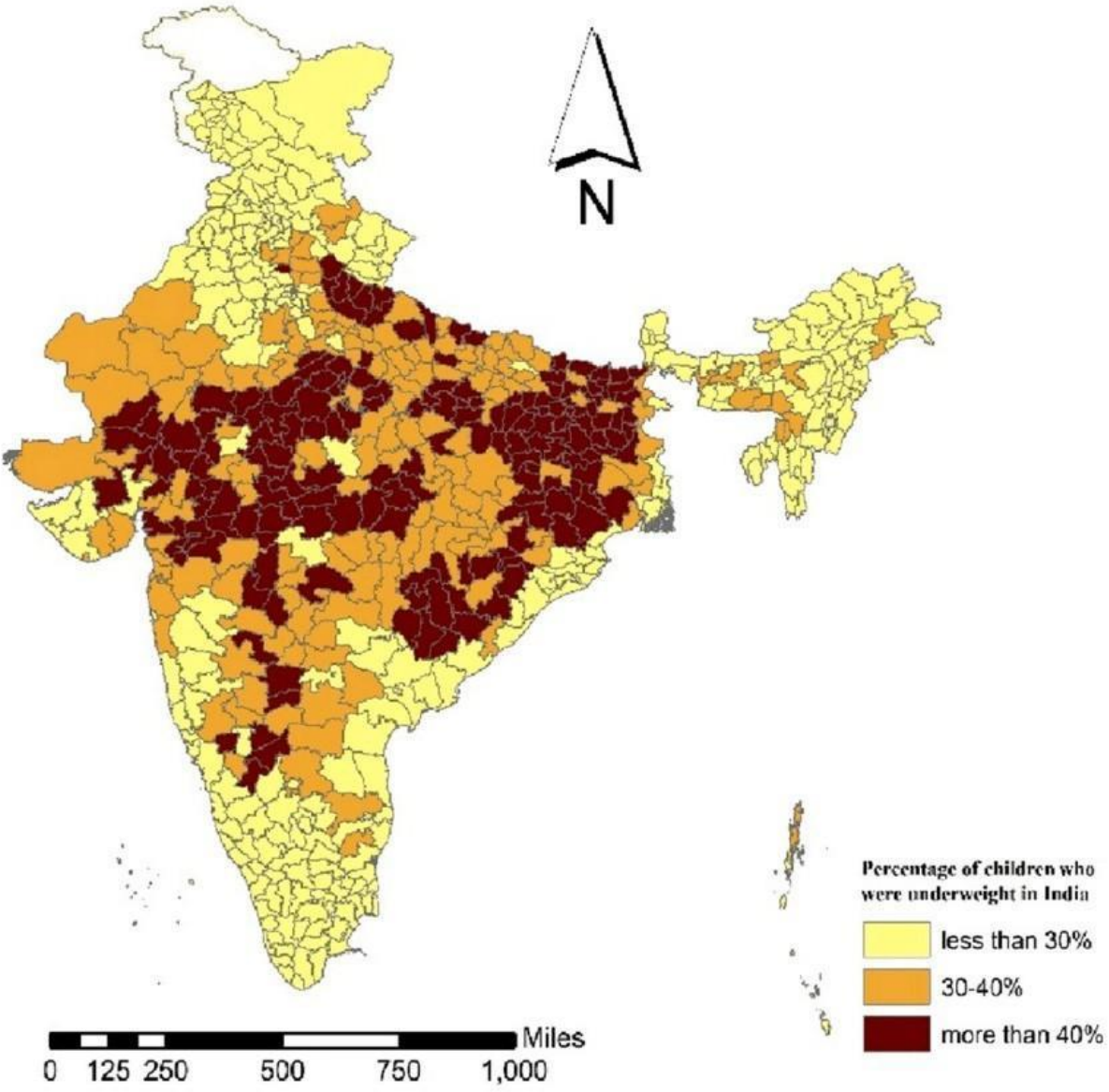

Figure A4. Prevalence of underweight across districts of India.

Source: Sharma *et al.*, 2020.

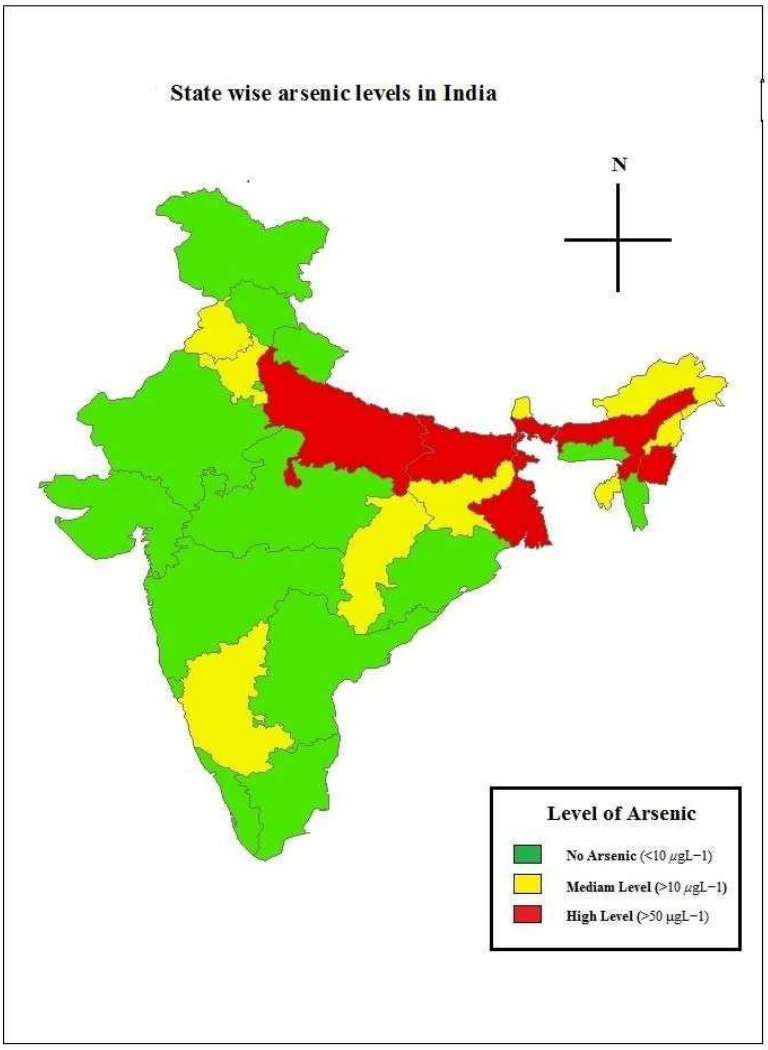

Figure A5. Geographical distribution of arsenic levels across states of India.

Source: Authors calculation using Central Ground Water Board report data (2016).

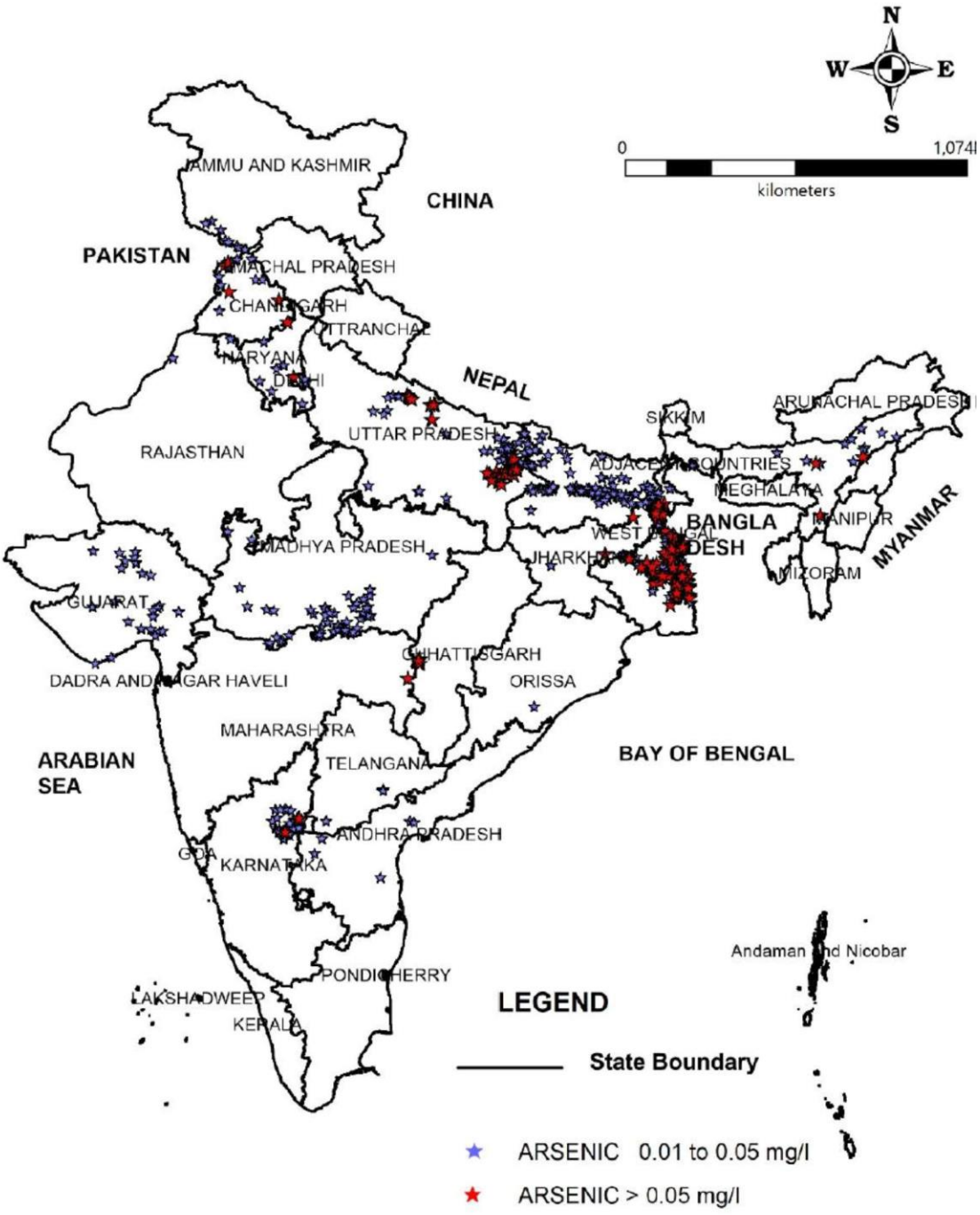

Figure A6. Geographical distribution of arsenic levels across districts of India.

Source: Central Groundwater Board.

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