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IMPACT OF MINING AND INDUSTRIALIZATION ON TRIBAL SETTLEMENTS: A CASE OF DHAR DISTRICT, MADHYA PRADESH

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ABSTRACT

This research paper analyses the impacts of mining and industrialization on tribal settlements in Dhar district, Madhya Pradesh, with emphasis on Pithampur industrial hub. Using demographic data (Census 2011), meteorological department-supported air quality data (IQAir & AQI.in), groundwater quality assessments (CGWB 2024, district reports), and soil pollution findings (TSDF Pithampur, UCIL waste incineration 2025), the study highlights threats to air, water, and soil quality and their impacts on human health. Findings show tribal communities—comprising over 56% of Dhar's population—face risks of land displacement, respiratory illnesses, fluorosis, and loss of traditional livelihoods. Policy suggestions include integrating traditional knowledge with modern planning, robust monitoring, and inclusive compensation mechanisms.

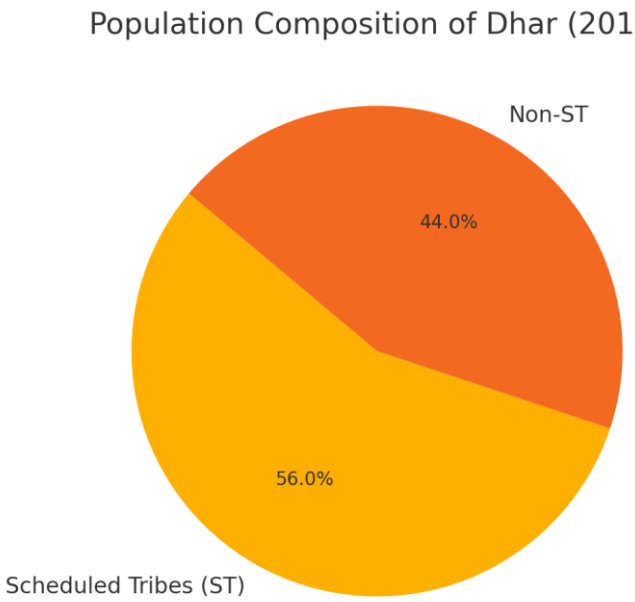
KEYWORDS : *Air Pollution, Water Pollution, Human Health Impacts, Soil and Hazardous Waste Issues.*

1. INTRODUCTION

Dhar district in western Madhya Pradesh is characterized by a high concentration of Scheduled Tribes (Bhil, Bhilala, Patelia) and the industrial township of Pithampur, known as the 'Detroit of India' due to its automobile cluster. Mining activities (notably limestone) and new infrastructure such as the Multi-Modal Logistics Park (MMLP) are reshaping land use and livelihoods. This paper examines the socio-environmental effects on tribal settlements.

2. DEMOGRAPHIC PROFILE OF DHAR DISTRICT

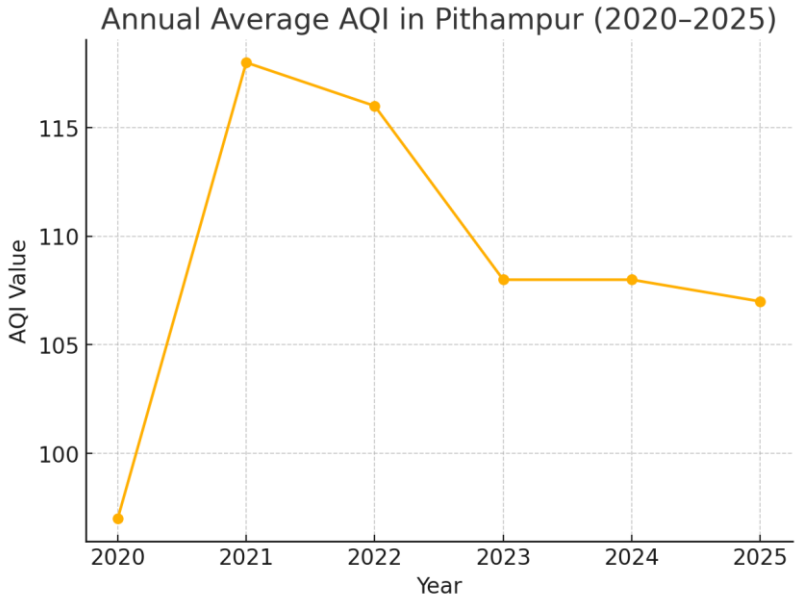
As per Census 2011, Dhar's population was 2,185,793, of which 1,222,814 (~56%) belonged to Scheduled Tribes. Rural population constituted ~81% and literacy stood at ~59%. The major tribes are Bhil, Bhilala, and Patelia.



3. AIR QUALITY IN PITHAMPUR (METEOROLOGICAL DATA)

Real-time air quality monitoring in Pithampur (via IQAir & AQI.in, 2025) indicates moderate pollution levels, with occasional exceedances of WHO standards. Data are drawn from CPCB-supported monitoring stations.

Source	AQI	PM2.5 (µg/m^3)	PM10 (µg/m^3)	CO	Other gases
IQAir (CPCB)	~62	15	45	270 µg/m^3	O_3 ~40, NO_2 ~8, SO_2 ~7
AQI.in	~61	14	46	312 ppb	O_3 ~12, NO_2 ~8, SO_2 ~3



4. WATER QUALITY IN DHAR

Groundwater in Dhar shows significant contamination. CGWB (2024) and a district case study (2025) report that ~20% samples exceeded nitrate limits, ~9% exceeded fluoride, and nearly 70% of the district area is affected by unsafe groundwater. Pithampur studies (2019, 2021) showed deterioration of pond and tube-well water due to industrial effluents.

Parameter	Observed Issue	Standard	Health Impact
Fluoride	Exceedance in Dhar pockets (~9%)	1–1.5 mg/L	Dental/skeletal fluorosis
Nitrate	~20% samples above 45 mg/L	45 mg/L	Blue baby syndrome, thyroid issues
Total Hardness	High levels in Dhar villages	200–600 mg/L	Kidney stress (very high levels)
Iron	Elevated in Dhar samples	0.3 mg/L	GI distress, taste issues

5. SOIL AND HAZARDOUS WASTE ISSUES

Pithampur TSDF (Treatment, Storage, Disposal Facility) incinerated ~337 MT of legacy UCIL toxic waste in 2025. Tests found heavy metals in incineration ash, now stored in a double-liner secured landfill with long-term monitoring. Improper disposal could leach lead, cadmium, or chromium into soils, threatening food chains and human health.

6. HUMAN HEALTH IMPACTS

Air: Elevated PM2.5/PM10 levels increase risks of asthma, bronchitis, heart disease, and premature death. Water: Nitrate contamination causes methemoglobinemia (blue baby syndrome); fluoride leads to fluorosis. Soil: Heavy metals can cause neurological, renal, and carcinogenic effects. These disproportionately affect tribal communities living near polluted sites with limited healthcare access.

7. POLICY RECOMMENDATIONS

1. Strengthen MPPCB & CGWB monitoring in Dhar.
2. Ensure free, prior, informed consent (FPIC) under FRA/LARR in all land acquisitions.
3. Expand tribal health programs focusing on fluorosis, respiratory disease, and occupational safety.
4. Integrate traditional ecological practices (sacred groves, organic farming) into district development plans.
5. Promote green industrial practices with CSR funding for water treatment and afforestation.
6. Develop GIS-based vulnerability maps for better planning.

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