

INDICATIVE PLAN
DISTRICT MINERAL FOUNDATION
BOKARO, JHARKHAND



Centre for Science and Environment



© 2017 Centre for Science and Environment

Published by
Centre for Science and Environment
41, Tughlakabad Institutional Area
New Delhi 110 062
Phones: 91-11-29955124, 29955125, 29953394
Fax: 91-11-29955879
E-mail: cse@cseindia.org
Website: www.cseindia.org

INDICATIVE PLAN
DISTRICT MINERAL FOUNDATION
BOKARO, JHARKHAND



Centre for Science and Environment

Contents

PREFACE	6
SECTION 1: INTRODUCTION AND OVERVIEW	7
SECTION 2: BACKGROUND OF THE DISTRICT	10
SECTION 3: SITUATION ANALYSIS THROUGH STOCK-TAKING.....	15
SECTION 4: SITUATION ANALYSIS THROUGH PARTICIPATORY RURAL APPRAISAL....	48
SECTION 5: PRIORITIZING ISSUES AND APPROACHES FOR INTERVENTION	56
THROUGH AN OUTCOME-OUTPUT FRAMEWORK	
REFERENCES	65

Preface

District Mineral Foundation (DMF) Rules of various states as well as Pradhan Mantri Khanij Khestra Kalyan Yojana (PMKKKY) specify that DMFs in every district should go through an annual planning exercise for identifying and prioritizing projects and works to be undertaken with DMF funds. Two clear issues have been underscored for DMF planning: districts should practice a bottom-up planning approach involving Gram Sabhas, and intervention should focus on certain “high priority” issues in mining-affected areas to maximize the welfare and benefit of the affected people.

Both of these specifications are given to ensure optimal deployment of financial resources available with DMFs for the “interest and benefit” of people affected by mining-related operations. For this, districts need to develop DMF plans adopting a systematic approach. This will also help to reduce ad hoc and reactive planning, poor investments and chances of special-interest interference.

To this effect, an indicative DMF plan for Bokaro district is proposed. The purpose of this exercise is to provide a template for identifying priorities and setting plan targets by DMFs based on an output-outcome oriented approach, which can be considered by the district in line with its annual district and DMF budgets. It is also as an attempt to enable more stable investments, as the indicative plan takes into account the opinions people from mining-affected areas, members of Gram Panchayats/wards, civil society representatives and officials at the block and district levels, the stakeholders who are in direct charge of the various bits of the economy.

Section 1: Introduction and overview

1.1 Context of indicative District Mineral Foundation plan

Planning and budget allocation of DMFs should happen as per provisions of the Mines and Minerals (Development and Regulation) Act (MMDR), 1957, as amended in 2015, and the Jharkhand DMF (Trust) Rules, 2016. The provisions under both of these emphasize on developing human capital, making people employable, and providing security for the future. The state DMF Rules also specify the requirement of a planning exercise that DMFs in every district should go through for identifying and investing on works and schemes that will benefit the people and areas affected by mining related operations. Districts should practice a bottom-up planning approach to understand people's needs and include such considerations in the DMF plan. There are also some clear directions in the state DMF Rules, aligned with the Government of India (GOI) scheme, the Pradhan Mantri Khanij Khestra Kalyan Yojana (PMKKKY) guidelines, which all DMFs are required to follow while developing plans and preparing budgets. These include:

- Undertaking a bottom-up planning approach involving Gram- Sabhas of mining-affected areas.
- Focusing on certain “high priority areas” such as, drinking water supply, sanitation, health, education, welfare of women and children, welfare of aged and disabled, skill development, environment preservation and pollution control measures.
- It has been specified that at least 60 per cent of the DMF budget should be earmarked towards addressing and mitigating the “high priority” issues.
- Limiting allocation on physical infrastructure and other big projects which already have funds from the state coffers. The Rules clarify that for areas such as physical infrastructure, irrigation, energy, watershed development etc, no more than 40 per cent of the money should be used.

Besides outlining the intervention issues, the DMF Rules and PMKKKY also emphasize on certain important factors that should be considered in DMF budgets:

- In the case of schemes or projects which already enjoy financial support from the Central or the state government, the developmental and welfare activities to be taken up by the DMF should complement those schemes and projects. This means there is a clear need to review the status of, and the gaps in, the Central/state schemes and projects which are operational in the districts.
- It has been clearly mentioned that a reasonable sum of the annual receipts should be kept as endowment fund for providing sustainable livelihood.

The indicative DMF plan as proposed for Bokaro district, takes all of these into consideration to provide a template for identifying issues and prioritizing investments that can serve the best interest of the people and areas affected by mining.

1.2 Planning approach

An ‘output and outcome’ oriented approach has been followed for developing the indicative DMF plan. In this approach, outputs are time-bound measurable products of investments and activities that can often be expressed in physical terms or units. The intended outcomes are collective results of the measurable outputs, which are qualitative improvements and sustainable over long-term.

The merit of an output and outcome oriented approach is that it ensures “accountable, pro-active and purposeful” planning as per the defined objective of a particular scheme. For DMF planning, this means fulfilling the objectives of the DMF law, as well as PMKKKY, which has been aligned to DMF.

The GOI has also emphasized on such approach in the latest budget of 2017-18. The GOI has noted that budget outlays need to be presented along with outputs and outcomes in measurable terms, to bring in greater accountability for the agencies involved in the execution of the schemes and projects¹.

1.3 Method

The method followed for developing the indicative plan involved the following two major steps:

- i. Gap analysis of key socio-economic, human development and environmental parameters.
- ii. Prioritizing issues and identifying approaches for intervention based on DMF objectives.

For both of these steps a bottom-up approach has been followed alongside evaluating factual and recorded information by the government.

i. Gap analysis: The deficiencies in intervention on the priority socio economic, human development and environmental issues in the district have been determined through gap analysis, taking into account quantitative and qualitative information, as well as resources. The gap analysis for various parameters was done through the following steps:

- a. Collecting data/information:** Collecting data and information on various parameters constitute of both quantitative and qualitative components.
 - The **quantitative part** is based on a **stock-taking exercise** on information pertaining to various socio-economic, human development and environmental parameters for the district, and specifically for mining-affected areas.
 - The qualitative part is based on the approach of participatory rural appraisal (PRA), to capture people’s perception and aspiration. The main PRA methods used for this exercise are focus group discussions (FGD), and semi structured interviews (SSI). For the purpose of this

study, FGDs have been conducted through randomized sampling in village(s)/ settlements, particularly in the mining-affected areas. With respect to SSI, discussions/ interviews were held with district and block officials and people in the mining-affected areas (*Refer to section 4 for detail on FGD and SSI process and observations*).

- b. Data collation and processing:** The quantitative and qualitative data/ information collected is collated and compiled in a prescribed format. The data has also to be checked for accuracy, errors, incompleteness and gaps.

Once the data is collated, it is important to analyze the situation. The collated data (both quantitative and qualitative) is thus used to describe the basic characteristics/features (descriptive statistics), and to draw broader inferences (inferential statistics).

- c. Resource mapping:** This involved identifying the resource envelop(s) to address the priority issues of the district. Since districts have budgets and allocations for every financial year, therefore the finances and allocations for only the last financial (2016-17) has been considered to understand the investments.

ii. Prioritizing issues and identifying approaches for intervention based on DMF objectives: Based on the gap-analysis, finally priority issues have been determined that DMFs need to focus on for intervention through a perspective planning approach. This will help to address issues immediately as well as plan for long-term investments.

Considering the output-outcome approach, a framework has been developed as the final step of the indicative planning exercise. In the framework, against each of the intended outcomes, a number of output factors have been identified which are considered to be crucial for achieving the target outcomes. It is intended that these outputs will be met through short-term, medium-term and long-term investments to achieve the final outcome.

Section 2: Background of the district

2.1 Location and geographical area

One of the 24 districts of Jharkhand, Bokaro is spread across 2,889 square kilometers, in about 3.6 per cent of the state's total area. It shares its boundary with Dhanbad to the east, Ramgarh to the west and Giridih, Hazaribagh and Dhanbad to its north. The southern boundary of the district runs along Purulia district of West Bengal. The district lies between 23°26" to 23°57" north latitude and 85°34" to 86°26" east longitude, and located at an elevation of 200-546 meters from mean sea level².

Damodar river and its tributaries flow through the district. Apart from this, minor rivers like Kunar, Khusa and Uri and Gobei also flow in the district.

2.2 Administrative areas

The Administrative headquarter of the Bokaro district is located at Bokaro Steel city. The district is divided into two sub-divisions – Chas and Bermo (Tenughat). Currently there are nine administrative blocks. These include Bermo, Chandankiyari, Chandrapura, Gomia, Petarwar, Nawadih, Chas, Jaridih and Kasmar (*See figure 1: Administrative map of Bokaro district*). The district has two municipal areas/nagar parishads, Chas and Phusro. There are a total of 635 villages (of which 611 are inhabited), 249 gram panchayats and 27 towns in the district³.

2.3 Land use/land cover

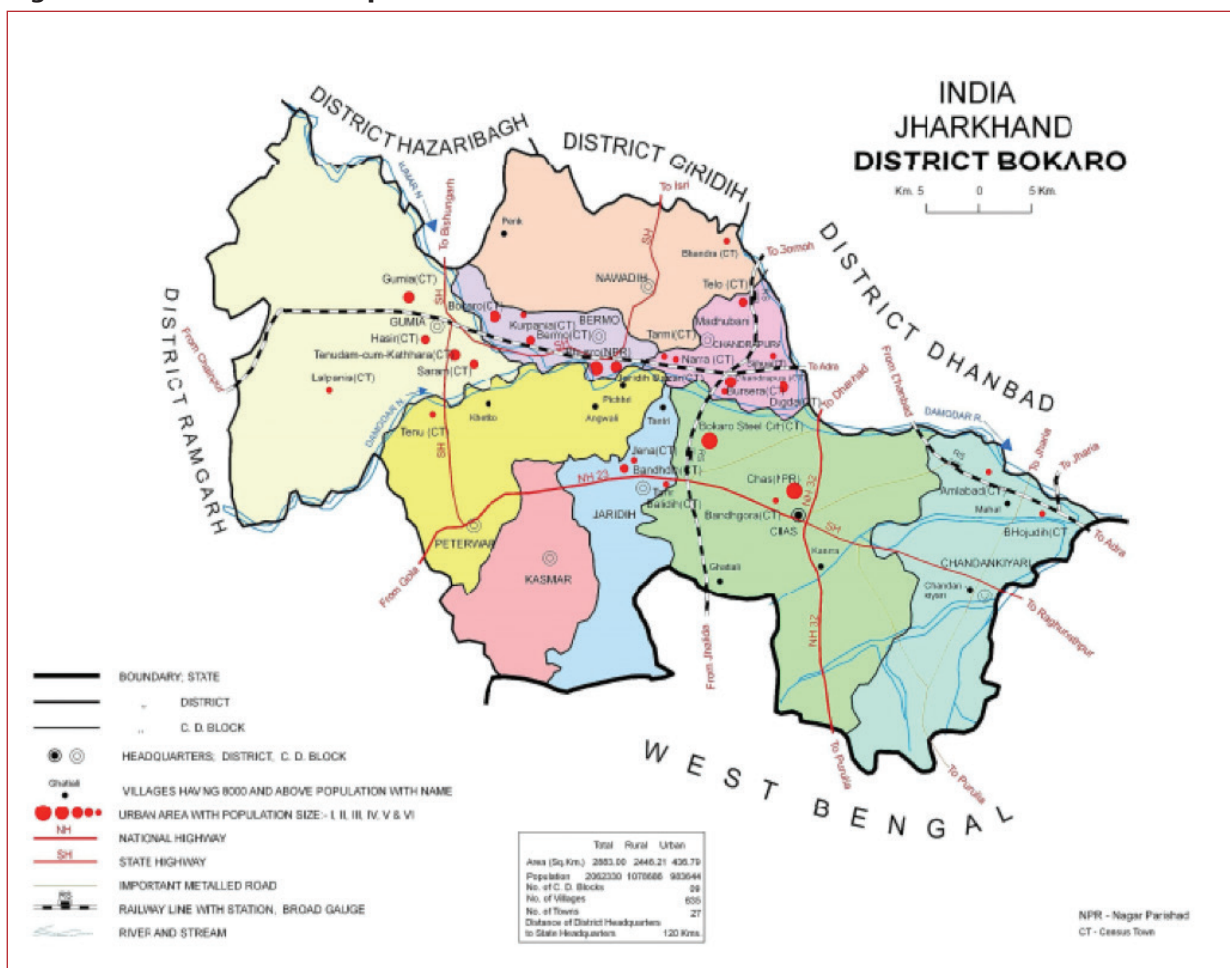
The land use/land cover of Bokaro shows that of the total area, about 42 per cent of the land is under active cultivation (12 per cent net sown area) or is cultivable (fallow land). About 25 per cent is forested. A significant proportion is also barren and wasteland, which taken together is about 17.7 per cent (*See table 1: Land use/land cover of Bokaro district*).

Land use/land cover of East Bokaro Coalfields

The East Bokaro coalfields constitute most of the mining landscape of Bokaro. As per the mapping of the coalfields done by the Central Mine Planning and Design Institute (CMPDI), the coalfields cover an area of about 20,266 hectares, most of which falls in Bokaro district⁴. As per information from the district, about 90 per cent of the mines are operated by Central Coalfields Limited (CCL).

The mining area constitutes about eight per cent of the coalfields. While the predominant land use in the area is of vegetation cover (about 36 per cent), but

Figure 1: Administrative map of Bokaro district



Source: District Census Handbook, Bokaro, 2011

Table 1: Land use/ land cover of Bokaro district

Section	Area (ha)	Total area (%)
Total geographical area	288,900	
Forest area	74,182	25.67
Area under non-agriculture use	30,946	10.71
Permanent pastures and other grazing lands	4857	1.7
Land under misc. tree crops and groves not included in net sown area	5409	1.9
Barren and uncultured land	40,311	14
Culturable wasteland	10,547	3.7
Fallow land other than current fallow	43,703	15
Current fallow	43,819	15
Net sown area	35,218	12

Source: Department of Planning-cum-Finance, Annual Plan, 2016-17.

most of it is covered by scrubs. Agricultural land, which is about 33 per cent, is also majorly fallow (See table 2: Land use/land cover in East Bokaro coalfields).

Table 2: Land use/land cover in East Bokaro coalfields

Land use/land cover classes	Area (ha)	Total area (%)
Vegetation cover	7315	36
Mining area	155	8
Agricultural land	6787	33
Wasteland	1791	9
Water body	161	8
Settlements	1213	6

Source: CMPDI, 2015

2.4 Mining activities and mining-affected areas

Jharkhand is one of the key coal producing states in India. In 2015-2016, the state produced more than 121 million tonnes (MT) of coal, accounting for nearly 19 per cent of the total production in the country⁵. In Bokaro, the total coal production in the last financial year was about 11.89 MT, almost all of which (11.7 MT) came from CCL mining operations. Bokaro district's estimated contribution to the state's coal production can be pegged at about 10 per cent.

As per the latest information provided by the district, Bokaro has 14 functional coal mines, most of which are operated by CCL or its subsidiaries (See table 3: Location of mines in Bokaro district). Apart from coal, the district also has many sand, stone and quartz quarries.

Table 3: Location of mines in Bokaro district

Block name	Number of mines	Name of mines
Bermo	4	Govindpur, Jarangdih, Bermo and Bokaro colliery
Chandrapura	1	Tarmi colliery
Gomia	2	Kathara and Swang colliery
Chandankiyari	2	Parbatpur and Amlabad colliery
Nawadih	2	Gunjardih and Dhori colliery
Peterwar	3	Jarangdih, Angwali and Kargali colliery
Kasmar	NIL	NIL
Chas	NIL	NIL
Jaridih	NIL	NIL

Source: District mines department, Bokaro

Mining-affected areas

The mining-affected area of Bokaro is spread across urban as well as in the rural areas. Considering this, six blocks in the district are regarded mining-affected, though in varied degrees. The major mining-affected area is the predominantly urban Bermo which also has the largest concentration of coal mines. Other areas include urban and rural parts of Chandrapura, and Gomia and rural parts of Chandankiyari, Nawadih and Peterwar. (See table 4: Mining-affected areas in Bokaro district).

It has to be noted that the district has currently only demarcated the villages which are in the close vicinity of the mines. However, ground observations suggest that many such areas have faced high displacement of the original inhabitants. Also, many areas like Chandrapura and Chandankiyari share the boundary with mines which fall administratively in Dhanbad. These areas have not been accounted for as mining-affected so far.

Table 4: Mining-affected areas in Bokaro district

Block name	Block affected (%)
Bermo	80
Chandrapura	70
Gomia	70
Chandankiyari	50
Nawadih	40
Peterwar	30
Kasmar	NIL
Chas	NIL
Jaridih	NIL

Source: As per estimates provided by district mines department, Bokaro

2.5 Demographic profile

As per Census of India 2011, the population of Bokaro district is about 20 lakhs – about 6.25 per cent of the state's total population – of which about 52 per cent is male and 48 per cent female. A decennial growth of nearly 16 per cent has been observed for the district's population in 2011 as compared to 2001 (See table 5: Population distribution).

The demographic distribution also reveals that the district is has high concentration of people in urban/municipal areas which is about 48 per cent of the total population; rest 52 per cent live in rural areas of the district. The district is also densely populated with a population density of 715 per sq km, as compared to India's population density of 328 (Census, 2011) and only second to Dhanbad which is the most populated district in the state.

Table 5: Population distribution

Total district population	Male (%)	Female (%)	Urban (%)	Rural (%)	SC (%)	ST (%)
2,062,330	52	48	47.7	52.3	14.5	12.4
Sex Ratio	922					
Density of Population (persons per sq. km)	715					
Total households	393,439 (rural: 206,148; urban: 188,770)					

Source: Census of India, 2011

Population distribution of mining-affected areas

Among the mining-affected areas, Bermo is most urbanized, with about 96 per cent of the people living in municipal areas. Chandrapura and Gomia are the other two blocks with a sizeable fraction of urban population (63 per cent and 43 per cent respectively). The other affected areas have predominantly rural population.

As per distribution across caste, while general category is predominant, but there is considerable representation of Scheduled Caste (SC) and Scheduled Tribes (ST) in the population. Among the mining-affected areas, Bermo and Nawadih blocks have the highest percentage of SC population and Peterwar the largest ST population (See table 6: Demographic profile of blocks in Bokaro district).

Table 6: Demographic profile of blocks in Bokaro district

Block name	Total (no.)	Female (%)	Male (%)	SC population (%)	ST population (%)	Rural population (%)	Urban population (%)
Bermo*	189777	47.8	52.2	14.9	6	2.2	97.8
Chandankyari	230238	48	52	25.3	8	95	5
Chandrapura	132162	48	52	11.3	8.5	37	63
Gomia	231185	48.5	51.5	12.5	20	56	43.4
Nawadih	138454	49	51	13.35	12.52	96.7	3.3
Petarwar	132150	48.5	51.5	15	29	96.5	3.43
Chas*	813402	47.4	52.6	13.5	8.1	30.6	69.4
Jaridih	104988	48	52	11	30.7	72	28
Kasmar	89974	49	51	11	15	100	–
TOTAL	2062330	48	52	14.5	12.4	52.3	47.7

Source: Census of India, 2011; *For the purpose of analysis, Phusro (NP) and Chas (NP) have been included in Bermo and Chas respectively

Section 3: Situation analysis through stock-taking

The stock-taking exercise of various socio-economic, human development and environmental parameters has been done by analyzing district and block level data/information. The main sources of data, including contextual information, include various Government documents and reports as published by accredited agencies. Some key sources from where data has been obtained include-

- Census of India reports- District Census handbook, Bokaro, 2011.
- National Sample Survey (NSS) data, Ministry of Statistics and Program Implementation.
- Socio Economic Caste Census data, Ministry of Rural Development.
- Rural Health Statistics Report (2014-15), Ministry of Health and Family Welfare.
- District Information System for Education (DISE): School Reports maintained by National University of Educational Planning and Administration (NUEPA).
- Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) MIS Reports for districts, Ministry of Rural Development.
- District level authorities and departments- such as District Rural Development Agency, health department, education department, water supply and sanitation department, social welfare department etc.
- Latest reports prepared by Government, accredited institutions/agencies.
 - National Family Health Survey of India.
 - Census of India, Annual Health Survey.
 - Ministry of Drinking Water and Sanitation, reports on Swachh Bharat Mission.
 - Central Ground Water Board (CGWB), District ground water brochures.

3.1 Analysis of human development parameters

Human development indicators typically reflect average achievement with respect to three key dimensions of human development. These include⁶:

- A long and healthy life.
- Having education and being knowledgeable.
- Having a decent standard of living.

Therefore, for a district, the key parameters of measure of human-development include the status of public health, nutrition and concerns of food security and livelihood of people. To ascertain the status of each of these a situation analysis was done through stocking-taking of data/information at the district and the block levels.

3.1.1. Public Health

Being a significant mining and industrial district of Jharkhand, Bokaro is also one of the polluted districts with high levels of air as well as water pollution suggests various scientific and academic studies. The Central Pollution Control Board (CPCB) has identified Damodar river, the main source of surface water, among the polluted river stretches (*Refer to section 3.3: Environmental pollution and degradation*) Interactions with the community and officials during FGDs and SSIs reveals heavy pollution due to coal-dust and emissions from coal based industries and its strong bearing on the health of people living in affected areas. (*Refer to section 4*).

The public health and healthcare status of Bokaro district, and particularly the mining-affected areas has been reviewed on the basis of the following key parameters:

- a. Disease prevalence.
- b. Existing healthcare infrastructure in the district – primary and secondary facilities.
- c. Status of available healthcare staff – doctors, health workers etc.

Based on the situation on each of these, the overall gaps in the public healthcare sector have been identified.

A. Review of healthcare parameters

a. Disease Prevalence

The data of disease prevalence at the district level, more so at the block level is poor. The situation has been largely captured through both available government data and interviews with health officials, health centre visits and interactions with communities in mining-affected areas.

According to Annual Health Survey (2012-13), Bokaro has a high prevalence of chronic diseases like diabetes, hypertension, tuberculosis (TB) in both rural and urban areas, even when compared to the Jharkhand average (*See table 7: Prevalence of diseases in Jharkhand state and Bokaro district*). Given the high air pollution in the region resulting from mining and industrial emissions, the population seems especially vulnerable to respiratory ailments such as asthma or chronic respiratory diseases in urban areas and TB in rural areas.

The TB prevalence in the district's rural areas is very high (254 per 1,00,000 population) when compared to the recent India average of 211⁷. It is to be noted that the India average is in itself very high and is regarded as the one of the high TB burden countries and has a Sustainable Development Goals (SDG) target of eradicating TB by 2030⁸. Furthermore, prevalence of other chronic diseases such as diabetes, hypertension is extremely high in Bokaro when compared with the state average.

During discussion, people as well as officials in mining-affected blocks reported widespread respiratory ailments including TB, bronchitis, asthma as well as kidney stones and skin allergies and infections.

Table 7: Prevalence of diseases in Jharkhand state and Bokaro district

Diseases	Prevalence in Jharkhand (per 1,00,000 population)			Prevalence in Bokaro district (per 1,00,000 population)		
	Total	Rural	Urban	Total	Rural	Urban
Diabetes	802	383	1970	1608	660	2463
Hypertension	839	453	1916	1447	613	2197
Tuberculosis	307	348	192	189	254	131
Asthma/Chronic respiratory disease	415	376	524	430	383	472
Any kind of chronic illness	7413	6536	9858	8759	7468	9923

Source: Annual health survey, 2012-13

Besides pulmonary diseases, incidence of water and vector-borne diseases such diarrhoea and malaria is high, particularly among children. Data of the Ministry of Health and Family Welfare (2017) shows that children below the age of five years are vulnerable to these diseases⁹. (See table 8: Percentage of diarrhoea, dehydration and malaria in children 0-5 years of age to total reported childhood diseases of corresponding age). Both diseases are recognized as key factors behind child morbidity and mortality both¹⁰.

The problem is pervasive across rural and urban areas. The primary reason for such illnesses is unavailability of clean drinking water and poor sanitation. These conditions have a strong bearing on the development of children, as also identified in the Global Hunger Index Report (2017). The report has clearly identified that lack of proper sanitation has a strong effect on child health and their nutrition absorption capacity¹¹.

Table 8: Percentage of diarrhoea, dehydration and malaria in children 0-5 years of age to total reported childhood diseases of corresponding age

Block name	Diarrhoea and dehydration (%)	Malaria (%)
Bermo	79.8	18.2
Chandankiyari	100	0
Chandrapura	NA	NA
Gomia	NA	NA
Nawadih	78.9	21.1
Petarwar	26.6	70.1
Chas	70.4	15.6
Jaridih	97.9	2.1
Kasmar	55.1	29.9

Source: Ministry of Health and Family Welfare, 2017

b. Existing healthcare infrastructure in the district - primary and secondary facilities

Given the severity of pollution and poor health conditions of people as reported to the researchers, the available health infrastructure, along with qualified health staff at the facilities is critical. Considering these factors, in this section review has been done separately for primary and secondary healthcare facilities. Health facilities have also been seen in rural and urban context, since requirements between these regions differ.

Primary healthcare: Health Sub Centres (HSC), Primary Health Centres (PHC) and Community Health Centres (CHC), together constitute primary healthcare facilities in the district.

Indian Public Health Standards (IPHS) stipulates the minimum requirements of these public health facilities. According to IPHS, in the rural areas with plain grounds, there should be at least one sub-centre for every 5,000 people, one PHC per 30,000 people, and one CHC per 1,20,000 people¹².

In Bokaro district, the number of CHCs when considered with regard to the corresponding rural or urban population, are more or less as per the IPHS standards. However, it is the HSCs and PHCs which are way short of requirement. Considering the rural population of the district, on an average, there is just one HSC per 14,000 people and one PHC per 98,000 people. (*See table 9: Healthcare centres in Bokaro district*).

This deficit is also reflected in the requirements estimated by the district. As per district data, about 300 more HSCs and 27 more PHCs are needed apart from the existing ones to comfortably meet the requirements as per population.

Table 9: Healthcare centres in Bokaro district

Block name	Total HSCs	Total PHCs	Total CHCs	Sub-divisional hospitals	District hospital
Rural areas					
Chandankiyari	12	2	1	3	1
Gomia	20	3	1		
Nawadih	14	3	1		
Petarwar	13	1	1		
Jaridih	8	1	1		
Kasmar	9	1	1		
Urban areas					
Bermo	16	1	1		
Chandrapura	NIL	NIL	NIL		
Chas	24	4	1		

Source: Office of civil surgeon, Bokaro district

The situation is equally stark in urban areas. The National Urban Health Mission (NUHM), stipulates the minimum requirements for these areas¹³. According to NUHM, there should be one urban PHC (U-PHC) per 50,000- 60,000

population in urban areas. However, in Bermo, with predominantly urban population, there is only one U-PHC for nearly 1.85 lakh people. Additionally, district officials reported that there is roughly one ambulance available per block. This compounds the situation further by restricting emergency response and referrals.

Secondary healthcare: The secondary healthcare system constitutes of sub-district/sub-divisional hospitals and district hospital. They both constitute important components of more specialized and comprehensive healthcare facilities for a district's rural as well as the urban population.

The sub-district/ sub-divisional hospitals form an important link between HSC, PHC and CHC on one end and district hospitals on other end, and are the first referral units for the tehsil/block population in which they are located. The National Health Mission (NHM) also identifies these units to be significant for bringing down the maternal mortality and infant mortality as these facilities are meant to provide emergency obstetrics care and neonatal care¹⁴.

The district hospital on the other hand functions as a secondary level referral centre for the public health institutions below the district level such as sub-divisional hospitals, CHC, PHC and HSC. While all district hospitals are required to be equipped to provide all basic specialty services, but they should also be developed into super-specialty services gradually, particularly for bigger districts identified in the NUHM¹⁵.

Bokaro district has three sub-divisional hospitals (SDH) and one district hospital (DH). This means that the district has the required referral facilities. For urban areas, these could also be points of enabling health access. However, the man-power and resources in the hospitals is a concern and needs to be strengthened, as discussed below.

c. Status of available healthcare staff

The healthcare staff information as obtained from official sources include information on medical officers or doctors, staff nurses, auxiliary nurse midwives (ANM) etc.

In Bokaro district, there is an acute shortage of doctors at both primary and secondary healthcare facilities. Among primary healthcare facilities, PHCs are regarded as the first port of call for a qualified doctor for people in rural areas who are seeking healthcare and also those who are referred from sub-centres for curative, preventive and promotive healthcare¹⁶. In Bokaro, most PHCs are functioning with half the number of doctors. The shortage is particularly acute in rural mining-affected areas. For example, in Gomia, there is just one doctor for a rural population of about 1.3 lakh people, in Nawadih, there is one doctor for every 44,600 people (*See table 10: Health staff at various healthcare facilities in Bokaro district*).

The deficit is glaring even at secondary healthcare facilities, which are the core to providing more sophisticated level of treatments. There are only 10 doctors at the district hospital against the 32 sanctioned posts reported in the

Table 10: Health staff at various healthcare facilities in Bokaro district

Block name	HSC		PHC			CHC		
	No. of ANMs	No. of MPHWs	No. of ANMs	No. of MPHWs	No. of doctors	No. ANMs	No. of Staff Nurse	Doctors
Rural areas								
Chandankiyari	22	5	3	1	1	1	0	2
Gomia	24	7	1	1	1	1	0	4
Nawadih	15	5	5	1	2	1	0	4
Peterwar	16	5	1	1	2	1	0	4
Jaridih	10	4	1	0	1	1	0	9
Kasmar	11	4	2	0	0	1	0	1
Urban areas								
Bermo	28	6	3	0	1	2	0	2
Chandrapura*	NA	NA	NA	NA	NA	NA	NA	NA
Chas	42	13	11	2	4	2	0	3
Sub-divisional hospital (doctors)								14
District hospital (doctors)								10

Source: Office of civil surgeon, Bokaro district; *Chandrapura is not considered as health block yet. Hence there are no separate healthcare facilities for the block.

district data. The shortage is equally acute at the CHC level. For example, in Chandankiyari, there are only two doctors for a population of 2.3 lakh people. Overall, CHCs in Bokaro are functioning with only half the required number of specialists. Besides doctors, there is also significant shortage of staff nurses. So far, none of the CHCs in the district have a full-time staff nurse. The IPHS norms require at least 1 staff nurse per CHC.

There is also a clear deficit of ANMs, which are the main health links for people at primary healthcare facilities, particularly at HSCs. Mining-affected Gomia, Peterwar and Nawadih are worse than other blocks, with just about one ANM per HSC. IPHS standard stipulate at least two.

Also the number of multi-purpose health workers (MPHW), who are critical to the medical edifice as they monitor and reach out as extension of the key government health programmes for TB, malaria, leprosy etc., fall short of the required capacity.

B. Gaps in health sector

The gaps or deficits in the health sector in the mining-affected areas shows deficits both in infrastructure as well as resources. The key deficits include:

- a. Inadequate human resources – doctors, nurses and frontline health workers.
- b. Inadequate number of primary healthcare facilities.

a. Inadequate human resources – doctors, nurses and frontline health workers

There is a clear deficit of healthcare personnel (particularly doctor and nurses) in the district including in mining-affected areas. The requirement, as indicated by the sanctioned posts provided by the district, brings out this deficit very clearly. (See table 11: Deficits in health staff Bokaro district)

The number of doctors in the district, at all levels is currently way short of the requirement. At the DH, for instance, there is a 69 per cent deficit in the number of doctors. At SDH and CHCs the shortfall is about 45 percent on an average. Additionally there is 50 per cent shortfall of specialists like surgeons, gynaecologist etc at CHCs in Bokaro.

There is also an acute crunch of staff nurses at CHCs. In the absence of full-time staff-nurses, CHCs in the district are managing with seven contractual nurses.

At the primary health facilities, there is about 28 per cent shortage of ANMs at HSCs and about 60 per cent deficit of multi-purpose health workers (MPHWs) at both HSC and PHC level.

Bokaro is the only district in Jharkhand which has three sub-divisional hospitals in addition to the district hospital, as reflected in Rural Health Statistics, 2014-15. The analysis shows that the district also has almost adequate number of CHCs. The infrastructure can be very effective if they have adequate, qualified and trained healthcare personnel.

Table 11: Deficits in health staff in Bokaro district

Type of healthcare personnel as per facility	Sanctioned	In-position	Contractual	Deficit (%)
Total number of ANMs at HSCs	232	168	-	28
Total number of MPHWS at HSCs	116	49	-	58
Total number of ANMs at PHCs	32	27	-	16
Total number of MPHWS at PHCs	16	6	-	63
Total number of sanctioned pharmacist and lab technicians at PHCs	32	11	-	66
Total number of staff nurse at CHCs	56	0	7	88
Total number of ANM at CHC	16	9	6	7
Medical officers at PHCs	30	13		56
Medical officers at CHC	55	29	-	48
Specilists at CHC	16	32	-	50
Medical officers at SDH	25	14	-	44
Medical officers at DH	32	10	-	69

b. Inadequate number of primary healthcare facilities

Considering the total rural population of about 10.8 lakh in Bokaro district, the primary healthcare infrastructure, specifically the HSCs and PHCs, is sub-optimal.

The primary healthcare infrastructure is particularly important for rural areas, as it is the first point of health contact, as well as delivery and referral services in cases of emergencies. It is also important for women and children to ensure nutrition and health monitoring.

In rural areas, all HSCs are serving more than double their capacity. In mining-affected Gomia, one HSC is serving more than four times the stipulated population (See table 12: *Deficits in infrastructure of primary healthcare facilities*). The situation is equally poor in other rural areas like Chandankiyari, Nawadih and Peterwar. Similarly, the PHCs in mining-affected areas are also over-burdened, serving about two to three times their capacity. Peculiarly worse off are Chandankiyari and Peterwar, which are serving more than three to four times the capacity. Ground-level interactions also back the district data (Refer to section 4). With a high pollution and health burden, lack of primary facilities remains a key concern for Bokaro.

In the urban context, having the minimum required number of U-PHCs as stipulated under NUHM is crucial for the poor, as well as for extending maternal and child benefits. In Bermo, the only U-PHC is catering to 6.2 times its stipulated population.

Table 12: Deficits in infrastructure of primary healthcare facilities

Block name	Average people served per HSC	Serving over IPHS norms (1 HSC/5000 people)	Average people served per PHC	Serving over IPHS norms (1 PHC/30,000 people)	Average people served per CHC	Serving over IPHS norms (1 CHC/1,20,000 people)
Rural areas						
Chandankiyari	18,216	2.7	109,299	3.6	218,597	1.8
Gomia	6545	4.6	43,633	1.5	130,898	1.1
Jaridih	9459	3.2	75,671	2.5	75,671	0.6
Kasmar	9997	3.0	89,974	3.0	89,974	0.7
Nawadih	9561	3.1	44,616	1.5	133,848	1.1
Petarwar	9817	2	127,617	4.3	127,617	1.1
Urban areas						
Block name	Average people served per HSC	Serving over IPHS norms (1 HSC/5000 people)*	Average people served per PHC	Serving over IPHS norms (1 PHC/50-60,000 people)	Average people served per CHC	Serving over IPHS norms (1 CHC/2,50,000 people)
Bermo	11,600	2.6	185595	6.2	185,556	0.7
Chas	23513	1.3	141080	2.8	564319	2.3

*NUHM does not prescribe standards for HSCs. The standard for assessment has been taken as per IPHS.

3.1.2 Nutrition and food security

With respect to nutrition and food security, the primary parameters looked at include:

- Infant mortality, under five mortality and malnourishment.
- Coverage under Integrated Child Development Services.
- Coverage under National Food Security Act.

Based on the situation of each of these, overall gaps with respect to nutrition and food security have been identified.

A. Review of nutrition and food security parameters

a. Infant mortality, under five mortality and malnourishment

In Bokaro district, the average infant mortality rate (IMR) is 28 and under five mortality rate (U5MR) is 38 (See table 13: IMR and U5MR for Bokaro district). Both these indicators are worse for rural areas. The rural areas, IMR is 35 and U5MR is 50. These parameters fall short of the country's commitment for Sustainable Development Goals (SDG), necessitating focused and serious intervention. Under SDG, India's target is to reduce U5MR to 25 by year 2030¹⁷.

Table 13: IMR and U5MR for Bokaro district

Indicators	Total	Rural	Urban
IMR	28	35	19
U5MR	38	50	24

Source: Annual health survey, 2012-13

Besides mortality indicators, child growth and development indicators are also critical for ensuring well-being. Malnutrition is the key for assessing child nutrition and development. Some of its main symptoms are prevalence of stunting, wasting, low weight among children below the age of five years.

In Bokaro district, these indicators are poor, reflecting prevalence of poor nutrition among children (See table 14: Symptoms of malnutrition among children below five years). About 40 per cent children in the district are stunted, close to 37 per cent are wasted and, about 50 per cent are underweight. The data also shows that only about seven per cent children in the six to 23 months age group receive an adequate diet¹⁸.

Table 14: Symptoms of malnutrition among children below five years

Nutritional Indicators	Urban	Rural	Total
Children under 5 years who are stunted	32.9	45.9	39.8
Children under 5 years who are wasted	29	43.8	36.9
Children under 5 years who are severely wasted	14.6	20.3	17.6
Children under 5 years who are underweight	38.8	61.3	50.8
Total children age 6-23 months receiving an adequate diet	8.9	6.4	7.7

Source: National family health survey (NFHS), 2015-16

Poor nutrition among children is also inextricably linked with poor nutritional status of mothers. As per National Family Health Survey (NFHS), 2015-16, about 30 per cent women in the 15-49 years age-group in the district have a below normal (lower than 18.5 kg/m) body mass index (BMI) and about 73 per cent pregnant women in the same age-group were also found to be anemic¹⁹.

b. Coverage under Integrated Child Development Services

The primary goal of Integrated Child Development Services (ICDS) as identified by the Government of India is to reduce malnutrition and morbidity and mortality caused by nutritional deficiencies. To achieve this, the government identifies six services that must be assured. These include – supplementary nutrition, health education, non-formal pre-school education, immunisation, health check-up and monitoring and referral services. Among these, the former three are required to be provided and supported by the network of anganwadi centers (AWCs), while the latter three are designed to be delivered through the primary healthcare infrastructure.

All children below the age of six years are the target group for ICDS as per the universal coverage aim of the programme. Further, the government has stipulated coverage norms for ICDS for this age-group. This requires that in non-tribal areas each AWC should cover 40 beneficiaries, and in tribal areas each AWC should cover 42 beneficiaries²⁰.

The status of ICDS coverage and AWCs has been looked into through four parameters – the coverage of beneficiaries under ICDS, adequacy of AWCs, staff at AWCs and availability of basic infrastructure and facilities such as AWCs with permanent structure, drinking water and toilet facilities within premises.

The overall coverage of ICDS beneficiaries considering children below six years of age is low in various areas, particularly the rural parts. Among mining-affected areas, except for Bermo, the coverage on an average is around or below 50 per cent. For example, in Chandrapura it is 45 per cent, in Nawadih 47 per cent (See table 15: Number of AWCs and beneficiaries covered in Bokaro).

Table 15: Number of AWCs and beneficiaries covered in Bokaro

Block name	No. of AWCs	0-6 population	Coverage of children 0-6 years	Average number of children covered per Anganwadi
Bermo	163	23,740	93,45	145
Chandrapura	157	18,110	8,137	115
Chandankiyari	324	36,317	19,612	112
Gomia	302	35,144	21,227	116
Nawadih	176	22,236	10,471	126
Peterwar	201	19,946	11,326	99
Chas*	669	110,068	45,161	164
Jaridih	140	15,342	8,602	109
Kasmar	124	12,883	7,030	103

Source: District social welfare department, Bokaro; Census of India, 2011; *includes B.S. City which has otherwise been recorded separately

Considering the basic infrastructure to deliver ICDS services, that is the AWCs, all mining-affected areas seem to have inadequate number of AWCs when compared against the ICDS benchmark. Considering universal coverage of all children below six years (potential beneficiaries), on an average every AWC in these areas need to support 2.5 to three times the number of children that the ICDS stipulates.

Many AWCs also lack the necessary infrastructure and basic facilities, such as having a permanent structure, drinking water facility and toilets (*See table 16: Infrastructure and status of facilities in AWCs in Bokaro*). For instance, only about 60 per cent AWCs have drinking water facility. Barring Bermo, very few AWCs have toilets and more than half the AWCs in Bokaro district are operating without a permanent structure.

Table 16: Infrastructure and status of facilities in AWCs in Bokaro

Block name	No. of AWCs	AWCs with permanent structure (%)	AWCs with drinking water facility (%)	AWCs with toilet facility (%)
Bermo	163	26.3	76	72.4
Chandankiyari	324	51	67	12.7
Chandrapura	157	53.5	84	32
Gomia	302	32.5	43.7	23
Nawadih	176	51	65	32
Peterwar	201	38	35	13
Chas	669	26.5	51	9
Jaridih	140	60.7	72	41
Kasmar	124	59	76	32

Source: District social welfare department, Bokaro

Though no quantitative indicators are available, discussions with the people in mining-affected areas as well as with district officials suggest that the AWC staff also needs to be trained for proper nutrition education as well as monitoring child health. Responses also point towards a limitation of AWC meals in addressing the nutrition issues. Most responses highlight need for nutritive enhancements in meals to tackle the issue of poor nutrition in both children as well as expectant and new mothers (*Refer to section 4*).

c. Coverage under National Food Security Act

The National Food Security Act (NFSA), 2013, aims to ensure people's access to adequate quantity of quality food at affordable prices through public distribution system²¹. In Jharkhand, The NFSA implementation has been made more targeted through an "inclusion and exclusion" criteria notified by the Jharkhand Food, Public Distribution and Consumer Affairs Department in January, 2017.

The notification particularly specifies two categories as beneficiaries to cover the vulnerable section through the targeted public distribution system (TPDS). These include "priority households" and the Antyodaya Anna Yojana (AAY)

households. Further there can be some other (which the notification does not elaborate on) as identified by the state government²².

While the AAY category includes the already defined, poorest of the poor, the notification provides detailed criteria to identify priority households. The “priority households” include those living on alms, households without shelter, and households of Primitive Tribal Groups (PTG). The criteria also includes all people with 40 per cent or more disability, those suffering from incurable diseases like AIDS, cancer, leprosy etc, widows, people above 60 years of age. All these beneficiaries must not be employed or retired as an employee of Central or state government, public sector undertakings (PSU), government aided autonomous and local bodies.

For urban areas, the notification specifically includes people of certain low earning/wage professions such as, those engaged in rag-picking, sweeping, domestic work, unskilled labour, rickshaw-puller, painter, mechanic, mason, plumber, tailor, security guard etc.

The notification also clarifies on who are excluded as being beneficiaries. The exclusion criteria includes households owning a motorized four wheeler/heavy vehicle like tractor, households with any member who is a regular employee of Central or state government, public sector undertakings (PSU), government aided autonomous bodies and local bodies, household with any member owning or managing a government registered business, households with any member paying income tax/service tax/occupational tax, households with any member owning five acres or more of irrigated land or land more than 10 acres, households that have an air-conditioner, refrigerator, washing machine etc., or own a pucca house with three or more rooms.

In Bokaro, there are 13.3 lakh people covered under priority and AAY households. This is essentially about 65 per cent of the total district population (*See table 17: Coverage under TPDS in Bokaro district*). The number therefore suggests that there is a huge section of people in the district who are economically vulnerable and need proper social and welfare support to secure the basics.

Table 17: Coverage under TPDS in Bokaro district

Block name	No. of beneficiaries under priority households	No. of beneficiaries under AAY
Bermo	83,079	3140
Chandrapura	83,447	6435
Chandankiyari	169,275	15,767
Gomia	156,511	17,084
Nawadih	115,425	11,933
Peterwar	88,340	8471
Chas*	401,288	20,858
Jaridih	63,921	10,092
Kasmar	70,473	6719

*Source: Food, public distribution and consumer affairs department website, Jharkhand; * Includes BS City which has otherwise been recorded separately.*

B. Gaps in nutrition and food security

The deficits with respect to nutrition related issues in the mining-affected areas as identified from the analysis of the official data shows deficits both in infrastructure as well as resources. The key deficits include:

- a. Inadequate number of AWCs.
- b. AWCs not having a permanent structure.
- c. AWCs lacking drinking water and toilet facilities.

Considering the absolute number of AWCs, as well as availability of basic infrastructure and facilities, there is a clear deficit in every aspect (*See table 18: Overall gap in AWC infrastructure and facilities*).

a. Inadequate number of AWCs

As analyzed, on an average, AWCs in mining-affected areas on an average are serving about three times their stipulated capacity. The fairly low coverage under ICDS also falls in line with such deficit as discussed earlier. The coverage which in most areas is now less than 50 per cent needs to be scaled up significantly. Having adequate number of functional AWCs will be key to this.

b. AWCs not having a permanent structure

The data also clearly reveals that not only the number of AWCs is of concern, but even the recorded existing ones do not have permanent structures. In extensively affected areas such as Bermo, Gomia and even Chandrapura, about 70 per cent AWCs do not have permanent structures.

c. AWCs lacking drinking water and toilet facilities

With respect to availability of proper drinking water and toilet facilities, which are critical for proper functioning of AWCs and health of children, most AWCs in the district fare poorly. For instance, in Gomia, 65 per cent AWCs lack drinking water facilities. Similarly, barring Bermo, close to 70 per cent AWCs in other areas lack toilet facilities. Bermo is only relatively better with about 27 per cent AWCs not having toilets.

Table 18: Overall gap in AWC infrastructure and facilities

Block name	Total AWCs	Coverage of children exceeding capacity	AWCs lacking permanent structure (%)	AWCs lacking drinking water facilities (%)	AWCs lacking toilet facilities (%)
Bermo	163	3.5	73.7	24	27.6
Chandrapura	157	3	46.5	16	68
Chandankiyari	324	2.8	49	33	87.3
Gomia	302	2.9	67.5	56.3	77
Nawadih	176	3	49	35	68
Peterwar	201	2.5	62	65	87
Chas	669	4	73.5	49	91
Jaridih	140	2.7	39.3	28	59
Kasmar	124	2.6	41	24	68

3.1.3 Education

The education status of Bokaro district, specifically of the mining-affected blocks has been reviewed on the basis of the following parameters:

- a. Status of literacy and level of education.
- b. Educational infrastructure – number of schools for various grades, availability of basic amenities in schools such as drinking water, toilets and electricity.
- c. Current enrollment status.
- d. Pupil teacher ratio (PTR).

Based on the situation of each of these, the overall gaps in the education sector have been identified.

A. Review of educational parameters

a. Status of literacy and level of education

The overall literacy rate in Bokaro is 72 per cent, which is better than the state's average of 66.4 per cent and close to the national average of 74 per cent (*See table 19: Literacy in Bokaro district*). Among the literate population, male literacy is about 82 per cent, which is way higher than 60 per cent literacy among the females. Among the scheduled groups, the literacy rate is poorer than the overall figures. It is about 56 per cent among ST population and about 63 per cent among SC population.

Table 19: Literacy in Bokaro district

Category	Total Literates (%)	SC Literates (%)	ST Literates (%)
Total	72	63	56
Male	82	75	68
Female	60	50	44

Source: Census of India, 2011

Among the blocks, Bermo (including the NPs) has the highest literacy rate, close to 79 per cent. The data shows that predominantly rural areas have lower levels of literacy compared to the urban (*See table 20: Block-wise literacy*).

Table 20: Block-wise literacy

Block name	Literate population out of block population (%)
Bermo	79
Chandrapura	75
Chandankiyari	64
Gomia	65
Nawadih	63
Peterwar	62
Chas	78
Jaridih	69
Kasmar	65

Source: Census of India, 2011

Table 21: Level of education in Bokaro district

Age-group	18-19			20-39			40-59		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Illiterates (%)	14	9	21	28	15	41	47	29	66
Literates (%)	86	91	79	72	85	59	53	71	34
Literates without education level (%)	1	1	2	3	2	3	4	3	6
Below primary (%)	4	4	5	6	5	8	8	7	11
Primary (%)	14	14	14	18	16	20	22	19	29
Middle (%)	17	16	17	19	19	18	19	19	19
Matric/Secondary (%)	26	27	25	17	19	18	20	21	17
Higher Secondary (%)	37	36	38	17	18	15	8	10	6
Graduate and above (%)	0	0	0	18	19	17	16	18	12

Source: Census of India, 2011; The proportion of male and female literates is calculated from their respective population.

While the percentage of literate population is high, the level of education completion that is required for securing employment (such as at least higher secondary or graduation level) is poor. For example, among the 72 per cent literates in the 20-39 years age group, which is the most employable age, only 17 per cent people completed highest secondary schooling, and just about 18 per cent completed graduation or above. The proportion of literate females is again poor in this age group, with about 59 per cent falling in the illiterate category (See table 21: Level of education in Bokaro district).

However, the trend seems to be improving over time, though far from the necessary development goals of education for all. For example, in the 18-19 years age group during the same enumeration period, of the 86 per cent literates, 37 per cent had completed higher secondary education.

b. Educational infrastructure

The educational infrastructure has been evaluated with respect to some key infrastructural issues such as number of schools of various grades and schools with basic amenities such as tap water supply, toilet facilities and electricity.

Number of schools for various grades: Official statistics show the presence of all levels of schools for elementary, secondary and higher secondary education. However, the numbers of schools for various levels vary (See table 22: Distribution of schools in Bokaro district).

In all blocks, including mining-affected areas, the number of schools providing elementary education (primary and upper primary levels) is considerably more than the number of secondary and higher secondary schools. During ground level interaction as well (Refer to section 4), most people pointed out the shortage of secondary and higher secondary schools (including their poor accessibility due to distance), often leading to drop-outs, particularly among females. The urban-rural divide is also apparent. Bermo and Chandrapura, for instance, have more number of secondary schools compared to the rural areas.

Table 22: Distribution of schools in Bokaro district

Block name	Pr.	Pr.+U.P.	Pr.+UP+ Sec+H.S.	Pr.+ U.P.+ Sec.	U.P.	U.P.+ Sec.	U.P.+ Sec+ H.S.	Sec.	H.S.	Sec.+ H.S.
Bermo	58	51	5	18	0	3	0	2	2	2
Chandrapura	89	56	3	7	0	2	2	7	2	0
Chandankiyari	176	86	1	11	0	4	1	3	2	1
Gomia	202	104	4	13	0	7	1	7	2	1
Nawadih	145	61	0	7	0	3	1	2	1	1
Petarwar	163	73	0	11	0	1	2	4	3	1
Chas	323	251	28	29	0	14	3	11	13	1
Jaridih	98	64	0	7	0	1	1	5	2	1
Kasmar	119	47	0	8	0	1	1	4	1	1
Total	1373	793	41	111	0	36	12	45	28	9

Source: The DISE Report, 2015-16

Availability of basic amenities in schools - drinking water, toilet, electricity:

Guidelines under both Right to Education (RTE) Act, 2009, and Rashtriya Madhyamik Shiksha Abhiyan (RMSA) stipulate the need for infrastructure support to enhance access and provide quality education. Supporting infrastructure include, having separate toilets for boys and girls at all levels of education, availability of clean drinking water at premises and electricity supply in schools²³.

The data on these basic amenities shows that while toilets are present in most of the schools across the district, the access to tap water and the coverage of electricity is very limited (*See table 23: Schools with tap water, toilets and electricity facilities*). Though schools in urban areas, Bermo and Chandrapura have better access to these two, the situation is only relatively better. Very few schools in the rural blocks have tap water and electricity.

c. Current enrolment status

The assessment of student enrolment is done through Gross Enrolment Ratio (GER) and Net Enrolment Ratio (NER) which are two key indicators for the number of children attending school.

GER is the number of children enrolled (irrespective of the age) at a particular level (elementary or secondary school), in comparison to the population of the age group who should “officially” be studying at that level. NER on the other hand records age and education level specific enrollment. It is the number of children enrolled belonging to a particular age group at a particular level (elementary or secondary), in comparison to the population of the age group who should “officially” be studying at that level.

At the elementary level, the GER and NER data shows high enrollment in all blocks/municipal areas – GER on an average being nearly 100 per cent and NER 96 per cent (*See table 24: GER and NER at various school levels*).

Table 23: Schools with tap water, toilets and electricity facilities

Block name	Schools with tap water (%)	Schools with toilets (%)	Schools with electricity (%)
Bermo	35	93	70
Chandrapura	16	93	28
Chandankiyari	1	98	9
Gomia	8	91	22
Nawadih	0	93	10
Petarwar	0	91	12
Chas	12	92	32
Jaridih	4	95	19
Kasmar	1	99	10

Source: The DISE Report, 2015-16

However, both these indicators drop at the secondary level. For example, in the most mining-affected area Bermo, the drop in GER between elementary and secondary levels is about 22 per cent. Similarly, in Chandankiyari it drops by about 23 per cent.

Table 24: GER and NER and various school levels (2015-16)

Block name	GER		NER	
	Elementary	Secondary	Elementary	Secondary
Bermo	91.98	69.1	83.59	44.35
Chandankiyari	101.75	77.8	94.98	63.39
Chandrapura	103.81	115.3	96.62	68.89
Gomia	110.8	65.36	100.88	42.48
Nawadih	108.93	80.64	102.85	56.06
Petarwar	108.91	86.28	105.13	61.25
Chas	92.02	82.31	86.76	58.75
Jaridih	102.95	80.79	96.38	50.37
Kasmar	106.24	98.55	97.29	66.84

Source: District education department

Interactions with the community suggests that distance to schools, poor quality of education, shortage of teachers etc. as well as financial situation of the family are big contributors to poor enrollment and dropouts in secondary and higher secondary education (*Refer to section 4*). At this level, this also indicates that there is a serious deficit in creating an educated workforce for procuring employment and livelihood opportunities.

d. Pupil teacher Ratio

Pupil teacher ratio (PTR) is described as average number of pupils/students per teacher at a given level of education, based on headcounts of both pupils and teachers²⁴. As per standards (RTE for elementary and RMSA for secondary), the PTR for lower primary level and secondary level should not exceed 30:1 and for upper primary 35:1²⁵.

For the purpose of this analysis, PTR of 30:1 has been taken as a uniform benchmark for both elementary and secondary education. Just about 60 per cent elementary level schools in the district meet the PTR benchmark. The situation is even poorer at the secondary level with just about 22 per cent secondary schools on an average meeting the benchmark (*See Table 25: Status of PTR at elementary and secondary schools in Bokaro district*).

A high PTR or shortage of teachers affects quality education and learning outcomes in the district (particularly in poor and distressed areas) including the mining-affected areas²⁶. It also has bearing on enrollment and dropouts.

Table 25: Status of PTR at elementary and secondary schools in Bokaro district

Block name	Elementary schools with PTR less than 30 (%)	Secondary schools with PTR less than 30 (%)
Bermo	56	30
Chandrapura	62	14
Chandankiyari	37	67
Gomia	60	27
Nawadih	49	14
Petarwar	69	11
Chas	49	14
Jaridih	71	20
Kasmar	78	7

Source: DISE Report, 2015-16

B. Gaps in the education sector

The gaps or deficits in the education sector in Bokaro district as identified from analysis of the official data shows deficits both in infrastructure as well as resources. The key deficits include:

- a. Inadequacy of secondary and higher secondary schools.
- b. Lack of clean drinking water (tap water) and electricity in schools.
- c. Poor enrollment in secondary schools as compared to elementary level.
- d. Inadequacy of teachers.

a. Inadequacy of secondary and higher secondary schools

The comparative account between facilities providing elementary education versus facilities providing secondary and higher secondary education clearly shows that secondary and higher secondary schools are very few compared to elementary. (*See table 26: Comparison of educational facilities offering various levels of education in Bokaro district*). In most areas, number of secondary schooling facilities is only 10 to 20 per cent of elementary education facilities. For higher secondary it is even lower, only 5 to 10 per cent.

The shortage is also heavily emphasized by the members of the community as well as district officials during ground interactions (*Refer to section 4*).

Table 26: Comparison of educational facilities offering various levels of education in Bokaro district

Block name	No of schools providing elementary education	No. of schools providing secondary education	No. of schools providing higher secondary education
Bermo	135	30	9
Chandrapura	160	21	7
Gomia	331	33	8
Chandankiyari	279	21	5
Nawadih	217	14	3
Petarwar	250	19	6
Chas	648	86	45
Jaridih	171	15	4
Kasmar	176	15	3
Total	2367	254	90

b. Lack of clean drinking water (tap water) and electricity in schools

Categorically more than 85 per cent schools on an average do not have tap water facility in Bokaro's mining-affected areas. In Bermo, which is an urban area, situation is slightly better at 65 per cent schools without tap water (*See table 27: Deficit in basic amenities in Bokaro district*).

The same trend is evident with respect to electricity access. In all affected areas, barring Bermo, on an average 75 per cent of schools do not have electricity. In Bermo, the coverage is better with just about 30 per cent schools without electricity.

Table 27: Deficits in basic amenities in Bokaro district

Block name	Total number of schools	Schools without tap water (%)	Schools without electricity (%)
Bermo	141	65	30
Chandrapura	169	84	72
Chandankiyari	285	99	91
Gomiya	341	92	78
Nawadih	221	100	90
Petarwar	258	100	88
Chas	673	88	68
Jaridih	179	96	81
Kasmar	182	99	90

c. Poor enrollment in secondary schools as compared to elementary level

An analysis of the enrolment data for the district shows a clear drop in enrollment for secondary level education as compared to elementary (*See table 28: Gap in GER at elementary and secondary level of education*). In most cases the drop is about 20 to 25 per cent. Bridging this gap is essential to improve overall educational status and employability of people.

Table 28: Gap in GER at elementary and secondary level of education

Block name	GER Elementary	GER Secondary	Drop in GER
Bermo	91.98	69.10	22.88
Chandankyari	101.75	77.80	23.95
Chandrapura	103.81	115.30	-11.49
Gomia	110.80	65.36	45.44
Nawadih	108.93	80.64	28.29
Petarwar	108.91	86.28	22.63
Chas	92.02	82.31	9.71
Jaridih	102.95	80.79	22.16
Kasmar	106.24	98.55	7.69

d. Inadequacy of teachers

There is a dearth of teachers across the district at both elementary and secondary level schools. More than 40 per cent of elementary schools in the district on an average have a high PTR (*See table 29: Deficits in human resources in education sector in Bokaro district*) or inadequate teachers when compared against the 30:1 standard stipulated under RTE Act (2009). In mining-affected areas, Chandankiyari and Nawadih, more than 50 per cent schools do not have adequate teachers. The situation is even worse in secondary schools where about 77 per cent of the schools have a high PTR.

Table 29: Deficits in human resources in education sector in Bokaro district

Block name	Elementary schools with PTR more than 30 (%)	Secondary schools with PTR more than 30 (%)
Bermo	44	70
Chandrapura	38	86
Chandankiyari	63	33
Gomia	40	73
Nawadih	51	86
Petarwar	31	89
Chas	51	86
Jaridih	29	80
Kasmar	22	93

3.1.4 Employment and Livelihood

Employment and livelihood is a key factor, often related to the well-being of a population. As per the Jharkhand Economic Survey Report (2016-17), Bokaro is one of the more “developed” districts ranked on a composite index comprising key parameters including poverty. Researches on poverty in the state have also reported lower levels of poverty in urbanized districts of Jharkhand including Bokaro, compared to rural districts²⁷. However, there is still a significant part of the population which is economically poor. While no estimates were available for urban population, the Socio-Economic Caste Census (SECC) provides some indicators for rural areas. As per SECC, the highest earning member in about 76 per cent rural households in Bokaro earns less than Rs 5,000.

In Bokaro district, the employment and livelihood situation has been analysed on the basis of the following:

- a. Distribution of population employment wise.
- b. Key sources of employment and livelihood.
- c. Intervention through other schemes to ensure livelihoods - Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), Self Help Groups (SHGs) as promoted under national Rural Livelihoods Mission (NRLM) and National Urban Livelihoods Mission (NULM).

A. Review of employment and livelihood parameters

a. Distribution of population employment wise

In Bokaro, the proportion of workers is about 33 per cent of the district’s total population, while non-working is 66.6 per cent. Among working population, about 55.5 per cent are main workers and nearly 44.5 per cent are marginal workers. Therefore, considering the proportion of non-working population and marginal workers, income uncertainty is high among a significant section.

However, the proportion of non-working people drops by more than 17 per cent when the employment of the working age group is considered (15-59 years). As per Census 2011, among this age group, the proportion of non-working population is about 49.2 per cent (*See table 30: Distribution of population according to working status in Bokaro district*).

The employment distribution is also skewed among sexes. Females constitute only 26 per cent of the total work force (considering the total district population), a majority being marginal workers. Also among the non-workers falling in the working age-group, a large majority, about 70 per cent, are women.

Table 30: Distribution of population according to working status in Bokaro district

Category	Total workers (%)	Main workers (%)	Marginal workers (%)	Total Non-workers (%)	Non-workers in 15-59 years age group (%)
Total	33	55.5	44.5	66.6	49.2
Male	74	86	59	41	30
Female	26	15.3	41	59	70

Source: Census of India, 2011

Among the mining-affected areas, in Bermo where there is highest concentration of mines, only about 27 per cent of the total population is working. The same trend is evident in other significant mining areas such as Chandrapura, Chandankiyari and Gomia.

Within the workers, the proportion of main workers – those who are employed for at least six months or more – is much higher in the predominantly urban areas such as Bermo and Chandrapura. This is due to availability of industry related jobs in the area as captured from ground level interactions. In the rural mining areas, the proportion of marginal workers is higher (*See table 31: Distribution of working and non-working population in Bokaro district*).

Table 31: Distribution of working and non-working population in Bokaro district

Block Name	Total working population (%)	Total number of main workers (%)	Total number of marginal workers (%)	Total non-working population (%)
Bermo	27	79	21	73
Chandrapura	29	62	38	71
Chandankiyari	38	37	63	62
Gomia	37	41	59	63
Nawadih	38	33	67	62
Petarwar	43	48	52	57
Chas	29	71.2	28.8	71
Jaridih	36.6	50.2	49.8	63.4
Kasmar	44.1	41.8	58.2	55.9

Source: Census of India, 2011

b. Key sources of employment and livelihood

Considering sector-wise distribution of the working population, specifically main workers in the mining-affected blocks and municipal areas, the majority of the main workers fall under the “other workers” category which includes construction, mining, trade, government workers, teachers etc. In Bermo, this is as high as 97 per cent (*See table 32: Categorization of main workers in Bokaro district*). In some of the rural mining areas, such as, Nawadih and Peterwar, about 40 to 50 per cent of the main workers are related to agriculture (combining cultivators and agricultural laborers).

Industries related employment: Bokaro is a major industrial area with various large, medium and small scale industries. Besides mining, industrial activities include steel, cement, chemical and glass production²⁸.

The district is known for Bokaro Steel Plant – now part of Steel Authority of India Limited (SAIL) – the first public sector steel plant started in 1965 in collaboration with what was then the Soviet Union. Some of the other key industrial players in the district, including mining companies, are Central Coalfields Limited, Bharat Coking Coal Limited, Electro steel Castings Limited,

Table 32: Categorization of main workers in Bokaro district

Block name			Categories of main workers			
	Total number of main workers	Main workers (%)	Cultivators (%)	Agricultural labourers (%)	Household industry (%)	Other workers (%)
Bermo	40,470	158	1	1	2	97
Chandrapura	23,563	62	10	3	2	85
Chandankiyari	31,852	37	24	13	4	60
Gomia	35,424	41	19	5	4	73
Nawadih	17,693	33	28	11	3	57
Petarwar	27,694	48	38	15	2	45
Chas	167,755	71.2	5	3	3	89
Jaridih	19,272	50.2	19	7	4	71
Kasmar	16,581	41.8	40	23	3	34

Source: Census of India, 2011

JP Cement, Bokaro Power Supply Corporation Private Limited. Overall, the district has about 77 large scale industries, and more than 1,000 units of medium and small scale industries²⁹.

In Bermo, as reported by block officials, most people are employed in mines at different levels based on their educational background. In Chandrapura, which has a high concentration of industries, including the coal-based thermal power station operated by Damodar Valley Corporation (DVC), many people are employed in the industry. Even in rural mining-affected areas, people are working in mines as well as in the industries near-by. Apart from that, there are micro and small scale enterprises which provide employment to locals. (See table 33: Micro and small enterprises and artisan units and employment).

Table 33: Micro and small enterprises and artisan units and employment

Type of Industry	Number of units	Investment	Employment
Engineering fabrication	198	64,266,992	1295
Consumer based	10	14,780,00	29
Leather based	18	13,920,00	64
Chemical based	51	43,714,000	260
Mechanical	241	34,0935,00	1246
Food processing	98	21,468,010	430
Textile	113	96,730,00	374
Forest and furniture	65	51,120,00	274
Metal based	14	73,960,00	64
Mineral based	43	71,509,102	458
Service	97	44,811,500	538
Electronics	167	25,239,270	12

Source: Brief Industrial Profile of Bokaro District, Micro, Small and Medium Enterprises

Despite the considerable industrial activities in the district, there are concerns of income insecurity among the local populations. The situation has been particularly captured through FGDs and interviews with officials (*Refer to section 4*). People have indicated that unemployment among locals is high as many of these jobs are taken by migrant population from other parts of the state or country. Most people reported low levels of education and skill in both rural and urban areas, which forces them to subsist on marginal labour and makes them incapable of securing full-time employment with decent wage.

Agriculture related livelihood: A significant proportion of the district's population, particularly in the rural areas, is dependent on agriculture for livelihoods. According to the district irrigation plan of Bokaro (2015), agriculture is the means for livelihood for about 40 per cent of the district population³⁰. The major crops grown in the district are paddy, wheat, various pulses oilseeds etc.

Among the mining-affected areas, various blocks have significant proportion of agriculture dependent population. For example, in Petarwar and Nawadih blocks, both of which have more than 96 per cent rural population about 53 and 39 per cent of the main workers are agriculture dependent. In Chandankiyari, another mining-affected area which has significant agriculture dependence, the proportion is 37 per cent.

In these predominantly rural blocks, a significant percentage of the total geographical area comes under cultivated land. For example, in Chandankiyari, about 53 per cent of the total land area is categorized as cultivated. In Nawadih this is more than 37 per cent and in Petarwar more than 30 per cent. Further a significant proportion of the land area have been identified with potential for agricultural use under the district irrigation plan. Essentially, if the potential land is made suitable for agriculture through proper measures, the agricultural activities can improve significantly and provide livelihood support in a sustainable way for many more people (*See table 34: Distribution of cultivated land and potential area for cultivation*).

Table 34: Distribution of cultivated land and potential area for cultivation

Block name	Total geographic area (ha)	Cultivated area (%)	Potential land area for agriculture		
			Cultivable wasteland (%)	Total fallow land (%)	Irrigated area (%)
Bermo	16,554	20.2	2.3	14.7	2.0
Chandankiyari	36,648	53	8.9	4.2	5.3
Gomia	65,741	11.7	4.9	19.7	1.2
Nawadih	32,675	37.2	3.4	47.3	3.7
Peterwar	30,218	30.2	7.6	13.4	3.0
Chas	56,622	38.5	5.0	5.3	3.9
Jaridih	20,759	24.8	3.4	32.0	2.5
Kasmar	28,882	28.7	7.0	3.5	2.9

Source: District Irrigation Plan, Bokaro District, 2015; Data for Chandrapura has not been provided.

Forest based livelihood: Besides agriculture, forest is an important sector on which local people particularly tribal communities and forest dwellers, depend on for augmenting their incomes and meeting other needs. Sal is the main species in the area. There is good production of fruits such as mangoes and jackfruit. Among minor forest produces, kendu leaves is the major one³¹.

The enumeration of livelihoods based on forest resources is very poor. The poor status can be owed to the fractional settlement of forest rights under the provisions of Forest Rights Act (FRA, 2006). For example, under community forest rights (CFR) only about two per cent of the rights have been settled out of the total number of claims received in Bokaro district. Such low percentages seriously undermine the potential of forest based livelihoods and the earnings that communities can derive from forest resources.

The FRA recognizes and emphasizes on community-based governance of forests. It specifically provides for recognizing forestlands as community forest resource areas and exercising community rights over it. This offers two crucial benefits for the forest-dwelling communities. First it gives them the right to manage forest resources, and secondly to secure livelihoods from such resources.

The recognition CFR rights thus have enormous potential for decentralized management of forest resources and improvement of ecological and economic services in CFR areas, contributing to well-being of communities. If CFR is awarded appropriately to forest communities, they would be entitled for better management of forest resources for productive use, support from the government in terms value addition for their products, improved market linkages and get better pricing for their products etc.

Similarly, under individual forest rights (IFR) the proportion of settlement is about 18.5 per cent. The settlement of rights under IFR would have given communities the opportunity to avail of agricultural subsidies, loans and other schemes for development of their agricultural lands (*See table 35: Settlement of individual and community forest rights*).

Table 35: Settlement of individual and community forest rights

Items	Individual Forest Rights	Community Forest Rights
No. of claims received by the District Level Committee under FRA (as of 30 April 2017)	4667	113
No. of title deeds issued by the District Level Committee under FRA (as of 30 April 2017)	862	3

Source: District Forest Department, Bokaro

Also if the implementation of CFR and IFR is converged with other government schemes and worked upon properly, the economic conditions of tribals and people who are dependent on and derive livelihoods from forest resources can change significantly.

c. Intervention through other schemes to ensure livelihoods

The MGNREGS is aimed at improving livelihood security of the rural population and ensure wage employment for at least 100 days per household annually. However, MGNREGS has not been very successful in securing wage employment in the mining-affected blocks. The viability of the scheme is largely compromised by the availability of land in mining areas. Additionally, there have been challenges of sufficient availability of work, timely payment of wages etc. These factors collectively have been an impediment for people for completing the 100 days of wage employment as envisioned under the scheme. In fact, as per information available through interaction with district and block level authorities, as well as data collected from the MGNREGS official reports, on an average only one to two per cent of the household in the mining-affected areas have completed 100 days of wage employment last year (*See table 36: Duration of employment provided/completed under MGNREGA during 2016-17 in Bokaro district*).

Table 36: Duration of employment provided/completed under MGNREGA during 2016-17 in Bokaro district

Block name	Average days of employment generates	Total no. of households worked	Total no. of households completed 100 days of wage employment	Proportion of households completed 100 days of wage employment (%)
Bermo	41	2213	24	1
Chandankiyari	38.5	9275	153	2
Chandrapura	38	5628	46	1
Gomia	46	9234	139	2
Nawadih	38	10866	123	1
Petarwar	41	6707	215	3
Jaridih	36	2926	70	2
Kasmar	50	9355	289	3
Chas	35	10386	22	0

Source: MIS report, MGNREGA

The NRLM and its urban equivalent, the National Urban Livelihood Mission (NULM), aims at reducing poverty by enabling poor households to access gainful self-employment and skilled wage employment opportunities through women SHGs.

The aim of NRLM, is to mobilize 10-12 crore rural households into self-help groups in a time bound manner by 2024-25. The Mission has been designed to bring about a sustainable improvement in the livelihoods of the poor through building strong community institutions. A central objective of the Mission is to establish efficient and effective institutional platforms of the rural poor that can enable them to increase household incomes through livelihood enhancements and improved access to financial and public services.

The NULM aims to do the same by organizing urban poor through strong grassroots level institutions, creating opportunities for skill development leading to market-based employment and helping them to set up self-employment venture by ensuring easy access to credit. There are no SHGs operating currently in the most mining-affected areas of the district, Bermo and Chandrapura. This is despite the fact that proportion of workers, and more importantly female workers, are very low in these areas.

In rural areas the situation is relatively better, where there are about 5570 SHGs. However, only about half the total SHGs are engaged in livelihood generating activities (*See table 37: Number and status of SHGs in Bokaro district*). The situation is particularly bad in mining-affected areas like Gomia and Peterwar, where only 27 and 34 per cent SHGs respectively are engaged in livelihood generating activities. Just about 30 per cent of SHGs in the district have been provided bank loans and many applications for loans are still pending.

Table 37: Number and status of SHGs in Bokaro district

Block name	Number of SHGs	No. of SHGs provided revolving fund	No. of SHGs provided loans	No. of SHG loan application pending in bank	No. of SHGs engaged in income generation/ livelihood activities
Chandankiyari	1284	161	293	339	602
Gomia	913	39	115	201	247
Nawadih	742	7	159	81	175
Petarwar	683	31	119	107	235
Chas	165	22	0	17	13
Chas NP	232	90	1	2	52
Jaridih	399	0	61	173	154
Kasmar	1152	27	873	66	1136
Total	5570	377	1621	986	2614

Source: District NRHM and NULM cell

B. Gaps in employment and livelihood

Considering the overall employment situation and livelihood opportunities in the district, the following outstanding issues emerge which needs attention:

- About 49 per cent of people within the working age-group are non-workers. Lower participation of women in work-force, which is about 70 per cent.
- Agriculture-related livelihoods remain much lower than the potential of the sector.
- Rural livelihood schemes ineffective in enhancing earnings. Schemes such as MGNREGS are limited due to poor land availability, inadequate work, wage payment issues. For women SGHs under the NRLM many of them are operating on the basis of revolving funds. For SHGs under NULM, it is yet to gain grounds in all mining-affected areas.

All of this together contributes to insecurity in employment and livelihood, particularly for the poor and vulnerable sections of the society.

3.2 Public amenities and infrastructure

The status of basic public amenities in Bokaro district, specifically in the mining-affected blocks has been reviewed on the basis of the following key parameters:

- a. Access of households to clean drinking water
- b. Sanitation/latrines facilities.
- c. Access to electricity.
- d. Road connectivity.

The data on these indicators has been reviewed as per information from the Census of India, 2011. Additional information made available by district officials as well as any recently updated sources (like Swachh Bharat Mission in case of sanitation) has also been taken into account. Based on the situation, the overall gaps in basic amenities have been identified.

A. Review of public amenities and infrastructure

a. Access of households to clean drinking water

Availability of clean drinking water is a major challenge in the district, particularly in the mining areas. Given the high levels of pollution, only treated tap water/treated piped can be assumed to be relatively safe.

However, most of the households rely heavily on untreated groundwater sourced through hand pumps or uncovered wells. The access is particularly poor in all rural areas of the district, including mining-affected areas.

Overall, the access to treated water varies in relation with the urbanization of the area. In almost fully urban Bermo area, about 59 per cent households have access to tap water from treated sources (*See table 38: Households by main source of drinking water in Bokaro district*). In contrast, the proportion of

Table 38: Households by main source of drinking water in Bokaro district

Block name	Tap water from treated source (%)	Tap water from untreated source (%)	Covered well (%)	Uncovered well (%)	Hand pump (%)	Others (%)
Bermo	59	10	1	12	10	8
Chandrapura	26	4	2	35	29	4
Chandankiyari	5	2	1	30	49	13
Gomia	21	6	1	45	18	9
Nawadih	1	0.88	2	66	23.0	8
Peterwar	3	1	2	55	29	11
Chas	30	4	1	17	40	8
Jaridih	1	1	2	58	30	8
Kasmar	2	1	1	72	21	3

Source: Census of India, 2011

households with access to treated tap water source shrinks to a mere one per cent in highly rural mining areas such as Nawadih and Peterwar.

b. Sanitation/latrine facility

Open defecation has been observed to be very high particularly in the rural areas of Bokaro district (*See table 39: Households by type of latrine facility in Bokaro district*). However, there has been some progress in the district for making villages and towns open defecation free (ODF) through funds available under Swachh Bharat Mission (SBM). As per latest statistics of GOI, the district has managed to construct household toilets for nearly 60 per cent rural households³². The district's urban area has been declared open defecation free (ODF)³³. However, responses captured through community interactions reveal that while toilet coverage is high, they are not used due to lack of water. Most respondents said that they do not use the toilets because there is no water to maintain them. Some also said the use of toilets is poor due to lack of behavioral change.

Other important sanitation issues like poor drainage system and waste have been largely captured through FGDs. Majority of people pointed to broken or no drains and poor waste management in the mining-affected areas (*Refer to section 4*).

Table 39: Households by type of latrine facility in Bokaro district

Block name	Flush/pour latrine (%)	Pit latrine (%)	Night soil disposed into open drain (%)	Open defecation (%)	Others (%)
Bermo	64	0.5	1.1	33	1
Chandrapura	34	0.7	0.2	65	0
Chandankiyari	6	0.3	0.1	93	1
Gomia	19	0.6	0.0	78	2
Nawadih	5	0.4	0.0	94	1
Peterwar	11	0.4	0.0	86	2
Chas	48	1.3	0.2	50	1
Jaridih	24	1.4	0.0	75	0
Kasmar	6	0.7	0.0	93	0

Source: Census of India, 2011

c. Access to electricity

Electricity availability and reliability is particularly a concern in some of the rural mining areas. For example, in Nawadih and Chandankiyari, about 54 per cent and 36 per cent households respectively have electricity. Apart from these two mining blocks, the coverage of electricity in the district is overall reasonable (*See table 40: Households by main source of lighting in Bokaro district*) Funds available under Deendayal Upadhyaya Gram Jyoti Yojna (DUGJY) for rural electrification is being used to improve electricity access in these areas.

The reliable availability of electricity is also a concern expressed by communities and officials alike during FGDs. Besides households, access and reliability also remain a issue for important facilities such as schools and healthcare centres.

Table 40: Households by main source of lighting in Bokaro district

Block name	Electricity	Kerosene	Others
Bermo	97.0	2.52	0.48
Chandrapura	88.3	11.42	1.12
Chandankiyari	36.7	62.89	0.44
Gomia	74.2	24.18	2.62
Nawadih	54.6	43.69	1.72
Peterwar	74.5	24.51	0.99
Chas	73.9	25.23	0.91
Jaridih	59.4	37.08	3.53
Kasmar	58.5	40.41	1.11

Source: Census of India, 2011

d. Road connectivity

All the mining-affected blocks are almost well connected to the district headquarters by major thoroughfares. However, the problem lies with rural connectivity to a certain extent.

The rural road density in Jharkhand is 516 km per 1000 sq. km., while the national average stands at 806.6 km per 1000 sq.km. As per Jharkhand Economic Survey, 2016-17, 43.7 per cent villages in Bokaro have paved roads. The fact has also been further supported during ground level interaction, particularly in the rural mining areas, where it was pointed out that there is lack of all weather roads, limiting people's access to basic facilities such as healthcare, education etc. (Refer to section 4).

B. Gaps in access to basic public amenities

The key gaps or deficits with respect to access of basic public amenities in mining-affected areas as identified from analysis of the official data include:

- a. Poor access to treated tap water.
- b. High levels of open defecation in rural areas due to lack of proper sanitation facilities.
- c. Connectivity in rural areas (all-weather roads).

a. Poor access to treated tap water

Most of the mining areas have poor access to treated tap water. While Bermo being the urban area is slightly better off, but even there about 41 per cent households do not have access to treated water (See table 41: Overall deficit of basic public amenities in Bokaro district). Lack of clean drinking water is the most pressing issue highlighted by local communities, PRIs as well as district officials during discussions and interactions.

Contaminants in groundwater are known to be high. Additionally, access to groundwater is a challenge given a receding water table due to mining activity. As per Central Ground Water Board (CGWB), ground water in Bokaro has more than permissible limits of fluoride³⁴. People living in affected areas also report (Refer section 4) shortage of water as well as contamination in water

drawn from wells and hand pumps. Lack of clean drinking water translates into many health challenges, particularly among children.

Table 41: Overall deficit of basic public amenities in Bokaro district

Block name	Households without access to water from treated source (%)	Households practicing open defecation (%)
Bermo	41	33
Chandrapura	74	65
Chandankiyari	95	93
Gomia	79	78
Nawadih	99	94
Peterwar	97	86
Chas	70	50
Jaridih	99	75
Kasmar	98	93

b. High levels of open defecation

Open defecation continues to be a major challenge in various parts of the district due to lack of toilets as well as lack of water for the ones constructed. While many toilets have been constructed under SBM, people reported low toilet use. They also pointed to poor drainage and waste disposal in the mining-affected areas.

c. Connectivity in rural areas (all-weather roads)

This has been captured largely through ground level interactions and FGDs. People in the mining areas have indicated poor connectivity in rural areas.

3.3 Environmental pollution and degradation

Bokaro industrial cluster, which includes coal mines, coal washeries, thermal power plants, steel and cement industries etc, has been constantly under the Central Pollution Control Board (CPCB) radar for pollution of water, air and soil. There have been constant media reports on the air pollution through industries as well as coal-dust from the mines^{35,36}. Of the 13 seriously polluting industries (SPI) identified by the Jharkhand State Pollution Control Board (JSPCB), 11 are located in Bokaro³⁷. These include coal washeries, thermal power plants and steel industries. The high level of pollution is a critical concern voiced by communities in mining-affected areas as well as district officials during interactions. The two pollution factors considered to gauge the status of environmental pollution and degradation in the mining-affected areas are:

- a. Air pollution/Ambient air quality (AAQ).
- b. Water pollution and groundwater depletion.

Though baseline data could not be obtained for a comprehensive analysis due to paucity of data on environmental parameters, the severity of the problem has been captured largely through government and independent reports as well as field visits and interactions with community and officials.

a. Air pollution/Ambient air quality

The poor air quality around the coal mining areas is visible to the naked eye. Opencast mining activities, blasting, transportation of coal in partially covered/uncovered trucks, poorly managed overburden dumps etc. all contribute to such pollution. Officials and communities alike report coal-dust cloud around mining areas, in many cases extending beyond 10-15 kilometer radius. Those still engaged in agriculture report sharp decline in productivity as well as constant layers of coal dust settling on the soil and crop. High exposure to pollutants is evident in the disease prevalence data where chronic respiratory diseases in the district are found to be high.

AAQ data for Bokaro mining areas was not available at the time of the research. However, various individual studies provides as estimation of the pollution and pollution potential. For example, the environment statement of CCL of Bokaro colliery suggests that the average PM₁₀ level in the area is 200 µg/m³, which is nearly 3.5 times the prescribed average of 60 µg/m³ as per national ambient air quality standards. Other pollutants include sulfur dioxide (SO₂), nitrogen dioxide (NO₂) and heavy metals. The region overall is also particularly susceptible to spatial dispersion of air pollutants from Dhanbad region and West Bokaro coalfields in Ramgarh and Hazaribagh³⁸.

Apart from mining, Bokaro is also a hub for many large scale industries and thermal power plants. Some of the prominent ones include Bokaro thermal power plant run by Damodar valley Corporation (DVC), Tenughat thermal power station among others. A survey by New Delhi based think tank Centre for Science and Environment (2015) on 47 thermal power plants assessing their performance on various parameters including air and water pollution, DVC Bokaro thermal power plant is ones of the lowest on the weightage scale when it comes to meeting global or even some of the better national standards³⁹.

b. Water pollution and groundwater depletion

Bokaro district, including the mining-affected areas, has a serious problem of ground and surface water pollution resulting from mining and other industrial activities. The water bodies get polluted from surface run-off of the collieries and from their discharges, including abandoned mines. Poorly managed OB dumps close to river Damodar and its tributaries have been sources of surface water pollution. CPCB identifies Damodar and Bokaro rivers which flow through the district as “critically polluted river stretches”⁴⁰.

The high levels of contamination in ground water has been identified by the Central Ground Water Board (CGWB). As per their report, Bokaro as one of the districts with more than acceptable levels of fluoride present in groundwater⁴¹. The district’s ground water booklet, also reports iron, manganese and zinc content in the ground water higher than permissible limits⁴².

Besides pollution, Bokaro district overall suffers from water scarcity. The water budget of the district as provided in the district irrigation report (2016-17) suggests that the current water availability in the district combining surface and ground water sources is 1.955 billion cubic meters (BCM). However, estimates

of total water demand in the district for industrial purposes, crop production, livestock, power generation and domestic use is 5.030 BCM. Taking into account the rise in consumption for all of these in the coming years, the total projected demand in 2020 is around 15.193 BCM. This suggests that additional 10.163 BCM water potential must be created to meet the projected demand. Therefore, if the water availability is not augmented through long term measures such as a watershed based approach, the water stress in the region will become critical.

Section 4: Situation analysis through participatory rural appraisal

4.1 Background of process

To complement the quantitative data and to understand the status of various socio-economic, human development and environmental issues further, a process of Participatory Rural Appraisal (PRA) was followed by engaging with concerned stakeholders. This constituted of conducting Focus Group Discussions (FGD) with various demographic groups and holding semi-structures interviews (SSI).

Focus Group Discussion (FGD): FGD is a ‘structured group review’ process, conducted to stimulate participants to reveal their views, beliefs, and perceptions about particular issue(s) and capture their understanding and opinion objectively.

For the purpose of this study, FGDs has been conducted through randomized sampling of representative population in the village(s) of two “mining-affected” blocks – Bermo and Chandrapura, along with block panchayat functionaries and block development officials. The total number of sample size considering all FGDs is about 164 (*See table 42: Focus Group Discussions in mining-affected areas*)

To capture the maximum possible diversity in people’s perceptions and needs, the following types of FGDs were conducted in each mining-affected area:

1. **Various demographic group FGD-** This was held with three constituencies, including:
 - i. **General populace FGD-** This included representative population- both male and female, from various demographic groups including, Scheduled Castes (SC), Scheduled Tribes (ST) and Other Backward Classes (OBC).
 - ii. **Women FGD-** Held with women separately to understand their specific issues. This had representation from teachers, SHG representatives, and various frontline workers such as ASHAs and AWC workers.
 - iii. **Scheduled group FGD-** A separate FGD was also held with the scheduled populace.
2. **Block panchayat FGD-** Held with block panchayat functionaries.
3. **Block development official FGD-** Held with various block development officials.

Semi structured interviews (SSI): SSI is a method of social evaluation and collecting information which is done on the basis of predetermined but open-ended questions. It provides an opportunity to receive information from (as well as give information to) the interviewees in a conversational but focused manner. For the purpose of this exercise, SSI was particularly held with communities during site visits, civil society organization (CSO) representatives, and concerned district and block officials. The total sample consulted through SSIs is about 50.

Therefore between all FGDs and SSIs held in the mining-affected areas, and also the group discussion held in the control block, a total of 214 people have been consulted through the process of PRA.

Table 42: Focus Group Discussions in mining-affected areas

Block name	Place where focus group was held with communities	Type of focus group	No. of total participants	Composition of participants
Bermo	Kurpania	General	45	M: 20; F: 25 OBC: 22; SC/ST:15
	Kurpania	Women	30	
	Bermo block panchayat	Block panchayat members	12	
		Block development officials	5	
Chandrapura	Karmatand	General	30	M:28; F: 2 OBC: 27; SC: 3
	Karmatand	Women	20	
	Chandrapura block panchayat	Block panchayat members	16	
		Block development officials	6	

4.2 Observations from FGDs

The FGDs as held with various socio-demographic groups in the mining-affected area brings out the key challenges with respect to various socio-economic, human-development and environmental conditions as perceived by the communities. It also provides an understanding on the key issues that DMFs should consider for intervention so that the needs of the people are appropriately addressed.

For the purpose of concise representation, the key issues/ problems identified by the people and those need to be addressed have been highlighted. The issues also capture the opinion of the majority, that represents the observation and opinion of at least 50 per cent or more of the representative sample. However,

in most cases the majority opinion reflects the response of 70 to 90 per cent of participants/ respondents.

In the sector-wise observation tables of FGDs, the majority response (70 per cent and above where people identified it as a major problem/issue) is denoted as “very poor” as applicable for respective mining-affected blocks. A mid range response of 50 to 70 per cent of participants is denoted as “poor”. Where only a handful number of people have mentioned a problem it has been noted as “not significant”, and an absence of a response by the participants has been denoted as “no response”.

4.3 Key issues highlighted by community for improvement

To capture the perception and need of mining-affected people in a comprehensive fashion, FGDs were held separately with various constituencies. The key issues highlighted by communities which they consider improvement is required on in outlined below (See table 43: Key issues highlighted by communities in mining-affected areas).

Table 43: Key issues highlighted by the communities in mining-affected areas

Block name	Constituency	Key issues
Bermo	General	Clean drinking water Lack of employment Pollution – air, water, soil Quality healthcare Quality education
	Women	Clean drinking water Lack of employment Quality healthcare Quality education Pollution
	Block Panchayat	Clean drinking water Air pollution Unemployment
	Block officials	Pollution – air, soil, emissions from mines Quality healthcare Employment
Chandrapura	General	Clean drinking water Unemployment Sanitation Education Pollution Quality healthcare
	Women	Lack of sources for clean drinking water Quality education Quality healthcare
	Block Panchayat	Clean drinking water Landlessness Unemployment
	Block officials	Clean drinking water Pollution – air, water and land Employment (migration of people from other districts/states)

4.4 Perception on issues sector-wise

a. Perception on health and public healthcare system

Majority of the people in the mining area reported poor health particularly high prevalence of respiratory problems, tuberculosis and various skin problems. They also pointed to poor access to health facilities due to distance. Another issue pointed out for poor access is lack of transportation, especially ambulances in times of emergency. Apart from these, most respondents categorically mentioned lack of doctors and other medical staff like nurses, health workers etc. at the healthcare facilities as well as shortage of various supporting resources such as medicines and beds (*See table 44: Key concerns and factors regarding public health*).

Table 44: Key concerns and factors regarding public health

Issues	Key challenges and factors identified	Block name	
		Bermo	Chandrapura
Disease burden	Respiratory/lung problems	High	High
	Tuberculosis	Poor	High
	Skin problems – allergies and infections	High	Poor
Infrastructure	Number of primary healthcare facilities	Poor	Very poor
	Poor health infrastructure- beds, ambulances, medicines	Very poor	Very poor
Resources and access	Lack of paramedical staff including full time doctors	Very poor	Very poor
	Poor access to nearest health facility (average distance travelled about 5-10 kms)	Poor	Very poor
	No or inadequate health coverage	Very poor	Very poor

b. Perception on nutrition and food security

The concerns regarding nutrition are primarily focused on availability and reach of various resources. Majority of the respondents pointed that while there is availability of packed foods at AWCs, people do not eat them due to lack of taste and repetitiveness. Other crucial factors include low awareness levels on nutrition and lack of behavioral counseling by AWC workers, lack of health monitoring, focus only on children and not on expectant and new mothers. (*See table 45: Key concerns and factors regarding nutrition and food security*). Majority participants, particularly women said that apart from availability of nutritive food, quality of food should be good. They feel that these would help them address nutritional deficits and prevent malnutrition among children.

While in Bermo, the PDS coverage was reported as satisfactory, in Chandrapura people reported irregular and short supply.

Table 45: Key concerns and factors regarding nutrition and food security

Issues	Key challenges and factors identified	Block name	
		Bermo	Chandrapura
ICDS related	Nutrition support from AWCs	Poor	Poor
	Adequacy of nutrition provided	Poor	Poor
	Nutrition education	Poor	Poor
	Lack of monitoring	Poor	Poor
PDS related	Timely ration	Not significant	Poor

c. Perception on education

The main issues pointed by majority of respondents with regard to education pertain to both infrastructure as well as resources (*See Table 46: Key concerns and factors regarding education*). While there are elementary schools in and around the villages, distance to secondary schools has been cited as a major concern, more so for the girl child. In the absence of schools buses, people are forced to either use private vans which add to the expense, or drop-out from the school. Lack of hostels further compounds this problem.

Apart from infrastructure, respondents also pointed to the lack of teachers. In cases where teachers are present, they pointed that teachers are preoccupied with other tasks (like preparing schools for various government run programmes, elections etc.) or do not take classes regularly.

Table 46: Key concerns and factors regarding education

Issues	Key challenges and factors identified	Block name	
		Bermo	Chandrapura
Infrastructure	Inadequate schools for elementary education	Not significant	Not significant
	Inadequate schools for secondary education	Poor	Very poor
	Basic infrastructure in schools; particularly toilet and electricity	Poor	No response
Resources and access	Quality of teachers	Poor	Poor
	Inadequate teachers in school	Poor	Poor
	Access to schools (particularly secondary level)	Poor	Poor
Financial assistance	Scholarships	Poor	Poor

d. Perception on employment and livelihood opportunities

Lack of viable and adequate livelihood options is one the most pressing concerns reported by almost all respondents (*See Table 47: Key concerns and factors regarding employment and livelihood*).

Table 47: Key concerns and factors regarding employment and livelihood

Issues	Key challenges and factors identified	Block name	
		Bermo	Chandrapura
Employment	Status of full-time employment	Very poor	Poor
	Work training that provides job	Poor	Poor
	Loan support	Required	Required
	Support for small businesses (handloom, dairy farming)	Required	Required
Livelihood around local resources	Support for agriculture based livelihoods	Very poor	Very poor
	Support for forest based livelihoods (MFP such as mahua, kendu leaves)	Not significant	Very poor
Government schemes	Work availability under MGNREGA	Poor	Poor

In both mining-affected blocks, most people who are working are daily wage labourers employed in mines. A small fraction of them are marginal farmers who also reported declining produce due to excessive coal dust and soil pollution. The rural employment schemes have not been of much support, particularly MGNREGS. A small fraction of women reported that they were engaged with SHGs.

Concerns were also raised about lack of any skilled training or help with small businesses to assist them into more relatable and meaningful livelihood options. This they fear has also taken away employment opportunities from the locals and skilled migrants are being hired instead. All respondents asked for skill training and assistance for small businesses around food products or small handicrafts.

e. Perception on welfare support available for vulnerable groups

Most people in the mining-affected blocks reported regular and timely pension paid to the elderly, disabled and the widows (*See table 48: Key concerns and factors regarding welfare support to vulnerable groups*). They also reported delivery of pension in the respective beneficiary accounts.

Table 48: Key concerns and factors regarding welfare support to vulnerable groups

Issues	Key challenges and factors identified	Block name	
		Bermo	Chandrapura
Pension funds and delivery	Adequate pension	No response	No response
	Delayed pension	Not significant	Not significant
	Difficulty in receiving pension due to access issues, no door-step delivery of pension	Not significant	Not significant

f. Perception on supply of and access to public amenities

The two most pressing concerns with regard to public amenities were drinking water and sanitation. (See table 49: Key concerns and factors regarding public amenities).

Clean water availability: All respondents reported their source of water as hand pumps or wells. The main concern was the contamination of water (expressed as yellow water) procured from these sources. Respondents, particularly women, reported that they have to travel more than a kilometer to fetch water from hand pumps. They also reported acute shortage due to hand pumps drying up. The only intervention reported by respondents is digging of borewells, installation of hand pumps and intermittent provision of water tankers by the mining companies. The water sources in the region are based of depleting and heavily contaminated groundwater, with no sustainable interventions.

Sanitation: Most respondents reported presence of toilets in households, many of them constructed under SBM. However, majority of them reported no use due to lack of water. Respondents also pointed to broken, clogged and polluted drainage systems and poor sewage management.

Table 49: Key concerns and factors regarding public amenities

Issues	Key challenges and factors identified	Block name	
		Bermo	Chandrapura
Clean drinking water	Availability of treated clean water	Very poor	Very poor
	Reliable and adequate supply	Very poor	Very poor
	Delivery by government intervention/ schemes	Poor	Poor
Sanitation	Toilet facilities and with water supply to toilets, SBM implementation poor.	Very poor	Very poor
	Poor drainage	Very poor	Very poor
Electricity	Electricity supply specially at night	Not significant	Not significant

g. Perception on environmental pollution

Environmental pollution of air, water and soil was a dominant concern for all respondents across FGDs and SSIs (*See table 50: Key concerns and factors regarding environmental pollution*). Heavy air pollution due to coal dust from mining related operations in the region remained an outstanding concern. As a consequence of this there is also a prevalence of respiratory ailments, particularly tuberculosis and asthma among people. The air pollution (coupled also with soil pollution) had affected the agricultural productivity of those who are engaged in small self-sustaining agriculture as thick layers of coal dust settle on the fields.

Water, as reported by respondents, is contaminated and scarce due to receding water table. They also feel that this is one of the key reasons behind high prevalence of skin and kidney diseases. Many respondents said that they experience excessive itching after taking a bath. In Bermo, CCL initially provided for piped water supply to households, but eventually put an end to the service. All people asked for clean water and reduction in pollution.

Table 50: Key concerns and factors regarding environmental pollution

Issues	Key challenges and factors identified	Block name	
		Bermo	Chandrapura
Air pollution	Pollution related health problems	Very poor	Very poor
Water pollution and water table depletion	Water availability for drinking	Very poor	Very poor
Soil pollution	Agricultural productivity and livelihood	Very poor	Very poor

Section 5: Prioritizing issues and approaches for intervention through an outcome-output framework

The MMDR Act (1957), under which DMF has been instituted through an amendment in 2015, specifies that the objective of the DMF is to “work for the interest and benefit of persons and areas affected by mining related operations”.

The PMKKKY, a scheme launched in September 2015 by the GOI to for the welfare of people in mining-affected areas, and aligned to DMF funds for implementation, also outlines three objectives to guide the appropriate use of DMF funds. These include:

- To implement various developmental and welfare projects/programs in mining affected areas that complement the existing ongoing schemes/projects of State and Central Government.
- To minimize/mitigate the adverse impacts, during and after mining, on the environment, health and socio-economics of people in mining districts.
- To ensure long-term sustainable livelihoods for the affected people in mining areas.

The sector and issues that have been analyzed in this document for identifying the critical gaps and capturing the need of the people are corresponding to the objectives of the DMF law and PMKKKY objectives. Based on such analysis and observation, priority issues have been identified for DMF investments for effective intervention.

5.1 Identifying priority issues

The priority issue for DMF investments is determined on the basis of a participatory approach, as well as through analysis of baseline information. Considering the qualitative and the quantitative information together, helps to capture the complete perspective on issues. It also makes the planning exercise purposeful, optimizes allocations, and can ensure that critical issues are addressed in the most effective manner.

5.2 Output-outcome framework for investments

As noted, the indicative planning exercise is based on an output and outcome oriented approach. In the proposed framework based on this approach, the intended outcomes have been determined on basis of the following:

- Critical needs as identified through participatory approach.

- Government and scientific information as analyzed.
- With reference to government and internationally accepted benchmarks.

The outputs against each outcome have been determined on basis of the following:

- Are related to and representative of the condition(s) in question.
- Are based on the best available information of acceptable quality, and that can be collected or monitored with a reasonable time.
- Relevant for policy and planning purposes.
- Easily understood and applied by potential users.
- Acceptable by stakeholders.

5.3 Priority sectors for DMF investments in Bokaro district

The sectors that DMF should focus on for investments in Bokaro district over next five years have been determined on the basis of deficits in each of these sectors, their contribution in human development and creating long-term development dividend and sustainable assets. The deficits take into consideration the observations based on official data/information, and people's perception captured through the process of PRA (*Refer to sections 3 and 4*).

For each of these priority sectors/issues, some target outcomes has been identified that DMF should aim to achieve. A number of intermediary outputs have also been identified that can help to achieve the target outcome. The outputs have been given against specific timeframes to ensure time-bound results and improve on intervention mechanisms. The framework also takes into consideration investments in simultaneous/parallel sectors that will help optimize the outcome for a specific issue. The sectors/issues as prioritized for intervention include:

- a. Nutrition and public health.
- b. Clean drinking water supply, enhancement of water quality and availability.
- c. Education, particularly post elementary level.
- d. Employment and livelihood enhancement.

5.4 Current availability of funds and considerations for investments

The funds accrued to DMF and estimated to be coming per year in the near future is substantial. The broad heads that the use of the funds should focus on are also clearly outlined. However, many of the sectors that DMF should focus on, are also the ones which are supported by the districts own financial resources, as well as through Centre and state government schemes. In many aspects, thus DMF funds are potentially add-ons to the various socio-economic and human-development works that are undertaken by the district.

For identifying the issues for which DMF funds must be directed and to what extent, a review of the existing resource envelope(s) is therefore important. For the purpose of this exercise, the financial grants available through various flagship schemes for addressing various socio-economic and human development

issues, which have been reviewed under gap analysis, are considered. These are also the ones which are priority areas under the DMF law, such as, water supply, sanitation, public health, nutrition, education and livelihood.

Some of the key schemes/budget heads reviewed include, ICDS for addressing issues of nutrition; NRHM and NUHM for health issues; Sarva Siksha Abhiyan (SSA) and RMSA for general education, Swami Vivekananda Nisshakta Svawalamban Protsahan Yojana (SVNSPY) to support education for disabled, Mukhyamantri Ladli Laxmi Yojna (MLLY) to support girl child education; MGNREGS and NRLM for livelihood enhancement; National Social Assistance Programme (NSAP) for assistance to vulnerable sections like widows, senior citizens, disabled etc.; National Rural Drinking Water Programme (NRDWP) for water supply; Integrated Watershed Management Programme (IWMP) for watershed development; Swachh Bharat Mission (SBM) for sanitation and Pradhan Mantri Awas Yojana (PMAY) for housing.

Given the unavailability of a comprehensive district budget, the resources under the schemes have been considered individually. As per available information from the district, funds received under the schemes during the financial year 2016-17 has been reviewed (*See table 51: Funds available through key schemes for socio-economic and human development purposes*). This will help to provide an understanding where DMF funds can be effectively used to address the most pressing issues, as well as bridge the financial shortfall.

Table 51: Funds available through key schemes for socio-economic and human development purposes (2016-17)

Sector	Name of the scheme	Total funds received (Rs. Crore)
Drinking water	NRDWP	7.11
Sanitation	SBM-Gramin	36
	SBM-Urban	7.97
	Solid waste management grant, Phusro NP (Bermo)**	0.5
Nutrition	ICDS	23.6*
Health	NRHM	24.17
	NUHM	1.44
Education	SSA	83.17
	RMSA	9.37
Education for girl and disabled	SVNSPY	7.6
	MLLY	15.8
Livelihood	MGNREGS	71.4
	NRLM	6.85
	Agriculture and allied	15.75
Watershed development	IWMP	2.27
Welfare	NSAP	33.31
Housing	PMAY – Gramin	133.8
	PMAY – Phusro NP (Bermo)**	1

Source: Bokaro district (respective departments), November 2017; *Under ICDS, budget for food for children and new and expectant mothers is Rs. 6.1 crore, for payment of AWC workers is Rs 17.5 crore; **Budget for Phusro (NP) was available for 2017-18 only.

The review shows that the sectors which are receiving a significant amount include sanitation, elementary education and housing. The gap analysis also indicates that these are the sectors where the district has also made progress. However, for the sectors that the district need focus and targeted intervention are also the ones where fund availability is grossly insufficient in comparison to the gravity of the problem. These include issues such as public health, nutrition, higher education and livelihood enhancement. Therefore, DMF investments must be prioritized for these issues through convergence (building up on the schemes) or standalone investments.

5.5 Sectors and approaches for DMF investments

The sectors/issues as prioritized for DMF fund use, need targeted investments over the next five years. Depending upon progress over this time, further investments can be planned. Many of the issues also need to be addressed simultaneously to achieve the desired results. This following section provides a framework of some investment approaches for the priority sectors/issues and target outcomes in a time-bound manner.

a. Nutrition and public health

Improving nutrition and public health status are crucial for maximizing demographic dividend and increasing economic productivity of a population. The two need to be considered simultaneously for effective investments and achieving desired outcomes.

In Bokaro, both IMR and U5MR are concerns particularly for rural parts of the district including mining-affected areas. Also there are serious problems of various chronic illnesses due to pollution exposure. However, the public healthcare infrastructure, particularly the primary healthcare and overall availability of staff and other resources are sub-optimal. Affordability of decent healthcare offered by private facilities is not a viable option for the poor as observed during ground interactions.

Investments in nutrition and healthcare need to consider all of these collectively. Also simultaneous investments will be necessary in ensuring better nutrition, clean drinking water, sanitation and hygiene, which influence health in a number of direct and indirect ways as has been suggested in various epidemiological and scientific studies on effective health investments.

Considering the availability of funds from health and nutrition schemes, the resource envelope is grossly insufficient. For instance, in the ICDS budget, the component for providing nutritive food to children and new/expectant mothers is only Rs 6.1 crore, about 25 per cent of the total ICDS allocation.

Given the ground situation, there can be three effective mechanisms to improve nutrition status and healthcare delivery and access. These include:

- Building on existing government programmes/schemes.
- Adopting a public private partnership (PPP) model to improve and augment resources and delivery of services.
- Support 'demand side financing' to improve access to and utilization of health services, particularly for the poor.

Outcome (projected)	Output	
	1-3 years	3-5 years
Reduction of neonatal and IMR to 12 by 2030, and U5MR to 25 by 2030, following targets of SDG	<p>a. Add on financial grant for ICDS to improve intervention.</p> <ol style="list-style-type: none"> Increase the number of AWCs to at least twice the existing numbers to meet the stipulated Government standards, which is one AWC per 40 children. Ensure clean/treated drinking water in all AWCs. Fill in food supply and supplementary nutrition gaps through proper assessment and considering locally available nutritious food resources. Improve nutrition education, health monitoring by capacity building of existing AWC workers as per the required skills. Support of the district health department should be considered for improved monitoring. In the initial phase a PPP model can be adopted by 'contracting in' private parties/CSOs working on health and nutrition for such services. <p>b. Augment primary healthcare facilities and resources (with focus on neonatal and pediatric care) to meet at least IPHS norms adopting PPP model and through demand side financing.</p> <ol style="list-style-type: none"> A PPP model can be adopted to improve and augment resources at primary healthcare facilities. This should focus on adequate numbers of trained healthcare personnel, scientific diagnosis and monitoring facilities, providing ambulances and mobile healthcare infrastructure. Provide 'health vouchers' to women/mothers to avail treatments and check-ups at both public and private facilities, to improve on the existing service as availed under Janani Suraksha Yojana and Janani Shishu Suraksha Karyakram. 	<p>a. Investments shall be continued building upon achievements of the previous three years.</p> <p>b. Direct transfer of stipend to women/ mothers of BPL households, who are widows or living without family support to improve nutrition and health of mother and child.</p>
Augment primary and secondary healthcare as per IPHS norms.	<p>a. Increase primary healthcare facilities to meet at least IPHS norms.</p> <ol style="list-style-type: none"> Increase HSC and PHC capacity each by 50 per cent all in mining affected areas. In areas where private clinics already exist, the district could also contract with those clinics (through PPP) in a way that allows them to expand capacity to provide more primary care in the mining-affected areas. <p>b. Fill in deficits of healthcare personnel and improve delivery of services.</p> <ol style="list-style-type: none"> 'Contracting-in' can be done to fill vacant positions in health units and hospitals. Doctors, nurses, technicians and other staff as required can be recruited on contracts for a stipulated time period. A 'management contract' can be arranged to expand health services. In this, obligation for service provision will remain with the public sector, while daily management and delivery will be the responsibility of the private partner. Public institutions will also be responsible for establishing performance standards and ensuring compliance. <p>c. Improve health access through demand side financing.</p> <ol style="list-style-type: none"> A 'voucher system' can be introduced to improve health access at public as well as private facilities. The voucher can be exchanged for defined goods or services as a token of payment. Vouchers can be provided against health packages for various common ailments / conditions, which can be bought by the people at specific intervals (two or three times a year). These vouchers can then be redeemed for receiving a set of services such as consultations, lab tests, and procedures, from accredited hospitals / partner clinics. For treatments that entail higher costs, a standard deductible can be stipulated (payable by the voucher user/patient), to cover part of the extra cost. 	<p>a. Investments shall be continued building upon achievements of the previous three years. This is particularly important for HSCs and PHCs.</p> <p>b. Build on coverage of national and state health insurance schemes for people in mining-affected areas. The schemes that may be considered include Rashtriya Swasthya Bima Yojana (RSBY) providing coverage to BPL families.</p> <p>Further, mine workers should be covered by building on the proposed state health insurance scheme Mukhya Mantri Swasthya Bima Yojana (Chief Minister Health Insurance Scheme), which has now been aligned with the NFSA, to cover the same set of beneficiaries under it.</p>

b. Clean drinking water supply and enhancement of water quality and availability

Drinking water is closely related to the health and well-being of people. The outstanding concerns with respect to clean drinking water supply and availability include high percentages of households without treated tap water access, lack of tap water/treated water within premises of majority AWCs, schools across all levels and even at health facilities.

While these problems and deficits need to be tackled on an immediate basis, given the vast surface and ground water pollution in mining areas, limitations of surface water sources and limited state of water development potential, a long term 'watershed approach' must be simultaneously adopted. A watershed approach has been adopted as best water management practice by international regulatory agencies such as the US Environment Protection Agency (US EPA). Such approach can help in drinking water protection, pollution control, agriculture enhancement, fish and wildlife habitat protection and preservation of native vegetation. It is also economic and efficient as it builds upon existing resources and saves management costs, improves coordination and reduces duplication among management practices and creates opportunities for long-term community development⁴³.

The proposed framework for augmenting clean drinking water supply and enhancement of water quality and availability, takes into consideration the immediate needs and the initiation of long term investment.

Outcome (projected)	Output	
	1-3 years	3-5 years
Safe and adequate drinking water for all households and service facilities in mining-affected areas	a. Ensure treated clean water supply in all panchayats (and wards) in the mining-affected areas. b. A mechanism of PPP can be adopted in the first phase. In this phase the contracted enterprise can be the technology provider and the management body for the delivery of services. The public partner can provide the infrastructure component such as land and any construction work that is required to be undertaken.	Investments to be continued building upon achievements of the previous three years.
Enhancement of water quality and water availability through watershed based approach	Initiation of a long term approach for watershed management in convergence with various concerned departments for environmental management and augmenting water resources. A convergence approach can be adopted with the Jharkhand State Watershed Mission (JSWM), to hasten such approach in the mining-affected areas.	The approach to be continued as a long term measure.

c. Education

Continuation of education beyond the elementary level is a challenge in the district. There exists significant disparity in terms of number of schools offering

elementary and secondary education (secondary schools being about 10 to 20 per cent of elementary education facilities, and higher secondary about 10 per cent of elementary). Schools across all levels also lack basic amenities such as tap water within premises/treated water and electricity. There is also concern of adequate number of teachers in elementary and secondary level schools as well as the quality of teachers. Financial constraints of families in the mining areas further restrict many children from continuing with higher education. These all need to be addressed through targeted investments in education that will contribute to completion of secondary and higher secondary education, improve employability, empower the vulnerable sections such as girls and women, and reduce overall financial insecurity.

As per the schemes reviewed, the district budget for SSA, which covers the elementary education, is substantial. However, the budget for secondary education as provided under RMSA is about one ninth the SSA budget. Given the inadequate allocation, RMSA can be built-upon to improve and expand access to secondary education.

Outcome (projected)	Output	
	1-3 years	3-5 years
Improvement of gross enrollment and completion for secondary education as per RMSA goals.	<p>a. Increase the number of secondary schools as per RMSA standards. This can be done by up gradation of the existing primary+upper schools in the mining-affected areas.</p> <p>b. Strengthen staff capacity in existing secondary education facilities to meet the stipulated PTR requirement of 30:1. Competitive remunerations need to be provided particularly for rural/distressed areas.</p> <p>c. Build on existing scholarships for higher education, including for women and disabled to make education accessible for all. Considerations include-</p> <ol style="list-style-type: none"> 1. To reduce overall dropout: National Means-cum-Merit Scholarship Scheme (NMMSS). 2. To improve girl education- National Scheme of Incentives to Girls for Secondary Education, MLLY. 3. To support education for children with disability between VIIIth to XIIth grade- Inclusive Education for Disabled at Secondary Stage, SVNSPY. 4. For SC/ST children- Pre-matric scholarships for SC/ST. 	<p>a. Fill in infrastructure and resource gaps for secondary secondary education as per RMSA norms building on from previous three years.</p> <p>b. Increase the scope of education scholarships by building on existing schemes for higher education.</p>
Universal improvement in learning outcomes up to secondary level.	<p>a. Strengthen staff capacity in all levels of schools.</p> <ol style="list-style-type: none"> 1. For elementary level schools, the stipulated PTR requirement (30:1 for primary and 35:1 for upper primary), as specified under RTE (2009) should be fulfilled by building upon SSA. 2. For secondary level schools, the stipulated PTR requirement (30:1) as specified under RMSA should be fulfilled (as discussed above). 3. Salaries of teachers should be improved at competitive rates to attract and retain qualified teachers. 4. Train and recruit local people particularly women for providing education till secondary schools. 	Investments to be continued building upon achievements of the previous three years.

d. Employment and Livelihood

Improving the status of employment and livelihood in Bokaro district will require a multi-pronged approach considering education and skill levels among young people within employable age, providing support to small businesses including for women and improving agriculture based livelihoods.

The budget for skill development is extremely limiting. As per the flagship scheme Pradhan Mantri Kaushal Vikas Yojana (PMKVY), the total training target between 2017-2020, for all of Jharkhand is for about 57,000 people. The total budget for three years is about Rs. 88 crore⁴⁴. However, in Bokaro itself, with 15-39 age groups, there are 4.8 lakhs non-workers. Therefore, convergence in this area is an utmost requirement to improve people's employability and earning opportunity, including women.

For agriculture, the major focus should be on water and soil conservation, which should be tackled with a long-term focus adopting a watershed based approach for improving agricultural productivity. The state also identifies the need of it as reflected in the initiative Jharkhand State Watershed Mission (JSWM).

Outcome (projected)	Output	
	1-3 years	3-5 years
Progress towards universal livelihood within employment age of 15-59 years, with focus on women and SC/ST	<p>a. Education support</p> <ol style="list-style-type: none"> For completing secondary and higher secondary to ensure eligibility for secured wage employment. Special education support should be provided for women. (Refer to recommendation on education). Augmenting assistance as provided under post-matric scholarship to SC/ST to incentivize higher education. <p>b. Skill development</p> <ol style="list-style-type: none"> Increase training for non-workers falling within working age group of 15-39 as per provisions of PMKVY to increase the number of skilled people. A focus of skill development/ training should be the vulnerable sections such as women, SC and ST, with 50 per cent of them enrolled in such programs. Given the local resources and socio-economic profile of Bokaro district, training can be focused around sectors such as agriculture, horticulture, food-processing, healthcare, and hospitality (and also identified sectors by the Jharkhand Skill Development Mission Society). 	<p>a. Improve on education support to increase people's employment from building on previous years.</p> <p>b. Roll out scholarships for meritorious students for higher education and business entrepreneurship.</p> <p>c. Increase the number of people trained and areas requiring skill development based on assessment of previous years.</p> <p>d. Provide capital subsidy/interest-free loans to for start-ups and micro, small & medium enterprise</p>
Enhancement of agriculture-based livelihood and income	<p>Initiate a long term approach for watershed management in convergence with various concerned departments, to improve water and soil conditions and relieve distress for the agricultural communities. Watershed management approach should be adopted in convergence with various concerned departments for augmenting water resources as per local potential.</p> <p>A convergence approach can be adopted with the JSWM. Also building on Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) can be considered to improve/enhance recharge of aquifers and introduce sustainable water conservation practices.</p>	

References

1. Ministry of Finance, Department of Economic Affairs, 2017, Output Outcome Framework for Schemes 2017-2018, as available from http://dea.gov.in/sites/default/files/OutcomeBudgetE2017_2018.pdf
2. As per information of district website of Bokaro, http://bokaro.nic.in/about_bokaro.html, accessed in November 2017
3. District census Handbook of Bokaro, Census of India 2011, http://www.censusindia.gov.in/2011census/dchb/2010_PART_B_DCHB_BOKARO.pdf, as accessed on November 2017
4. Report on Land Use / Vegetation Cover Mapping of East Bokaro Coalfield based on Satellite Data for the Year 2015, CMPDI, http://www.centralcoalfields.in/subts/pdf/Report_EBCF_2015.pdf, as accessed in November 2017
5. Provisional coal statistics 2015-2016, as available from, <http://www.coalcontroller.gov.in/writereaddata/files/Provisional%20Coal%20Statistics%202015-16.pdf>, accessed on November 2017, Ministry of Coal, Government of India
6. *United Nations Development Programme (UNDP), Human Development Index, as accessed from <http://hdr.undp.org/en/content/human-development-index-hdi>*
7. World Health Organisation (WHO), Global Tuberculosis Report, 2017, as accessed in November 2017 from <http://apps.who.int/iris/bitstream/10665/259366/1/9789241565516-eng.pdf?ua=1>
8. The End TB Strategy, World Health Organization, http://www.who.int/tb/End_TB_brochure.pdf?ua=1, accessed on November 2017
9. Ministry of Health and Family Welfare, August 2017, MIS
10. World Health Organisation (WHO), Malaria in infants, as accessed from http://www.who.int/malaria/areas/high_risk_groups/infants/en in November 2017
11. 2017 Global Hunger Index: The inequalities of Hunger, International Food Policy Research Institute, <https://www.ifpri.org/publication/2017-global-hunger-index-inequalities-hunger>, accessed on November 2017
12. Indian Public Health Standards, National Health Mission, <http://nhm.gov.in/nhm/nrhmguidelines/indian-public-health-standards.html>, accessed on November 2017, Ministry of Health & Family Welfare, Government of India
13. National Urban Health Mission, Framework for Implementation, http://www.pbnrhmguidelines.org/docs/nuhm_framework_implementation.pdf, accessed on November 2017, Ministry of Health & Family Welfare, Government of India
14. Indian Public Health Standards, Guidelines for Sub-District/ Sub-Divisional Hospitals, Revised 2012, <http://nhm.gov.in/images/pdf/guidelines/iphs/iphs-revised-guidelines-2012/sub-district-sub-divisional-hospital.pdf>, accessed on November 2017, Ministry of Health & Family Welfare, Government of India

15. Indian Public Health Standards, Guidelines for District Hospitals, Revised 2012, <http://nhm.gov.in/images/pdf/guidelines/iphs/iphs-revised-guidlines-2012/district-hospital.pdf>, accessed on November 2017, Ministry of Health & Family Welfare, Government of India
16. Indian Public Health Standards, Guidelines for Primary Health Centres, Revised 2012, as accessed from <http://health.bih.nic.in/Docs/Guidelines/Guidelines-PHC-2012.pdf>, in November 2017
17. Global Health Observatory (GHO) data, World Health Organization, http://www.who.int/gho/child_health/mortality/mortality_under_five_text/en/, as accessed on November 2017
18. *National family health survey (NFHS), 2015-16, Bokaro Factsheet as accessed from http://rchiips.org/NFHS/FCTS/JH/JH_Factsheet_355_Bokaro.pdf, in November 2017; NFHS describes “adequate diet” as breastfed children receiving 4 or more food groups and a minimum meal frequency, non-breastfed children fed with a minimum of 3 infant and young child feeding practices (fed with other milk or milk products at least twice a day, a minimum meal frequency that is receiving solid or semi-solid food at least twice a day for breastfed infants 6-8 months and at least three times a day for breastfed children 9-23 months, and solid or semi-solid foods from at least four food groups not including the milk or milk products food group).*
19. Ibid
20. *Planning Commission, Evaluation Study on Integrated Child Development Scheme (ICDS), Volume I, as accessed from http://planningcommission.nic.in/reports/peoreport/peoevalu/peo_icds_v1.pdf, in November 2017*
21. Ministry of Consumer Affairs, Food and Public Distribution, 2013, National Food Security Act (2013)
22. Jharkhand Food, Public Distribution and Consumer Affairs Department, Notification dated January 2017, Government of Jharkhand
23. Guidelines for School Infrastructure and Strengthening (civil works), December 2014, http://rmsaindia.gov.in/images/School_Infrastructure_and_Strengthening.pdf, as accessed on November, 2017
24. United Nations Educational, Scientific and Cultural Organization, <http://uis.unesco.org/en/glossary-term/pupil-teacher-ratio-ptr>, accessed on Oct 2017
25. Student- Teacher Ratio, Ministry of Human Resource Development, Department of Higher education, http://mhrd.gov.in/sites/upload_files/mhrd/files/Student-Teacher%20Ratio.pdf, accessed on November 2017, Government of India
26. Chapter 21, Education, Planning Commission of India, <http://planningcommission.gov.in/hackathon/Education.pdf>, accessed in November, 2017
27. Poverty and Hunger in Jharkhand: Challenges of Eradication, Sharan Ramesh as accessed from <http://www.iesd.org.in/jjsd/Journal%20pdf/2013-V-1&2%20ramesh%20sharan.pdf> in November, 2017
28. Brief Industrial Profile of Bokaro District, Micro, Small and Medium Enterprises, as accessed on November, 2017 from <http://dcmsme.gov.in/dips/DIPS%20Bokaro.pdf>

29. Ibid.
30. District Irrigation Plan, Bokaro 2015-2020, Pradhan Mantri Krishi Sinchayee Yojana, <http://pmksy.gov.in/mis/Uploads/2017/20170221124204004-1.pdf>, as accessed on Nov 2017, Government of India
31. Ibid
32. Swachh Bharat Mission - Gramin dashboard, as accessed on November 22, 2017
33. As informed by District Swachh Bharat Mission – Urban cell
34. Central Ground Water Board (CGWB), Contaminated Areas as accessed in November 2017, from <http://cgwb.gov.in/Documents/Contaminated%20Areas.pdf>
35. DownToEarth, October 2011, Bokaro's displaced still await compensation
36. <https://timesofindia.indiatimes.com/city/ranchi/Bokaro-Steel-neglecting-green-guidelines/articleshow/19180619.cms>
37. Sectorwise list of Seriously Polluting Industries (SPI), Jharkhand State Pollution Control Board, as accessed in December, 2017 from [http://www.jspcb.org/Information/Final%20Information%20on%20Seriously%20Polluting%20Industries%20\(SPI\).pdf](http://www.jspcb.org/Information/Final%20Information%20on%20Seriously%20Polluting%20Industries%20(SPI).pdf)
38. B. Pandey, M. Agrawal and S. Singh, 2014, Assessment of air pollution around coal mining area: Emphasizing on spatial distributions, seasonal variations and heavy metals, using cluster and principal component analysis, Atmospheric Pollution Research, Volume 5, pg 79-86
39. Chandra Bhushan et al, 2015, Heat On Power, Centre for Science and Environment, New Delhi
40. River Stretches for Restoration of Water Quality, Central Pollution Control Board, February 2015, as accessed from <http://cpcb.nic.in/RESTORATION-OF-POLLUTED-RIVER-STRETCHES.pdf> in November, 2017
41. ibid
42. Groundwater Information Booklet, Bokaro District, Jharkhand State, September 2013, as accessed in November 2017, from http://www.cgwb.gov.in/District_Profile/Jharkhand/Bokaro.pdf
43. United States Environment Protection Agency, 1996, Watershed Approach Framework, Office of Water, USA
44. Ministry of Skill Development and Entrepreneurship, 2017, Communication dated September 2017, as available from http://www.skilldevelopment.gov.in/assets/images/Sanction/Sanction%20order_Jharkhand.pdf, accessed on November, 2017





Centre for Science and Environment
41, Tughlakabad Institutional Area, New Delhi 110 062
Phones: 91-11-29955124, 29955125, 29953394
Fax: 91-11-29955879 E-mail: cse@cseindia.org
Website: www.cseindia.org