

Labour Engagement Trends in Mining and Quarrying

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Article Info	ABSTRACT
Article History: Received: 15 th Dec 2025 Accepted: 18 th Dec 2025 Published: 20 th Dec 2025	Mining and quarrying have historically played a pivotal role in shaping the economic and social landscape of both industrialized and developing nations. In India, the sector has long been recognized as a critical source of employment, especially in remote and rural regions where alternative livelihood options remain limited. The mining industry does not merely contribute to the extraction of natural resources; it is a dynamic labour-intensive sector that supports millions through both direct and indirect employment opportunities. From large-scale mechanized operations in coal, iron ore, and bauxite mines to informal and decentralized activities such as stone quarrying and small-scale mineral extraction, the scope of employment generated by this sector is extensive and multifaceted. In rural areas, particularly in mineral-rich belts of central and western India, quarrying activities offer seasonal but significant sources of livelihood to marginal populations, including landless labourers, tribal communities, and migrant workers. This makes the mining and quarrying sector not only an economic engine but also a vital socio-economic support system for vulnerable sections of society.
Keywords: <i>Quarry, Migration, multifaceted</i>	
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Introduction-

The increasing mechanization of large-scale mines, changes in mining laws, environmental clearances, and shifts in global commodity prices have all influenced employment patterns in this sector in recent years. At the same time, informal quarrying, especially for construction materials like stone, gravel, and sand, has continued to absorb a considerable number of laborers, albeit in precarious working conditions. This dual nature of the sector—formal and informal—demands a nuanced understanding of employment trends over time. Hence, a detailed analysis of labor engagement from 2015 to the present provides a critical lens through which to assess the sector's performance as a job provider. Nationally, the mining sector's contribution to employment has undergone various shifts influenced by policy reforms, environmental regulations, and socio-economic changes, while regionally, areas such as Satara district in Maharashtra have seen localized patterns of labor engagement, particularly in stone quarrying activities that are deeply embedded in the local economy.

Significance of the study:

The study reviewed the scenario increasing employment opportunity in mining and quarrying in economy. It also study the Impacts on employment are large, especially in rural and indigenous communities.

Objective of study:

- 1) To study the various Employment opportunity in Mining and Quarry sector
- 2) To evaluate proportion of labour participation in quarry increase after covid -19.
- 3) To suggest policy for the up gradation of vulnerable sections of society engaged in quarrying..

• Statement of the research Problem:

Post covid biggest effect faced by every country is structural unemployment. To reduce it, many of authorities taken some measure so up gradation of Primary and secondary sector done on large basis to divert the pressure of employment opportunity in service sector .after 2020 mining and quarrying business got boost due to infrastructural development. It has been observed that the trend in extraction sector increases through the article researcher wants put up the scenario of employment so it will help to government to socio-economic support system for vulnerable sections of society.

• Scope of the study:

This study explained trend of labour engaged in Mining and Quarrying. It specifically explain the scenario of satara district which rich in quarrying of boxite stone.it help the understand difficulty and obstacle in quarry labour workplace The data collect for the study is for 2015-2024.

• Data and methodology:

This study based upon the secondary data which availed from Collector office and District statistical department.

Labour Force Participation in Indian Mining Sector (2015–2024)

Over the last decade, employment patterns in India's mining sector have undergone notable shifts, reflecting the influence of multiple macroeconomic and regulatory factors. Mining labor, though relatively small in proportion to the national labor force, continues to provide a livelihood to lakhs of individuals, particularly in resource-rich but economically underdeveloped regions. From 2015 to 2024, labor participation in mining activities has fluctuated between 5.2 and 7.4 lakh workers. When measured against the overall national labor force—ranging from approximately 48 crore in 2015 to 53 crore by 2024—the share of mining-related employment consistently remains below 0.2%, demonstrating the capital-intensive nature of large-scale mining and the growing reliance on automation in the sector.

In 2015, the mining sector employed an estimated 7.2 lakh individuals, contributing approximately 0.15% of the national labor force. This figure saw a modest rise in 2016, touching 7.4 lakh (0.15%), largely driven by coal block auctions and new mineral concessions under the revised MMDR Act, 2015. However, a slight contraction occurred in subsequent years, with the workforce dropping to around 6.8 lakh in 2018. This decline coincided with regulatory tightening, delays in environmental clearances, and increasing scrutiny over illegal mining operations. Additionally, the slow pace of exploration licensing and the bureaucratic delays in lease renewals

led to a slump in new mining activity, affecting job creation during that period.

The impact of the COVID-19 pandemic in 2020 and 2021 was significant, pushing mining labor numbers down to 5.2 lakh, the lowest point in this period. Nationwide lockdowns disrupted logistics and production, while health risks and social distancing norms made it difficult to operate in labor-dense environments, especially in informal small-scale mining and quarrying operations. According to Sharma (2019), the sector was already reeling under reduced employment opportunities due to increasing mechanization and policy inertia, and the pandemic further accelerated this contraction.

From 2022 onwards, as the economy began recovering, there was a mild resurgence in mining-related employment, supported by policy push towards self-reliance in minerals and the expansion of domestic coal and iron ore production. The labor count rose to 6.5 lakh in 2024, supported by infrastructure-led growth, renewed construction demand, and attempts to boost domestic mineral processing capacities. Nonetheless, the mining sector's share of employment remains structurally low due to its nature—requiring heavy machinery, skilled manpower, and high upfront capital investments, unlike sectors such as agriculture or manufacturing which are labor-intensive.

Another important factor influencing employment levels in mining is the relatively low participation of women, driven by policy restrictions on underground work and limited access to skilled training. Despite the sector's potential, its employment impact is limited unless broader reforms focus on small-scale mining legalization, labor welfare, skill enhancement, and simplification of licensing and clearances. As highlighted by H.M. Channabasavaiah and G. (2022), the overall economic importance of mining is not fully realized unless labor participation is actively monitored and facilitated through formal systems. Therefore, while mining continues to offer steady employment, its proportional contribution to India's labor economy remains modest and highly sensitive to policy, global prices, and environmental governance.



Labour Engagement in Stone Quarrying – Satara District (2015–2024)

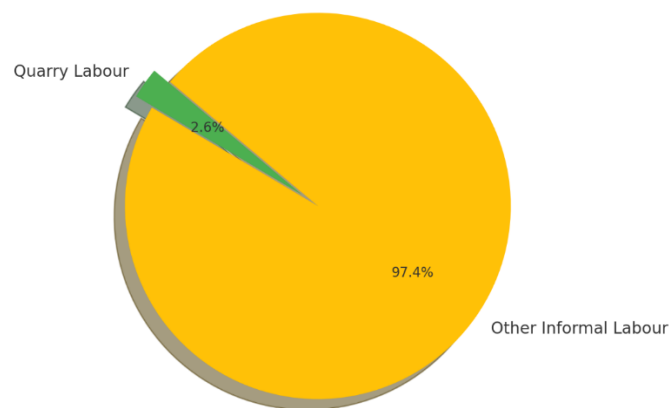
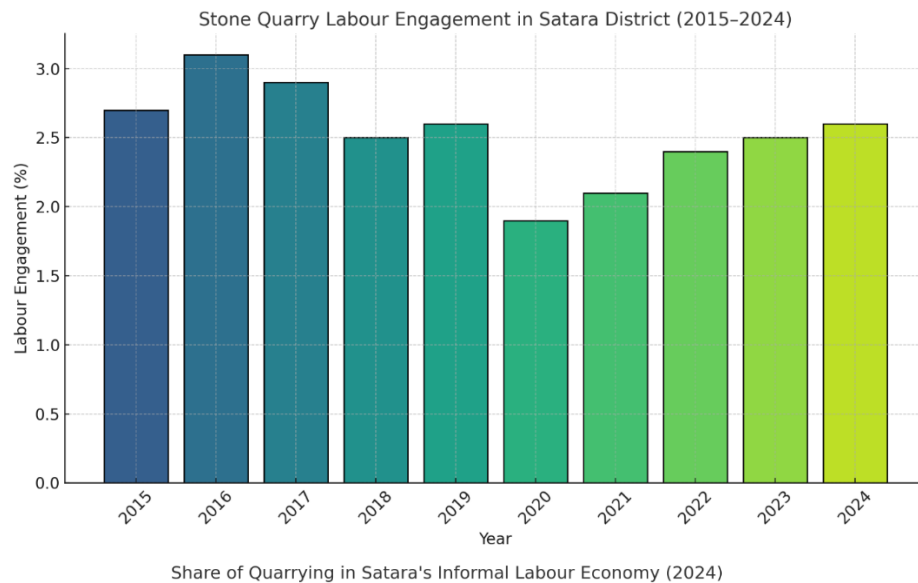
The stone quarrying sector in Satara district has remained a crucial contributor to rural livelihoods and informal employment across the last decade. As documented in various District Survey Reports (Govt., Satara, 2021) and publications by the Maharashtra Pollution Control Board (GOVT., MPCB, 2021), stone quarrying has played a central role in shaping the economic profile of blocks like Phaltan, Saspad, and Aundh. These areas, being naturally rich in basalt and other construction-grade rocks, have witnessed widespread quarrying activity, particularly for the production of building materials such as crushed stone, aggregates, gravel, and dimension stone. The nature of employment in these quarries is largely informal and labor-intensive,

drawing a substantial share of the rural working population into physically demanding tasks. Quarry jobs in Satara include blasting operations to dislodge rock masses, manual and mechanical loading of quarried material, stone crushing and sorting, and transport duties involving heavy vehicles like dumpers and tractor-trolleys. Each of these roles has different skill requirements and levels of occupational hazard, but all are integral to the day-to-day operations of quarry units. From 2015 to 2024, the percentage of Satara district's working population engaged in quarrying has shown both growth and decline, influenced by seasonal patterns, government regulations, and changing market demand for construction material. In 2015, approximately 2.7% of Satara's estimated working population was engaged in quarry-related work. This number rose slightly to 3.1% by 2016, reflecting the peak infrastructure and construction activity driven by the state's push for rural road development and housing schemes. However, subsequent years saw periodic declines. By 2018, the percentage fell to around 2.5%, largely due to increased environmental scrutiny, temporary halts on operations due to violations, and the saturation of supply in nearby urban markets. Additionally, erratic monsoon patterns and flooding in certain talukas restricted open-pit quarrying for extended periods, reducing labor requirements during those months. Notably, the Maharashtra State Government's tightening of Environmental Clearance (EC) procedures in 2019 led to operational delays and loss of workdays, which translated into reduced labor engagement at the ground level.

The onset of the COVID-19 pandemic in 2020 further compounded these issues, causing a sharp decline in workforce numbers as quarry units were forced to shut down temporarily or reduce operations to minimal capacity. According to local estimates and administrative field data, labor participation in quarrying during 2020 dipped to as low as 1.9% of the district's active working population. Migrant laborers returned to their native villages, and informal workers were left without safety nets or alternative employment, highlighting the vulnerability of the quarry workforce during crises. However, from 2021 onwards, the district witnessed a cautious revival in stone quarrying activities, aided by infrastructure-led economic recovery and resumption of halted projects. Quarry units began scaling up operations, albeit with more mechanization and fewer manual labor requirements, which explains why the labor percentage, though increasing, did not fully return to pre-pandemic levels.

By 2024, the estimated labor force engaged in quarrying in Satara has stabilized around 2.6% of the total working population. This relative equilibrium can be attributed to two counterbalancing forces: on one hand, increased demand for building materials from regional construction hubs and highway expansion projects; and on the other hand, the adoption of more efficient, semi-automated crushing and loading mechanisms which have gradually displaced unskilled manual workers. Additionally, regulatory requirements regarding the Environmental Impact Assessment (EIA) and sustainable mining protocols have become stricter in Satara district, requiring quarry operators to maintain buffer zones, ensure dust control, and limit excavation to approved boundaries (GOVT., 2021). These conditions have increased operational costs for some units, prompting them to cut down on redundant labor and shift towards productivity-based workforce models.

Comparing the quarry labor force to the total labor population of Satara reveals a pattern of dependence and vulnerability. While the quarrying sector employs a relatively small percentage of the overall workforce, it plays a disproportionately important role in sustaining families with little access to agriculture, education, or salaried employment. This is especially true in rocky, semi-arid talukas where farming is unviable and seasonal migration is the norm. The lack of formal employment benefits, safety provisions, and minimum wage guarantees continues to plague this workforce, despite multiple government acts being in place. As highlighted by Devata (2010), the socio-economic profile of quarry workers—many of whom belong to Scheduled Tribes or economically backward classes—demands targeted intervention for skill development, social security, and fair labor rights.



When analyzing the employment trends in the mining sector at the national level against those within Satara district's quarrying units, a contrast in trajectories becomes evident, particularly in the latter half of the decade. At the national scale, the mining sector has witnessed a general decline in labor participation from 2015 to 2021, influenced largely by increased automation, tightened environmental regulations, and disruptions caused by the COVID-19 pandemic. According to H M, Channabasavaiah and G. (2022), mining labor in India dropped from around 7.4 lakh in 2016 to a low of approximately 5.2 lakh during the peak of the pandemic, with recovery only beginning to show in 2023 and 2024. This reflects the increasing capital intensity of large-scale mining operations and the gradual phasing out of unskilled manual labor in favor of technology-driven efficiency.

In contrast, Satara district—where stone quarrying is deeply embedded in the rural economic structure—has shown a more resilient and sometimes divergent pattern. For instance, even during periods when national mining employment was declining, Satara witnessed local spikes in quarry labor engagement, notably in 2016 and again during the recovery period in 2022 and 2023. These anomalies are largely rooted in the district's dependence on quarrying for employment in semi-arid and rocky regions where agriculture is unviable. Furthermore, the demand for crushed stone and construction materials remained relatively steady due to regional infrastructure projects, thereby sustaining quarry activities even when other sectors faltered.

However, it is crucial to note that the nature of employment in Satara's quarrying units is overwhelmingly seasonal and informal. The workforce fluctuates based on monsoonal conditions, with reduced activity during the rainy season due to waterlogging in open-pit quarries and stricter safety concerns. Moreover, gender participation remains skewed, with women largely confined to low-wage, non-mechanized roles like stone sorting and manual loading, often without

legal protections or consistent wages (Devata, 2010). Rural-to-urban migration trends also play a role—young men often migrate to cities for better-paying jobs, while older workers and women remain dependent on local quarry work, creating an uneven demographic composition within the quarry workforce.

Policy Implications & Suggestions

The persistent informality and vulnerability of quarry workers in districts like Satara call for a rethinking of labor policies specific to the small-scale mining and quarrying sector. One of the most pressing needs is the establishment of a reliable and transparent employment documentation system. Currently, most quarry laborers remain off the official employment records, making it difficult for them to access government welfare schemes, accident insurance, or even legal recourse in case of disputes. A decentralized but verifiable registry, maintained by the district labor office in coordination with mining lessees, could provide much-needed visibility and accountability in this labor segment.

Secondly, support schemes tailored to the realities of quarry labor must be institutionalized. These should include low-cost accident and life insurance coverage, particularly given the hazardous nature of tasks like blasting and heavy material handling. In addition, skilling programs can be introduced to enhance the employability of quarry workers beyond the extraction phase—such as in equipment maintenance, safety auditing, and mechanized transport logistics. Providing training and certification in these domains can help workers transition into more stable and better-paying roles within the mining ecosystem. Similarly, subsidized distribution of safety equipment—such as helmets, gloves, dust masks, and visibility jackets—should be made compulsory for all licensed quarry operators under their operational clearances. Importantly, there is a need to formally integrate quarry workers into the broader framework of India's labor welfare system. At present, most quarry laborers fall outside the ambit of schemes like the Employees' Provident Fund (EPF), health insurance, and pension benefits due to the informal nature of their engagement. Policy reforms must incentivize quarry owners to register workers and contribute to basic social security schemes. This could be facilitated by offering tax concessions or faster license approvals to compliant operators. Furthermore, periodic safety and labor audits should be mandated as part of the Environmental Clearance process, linking compliance directly with license renewals.

In conclusion, addressing the precarious conditions of quarry workers requires a multipronged approach involving better labor documentation, the extension of social protection schemes, targeted skill development, and stronger regulatory enforcement. By doing so, quarrying can evolve from being a survival-based occupation to a more sustainable and dignified form of rural employment, in line with national goals of inclusive development and employment generation.

References

1. Agaarwal, Dr. Manisha. 2022. "Career in Mining."
2. Carman, J.S. and Berger, A. .. 1990. "Small-Scale Mining: A General Review', In J.F. McDivitt (Ed.), *Smallscale Mining: A Guide to Appropriate Equipment*, Intermediate Technology Publication, London Pp. ix–xi."
3. Cramer, S. 1990. "The Legal Battle of Small-Scale Mining." *Appropriate Technology*.
4. Devata, Umesh Chandra. 2010. "Profile of Mine Workers in Orissa."
5. GOVT., MPCB. 2021. "Public Hearing for Fourteen District Level Sand Spots, Satara District, Maharashtra."
6. Govt., Satara. 2021. "District Survey Report Satara District."
7. H M, Channabasavaiah and G, Prof. venkat. naidu. 2022. "Income and Employment Generation through Mining Industry in India." *Mukt Shabd Journal*.
8. LAHIRI-DUTT, KUNTALA. 2003. "Not a Small Job: Stone Quarrying and Women Workers in the Rajmahal Traps in Eastern India."
9. McCloskey, Deirdre. 1999. "Other Things Equal - Economical Writing: An Executive Summary." *Eastern Economic Journal*.
10. Mehta, Pradeep S. 2002. "The Indian Mining Sector: Effects on the Environment & FDI Inflows."
11. Mishra, Niharranjan, and Nabanita Das. 2017. "Coal Mining and Local Environment: A Study in Talcher Coalfield of India." *Air, Soil and Water Research* 10:117862211772891. doi: 10.1177/1178622117728913.
12. Sharma, R. K. 2019. "Explained: How Mining Sector Can Create Lakhs of Jobs."
13. Times, Economic. 2019. "Mining Sector Witnessing Job Losses; Has Potential to Create 5 Cr Jobs