

School Infrastructure in India: Trends, Interstate Disparities and the Challenge of Viksit Bharat 2047

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Abstract

For achieving Viksit Bharat 2047, a technologically advanced and egalitarian educational system needs be established along with universal access to basic school facilities. This study looks at long-term trends and disparities in India's school infrastructure using UDISE+ data from 2013 to 2025. Seven indicators—power, drinking water, male and female restrooms, library facilities, internet access, and computer availability—are examined using three dimensions: basic amenities, learning support, and digital infrastructure. The results show a slight improvement in library access, a significant lag in digital infrastructure, and a near universalization of basic amenities. According to inequality research using the coefficient of variation, basic amenities show little variance, but digital facilities continue to be highly unequal among states. Furthermore, there are clear regional disparities between each facility's top five and bottom five performers, with improvements concentrated in a small number of areas. According to these findings, bridging the digital divide must be given top priority to create the inclusive, knowledge-driven educational system that is at the core of the Viksit Bharat 2047 goal, even though India has been successful in reducing disparities in basic services.

Keywords: School Infrastructure, Inequality, Digital Divide, UDISE+, Education Policy, Viksit Bharat 2047

Note: *Evidence from UDISE+ Data, 2013–2025*

1. Introduction:

Education has long been recognized as the critical component of social and economic development by human capital theory. Education is an investment which is essential for human capital formation and is like physical capital accumulation (Schultz 1961). A strong relationship exists between higher level of education and higher level of earnings which leads to enhanced labor market outcomes (Mincer 1974). Lucas 1988 emphasized human capital formation through investment in education and training creates positive spillovers which act as the key driver to long run and self-sustaining economic growth. Economic growth is strongly correlated with quality of education rather than mere years of schooling demonstrated by empirical cross-country evidence (Hanushek and Woessmann 2015). In India NEP 2020 was brought to strengthen the education system to achieve the global educational development agenda incorporated in the Sustainable Development Goals 4 and transform India to an equitable and vibrant knowledge society. (NEP 2020). The vision of Viksit Bharat which aspires to transform India to a developed and knowledge driven economy by 2047 will strongly require strengthening educational systems and educational infrastructural (NITI AAYOG).

Educational infrastructure plays a crucial role in shaping learning outcomes, as highlighted by a comprehensive World Bank synthesis of 129 international studies (Barrett et al., 2019). Complementing this, a systematic review of 79 studies in developing countries found that investments in infrastructure elements like electricity, libraries, and blackboards significantly improve student learning, although the strength of effects varies. (Glewwe et al., 2011).

Building on education's fundamental role in the development of human capital, educational infrastructure becomes an essential facilitator for achieving these advantages in India, especially considering the Viksit Bharat 2047 vision. Investments in school infrastructure, from digital tools like computers and the internet to basic amenities like electricity and sanitation, must be in line with NEP 2020's emphasis on equitable access and high-quality education as India works to become a developed, knowledge-driven economy [NEP 2020]. India's School Infrastructure development agenda has led to adoption of various policies and schemes targeting many aspects to ensure equity, quality and access. The Sarva Shiksha Abhiyan (SSA) laid the foundation by constructing classrooms, restrooms, and water facilities in primary schools while also attempting to bring the out-of-school children into the mainstream. SSA has opened more than 117,000 new schools, hired more than 386,000 teachers, established more than 60,000 academic resource centers to support teacher training and classroom instruction, and reduced the number of out-of-school children from 32 million in 2001 to 9.5 million by 2005 (Kainth, 2006). The Swachh Vidyalaya Abhiyan a national campaign in India with a motto of *Clean India: Clean schools* was successful in providing the schools with functional toilets which resulted in enhancement in schools' attendance particularly in the northeastern states, but no significant impact was observed in school enrollment rates. (Borthakur & Baruah, 2019). UNICEF's Clean India–Clean Schools initiative further intensified efforts by targeting provision of sanitation facilities across more than 1.2 million schools (UNICEF India,). To improve secondary education access and quality for students between the ages of 14 and 18, Rastriya Madhyamik Siksha Abhiyan was started in 2009 and has since upgraded schools with labs and libraries [Nabi, 2020]. Despite progress, implementation gaps in districts like Pulwama highlight the need for additional alignment with Viksit Bharat's goals [Nabi, 2020].

Despite the progress made by programs like SSA, Swachh Vidyalaya Abhiyan, and RMSA [NITI Aayog], interstate disparities in educational infrastructure hinder the inclusive expansion of Viksit Bharat 2047. Based on UDISE+ 2025 statistics, inequality is high in digital infrastructure (CV 34.36% for computers, 23.80% for internet) than compared to the basic amenities (CV 5.77%-9.31% for water/toilets) [UDISE+, 2025]. Hanagodimath [2024], advocates for fixed per-student spending because India's is spending <3% GDP on education which falls short of the Kothari Commission's 6% target, these draws attention to regional disparities. Kumar et al. [2024] draw attention to rural deficiencies, such as the 72% of Barwani schools that lack laboratories and the 65% of Kalahandi schools that lack digital tool which expands the digital divide. In contrast to elementary education, which has moderate variability, rural AC-level higher education access varies greatly, with Manipur, Arunachal Pradesh, and Bihar exhibiting the most variance (Swaminathan et al., 2020). Targeted changes are necessary since socioeconomic and geographic determinants have shown restricted mobility and provided uneven results [Azam & Kingdon, 2013; Glewwe et al., 2011].

In India, many basic school facilities such as power, drinking water, and sanitation are nearly universally available, but there are still gaps in learning assistance and digital infrastructure. These gaps are particularly prominent in rural and northeastern India. Much attention has been given previously to infrastructure development in the initial stages of SSA and RMSA, however, an examination of the post-2020 context, when national objectives were redefined towards education that is accessible and technically robust in the NEP 2020 and Viksit Bharat 2047 vision, are majorly needed now. Most studies are mostly descriptive and fail to systematically assess interstate variations and their implications, thus generating a major gap in knowledge: not only do we not know how far we have come, but we also don't know how resources are represented unequally which may exacerbate education gaps and cause a hinderance in the *Viksit Bharat 2047* vision of an inclusively developed knowledge driven economy. There is still a need for more research in order to develop up-to-date, evidence-based information that will guide targeted action, reduce the digital divide, and ensure that infrastructure development leads to equitable educational opportunities throughout the country.

2. Objectives

The primary objectives of this study are to:

- Analyze the trends in school infrastructure availability across India from 2013 to 2025 using UDISE+ data.
- Evaluate interstate disparities in school infrastructure, identifying top-performing states and bottom-performing states to highlight regional inequities.
- Assess the progress toward universal coverage of key facilities, focusing on the digital divide and its implications, to inform targeted policy interventions for achieving Viksit Bharat 2047 goals.

3. Data and Methodology

In the study a descriptive analytical approach is used to examine the trends and the interstate inequalities in school infrastructure in India, for this secondary data was drawn from the *unified District Information System for Education Plus (UDISE+)* for the period 2013–2025. UDISE+ is managed by Ministry of Education, Government of India. It is a national database on school education in India which includes data for several educational indicators across all the states and the Union Territories. For this paper seven key indicators representing three core dimensions of Educational Infrastructure essential for achieving Viksit Bharat 2047 namely: (i) basic amenities, (ii) learning support facilities, and (iii) digital infrastructure was selected. The seven indicators are electricity availability, functional boys' and girls' toilets, drinking water facility, library facility, internet access, and computer availability.

The analysis is done in three stages. In the beginning a trend analysis is done for 2013-2025 to capture long run progress in school infrastructure. For the cases of anomalous fluctuations, the raw UDISE+ figures were kept for transparency while smoothed interpolations were used in graphical representations.

Secondly, the mean, standard deviation and coefficient of variation (CV) are computed for all the 7 indicators for 2024-2025 to access the interstate inequality. The CV provides a standardized measure of inequality across states, allowing comparison between basic and digital infrastructure.

Finally, Top 5 and Bottom 5 performing states/union territories are ranked for each indicator. This exercise highlights the regional leaders and laggards and offer insights into the sources of inequalities and the areas which needs to be prioritized as areas requiring the focus of policy interventions

UDISE+ provides wide coverage across the country, but the analysis is limited in a number of ways. Since the data only documents infrastructure availability rather than actual use or functioning, small reporting differences between states may influence year-to-year comparability. Additionally, this study does not directly link infrastructure to student learning outcomes, which is still an important topic for additional research.

4. Results And Discussions

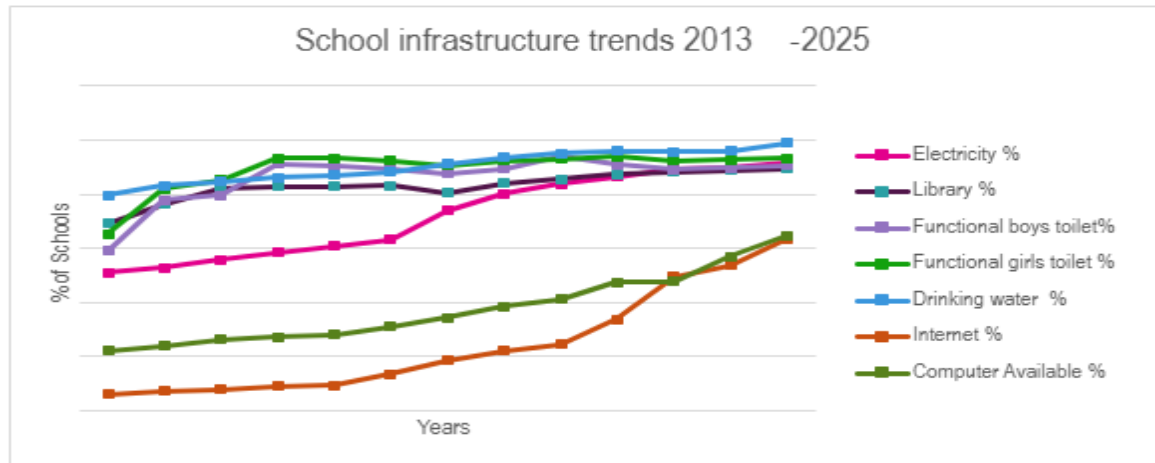
4.1 Trends in School Infrastructure, 2013-2025

Table 4.1: Trends in school Infrastructure in India 2013-2025

Years	Electricity %	Library %	Functional boys' toilet %	Functional girls' toilet %	Drinking water %	Internet Facility %	Computer Availability %
2013	51.03%	69.16%	58.99%	65.46%	79.74%	6.16%	22.18%
2014	52.97%	76.42%	77.93%	81.96%	83.24%	7.29%	24.08%
2015	55.96%	82.20%	79.77%	85.17%	84.82%	8.05%	26.42%
2016	58.55%	82.84%	91.15%	93.44%	86.26%	8.99%	27.31%
2017	60.81%	82.96%	90.47%	93.36%	49.06%	9.46%	28.24%
2018	63.14%	83.12%	89.33%	92.42%	88.24%	13.61%	31.27%
2019	73.86%	80.57%	87.63%	90.74%	91.24%	18.73%	34.52%
2020	80.16%	84.08%	89.32%	92.40%	93.77%	22.28%	38.54%
2021	83.92%	85.58%	94.25%	93.11%	95.17%	24.51%	41.25%
2022	86.58%	87.30%	90.86%	93.90%	95.93%	33.91%	47.51%
2023	89.51%	88.28%	89.27%	92.51%	95.81%	49.66%	47.75%
2024	89.67%	89.02%	89.72%	92.86%	95.92%	53.88%	57.16%
2025	91.88%	89.50%	90.71%	93.30%	99.01%	63.47%	64.69%

Source: UDISE+, Ministry of Education, Government of India Reports, 2013-2025

Figure 4.1 School Infrastructure trends in India 2013-2025



Source: UDISE+, Ministry of Education, Government of India Reports, 2013-2025

The Table 4.1 and Figure 4.1 provide an overview of the evolution of the key school infrastructural facilities in India between 2013 and 2025, based on UDISE+ data. Across the basic facilities, learning support facilities and digital infrastructure facilities three distinct patterns emerge.

The basic infrastructure facilities have developed rapidly and are almost close to universalization. Functional electricity coverage has rose rapidly from 51.03% in 2013 to 91.88 % in 2025 an increase of nearly 40.85% in 12 years. Functional toilets for both boys and girls have climbed to 90.71% and 93.50 % in 2025, drinking water facility development shows a phenomenal progress with coverage reaching about 99.01 % points by the year 2025, the raw series shows a sudden dip in 2017 in drinking water but this is an anomaly rather than a genuine decline. To maintain transparency the actual value from UDISE+ data has been retained in the table however the figure uses an interpolated estimate to smooth the time series. These figures are the indicators of India being able to nearly complete the task of providing basic amenities in schools.

The learning support infrastructure facilities as represented by the library and reading facilities indicators shows advancement but has remained incomplete. This indicator progressed from 69.16 % in 2013 to 89% in 2025, which shows that the progress is significant, but some schools still lack even minimal access to reading resources, which is an important representation of the quality of learning.

The digital infrastructure is the slowest moving dimension, although the computer facilities has increased from 22.18% in 2013 to 64.49 % in 2025 and the internet facilities rose from 6.16 % in 2013 to about 63.47 % in 2025 despite the upward movement these figures highlight the contrast with the near universality of basic facilities. These indicates that nearly two-thirds of the schools in 2025 lacked computers and internet facilities.

Together the table and the figure reveal that the school infrastructure story of India can be divided into two phases, the universalization of the basics has been nearly completed but the school's digital infrastructure readiness which will be crucial determinant of Indias vision Viksit Bharat 2047, where not only basic inputs but also digital readiness will define the

transition towards world class schooling standards. The contrast between almost complete basic infrastructure and lagging digital facilities suggest that in the coming years India must focus on strengthening the Digital Infrastructure to truly transform India into a knowledge driven economy. The 2013-2025 trends provide both a success narrative and a warning signal for the next decades leading to Viksit Bharat 2047.

4.2 Interstate Inequality in School Infrastructure 2024-2025

Despite the national averages providing a strong picture of progress, school infrastructure development in India remains highly uneven across states and union territories. Some states are already near universally equipped with all the basic amenities required for efficient learning outcomes while others are lagging far behind even in the most essential provisions. In a diverse country like India, it is necessary to document the interstate gaps because they directly result in unequal learning outcomes. For Viksit Bharat it is equally essential for all the states move together towards achieving the national targets. To capture the extent of this variation we calculate the mean, standard deviation and coefficient of variation for each facility. This method provides us with a standardized measure of state inequality with higher values of CV indicating greater disparity. This approach allows us to identify the facilities which have been successfully universalized and identifies those where there are significant disparity and progress is concentrated in few better performing states.

Table 4.2: Interstate Mean, Standard Deviation and coefficient of Variation (CV) in School Infrastructure facilities, 2024-2025

Facility	Mean (%)	Standard Deviation (%)	CV (%)	Rank By Inequality
Functional Electricity	90.00%	14.59%	16.21%	4
Library Facility	83.94%	19.06%	22.70%	3
Functional boys' toilet	91.24%	8.36%	9.16%	6
Functional girls' toilet	93.88%	8.74%	9.31%	5
Functional Drinking water	97.99%	5.65%	5.77%	7
Internet Facility	78.24%	25.72%	23.80%	2
Computer Facility	69.25%	32.87%	34.36%	1

Source: Calculations based on UDISE+ dataset, Ministry of Education, Government of India 2024-2025

The table 4.2 highlights the extent of interstate inequality in school infrastructure for 2024-2025. A clear divide between the basic and digital facilities has been evident from the results. On one hand basic infrastructure facilities like Drinking water (SD=5.65, CV= 5.77%), Functional boys' toilet (SD = 8.36, CV = 9.16%), functional Girl's toilet (SD = 8.74,CV = 9.31%) shows very low variation across the states, reflecting their approach to near universalization due to successful large scale government policy interventions like Swachh Vidyalaya Abhiyan and Samagra Shiksha Abhiyan etc.

On the other hand, sharpest inequality is evident on the digital infrastructure side. Computer Availability records the highest rank CV at 34.36% and SD at 23.87% and is followed by Internet Access which ranks second at CV 23.80 % and SD at 25.72% which is an indicator that digital readiness of the states remains highly uneven and is skewed towards the better off states and union territories. Electricity with a CV of 16.21 % and Sd of 14.59 % and Library facilities with a CV of 22.70 % and SD of 19.06% shows slightly better performance than the digital infrastructure yet there is evidence of moderate level of inequality.

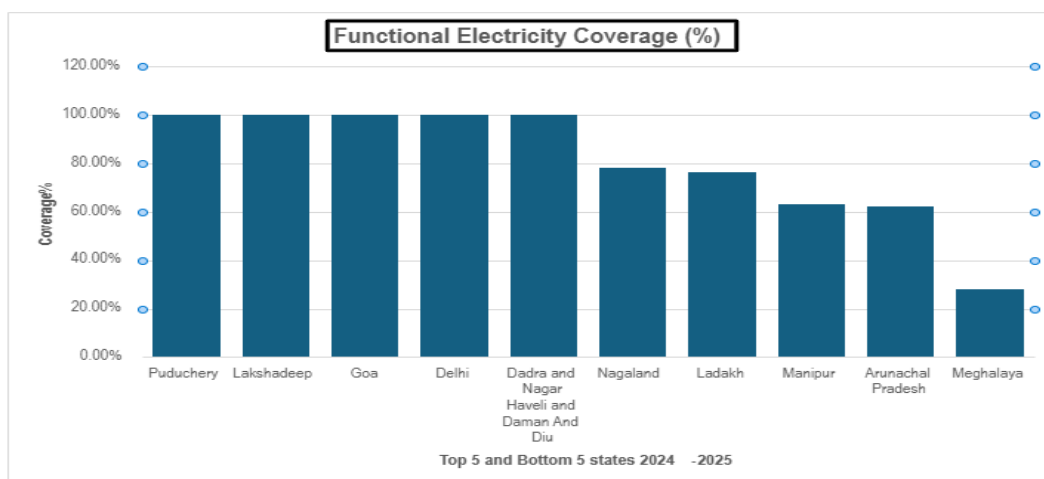
Overall, it can be interpreted from the findings that India has been successful in providing universal access to the basic facilities, but similar progress has not been attained on the digital infrastructure side which remains concentrated in a handful of states and other states lagging far behind. For the idea of Viksit Bharat 2047 this will prove to be a crucial bottleneck which needs to be addressed in the next decade because without bridging this digital gaps India will have a school system which is physically equipped but digitally fragmented, undermining the vision of technology driven, globally competitive education system.

4.3 Top and Bottom performing States

To capture the dimension of which states or union territories drive these inequalities in the infrastructure facilities, we identify the Top 5 and Bottom 5 performing states for each facility in 2024-2025. This analysis highlights the leaders and the laggards showing where universalization has already been achieved and which states and union territories needs special targeted focus and to what extent efforts needs to be done to make the dream of Viksit Bharat 2047 a success.

Functional Electricity

Figure 4.3.1: Electricity coverage (% of schools) – Top-5 vs Bottom-5 states



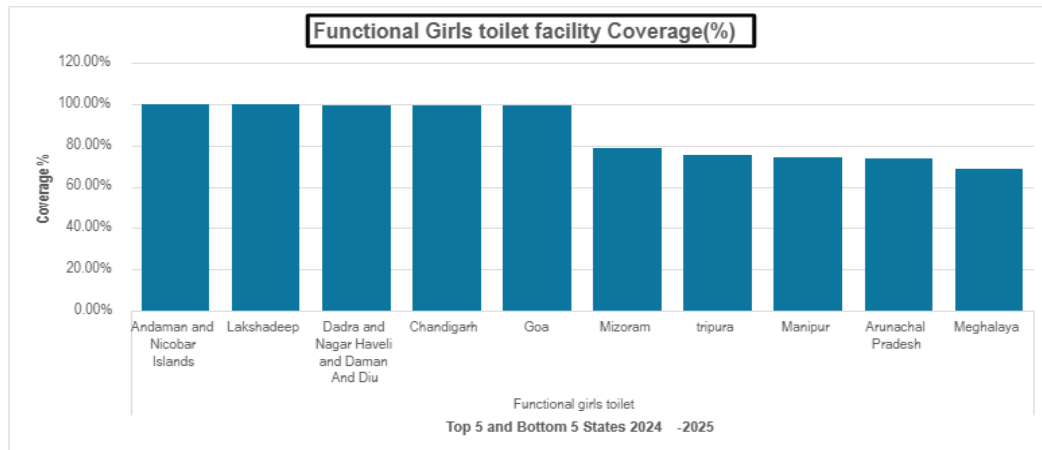
Source: Author's illustration using UDISE+ 2024–25.

The figure 4.3.1 presents the electricity coverage is near universal in most parts of India. Puducherry, Lakshadweep, Goa, Delhi, Dadra and Nagar Haveli & Daman and Diu have reported 100 % coverage demonstrating smaller union territories and better performing states have reached saturation levels. In contrast to this the northeastern states like Meghalaya,

Arunachal Pradesh remains significantly behind, these persistent lags create a pocket of exclusion which can be seen from the data is concentrated on the northeastern part of India. Bridging this gap is essential for achieving inclusive and universal school coverage targets of Viksit Bharat 2047.

Functional Girls Toilet Coverage

Figure 4.3.2: Girls' toilets Coverage (% of schools)– Top-5 vs Bottom-5 states

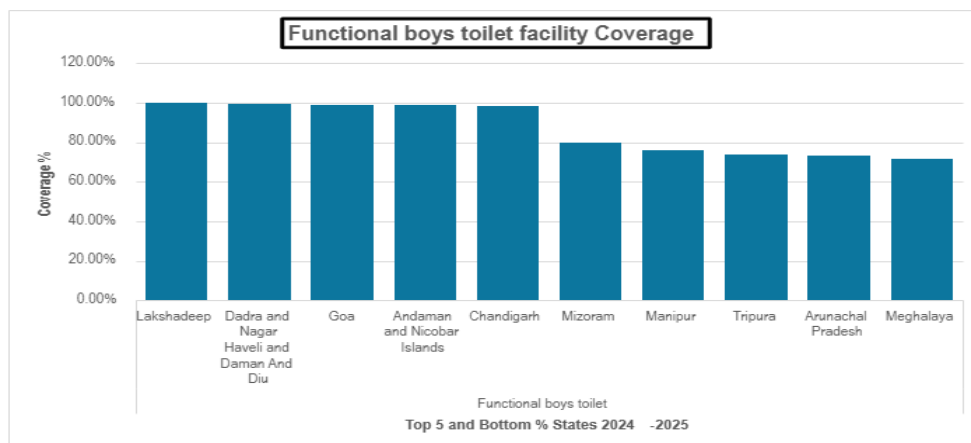


Source: Author's illustration using UDISE+ 2024–25.

The figure 4.3.2 presents the condition of girl's toilet infrastructure coverage in the states and union territories of India in 2024-2025. The evidence from the top performers like Andaman and Nicobar Islands, Lakshadweep, Dadra and Nagar haveli and Daman & Diu, Chandigarh, Goa shows that strong prioritization has been given to the gender sensitive infrastructure as they have reached and saturated at 100 % but the laggards like Mizoram, Tripura and various northeastern states shows questionable coverage below 75%. Ensuring availability of this basic gender sensitive sanitation facility is essential to achieve gender equity as well as achieving the Viksit Bharat idea growth with inclusivity of all

Functional Boys Toilet Coverage

Figure 4.3.3: Boys' toilets Coverage (% of schools)– Top-5 vs Bottom-5 states

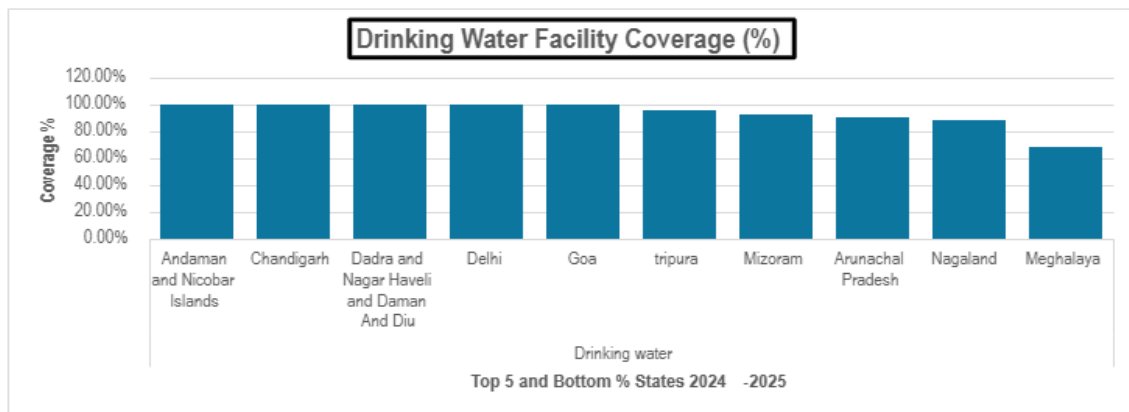


Source: Author's illustration using UDISE+ 2024–25.

The figure 4.3.3 illustrates the coverage of Functional Boys toilet facilities across states and union territories in 2024-2025. The top performers have nearly achieved universal coverage reflecting success of sanitation facilities development. The bottom performers represent coverage hovering between 75% to 80%. Although the gap is narrower compared to the girl's sanitation facilities, yet these disparities are the indicators of regional imbalance which needs to be dealt with effectively for ensuring equitable access to basic sanitation facilities to achieve the Sustainable Development Goals.

Drinking Water Facility Coverage

Figure 4.3.4: Drinking Water Facility Coverage (% of schools)– Top-5 vs Bottom-5 states

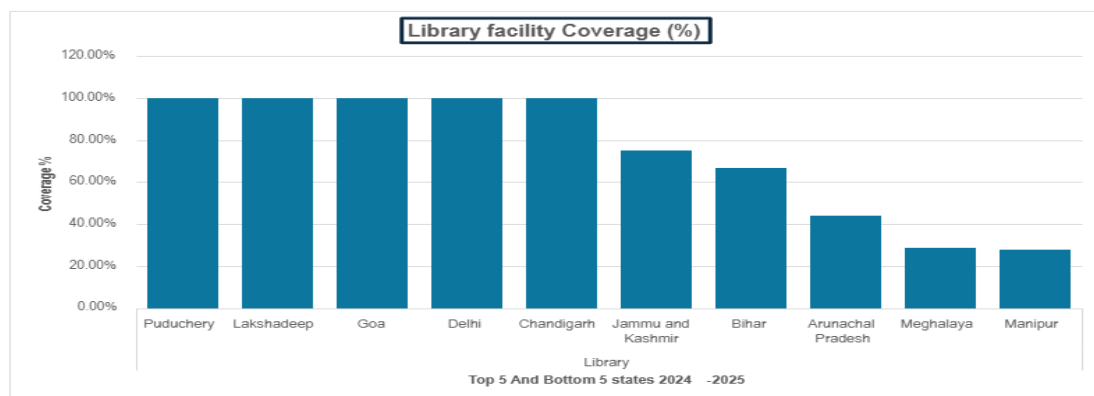


Source: Author's illustration using UDISE+ 2024–25.

The Figure 4.3.4 represents the functional drinking water facility coverage in the schools of states and union territories of India in 2024-2025. The top performers represent near universal coverage demonstrating compliance with the basic infrastructure mandates of the schools. However, the bottom performers specially the northeastern states lag with average coverage of nearly 70 %. While drinking water has become universal in most of the regions as it is a crucial infrastructure for daily lives, yet these regional disparities raise concern about the basic standards of schools and targeted policy actions are strictly needed in these areas.

Library Facility Coverage

Figure 4.3.5: Library Facility Coverage (% of schools)– Top-5 vs Bottom-5 states

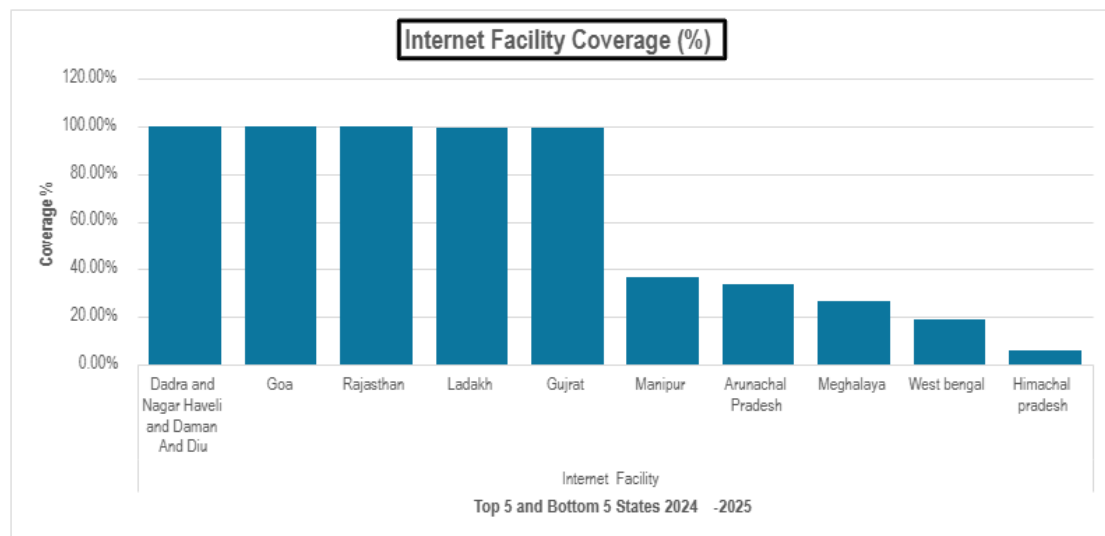


Source: Author's illustration using UDISE+ 2024–25.

The figure 4.3.5 illustrates the stark disparities in library facility coverage across the Indian states and union territories in 2024-2025. Libraries are the cornerstone of a knowledge driven economy which is the aim of Viksit Bharat as these libraries are crucial for fostering literacy, digital skills and lifelong learning. While Puducherry, Lakshadweep, Goa, Delhi, Chandigarh have achieved near universal coverage but the states in the bottom lines provides stark contrast States like Jammu and Kashmir, Bihar, Arunachal Pradesh, Meghalaya, Manipur shows alarmingly low level of coverage, these inequalities highlight structural deficiencies which needs urgent attention as it hampers the learning outcomes of the students. Addressing this is highly important to achieve the goal of equitable distribution of educational infrastructure as a part of Viksit Bharat 2047.

Internet facility Coverage

Figure 4.3.6: Internet Facility Coverage (% of schools)– Top-5 vs Bottom-5 states

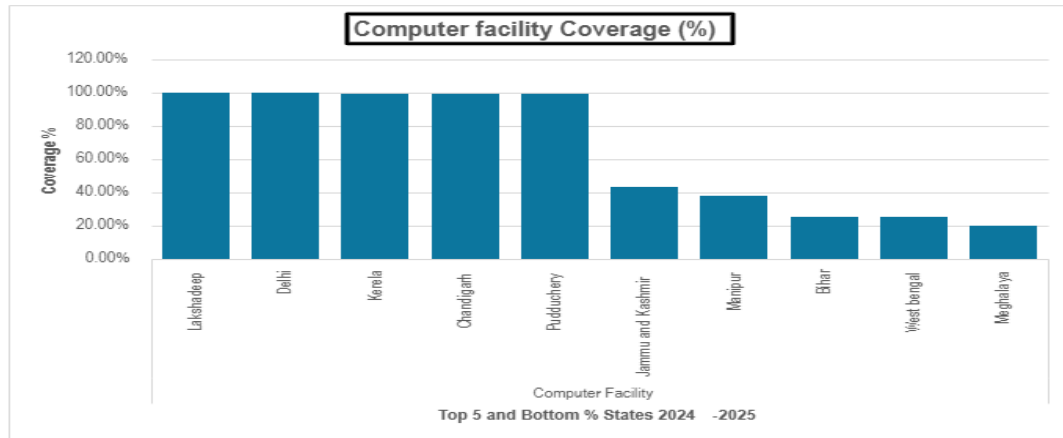


Source: Author's illustration using UDISE+ 2024–25.

The figure 4.3.6 is a representation of the persistent digital divide in Indian schools. While some regions show near universal coverage in Internet access several major states Like Manipur, Arunachal Pradesh, Meghalaya, West Bengal and Himachal Pradesh lag far behind with some having coverage below 20 %. this disparity highlights deep inequalities, which risks many students from online learning, digital learning and future oriented skills. As a part of Viksit Bharat's knowledge driven economy bridging this gap is urgent. Without equitable internet access Indian digital transformation may reinforce inequality rather than eliminating it, which would be a threat to the inclusive development goals.

Computer Facility Coverage

Figure 4.3.7: Computer Facility Coverage (% of schools)– Top-5 vs Bottom-5 states



Source: Author's illustration using UDISE+ 2024–25.

The Figure 4.3.7 shows that the computer facilities reveal sharp inequalities across states and union territories in 2024-2025. While some states show near universal availability of this facility but large states like Bihar, West Bengal, Meghalaya, Manipur, Jammu and Kashmir remains below 40 % coverage which is quite alarming in the 21st century. This uneven distribution is a direct representation of the existent digital divide as access to computers is the foundation of digital literacy. In the context of Viksit Bharat which focus on technology driven learning as central to economic growth and human capital formation such disparities need to be addressed on a priority basis through targeted policy interference as it is vital to prevent system exclusion and foster inclusive national progress.

Conclusion

India has made significant strides in expanding its educational infrastructure, as evidenced by the analysis of UDISE+ data from 2013 to 2025. By increasing the availability of drinking water to 99.01%, having functional toilets for both boys and girls to over 90%, and increasing the coverage of electricity from 51.03% to 91.88%, basic amenities became closer to being universal. Library facilities have increased to about 89.50%, but there are still large gaps. However, there is still a deficiency in digital infrastructure; only 63.47% of schools have computers, and only 64.69% have internet, which means that one-third of schools are underserved. While basic services show minimal variation (CV 5.77%–9.31%), indicating policy achievements like the Swachh Vidyalaya Abhiyan, digital indicators show significant disparities (CV 23.80% for internet, 34.36% for computers). This discrepancy is validated by the calculated inequality measures. Given that digital inclusion is necessary for a knowledge-driven economy, this unequal growth presents dangers for Viksit Bharat 2047. To close the digital divide, maintain gender-sensitive sanitation, and guarantee fair educational results across the country, targeted NEP 2020 investments, more robust public-private partnerships, and improved UDISE+ monitoring are crucial.

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