

Unequal Digital Readiness Among Indian Youth and its Implications for Equitable Digital Health Interventions

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Introduction

Digital health interventions (DHI) – i.e., any device, product, service to support persons with health challenges or disability – can arguably improve health equity (Vasanthan et al., 2024), and offer greater protection and minimize developmental risks for youth. India is investing strongly in digital initiatives such as the Ayushman Bharat Digital Mission (ABDM) (National Health, Authority, NHA, 2026). ABDM has tremendous scope to improve health equity and reach unreached youth through DHI for prevention and promotion. However, prior research shows that extant social inequalities are replicated as digital inequities, with exclusion of vulnerable groups (Ragnedda & Gladkova, 2020). Through an analysis of available datasets on digital penetration and readiness in the country, we offer insights into extant digital inequities in India, which will likely have implications for diverse youth's access and participation through DHIs.

Methods

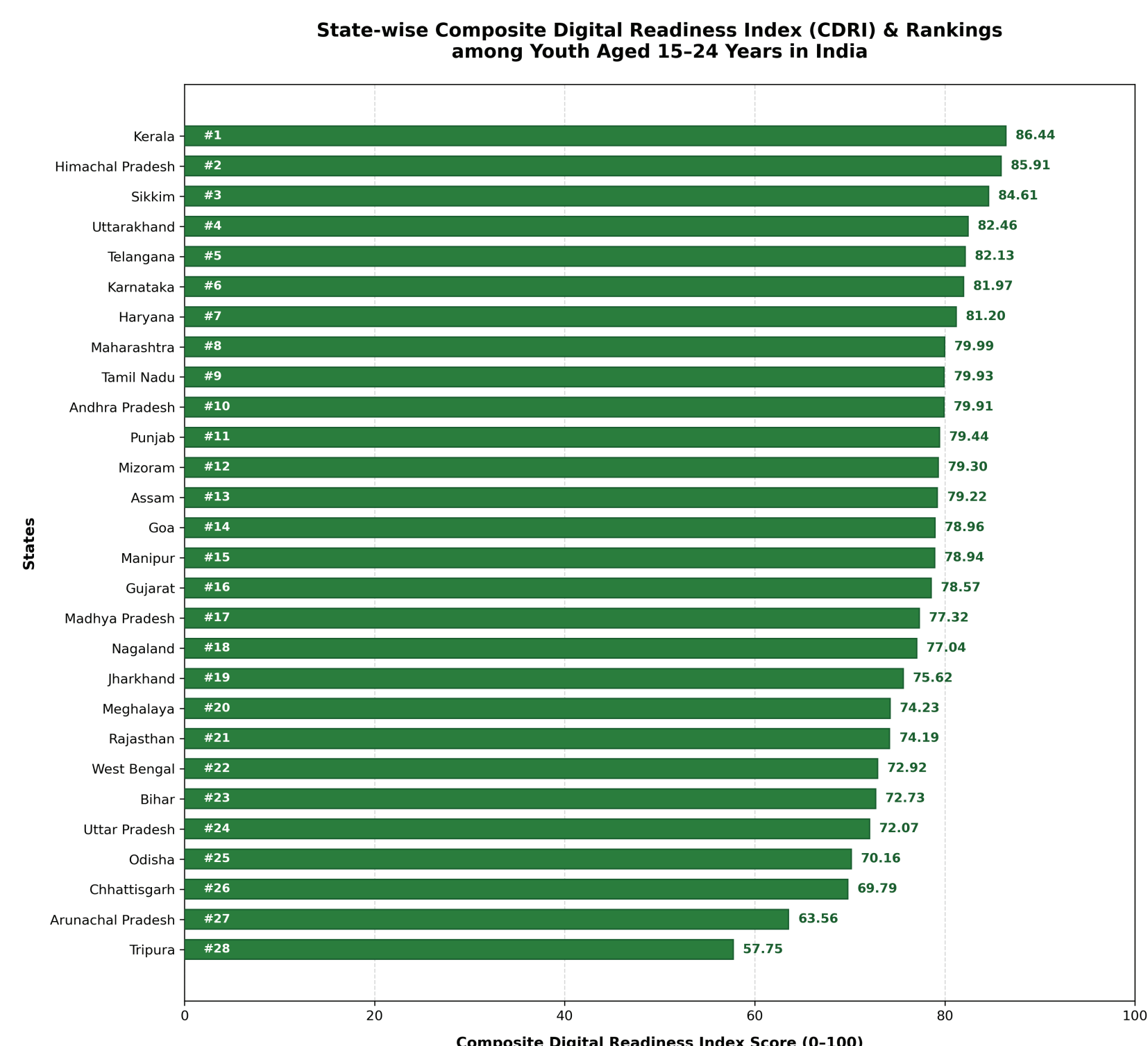
We analysed the Comprehensive Modular Survey: Telecom (CMS-T) 2025 (Ministry of Statistics, Planning and Implantation) data on youth 15-24 years in India. A Composite Digital Readiness Index (CDRI), and a Digital Heterogeneity Index (DHI). We selected eight core indicators to include first- and second order digital divides, to assess CDRI, reflecting: Internet use, frequency of internet use, smartphone ownership; digital skills including copy and paste function, creating electronic documents, online banking, and reporting cybercrime. The DHI measures internal inequalities across gender and rural-urban residence for the same indicators. All variables were normalised using min-max scaling. Pearson and Spearman correlation analyses were conducted to assess associations between digital readiness and internal inequality at national level. Quadrant analysis classified states into readiness-inequality typologies based on index median (CDRI=78.95, DHI=31.08). Median-based cut-offs were used to ensure an objective, non-skewed distribution of states across the four typologies. K-means clustering (Ye, S.Y. 2025) was applied to identify latent state groupings with similar digital inclusion profiles, with the optimal number of clusters determined using a combination of the Elbow Method and Silhouette Scores - 0.45.

Study Population

The eight available indicators, disaggregated by sex (male/female) and residence (urban/rural) for the 15–24 age group, from the CMS-T data were utilized. Available indicators were obtained at individual level.

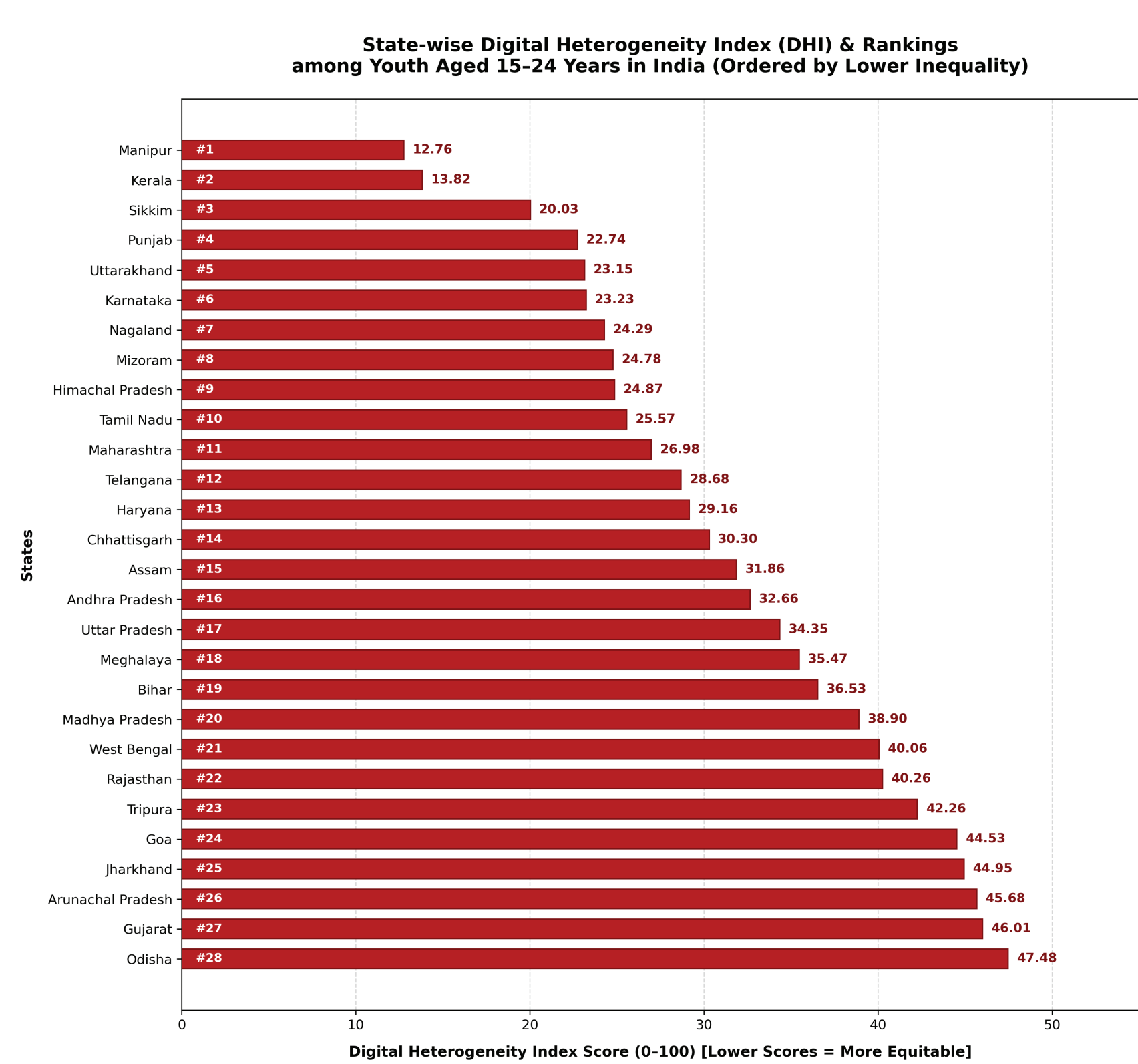
Results

Figure 1: State-wise Composite Digital Readiness Index Scores and Rankings among Youth Aged 15–24 Years in India



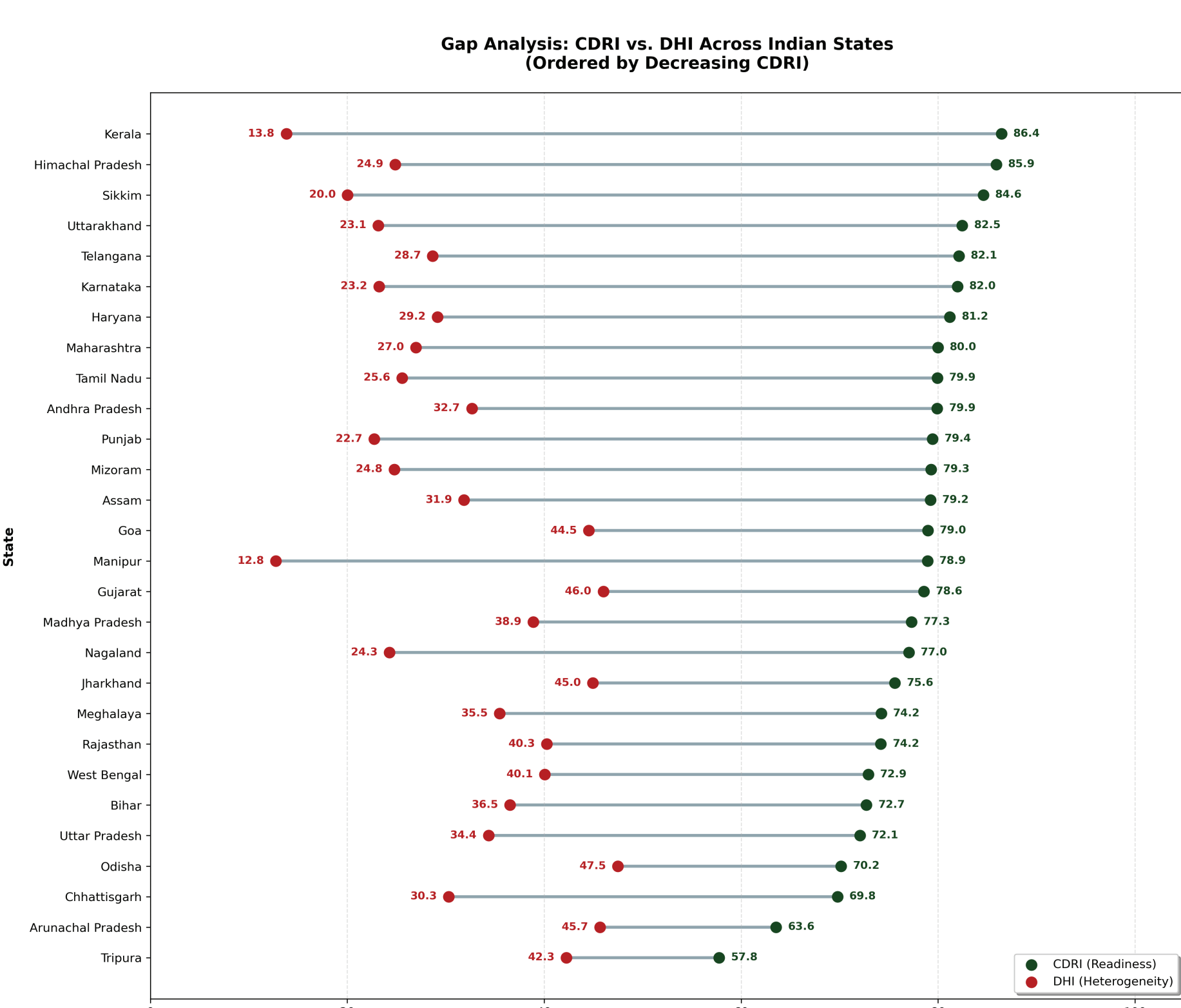
- Inter-state variations in digital readiness among youth aged 15–24 years is seen.
- Kerala (86.44), Himachal Pradesh (85.91), Sikkim (84.61), Uttarakhand (82.46), and Telangana (82.13), recorded the highest CDRI scores, indicating stronger digital access and participation.
- Tripura (57.75), Arunachal Pradesh (63.56), Chhattisgarh (69.79), Odisha (70.16), and Uttar Pradesh (72.07) ranked lowest, reflecting weaker digital readiness.

Figure 2: State-wise Digital Heterogeneity Index Scores and Rankings among Youth Aged 15–24 Years in India



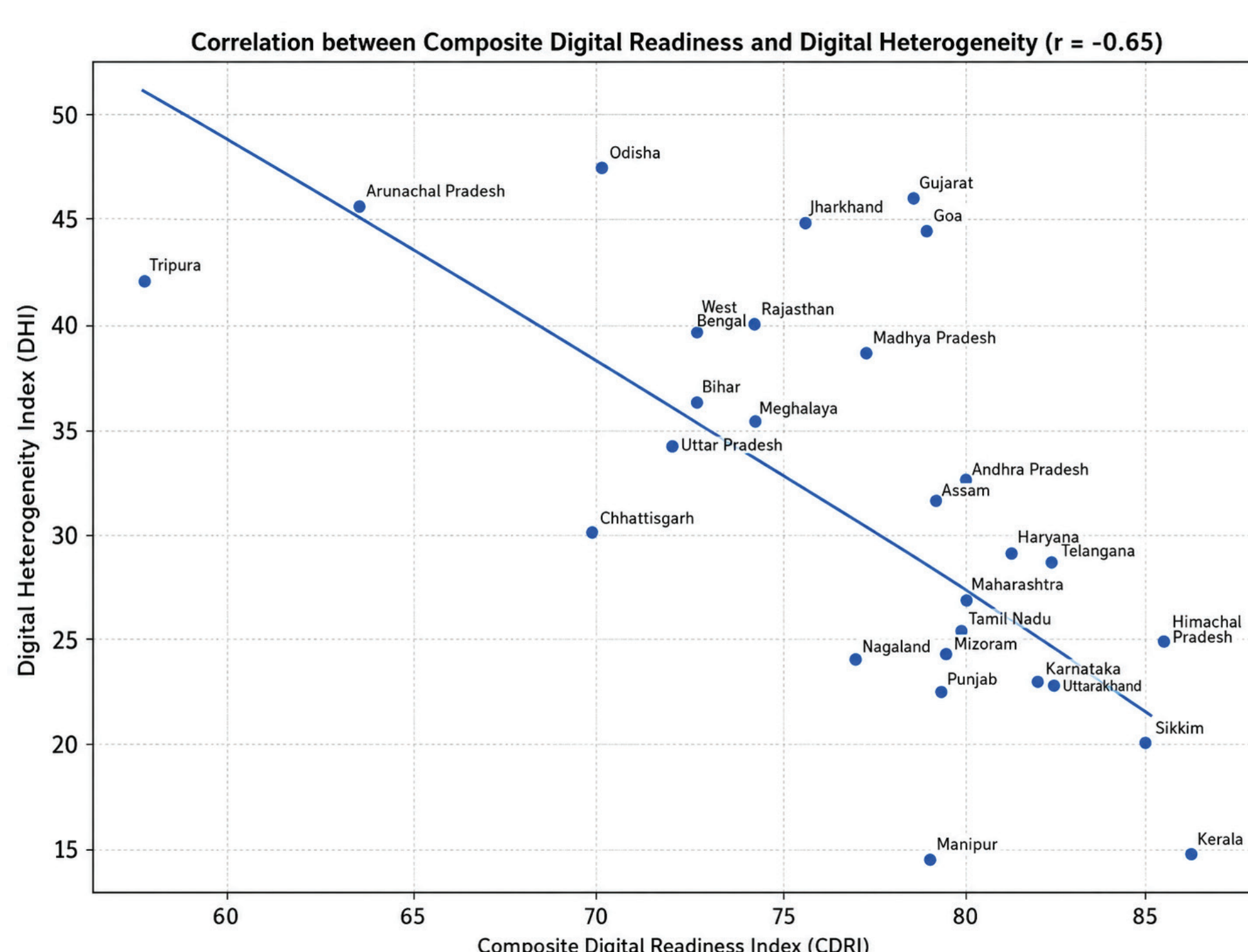
- Odisha (47.48), Gujarat (46.01), Arunachal Pradesh (45.68), Jharkhand (44.95), and Goa (44.53), recorded high DHI, indicating substantial gender and rural-urban disparities in digital access and participation.
- Manipur (12.76), Kerala (13.82), Sikkim (20.03), Punjab (22.74), and Uttarakhand (23.15) showed lower inequality.
- Higher digital readiness does not uniformly translate into equitable digital inclusion across social groups.

Figure 3: Comparison and Gap Analysis of State-wise Composite Digital Readiness and Digital Heterogeneity Scores among Youth Aged 15–24 Years in India



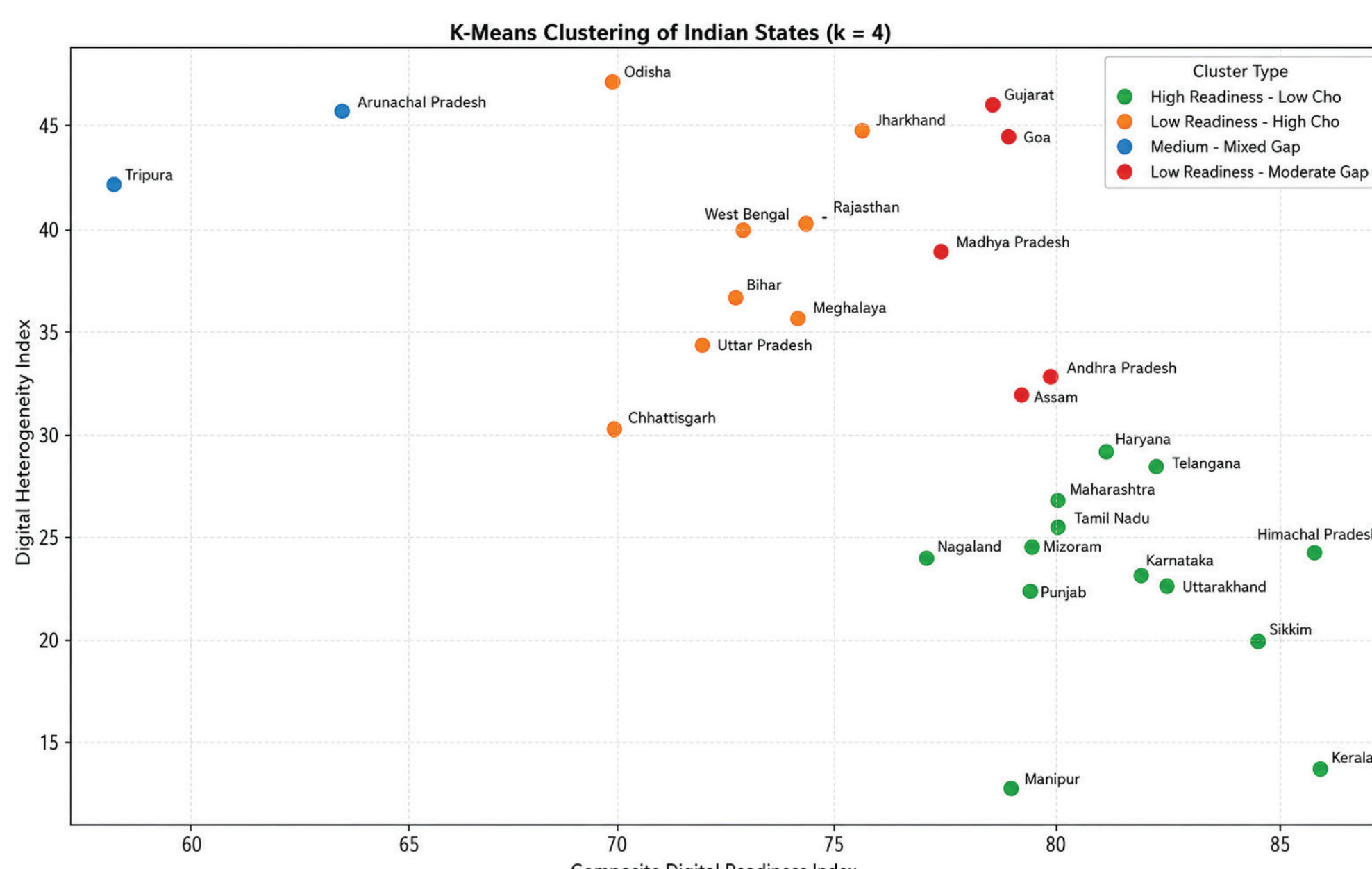
- Complex patterns of digital inclusion are seen across population groups.
- Gujarat and Manipur have somewhat scores on the CDRI (78.6 and 78.94 respectively), they rank among the highest and lowest on internal-inequality (DHI=46.0, and 12.76 respectively).
- Kerala, shows the highest digital readiness (CDRI =86.44) and low inequality (DHI=13.82), thus balancing digital preparedness with an inclusive distribution of digital infrastructures and skills among its youth.

Figure 4: Correlation Analysis: Composite Digital Readiness Index (CDRI) vs. Digital Heterogeneity Index (DHI) Across Indian States



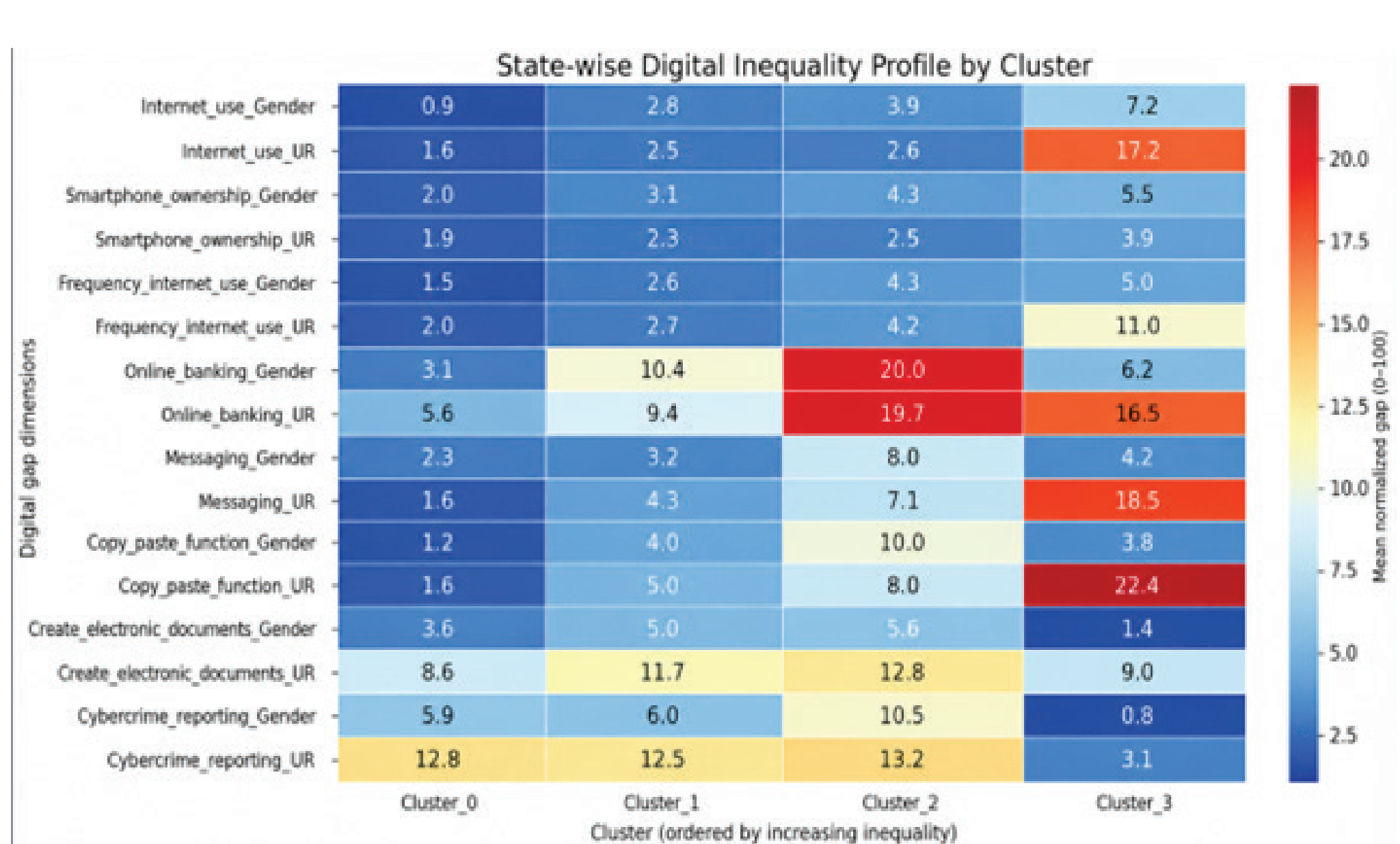
A moderate inverse relationship is seen between CDRI and DHI across states ($r = -0.65$). While higher digital readiness is generally associated with lower internal inequality, the scatterplot shows wide dispersion of states around the regression line, indicating digital readiness does not uniformly translate into equitable digital inclusion. In Kerala, Sikkim, Uttarakhand, and Karnataka high readiness is complemented by low heterogeneity. In Odisha, Gujarat, Jharkhand, and Goa moderate-to-high readiness is however accompanied by high digital inequality, with gender and rural-urban gaps.

Figure 5: K-Means Clustering of Indian States by Composite Digital Readiness and Digital Heterogeneity (k = 4)



K-means clustering ($k=4$) shows the interaction between the core digital readiness indicators. The K-means cluster identified distinct state-level digital inclusion profiles: high readiness with low inequality; low readiness and high inequality; and mixed patterns, with moderate readiness and persistent disparities, highlighting diverse trajectories of digital inclusion across India.

Figure 6: Cluster Analysis of State-wise Digital Disparities: Evaluating Gender and Rural-Urban Gaps across Indian States



Cluster_0: includes Manipur, Kerala and Sikkim and represents states with the highest digital equity across India. The mean normalized gap for 14 of 16 indicators remained remarkably low, with the exception of urban-rural gaps in cybercrime reporting (12.6), reflecting relatively inclusive digital participation and balanced access to digital opportunities.

Cluster_1: includes 12 states with balanced smartphone ownership and internet use, gender gaps in advanced skills such as online banking, and urban-rural gaps in creating electronic documents and cybercrime reporting. (Andhra Pradesh, Himachal Pradesh, Karnataka, Haryana, Assam, Nagaland, Uttarakhand, Tamil Nadu, Telangana, Mizoram, Punjab)

Cluster_2: includes 11 states with high gender gaps in basic (i.e., copy paste function) and advanced digital skills such as online banking, cybercrime reporting. Urban-rural gaps in cybercrime reporting is also observed. (Bihar, Rajasthan, Meghalaya, Jharkhand, Madhya Pradesh, Goa, Chhattisgarh, Gujarat, Odisha, West Bengal, Uttar Pradesh).

Cluster_3: includes Arunachal Pradesh and Tripura, and represents states with high rural-urban gaps in internet use, basic (e.g., messaging, copy paste function) and advanced digital skills (like online banking).

Conclusion

The findings reveal moderate negative correlation ($r = -0.65$) between digital readiness and digital inequalities in India, implying that in general improved digital readiness will be complemented by reduction in digital inequalities. However, state-wise variations in digital equity despite digital readiness are observed. For states such as Andhra Pradesh, Assam, Odisha, Gujarat, Jharkhand, and Goa digital readiness is not accompanied by digital equity, suggesting that expanding digital health infrastructure like ABDM is insufficient without actively addressing the first- and second-order digital divides among youth. High gender and urban-rural gaps across several states suggest that youth face a double jeopardy: lacking foundational digital skills and access to emerging digital health resources. Therefore, public health policies must shift from a “one-size-fits-all” digital deployment to target localized, intersectional inequalities. To achieve true health equity, interventions must integrate infrastructure-strengthening in peripheral states with gender-transformative digital literacy programs.

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