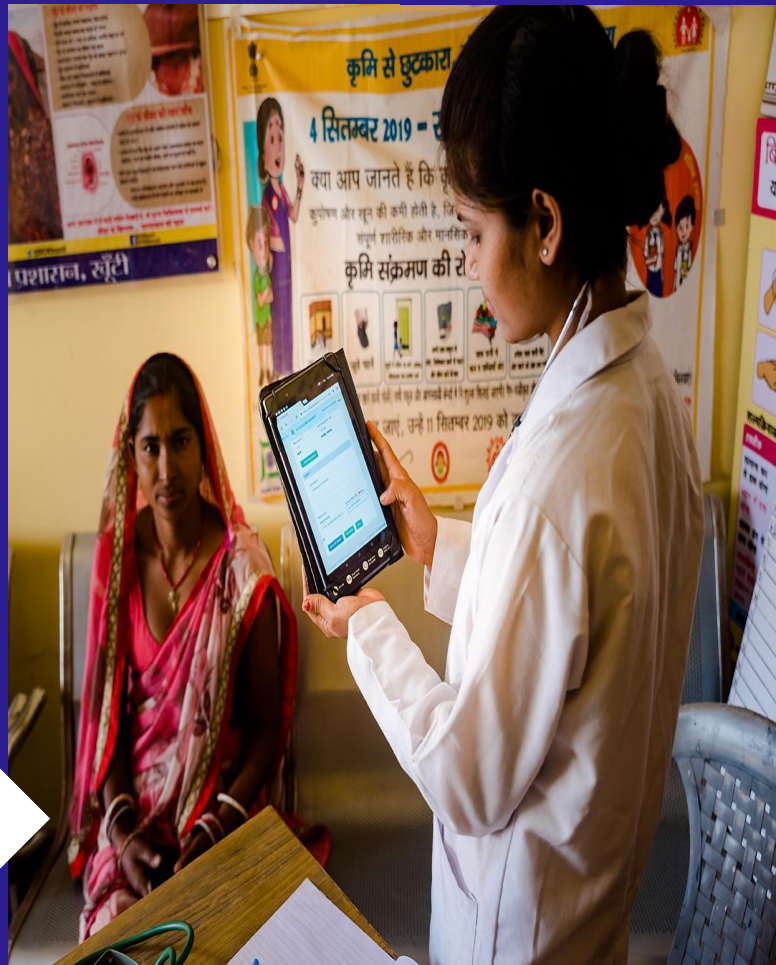
Antelehealth

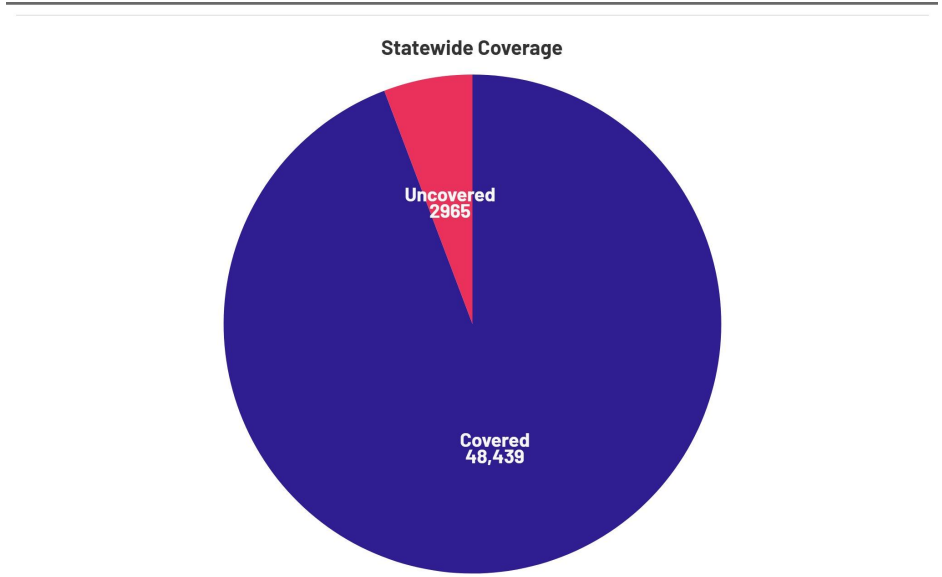
Odisha Coverage Analysis

IN ASSOCIATION WITH



Executive Summary – Odisha Healthcare Access at a Glance

- 94.23% of Odisha's 51,404 villages are covered within 3 km of a Primary Health Centre (PHC) or Health Sub-Centre (HSC) → 48,439 villages.
- 5.77% (or 2,965 villages) remain uncovered, primarily located in remote, tribal, and hard-to-reach interior regions.
- This highlights a strong statewide coverage baseline, but also an opportunity to close critical access gaps through targeted interventions like Mobile Health Units (MHUs) or referral system strengthening.



Datasets Used

Layer	Description	Source	Strengths	Limitations
Village Points	Village centroids with LGD codes	Esri India (Census 2011 + RGI 2020)	High-resolution, LGD-linked	Not official admin boundaries
PHC/HSC List	Facility names, locations, types, districts	GoI Health Directory + HMIS 2024	Authoritative, HMIS-verified	Required manual correction of type mismatches
Routing Output	Distance to nearest PHC/HSC (geodesic)	OSRM engine + cleaned road network	Scalable, reproducible	Radial-line only; no travel time model
Odisha Boundary	District polygons for mapping	GADM v4.1 (Level 2, Odisha)	Standards-compliant, map-ready	May differ from state official boundaries

Methodology

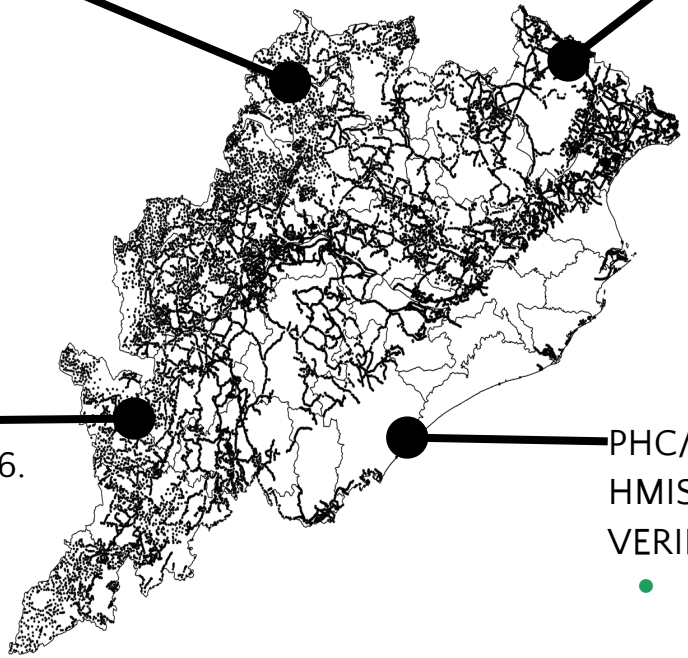
UNIFIED VILLAGE COVERAGE COMPUTED USING GREAT-CIRCLE DISTANCE VIA OSRM.

Coverage is defined as:

- PHC: within 5 km
- HSC: within 3 km
- Unified: within 3 km of either

TOTAL VILLAGES ANALYZED: 51,404 ACROSS 30 DISTRICTS.

Total PHCs Analyzed= 1210
Total HSCs Analyzed= 6685
Difference from on-field data, PHC=1254 (44), HSC= 6687 (2)



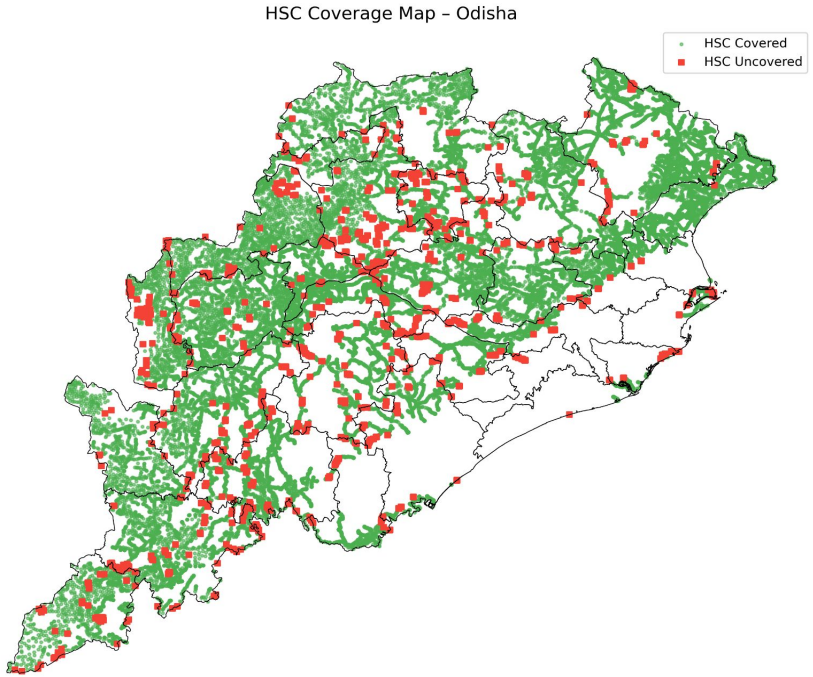
SPATIAL JOINS DONE WITH LGD CODES; REPROJECTED TO EPSG:4326.

- Routing: Geodesic distance analysis
- Maps and tables derived from cleaned spatial data layers.

PHC/HSC FACILITY LOCATIONS: HMIS (2024), CLEANED AND VERIFIED WITH NINS.

- Village dataset: Esri India (2024), LGD-coded, 2024 population projections.
- Final outputs were validated using both visual and statistical method

HSC Coverage – District Insights



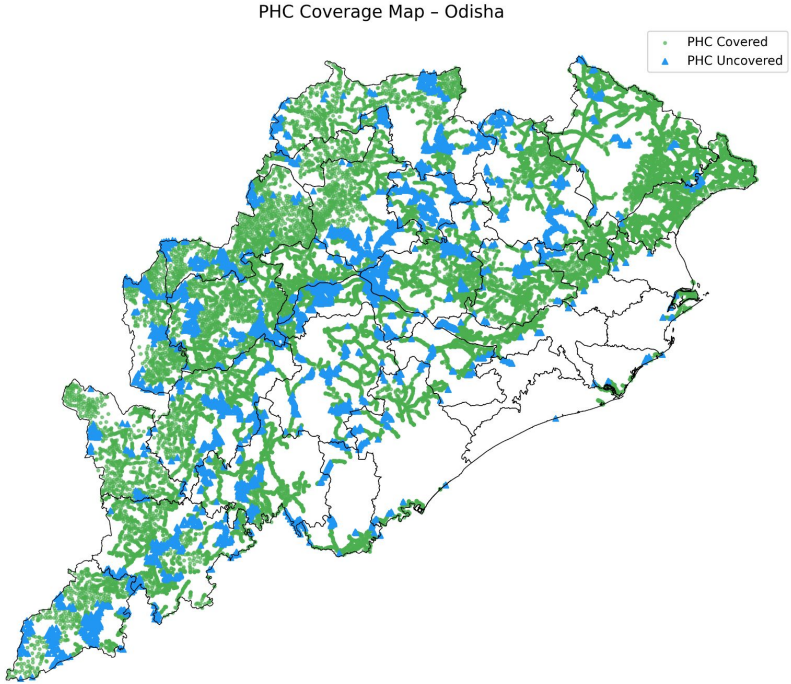
HSC Coverage (3 km threshold):

- **Covered villages**: 46,875
- **Uncovered villages**: 4,529
- **Uncovered percentage**: 8.8%

Dense Green Coverage: Most central, northern, and coastal parts of Odisha are fully covered — especially in Mayurbhanj, Balasore, Cuttack, and Sambalpur.

Coverage Gaps in Tribal/Remote Zones: Notable uncovered red zones are seen in Kandhamal, Malkangiri, Koraput, Kalahandi, and Rayagada — all predominantly tribal districts.

PHC Coverage – District Insights



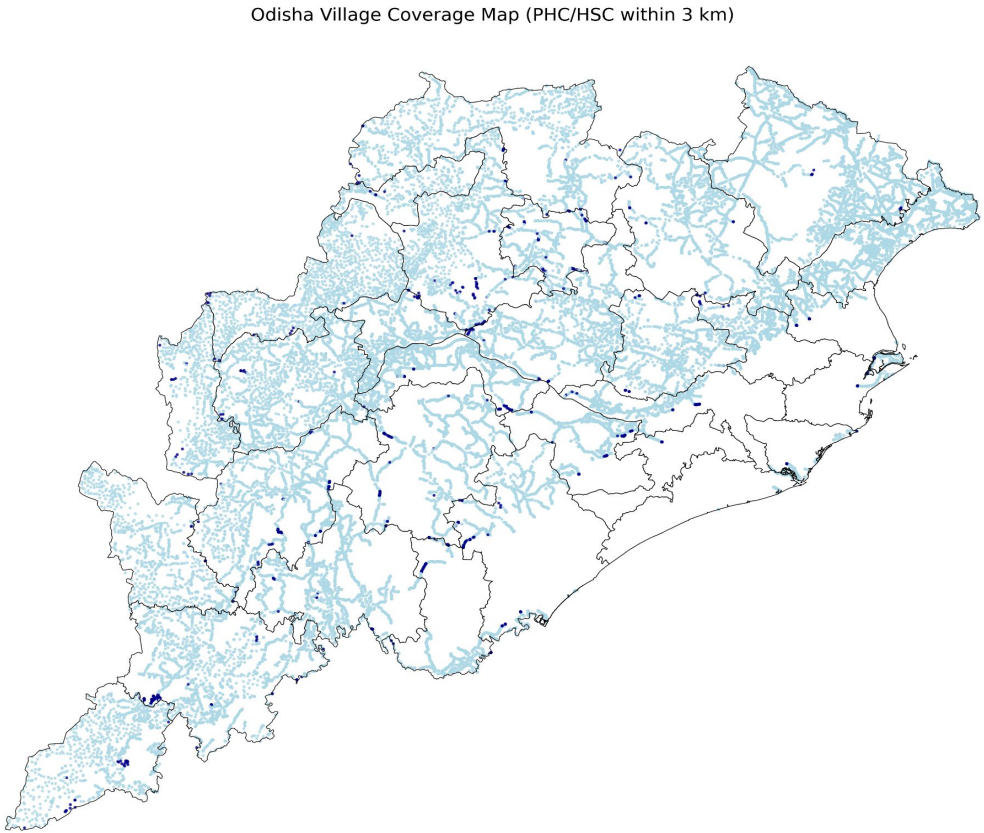
PHC Coverage (5 km threshold):

- **Covered villages:** 43,303
- **Uncovered villages:** 8,101
- **Uncovered percentage:** 15.7%

Thinner Green Spread: While green dominates major corridors, the blue uncovered zones are spread more widely across western, southern, and some northern districts

Even with a **larger coverage threshold (5 km)**, PHCs have nearly twice as many uncovered villages as HSCs. This indicates gaps in mid-tier primary care infrastructure, especially in transition zones between rural and peri-urban areas.

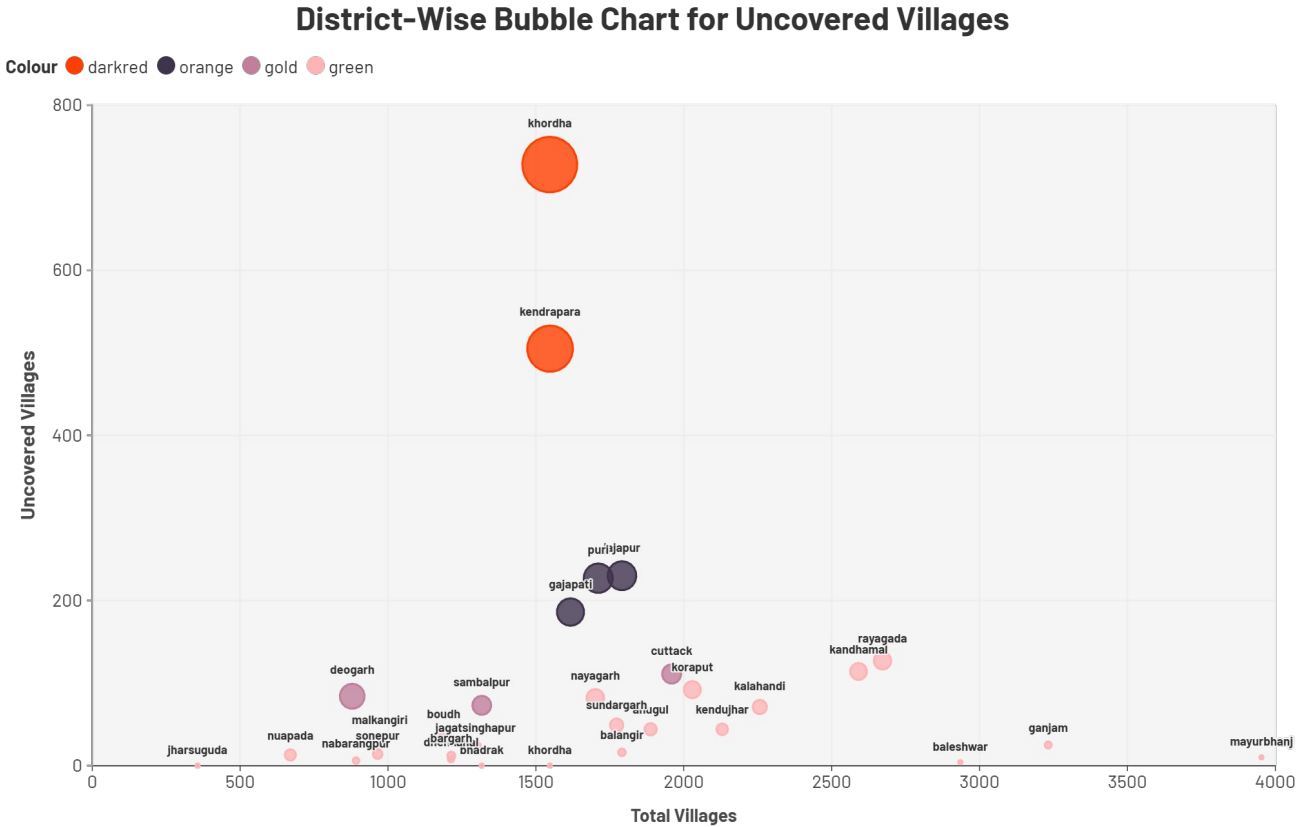
Unified PHC+HSC Coverage (3km Threshold)



Coastal Division – Unexpected High-Gap Zones Khordha (728) and Kendrapara (505) top the list with the highest number of uncovered villages, despite being coastal and urban-adjacent. Other notable districts with gaps: Puri (227) and Jajapur (230). Insight: These gaps likely emerge from peri-urban growth, misaligned facility location, or population overspill zones.

Southern and Tribal Belt – Structural Access Deficits. Consistent underserved regions across hilly and tribal districts: Kandhamal, Rayagada, Koraput, Malkangiri, Gajapati all show high proportions of uncovered villages. Though not topping in absolute numbers, their terrain and remoteness compound the challenge.

Coverage Breakdown By District

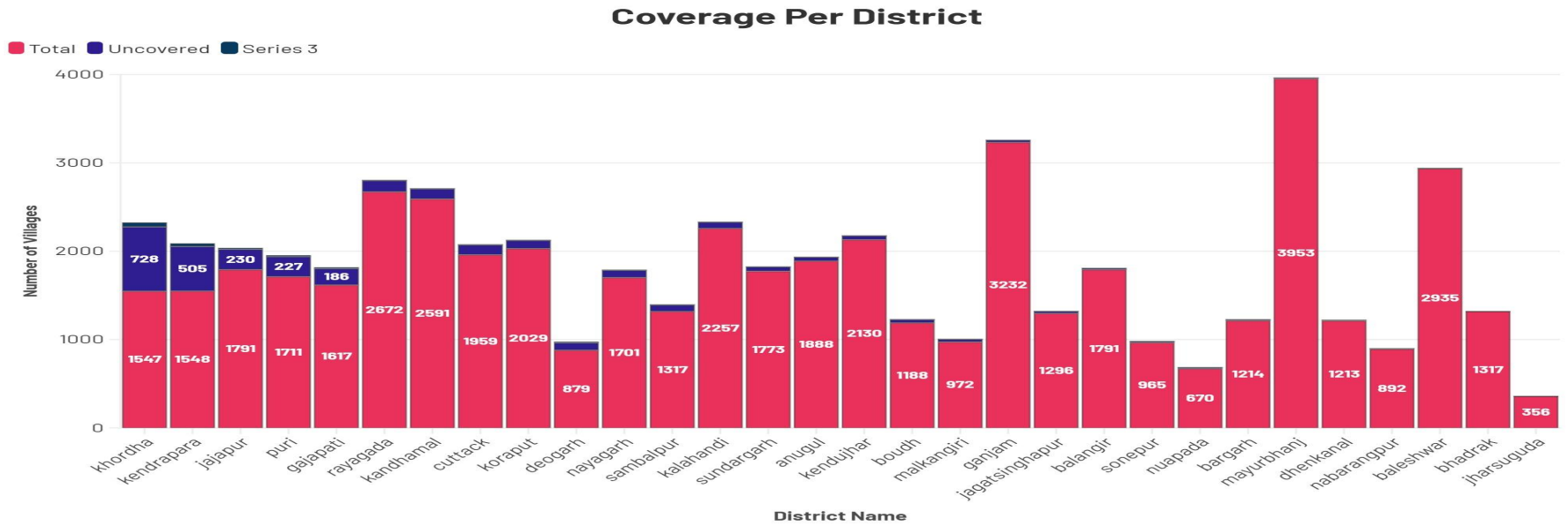


Western Interior – Moderate but Isolated Gaps: Deogarh, Sambalpur, Boudh, Nuapada, and Sonepur reflect dispersed infrastructure, often forest-locked or under-resourced. These areas are less dense but harder to reach, causing moderate access failure.

Northern & Central – Generally Well-Covered: Districts like Mayurbhanj, Cuttack, Baleshwar, Bhadrak, Jagatsinghpur, and Khordha (urban core) show very low uncovered rates (≤5%). These areas benefit from dense road networks and higher PHC/HSC saturation.

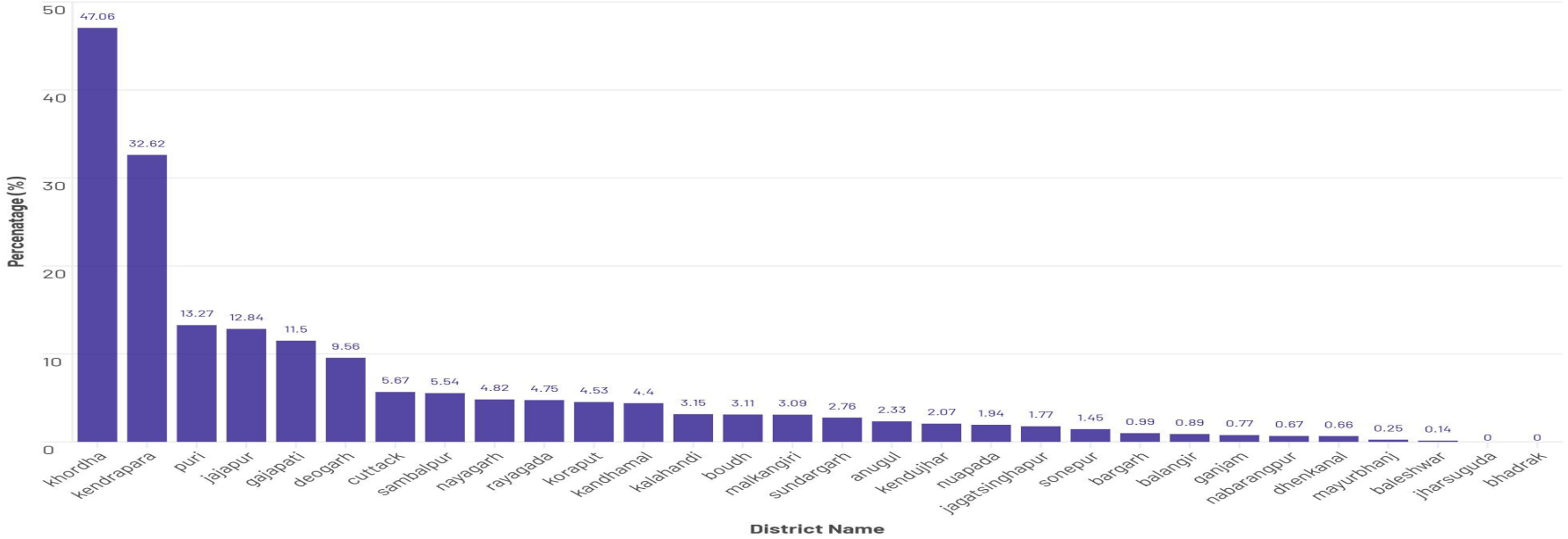
Unified Coverage Across Odisha

Khordha and Kendrapara are the top contributors to total uncovered villages, with 728 and 505 uncovered respectively — despite having relatively fewer total villages compared to high-population districts like Mayurbhanj or Ganjam. This indicates severe urban-fringe and peri-urban coverage gaps. Districts with large village counts such as Mayurbhanj (3,953), Ganjam (3,232), and Rayagada (2,672) show strong baseline coverage, but smaller gaps still exist — highlighting the need for targeted micro-planning rather than just population size-based allocation.



District-wise Pattern

Traditional tribal-access gap districts like Rayagada (4.75%), Koraput (4.53%), and Kandhamal (4.4%) show lower percentages, highlighting that coverage is improving in remote areas. Majority of Odisha's districts have uncovered percentages below 10%, reflecting a strong statewide baseline of spatial coverage. However, even small percentages in high-population districts (like Puri, Jajapur, and Gajapati) translate into hundreds of underserved villages, underscoring the need for district-specific micro-interventions



Recommendation and way forward

- Targeted activation of sub centers and PHCs across vulnerable areas based on population density and demographic characteristics
- Identifying clusters of villages in districts to deploy mobile health units. Clusters can be identified based on remoteness, population density and topography
- Leveraging data to accurately estimate requirements for HWC activation and improving service availability.
- Extend analysis to account for topography and road availability in determining access to health facilities

Thank you