

District Level Estimates of Contraceptive Prevalence Rate

Using Spatial Temporal Small Area Estimations to Bridge Data Gaps for Family Planning Decisions

Why District Estimates with Supplies Data

Surveys inform about health indicators at national and provincial levels while administrative decisions require more granular information at the district or even union council levels. In previous work, we used national survey data to develop CPR and mCPR at the district levels to address this gap.

However, surveys such as the PDHS or PSLM happen too infrequently to provide necessary information to plan or track services or measure impact of programs.

We address this gap by modeling supplies data from cLMIS. The model accounts for errors and gaps in data, including the fact that although there is a large private sector component, it is not fully captured. It uses previously modeled district level estimates from PSLM 2019-20 survey as benchmarks. The model is highly consistent with under 0.04% variation in CPR and 0.01% in mCPR, and accounts for both data quality issues and gaps, including missing private sector inputs.

District Estimates 2021-2024

National CPR was **33% in 2024**, with **Punjab (37%)**, **KP (30%)**, **Sindh (29%)**, **Federal (44%)**, and **Balochistan (15%)**. This comes after a sharp decline from 2023, when national CPR was 36%. [Without this decline, national CPR would likely have been 37-38%](#).

Within each province, there are 11 High-performing districts ($\geq 40\%$ CPR consistently): 9 in Punjab, plus Islamabad and Karachi central. Most districts across all provinces are mid-performing (25-39% CPR), such as Abbottabad, Karachi Korangi, and Bhakkar. Lower performing ($< 25\%$ CPR) districts are mostly in Balochistan with a 13-20% range.

Policy Implications

- District CPR and mCPR provide an important tool for tracking success of programs
- Since these estimates are derived from supplies or service data and that errors and gaps can be modeled, SAE is a very useful tool for tracking performance in near real time.
- Availability of such a tool helps Provincial Departments of Health and Population Welfare in prioritizing resource allocation, staffing, and supply chain management, and for development

KEY TAKEAWAYS

- National CPR seemed on track to be around 37-38% in 2025, if not for a sharp decline in 2024. This must prompt an investigation into causes such as lack of procurements.
- District measurement of CPR and mCPR is possible with government cLMIS data
- Performance varies between districts. This analysis allows localized decisions, including funding and supplies allocations
- Large intra-provincial inequalities suggest that there may be mutually beneficial learnings between provinces

partners and donors to align funding with service need, ensuring value for money.

- Performance-based budgeting can be linked to improvements in district-level indicators, enabling transparent tracking of outcomes.

Methods

- Monthly data on contraceptive consumption and stock levels were obtained from Contraceptive Logistic Management Information System (cLMIS) for the period 2020-2024.
- Monthly service statistics were aggregated to annual measures and standardized using district-level population denominators to ensure comparability across districts.
- A **spatial-temporal small area estimation (SAE) framework** was applied, incorporating an error correction mechanism to adjust for discrepancies between administrative data and survey-based benchmarks.
- The model accounts for temporal trends and spatial correlation across neighboring districts, reducing random fluctuations and producing stable, policy relevant estimates.
- Estimates for modern and traditional methods were generated separately and then combined to give overall CPR estimates plus uncertainty intervals.

Figure 1: CPR at the District Level 2024

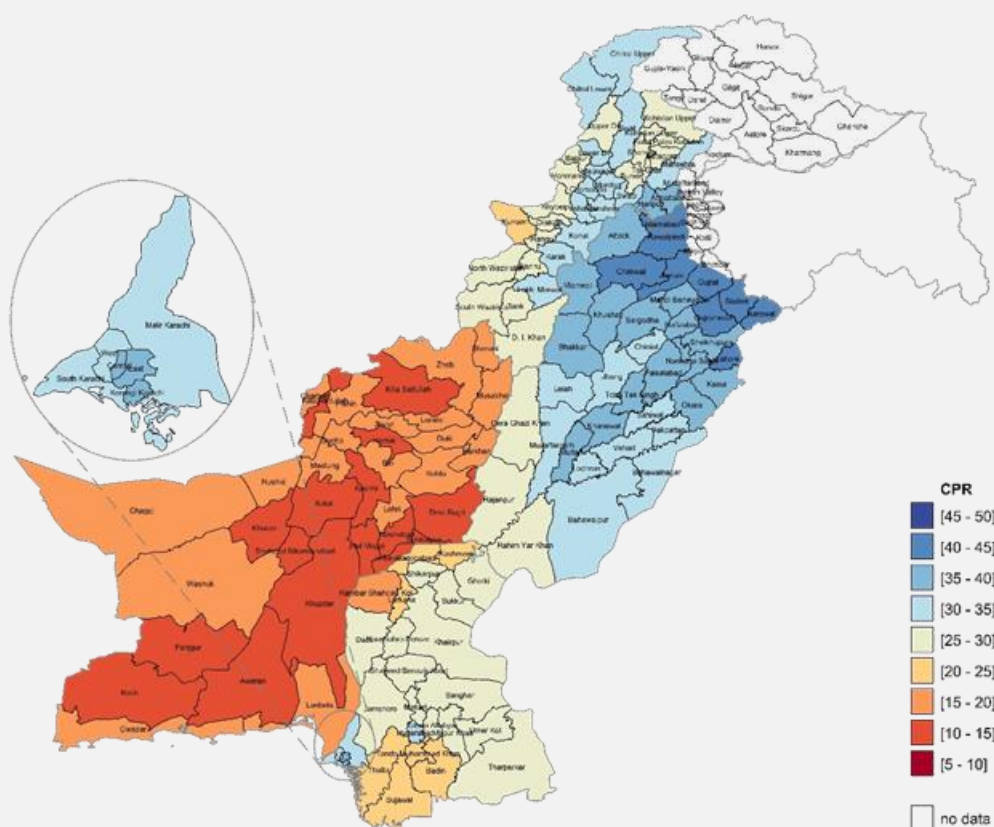
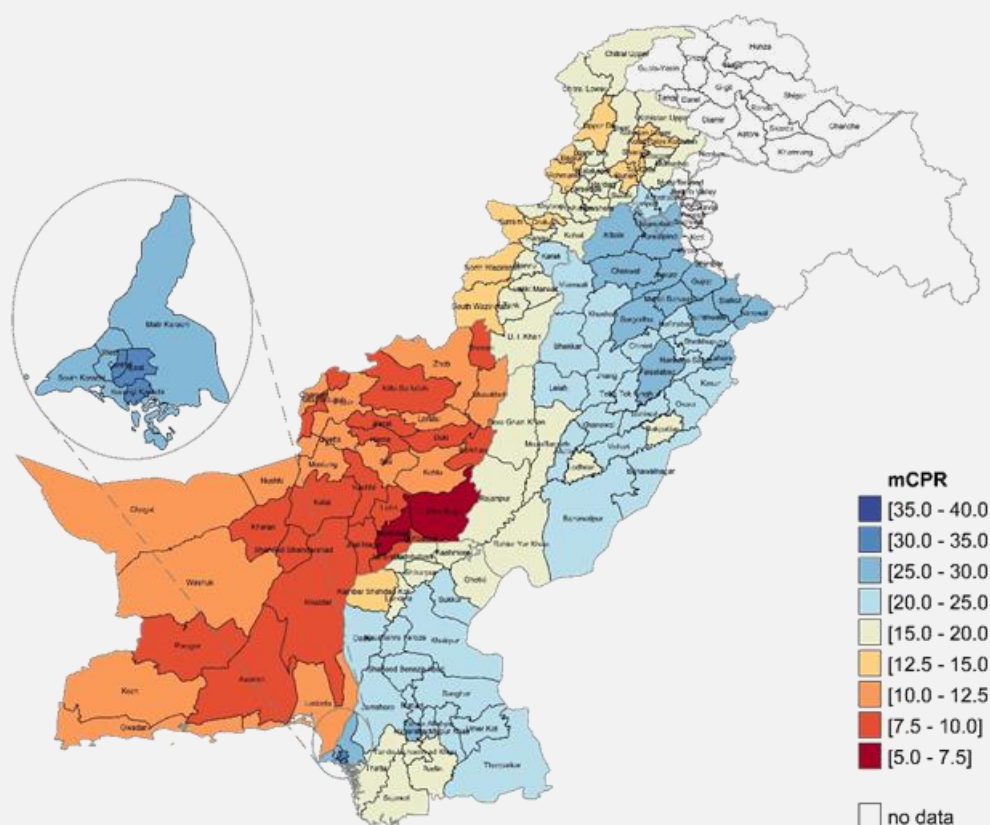


Figure 2: CPR for Modern Methods (mCPR) at the District Level 2024



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For more information, please contact
Dr. Adnan Khan, MBBS, MS.
adnan@resdev.org

Islamabad

	CPR						mCPR			
	PDHS 2017	2021	2022	2023	2024	PDHS 2017	2021	2022	2023	2024
National	34%	34%	35%	36%	33%	25%	24%	25%	25%	22%
Islamabad	44%	45%	46%	47%	44%	33%	31%	32%	33%	29%

Sindh

Districts	CPR						mCPR			
	PDHS 2017	2021	2022	2023	2024	PDHS 2017	2021	2022	2023	2024
Sindh	31%	30%	31%	32%	29%	24%	26%	27%	27%	24%
Badin	27%	25%	25%	26%	23%	26%	20%	21%	21%	19%
Central Karachi	44%	40%	41%	42%	38%	27%	36%	37%	38%	33%
Dadu	20%	27%	27%	28%	25%	19%	22%	23%	24%	20%
East Karachi	46%	38%	39%	40%	36%	30%	33%	34%	35%	31%
Ghotki	27%	27%	28%	29%	26%	26%	20%	21%	21%	18%
Hyderabad	35%	34%	35%	36%	32%	30%	29%	30%	31%	27%
Jacobabad	15%	24%	24%	25%	23%	15%	19%	19%	20%	17%
Jamshoro	35%	28%	28%	29%	26%	32%	23%	24%	25%	21%
Kambar Shahdad Kot	19%	20%	20%	21%	19%	17%	15%	16%	16%	14%
Kashmore	32%	24%	24%	25%	23%	28%	18%	18%	19%	16%
Khairpur	30%	28%	29%	30%	27%	27%	24%	24%	25%	22%
Korangi Karachi	46%	39%	40%	41%	37%	32%	35%	36%	37%	32%
Larkana	18%	25%	26%	26%	24%	18%	20%	21%	21%	18%
Malir Karachi	35%	33%	34%	35%	31%	25%	28%	29%	30%	26%
Matiori	23%	29%	30%	31%	28%	22%	25%	25%	26%	23%
Mirpur Khas	32%	29%	30%	31%	28%	29%	25%	25%	26%	23%
Naushahro Feroze	26%	29%	30%	31%	28%	22%	25%	26%	26%	23%
Sanghar	21%	28%	29%	30%	27%	19%	24%	25%	25%	22%
Shaheed Benazir Abad	18%	28%	29%	30%	27%	18%	24%	24%	25%	22%
Shikarpur	36%	27%	28%	28%	26%	32%	22%	22%	23%	20%
South Karachi	36%	36%	37%	38%	35%	23%	32%	33%	34%	30%
Sujawal	22%	24%	25%	25%	23%	19%	20%	20%	21%	18%
Sukkur	23%	29%	30%	31%	28%	20%	24%	25%	25%	22%
Tando Allahyar	33%	27%	27%	28%	25%	28%	22%	23%	24%	20%

Tando Muhammad Khan	27%	24%	25%	25%	23%	21%	20%	20%	21%	18%
Tharparkar	18%	28%	29%	29%	26%	18%	23%	24%	25%	21%
Thatta	20%	24%	25%	26%	23%	19%	20%	21%	21%	18%
Umer Kot	35%	29%	30%	30%	27%	33%	24%	25%	26%	22%
West Karachi	39%	33%	34%	35%	32%	29%	29%	30%	31%	27%

Punjab

Districts	CPR					mCPR				
	PDHS 2017	2021	2022	2023	2024	PDHS 2017	2021	2022	2023	2024
Punjab	38%	38%	39%	40%	37%	27%	26%	27%	28%	24%
Attock	24%	41%	42%	43%	40%	18%	28%	29%	29%	26%
Bahawalnagar	39%	34%	35%	36%	34%	33%	23%	23%	24%	21%
Bahawalpur	38%	33%	34%	35%	32%	28%	22%	23%	23%	20%
Bhakkar	36%	37%	38%	39%	36%	28%	25%	25%	26%	23%
Chakwal	24%	44%	45%	46%	42%	18%	30%	31%	32%	28%
Chiniot	34%	35%	36%	37%	34%	22%	23%	24%	24%	21%
Dera Ghazi Khan	29%	30%	31%	32%	30%	21%	21%	22%	22%	19%
Faisalabad	39%	40%	41%	42%	39%	29%	27%	28%	29%	25%
Gujranwala	33%	43%	44%	45%	42%	23%	30%	31%	32%	28%
Gujrat	30%	44%	46%	47%	43%	24%	31%	31%	32%	28%
Hafizabad	46%	39%	40%	41%	38%	29%	26%	27%	28%	24%
Jhang	34%	35%	36%	37%	35%	23%	23%	24%	25%	21%
Jhelum	36%	45%	47%	48%	44%	26%	32%	33%	33%	29%
Kasur	52%	38%	39%	40%	37%	28%	26%	27%	27%	24%
Khanewal	42%	37%	38%	39%	36%	34%	26%	26%	27%	23%
Khushab	35%	39%	40%	41%	38%	26%	26%	27%	28%	24%
Lahore	56%	43%	44%	45%	42%	35%	31%	31%	32%	28%
Leiah	27%	35%	36%	37%	34%	20%	23%	24%	25%	21%
Lodhran	33%	33%	34%	35%	32%	26%	22%	22%	23%	20%
Mandi Bahauddin	26%	41%	42%	43%	40%	23%	27%	28%	29%	25%
Mianwali	30%	37%	38%	39%	36%	26%	25%	26%	26%	23%
Multan	32%	37%	38%	39%	36%	25%	25%	26%	27%	23%
Muzaffargarh	25%	31%	32%	33%	30%	22%	21%	21%	22%	19%
Nankana Sahib	48%	39%	40%	41%	38%	23%	26%	27%	28%	24%

Narowal	44%	43%	44%	45%	42%	25%	29%	30%	31%	27%
Okara	41%	37%	38%	38%	36%	30%	24%	25%	26%	22%
Pakpattan	23%	33%	34%	35%	32%	18%	21%	22%	22%	19%
Rahim Yar Khan	32%	30%	31%	32%	30%	22%	21%	22%	22%	19%
Rajanpur	16%	27%	28%	29%	26%	13%	19%	20%	20%	18%
Rawalpindi	37%	45%	46%	47%	44%	28%	32%	33%	33%	29%
Sahiwal	37%	36%	37%	37%	35%	28%	24%	24%	25%	22%
Sargodha	41%	41%	42%	43%	40%	29%	28%	28%	29%	25%
Sheikhupura	60%	40%	41%	42%	39%	36%	27%	28%	28%	25%
Sialkot	42%	46%	47%	48%	45%	32%	32%	33%	34%	30%
Toba Tek Singh	45%	37%	38%	39%	36%	30%	25%	26%	27%	23%
Vehari	32%	34%	35%	36%	33%	27%	22%	23%	24%	20%

Khyber Pakhtunkhwa

Districts	CPR					mCPR				
	PDHS 2017	2021	2022	2023	2024	PDHS 2017	2021	2022	2023	2024
KP	30%	31%	32%	33%	30%	22%	19%	20%	20%	17%
Abbottabad	24%	37%	38%	39%	37%	20%	24%	24%	25%	22%
Bajaur	21%	27%	28%	29%	27%	17%	16%	16%	17%	14%
Bannu	29%	30%	30%	31%	29%	20%	19%	19%	20%	17%
Batagram	23%	28%	29%	30%	28%	20%	17%	17%	18%	15%
Buner	26%	28%	29%	29%	28%	23%	16%	17%	17%	15%
Charsadda	36%	31%	32%	33%	31%	25%	20%	20%	21%	18%
Chitral Lower	27%	34%	35%	36%	34%	23%	21%	22%	23%	20%
Chitral Upper	27%	34%	35%	36%	34%	23%	21%	22%	23%	20%
D. I. Khan	26%	28%	29%	30%	28%	19%	18%	19%	19%	16%
Hangu	25%	29%	30%	31%	28%	16%	18%	19%	19%	16%
Haripur	25%	36%	37%	38%	35%	22%	23%	24%	24%	21%
Karak	35%	36%	37%	38%	35%	28%	23%	24%	25%	21%
Khyber	30%	29%	29%	30%	28%	15%	18%	18%	19%	16%
Kohat	37%	33%	34%	34%	32%	26%	21%	21%	22%	19%
Kohistan Lower	-	28%	29%	29%	28%	-	16%	16%	17%	14%
Kohistan Upper	-	30%	31%	31%	29%	-	18%	18%	19%	16%
Kolai Palas Kohistan	-	29%	29%	30%	28%	-	16%	17%	17%	15%

Kurram	15%	25%	26%	26%	25%	13%	15%	15%	16%	13%
Lakki Marwat	32%	31%	32%	33%	31%	27%	20%	20%	21%	18%
Lower Dir	26%	31%	31%	32%	30%	20%	19%	20%	20%	17%
Malakand	28%	32%	33%	34%	31%	22%	20%	21%	21%	18%
Mansehra	22%	33%	34%	35%	32%	17%	20%	21%	21%	18%
Mardan	43%	32%	33%	34%	31%	28%	20%	20%	21%	18%
Mohmand	22%	26%	27%	27%	26%	11%	15%	15%	16%	13%
North Waziristan	18%	26%	27%	28%	26%	8%	16%	17%	17%	15%
Nowshera	38%	33%	34%	35%	33%	29%	21%	22%	23%	19%
Orakzai	21%	26%	27%	28%	26%	15%	15%	16%	16%	14%
Peshawar	35%	32%	33%	34%	32%	22%	21%	21%	22%	19%
Shangla	22%	26%	27%	28%	26%	19%	15%	15%	16%	14%
South Waziristan	16%	26%	27%	27%	25%	11%	16%	17%	17%	15%
Swabi	32%	33%	33%	34%	32%	24%	20%	21%	21%	18%
Swat	36%	31%	32%	32%	30%	31%	19%	19%	20%	17%
Tank	32%	28%	29%	29%	27%	26%	17%	18%	18%	16%
Tor Ghar	10%	27%	28%	29%	27%	9%	15%	16%	16%	14%
Upper Dir	18%	28%	29%	29%	27%	16%	16%	17%	17%	15%

Balochistan

Districts	PDHS 2017	CPR				PDHS 2017	mCPR			
		2021	2022	2023	2024		2021	2022	2023	2024
Balochistan	20%	16%	16%	17%	15%	14%	11%	11%	12%	10%
Awaran	12%	14%	14%	14%	13%	10%	9%	10%	10%	8%
Barkhan	-	16%	17%	18%	16%	-	10%	10%	11%	9%
Chagai	-	16%	16%	17%	15%	-	11%	12%	12%	10%
Chaman	-	16%	17%	17%	16%	-	11%	12%	12%	10%
Dera Bugti	9%	14%	14%	14%	13%	8%	8%	8%	9%	7%
Duki	-	16%	16%	17%	16%	-	10%	10%	11%	9%
Gwadar	9%	18%	19%	19%	17%	8%	14%	14%	15%	12%
Harnai	-	15%	16%	16%	15%	-	10%	10%	11%	9%
Jaffarabad	43%	15%	15%	16%	14%	35%	10%	10%	10%	9%
Jhal Magsi	10%	15%	16%	16%	15%	8%	10%	11%	11%	9%
Kachhi	21%	15%	16%	16%	15%	17%	11%	11%	12%	10%
Kalat	6%	14%	14%	15%	13%	6%	9%	10%	10%	9%
Kech	9%	15%	16%	16%	15%	9%	11%	12%	12%	10%
Kharan	9%	14%	14%	15%	14%	8%	10%	10%	10%	9%

Khuzdar	14%	14%	14%	14%	13%	12%	9%	10%	10%	8%
Killa Abdullah	31%	15%	15%	16%	14%	19%	10%	10%	11%	9%
Killa Saifullah	10%	14%	15%	15%	14%	7%	9%	9%	10%	8%
Kohlu	10%	18%	19%	19%	18%	9%	12%	13%	13%	11%
Lasbela	19%	18%	18%	19%	17%	16%	13%	14%	14%	12%
Lehri	16%	15%	16%	16%	15%	14%	10%	11%	11%	9%
Loralai	16%	18%	18%	19%	17%	12%	12%	12%	13%	11%
Mastung	12%	17%	18%	18%	17%	10%	13%	13%	14%	12%
Musakhel	-	19%	20%	21%	19%	-	12%	12%	13%	11%
Nasirabad	15%	13%	13%	14%	13%	11%	8%	9%	9%	7%
Nushki	-	16%	16%	17%	15%	-	11%	12%	12%	10%
Panjgur	-	15%	15%	16%	14%	-	11%	11%	11%	10%
Pishin	20%	17%	17%	18%	16%	13%	12%	12%	13%	11%
Quetta	25%	18%	19%	19%	18%	16%	13%	14%	14%	12%
Shaheed Sikandarabad	-	14%	15%	15%	14%	-	10%	11%	11%	9%
Sherani	11%	18%	18%	19%	18%	8%	9%	10%	10%	8%
Sibi	28%	17%	18%	18%	16%	22%	12%	12%	13%	11%
Sohbatpur	14%	15%	15%	16%	14%	10%	9%	10%	10%	9%
Washuk	9%	16%	16%	17%	15%	8%	12%	12%	12%	11%
Zhob	8%	18%	19%	20%	18%	6%	11%	12%	12%	10%
Ziarat	-	16%	16%	17%	15%	-	10%	11%	11%	9%