

## 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

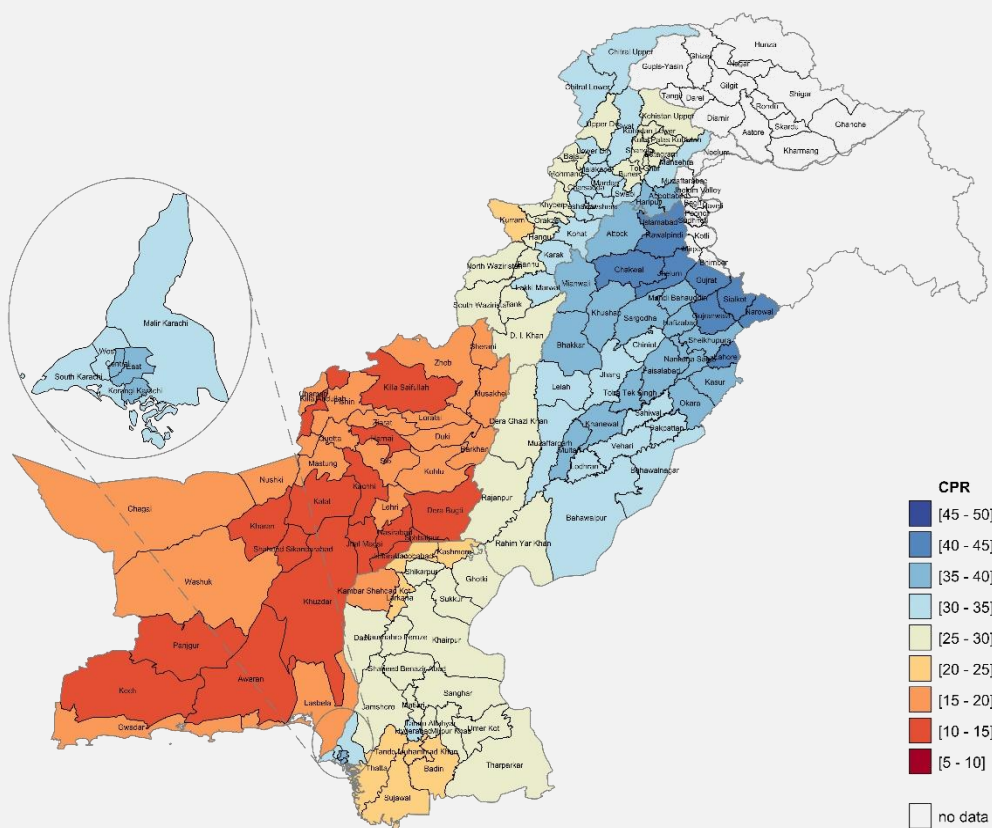
partners and donors to align funding with service need, ensuring value for money.

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

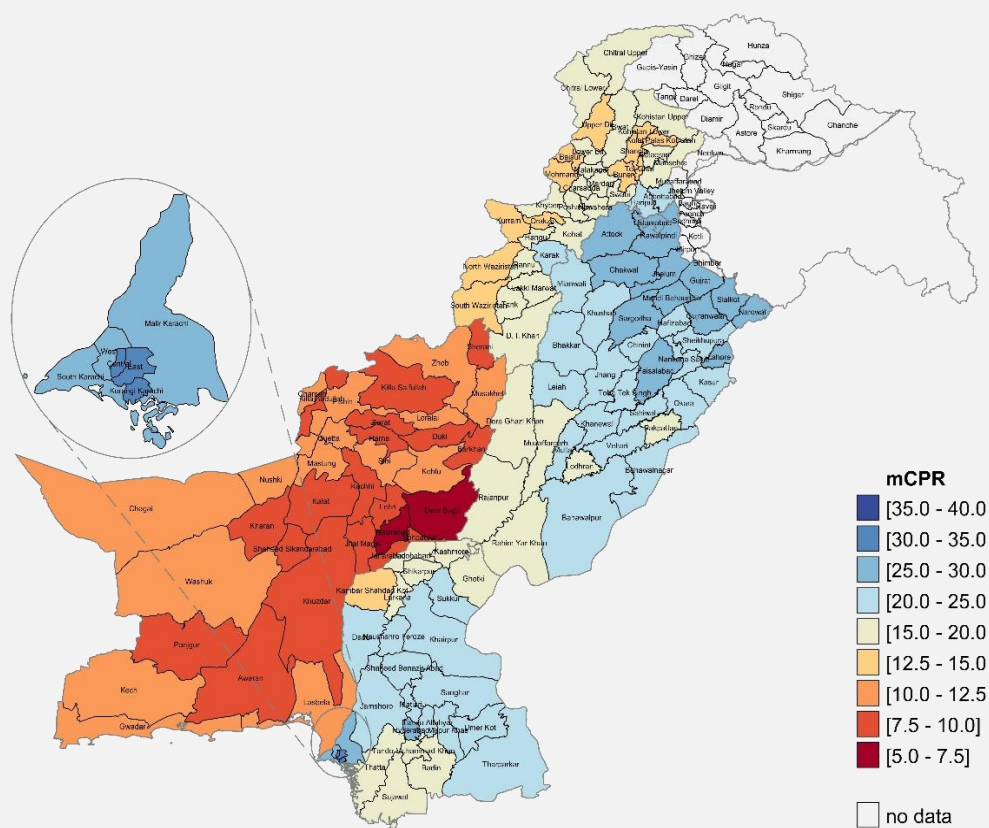
#### Methods

- 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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## Islamabad

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

## Sindh

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

## Punjab

Districts	CPR				mCPR			
	2021	2022	2023	2024	2021	2022	2023	2024
<b>Punjab</b>	<b>38%</b>	<b>39%</b>	<b>40%</b>	<b>37%</b>	<b>26%</b>	<b>27%</b>	<b>28%</b>	<b>24%</b>
Attock	41%	42%	43%	40%	28%	29%	29%	26%
Bahawalnagar	34%	35%	36%	34%	23%	23%	24%	21%
Bahawalpur	33%	34%	35%	32%	22%	23%	23%	20%
Bhakkar	37%	38%	39%	36%	25%	25%	26%	23%
Chakwal	44%	45%	46%	42%	30%	31%	32%	28%
Chiniot	35%	36%	37%	34%	23%	24%	24%	21%
Dera Ghazi Khan	30%	31%	32%	30%	21%	22%	22%	19%
Faisalabad	40%	41%	42%	39%	27%	28%	29%	25%
Gujranwala	43%	44%	45%	42%	30%	31%	32%	28%
Gujrat	44%	46%	47%	43%	31%	31%	32%	28%
Hafizabad	39%	40%	41%	38%	26%	27%	28%	24%
Jhang	35%	36%	37%	35%	23%	24%	25%	21%
Jhelum	45%	47%	48%	44%	32%	33%	33%	29%
Kasur	38%	39%	40%	37%	26%	27%	27%	24%
Khanewal	37%	38%	39%	36%	26%	26%	27%	23%
Khushab	39%	40%	41%	38%	26%	27%	28%	24%
Lahore	43%	44%	45%	42%	31%	31%	32%	28%
Leiah	35%	36%	37%	34%	23%	24%	25%	21%
Lodhran	33%	34%	35%	32%	22%	22%	23%	20%
Mandi Bahauddin	41%	42%	43%	40%	27%	28%	29%	25%
Mianwali	37%	38%	39%	36%	25%	26%	26%	23%
Multan	37%	38%	39%	36%	25%	26%	27%	23%
Muzaffargarh	31%	32%	33%	30%	21%	21%	22%	19%
Nankana Sahib	39%	40%	41%	38%	26%	27%	28%	24%
Narowal	43%	44%	45%	42%	29%	30%	31%	27%
Okara	37%	38%	38%	36%	24%	25%	26%	22%
Pakpattan	33%	34%	35%	32%	21%	22%	22%	19%
Rahim Yar Khan	30%	31%	32%	30%	21%	22%	22%	19%
Rajanpur	27%	28%	29%	26%	19%	20%	20%	18%
Rawalpindi	45%	46%	47%	44%	32%	33%	33%	29%
Sahiwal	36%	37%	37%	35%	24%	24%	25%	22%
Sargodha	41%	42%	43%	40%	28%	28%	29%	25%
Sheikhupura	40%	41%	42%	39%	27%	28%	28%	25%
Sialkot	46%	47%	48%	45%	32%	33%	34%	30%
Toba Tek Singh	37%	38%	39%	36%	25%	26%	27%	23%
Vehari	34%	35%	36%	33%	22%	23%	24%	20%

## Khyber Pakhtunkhwa

Districts	CPR				mCPR			
	2021	2022	2023	2024	2021	2022	2023	2024
KP	31%	32%	33%	30%	19%	20%	20%	17%
Abbottabad	37%	38%	39%	37%	24%	24%	25%	22%
Bajaur	27%	28%	29%	27%	16%	16%	17%	14%
Bannu	30%	30%	31%	29%	19%	19%	20%	17%
Batagram	28%	29%	30%	28%	17%	17%	18%	15%
Buner	28%	29%	29%	28%	16%	17%	17%	15%
Charsadda	31%	32%	33%	31%	20%	20%	21%	18%
Chitral Lower	34%	35%	36%	34%	21%	22%	23%	20%
Chitral Upper	34%	35%	36%	34%	21%	22%	23%	20%
D. I. Khan	28%	29%	30%	28%	18%	19%	19%	16%
Hangu	29%	30%	31%	28%	18%	19%	19%	16%
Haripur	36%	37%	38%	35%	23%	24%	24%	21%
Karak	36%	37%	38%	35%	23%	24%	25%	21%
Khyber	29%	29%	30%	28%	18%	18%	19%	16%
Kohat	33%	34%	34%	32%	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	25%	26%	26%	25%	15%	15%	16%	13%
Lakki Marwat	31%	32%	33%	31%	20%	20%	21%	18%
Lower Dir	31%	31%	32%	30%	19%	20%	20%	17%
Malakand	32%	33%	34%	31%	20%	21%	21%	18%
Mansehra	33%	34%	35%	32%	20%	21%	21%	18%
Mardan	32%	33%	34%	31%	20%	20%	21%	18%
Mohmand	26%	27%	27%	26%	15%	15%	16%	13%
North Waziristan	26%	27%	28%	26%	16%	17%	17%	15%
Nowshera	33%	34%	35%	33%	21%	22%	23%	19%
Orakzai	26%	27%	28%	26%	15%	16%	16%	14%
Peshawar	32%	33%	34%	32%	21%	21%	22%	19%
Shangla	26%	27%	28%	26%	15%	15%	16%	14%
South Waziristan	26%	27%	27%	25%	16%	17%	17%	15%
Swabi	33%	33%	34%	32%	20%	21%	21%	18%
Swat	31%	32%	32%	30%	19%	19%	20%	17%
Tank	28%	29%	29%	27%	17%	18%	18%	16%
Tor Ghar	27%	28%	29%	27%	15%	16%	16%	14%
Upper Dir	28%	29%	29%	27%	16%	17%	17%	15%

## Balochistan

Districts	CPR				mCPR			
	2021	2022	2023	2024	2021	2022	2023	2024
<b>Balochistan</b>	<b>16%</b>	<b>16%</b>	<b>17%</b>	<b>15%</b>	<b>11%</b>	<b>11%</b>	<b>12%</b>	<b>10%</b>
Awaran	14%	14%	14%	13%	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	14%	14%	14%	13%	8%	8%	9%	7%
Duki	16%	16%	17%	16%	10%	10%	11%	9%
Gwadar	18%	19%	19%	17%	14%	14%	15%	12%
Harnai	15%	16%	16%	15%	10%	10%	11%	9%
Jaffarabad	15%	15%	16%	14%	10%	10%	10%	9%
Jhal Magsi	15%	16%	16%	15%	10%	11%	11%	9%
Kachhi	15%	16%	16%	15%	11%	11%	12%	10%
Kalat	14%	14%	15%	13%	9%	10%	10%	9%
Kech	15%	16%	16%	15%	11%	12%	12%	10%
Kharan	14%	14%	15%	14%	10%	10%	10%	9%
Khuzdar	14%	14%	14%	13%	9%	10%	10%	8%
Killa Abdullah	15%	15%	16%	14%	10%	10%	11%	9%
Killa Saifullah	14%	15%	15%	14%	9%	9%	10%	8%
Kohlu	18%	19%	19%	18%	12%	13%	13%	11%
Lasbela	18%	18%	19%	17%	13%	14%	14%	12%
Lehri	15%	16%	16%	15%	10%	11%	11%	9%
Loralai	18%	18%	19%	17%	12%	12%	13%	11%
Mastung	17%	18%	18%	17%	13%	13%	14%	12%
Musakhel	19%	20%	21%	19%	12%	12%	13%	11%
Nasirabad	13%	13%	14%	13%	8%	9%	9%	7%
Nushki	16%	16%	17%	15%	11%	12%	12%	10%
Panjgur	15%	15%	16%	14%	11%	11%	11%	10%
Pishin	17%	17%	18%	16%	12%	12%	13%	11%
Quetta	18%	19%	19%	18%	13%	14%	14%	12%
Shaheed Sikandarabad	14%	15%	15%	14%	10%	11%	11%	9%
Sherani	18%	18%	19%	18%	9%	10%	10%	8%
Sibi	17%	18%	18%	16%	12%	12%	13%	11%
Sohbatpur	15%	15%	16%	14%	9%	10%	10%	9%
Washuk	16%	16%	17%	15%	12%	12%	12%	11%
Zhob	18%	19%	20%	18%	11%	12%	12%	10%
Ziarat	16%	16%	17%	15%	10%	11%	11%	9%