Districts Vulnerable to High Maternal Mortality Ratios in Uttar Pradesh, India

Research Question:

The Indian state of Uttar Pradesh (UP) has the second highest maternal mortality ratio in the country, at 285 deaths per 100,000 births in 2011-2013. As the most populous Indian state (226 Million, Census of India, 2011), it is in the spotlight for its relatively higher fertility and mortality figures. Consequently, the National Health Mission (NHM) has put a strategic focus on maternal healthcare and public healthcare infrastructure in UP. To support the work of the NHM, so that healthcare interventions can be effectively targeted, this project focuses on the following questions: Which districts in UP are most vulnerable to a high maternal mortality ratio, based on maternal healthcare practices and public healthcare infrastructure?

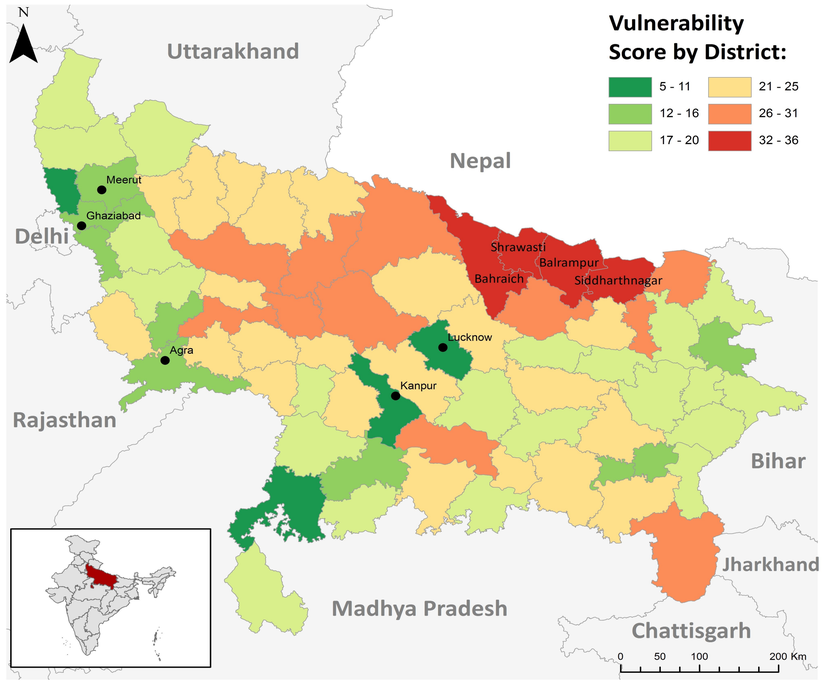
Methodology:

A) Maternal Healthcare Practices: The table and choropleth maps below capture select maternal healthcare data, highlighted in literature published by the NHM, and collected by the National Family Health Survey 2015-16. The districts' data were classified according to their standard deviation from the mean, to accurately depict the most vulnerable populations.

Healthcare Practice	Description
Family Planning	% of Women using Modern Contraceptive Methods
Antenatal Care	% of Mothers who had at least 4 Antenatal Care Visits
Intrapartum Care	% of Institutional Deliveries to Total Safe Births
Postnatal Care	% of Mothers who Received Postnatal Care within 2 days of Delivery

B) Public Health Infrastructure Index: This Index was developed by the Brookings India Health Monitor. It captures the quantity and type of healthcare infrastructure in a district, and the access of villages to healthcare facilities based on norms defined by the NHM. The access of villages to healthcare facilities is calculated from sample data collected by the Census of India, 2011. The Index has been altered to depict the shortage of public health infrastructure in a given district. This has been captured in the choropleth below, where data points for each district were classified by their standard deviation from the mean.

C) Final Product: All the aforementioned data were given a vulnerability rank based on their standard deviation. Each factor was given an equal weight, and a vulnerability score was aggregated out of 40. Districts were then classified using Natural Breaks, from least vulnerable (lowest score) to most vulnerable (highest score) to draw a trend amongst them.



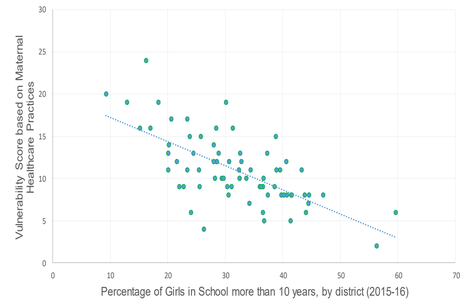
Findings:

A) The following table shows districts, highlighted in red, that received scores between 32-36 and are the most vulnerable. The NHS should prioritize improving maternal healthcare practices and public health infrastructure in these districts first.

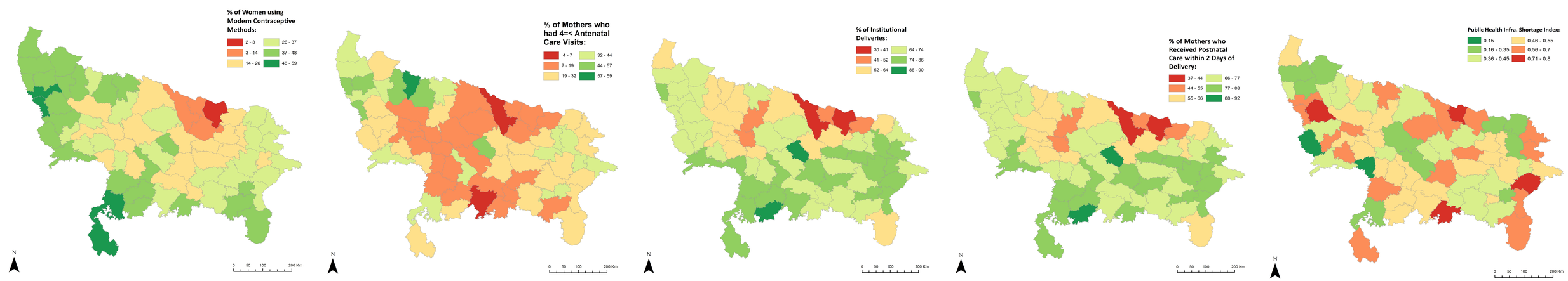
District Name	% of Women using Modern Contraceptive Methods	% of Mother who received 4+< Antenatal Visits	% of Institutional Deliveries to Safe Births	% of Mothers who received Postnatal Care within 2 days of delivery	Pub. Infra. Shortage Index	Vulnerability Score (/40)
Shrawasti	6.79	8.3	48.4	49.57	0.8	36
Balrampur	2.67	10.75	30.75	40.06	0.8	35
Bahraich	9.09	4.34	37.31	36.73	0.5	34
Siddharthnagar	16.59	14.79	45.34	44.25	0.7	33

B) Districts which have large urban centers (Meerut, Ghaziabad, Agra, Kanpur and Lucknow) have received lower vulnerability scores. While this correlation has not been conclusively established in this project, it warrants further research.

C) The percentage of girls who have stayed in school for more than ten year by district has an inverse relationship with vulnerability caused by maternal healthcare practices. This suggests that educating girls may be a solution in reducing the high MMR in UP.



D) A scatter plot mapping the aggregate vulnerability score against the actual maternal mortality ratio data, collected by the Census of India, 2011, didn't show any obvious correlations. This indicates that there are multiple and complex factors that affect maternal mortality, that have not been captured in this project.



Cartographer: Rashi Rathi | Class: DHP P207 | Date: 05/08/2018 | Projection System : Asia South Lambert Conformal Conic

Sources: Census of India, 2011 | National Family Health Survey 2015-16 | National Health Mission | Brookings India Health Monitor | ESRI | ML Infomap