Analyzing Girl Child Marriage: India Deep Dive

Prepared for the Child Marriage Learning Partners Consortium

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About Fraym

MAPPING
HUMANITY

We use advanced machine learning models to produce unprecedented, local information on human and population characteristics in critical geographies around the world—down to $1km^2$ even in remote areas.

Fraym has built machine learning (ML) software that weaves together geo-tagged household survey data with satellite imagery to create localized population information (1 km^2).
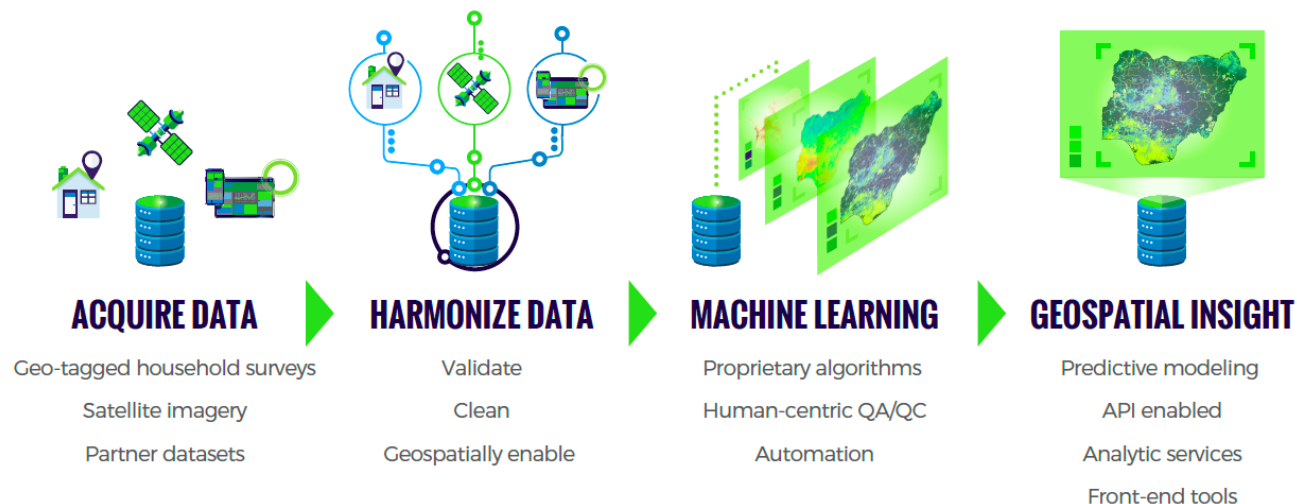
1 The primary ML model input is data from high-quality, geo-tagged household surveys. Key indications of a high-quality household survey include implementing organization(s), sample design, sample size, and response rates. After data collection, *post-hoc* sampling weights are created to account for any oversampling and ensure representativeness.

2 The second major data input is satellite imagery and related derived data products, including earth observation (EO) data, gridded population information (e.g., human settlement mapping, etc.), proximity to physical locations (e.g., health clinics, ports, roads, etc.) and biophysical surfaces like soil characteristics. As with the survey data, Fraym data scientists ensure that the software only uses high-quality imagery and derivative inputs.

3 To create spatial layers from household survey data, Fraym leverages machine learning to predict an indicator of interest at a 1 square kilometer resolution. This methodology builds upon existing, tested methodologies for interpolation of spatial data. The resulting model is used to predict the survey data for all non-enumerated areas. A similar approach was originally developed by academic researchers focused on health outcomes, which were expanded upon by USAID's Demographic and Health Surveys program since then by Fraym and others.[1]

ACQUIRE DATA	HARMONIZE DATA	MACHINE LEARNING	GEOSPATIAL INSIGHT
Geo-tagged household surveys	Validate	Proprietary algorithms	Predictive modeling
Satellite imagery	Clean	Human-centric QA/QC	API enabled
Partner datasets	Geospatially enable	Automation	Analytic services
			Front-end tools

Note 1: Gething, Peter, Andy Tatem, Tom Bird, and Clara R. Burgert-Brucker. 2015. Creating Spatial Interpolation Surfaces with DHS Data DHS Spatial Analysis Reports No. 11. Rockville, Maryland, USA: ICF International. Other notable, relevant work includes: Weiss DJ, Lucas TCD, Nguyen M, et al. Mapping the global prevalence, incidence, and mortality of *Plasmodium falciparum*, 2000–17: a spatial and temporal modelling study. Lancet 2019 and Tatem A, Gething P, Pezzulo C, Weiss D, and Bhatt S. 2014. Final Report: Development of High-Resolution Gridded Poverty Surfaces. University of Southampton. https://www.worldpop.org/resources/docs/pdf/Poverty-mapping-report.pdf

Report Overview

REPORT OVERVIEW || ANALYTIC FRAMEWORK

Fraym produced hyperlocal visualizations of girl child marriage prevalence and burden, community contexts, and potential risk factors to child marriage. The community context and potential risk factors focus solely on Bihar and Uttar Pradesh.

1 Fraym **mapped the prevalence and burden of under-18 and under-15 girl child marriage nationally.**

2 Additionally, Fraym examined the **relationship between community context and child marriage prevalence in two focus states (Bihar and Uttar Pradesh)**. Target community-level indicators include those that are more traditionally associated with child marriage, such as employment and education, as well as less explored factors, such as access to electricity or improved sanitation at home.

3 In order to assess the populations vulnerable to child marriage in Bihar and Uttar Pradesh, Fraym **developed three profiles that capture potential risk factors based on a summary of available evidence and expert consultation**: (i) pregnancy before marriage; (ii) poverty; and (iii) gender-inequitable attitudes and behaviors. Fraym then mapped these profiles to identify high-risk communities and to estimate the number of at-risk girls between the ages of 10 and 14 years old.

4 Finally, Fraym conducted **hotspot analysis, identifying areas of high child marriage prevalence and/or burden in Uttar Pradesh and Bihar** and more deeply explored the risk profiles and community context.

5 In addition to India, Fraym used this same analytical framework to produce country reports for Ethiopia, Bangladesh, Kenya, Malawi, Senegal, and Nigeria, as well as a cross-country synthesis report, as part of the Child Marriage Learning Partners Consortium.[1]

Note 1: Members of the Bill & Melinda Gates Foundation funded consortium include Fraym, Iris Group, Girls Not Brides, Population Council, Center on Gender Equity and Health, UNICEF, and Unchained at Last.

REPORT OVERVIEW || KEY FINDINGS

The results of this report can help to inform policy, bolster advocacy, and further knowledge.

1. Nationally, the under-18 child marriage is 25 percent. **Prevalence is more widespread in the north** including Bihar (40 percent), West Bengal (37 percent), and Jharkhand (36 percent).

2. **Fraym identified two hotspots in each of the two focus states**: (i) Samastipur (Bihar); (ii) Gaya (Bihar); (iii) Kheri (Uttar Pradesh); and (iv) Gonda (Uttar Pradesh). These districts have some of the highest under-18 prevalence rates and under-18 burden.

3. **Poverty is the risk factor that is most closely associated with child marriage** in Bihar and Uttar Pradesh, followed by gender-inequitable attitudes and behaviors. Pregnancy outside of marriage does not appear to be a risk factor.

4. The relationship between child marriage and other community characteristics aligns with the existing literature.

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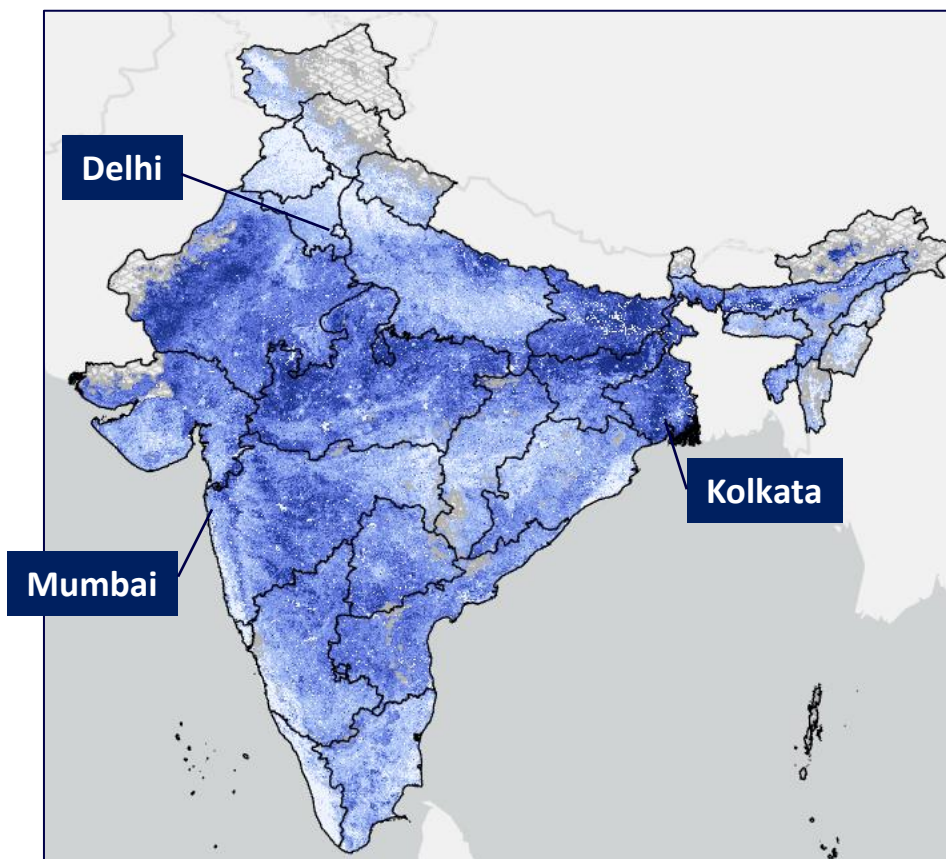# Mapping Prevalence and Burden

Fraym mapped the prevalence and burden of under-18 and under-15 child marriage nationally before conducting more detailed analysis on two focus states (Bihar and Uttar Pradesh).

1 Fraym's analysis **focused primarily on the cohort of women aged 20 to 24**. Under-18 child marriage prevalence is defined as the percent of women aged 20 to 24 at the time of survey enumeration who were married before age 18. Similarly, under-15 child marriage is defined as women aged 20 to 24 at the time of survey enumeration and who were married before age 15.[1] Burden is the number of women who were married before age 18 and 15.

2 Using the most recently available geo-tagged household survey (2016), **Fraym mapped under-18 and under-15 child marriage prevalence and burden at the national, state, district, and community level (1km²).**

3 Fraym **did not have access to a historical geo-tagged household survey** that includes age at first marriage. Therefore, spatiotemporal analysis is not possible at this time.

4 This mapping and associated analysis can help researchers, policymakers, and other decision-makers to target their future activities and resource allocation.

fraym   **Note 1:** Please see the appendix for more detailed information on the definition.

MAPPING PREVALENCE AND BURDEN || UNDER-18

Nationally, 25 percent of women aged 20-24, or 15.1 million women, were married before age 18. Prevalence is particularly concentrated in the north. Burden is concentrated in cities, as well as in Bihar and Uttar Pradesh.
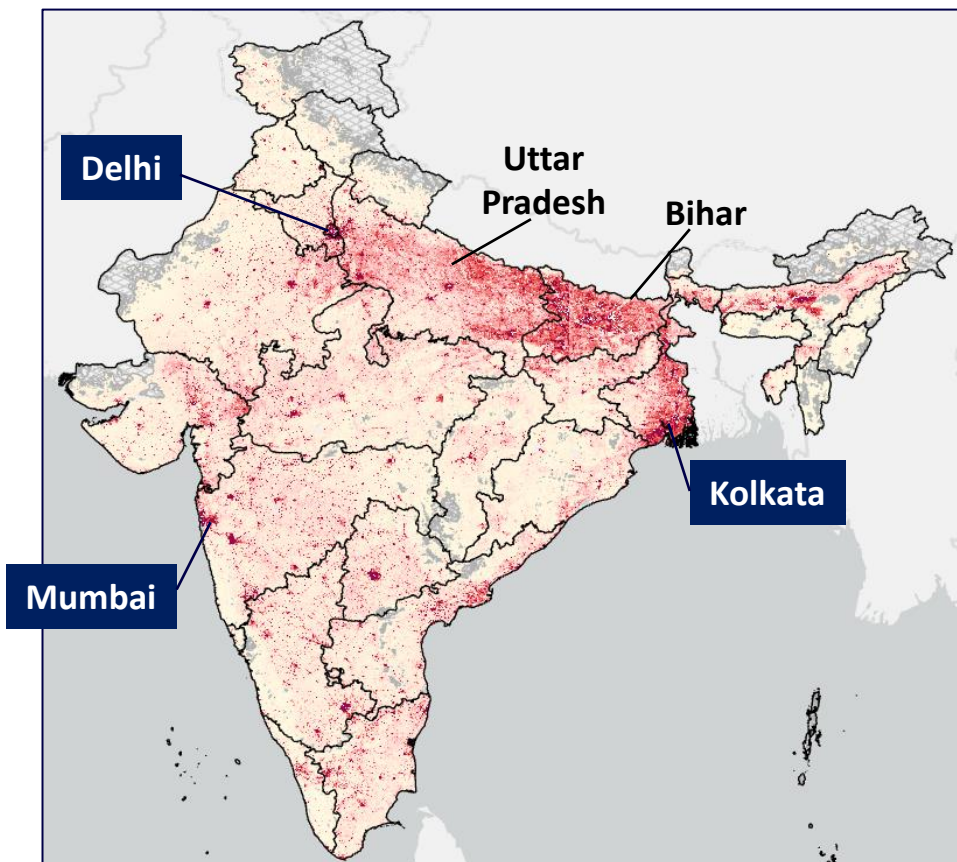
Under-18 Prevalence

Delhi

Mumbai

Kolkata

Percent of women (aged 20-24) who were married before 18

0%   65%+

Under-18 Burden

Delhi

Uttar Pradesh

Bihar

Mumbai

Kolkata

Number of women (aged 20-24) who were married before 18

0   100+

Areas with total population less than 10 people per sq km

City Large cities

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MAPPING PREVALENCE AND BURDEN || UNDER-18 BIHAR AND UTTAR PRADESH

The under-18 prevalence rate in Uttar Pradesh is 21 percent, on par with the national rate of 25 percent. In Bihar, under-18 prevalence is 40 percent, nearly twice the national rate.
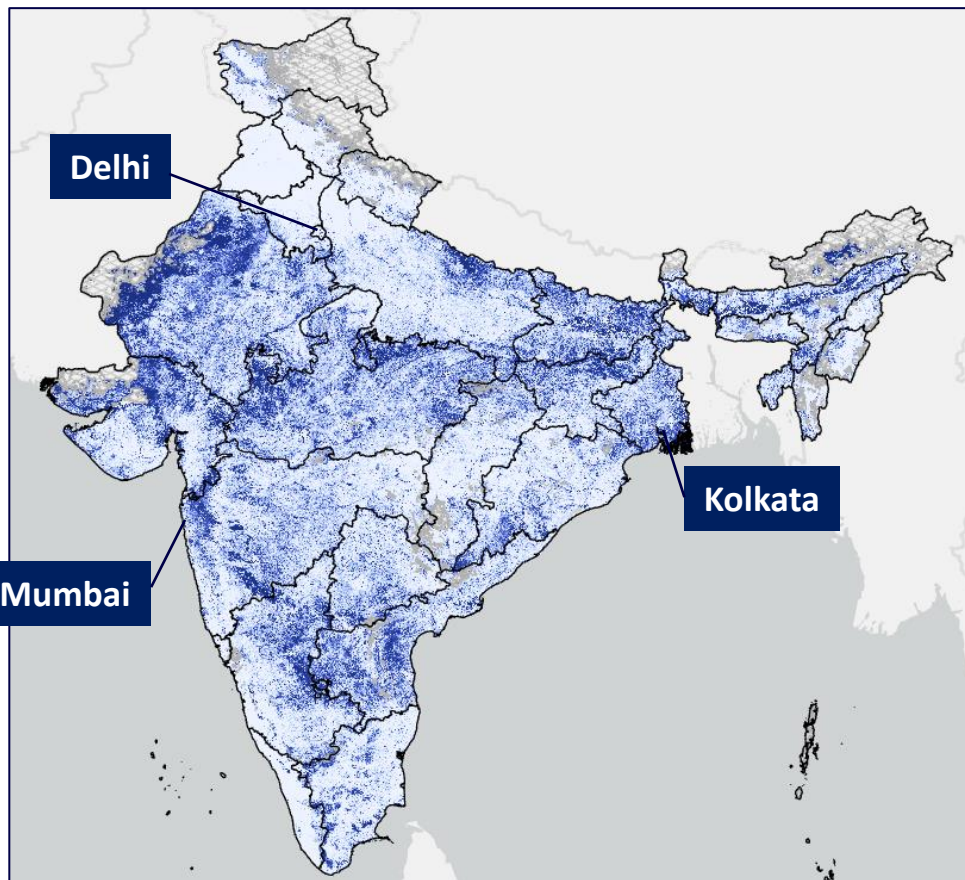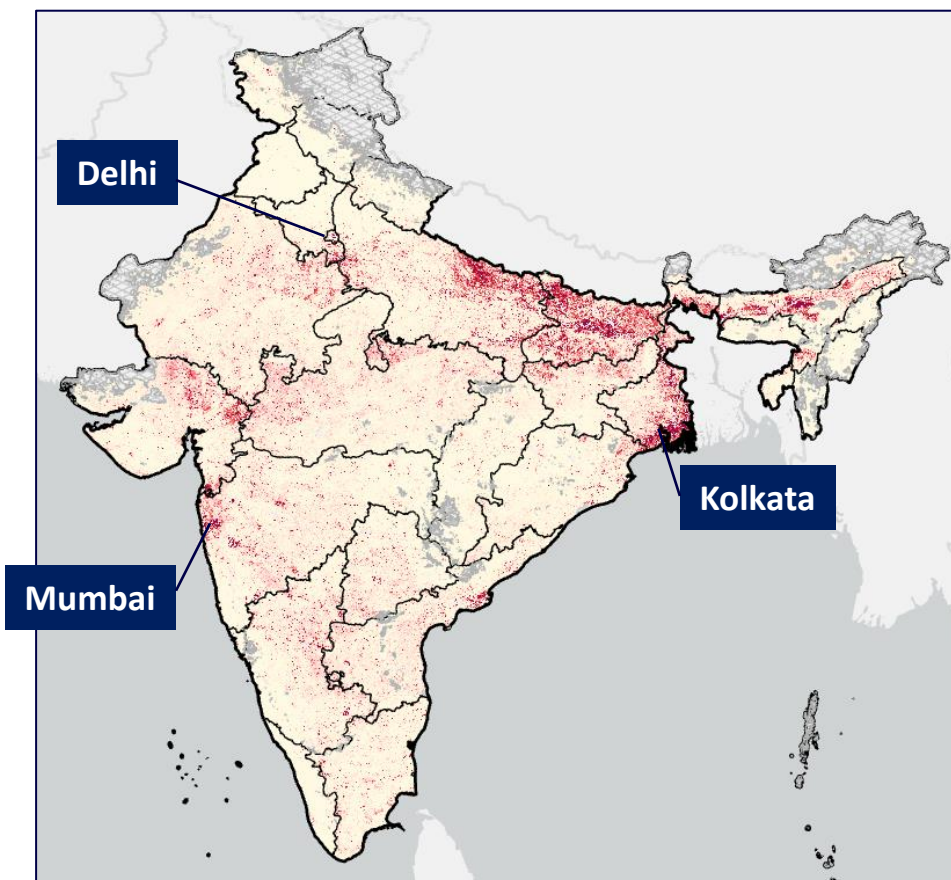
Under-18 Prevalence

Lucknow

Patna

Percent of women (aged 20-24) who were married before 18

0%   65%+

Areas with total population less than 10 people per sq km

City State capital

fraym
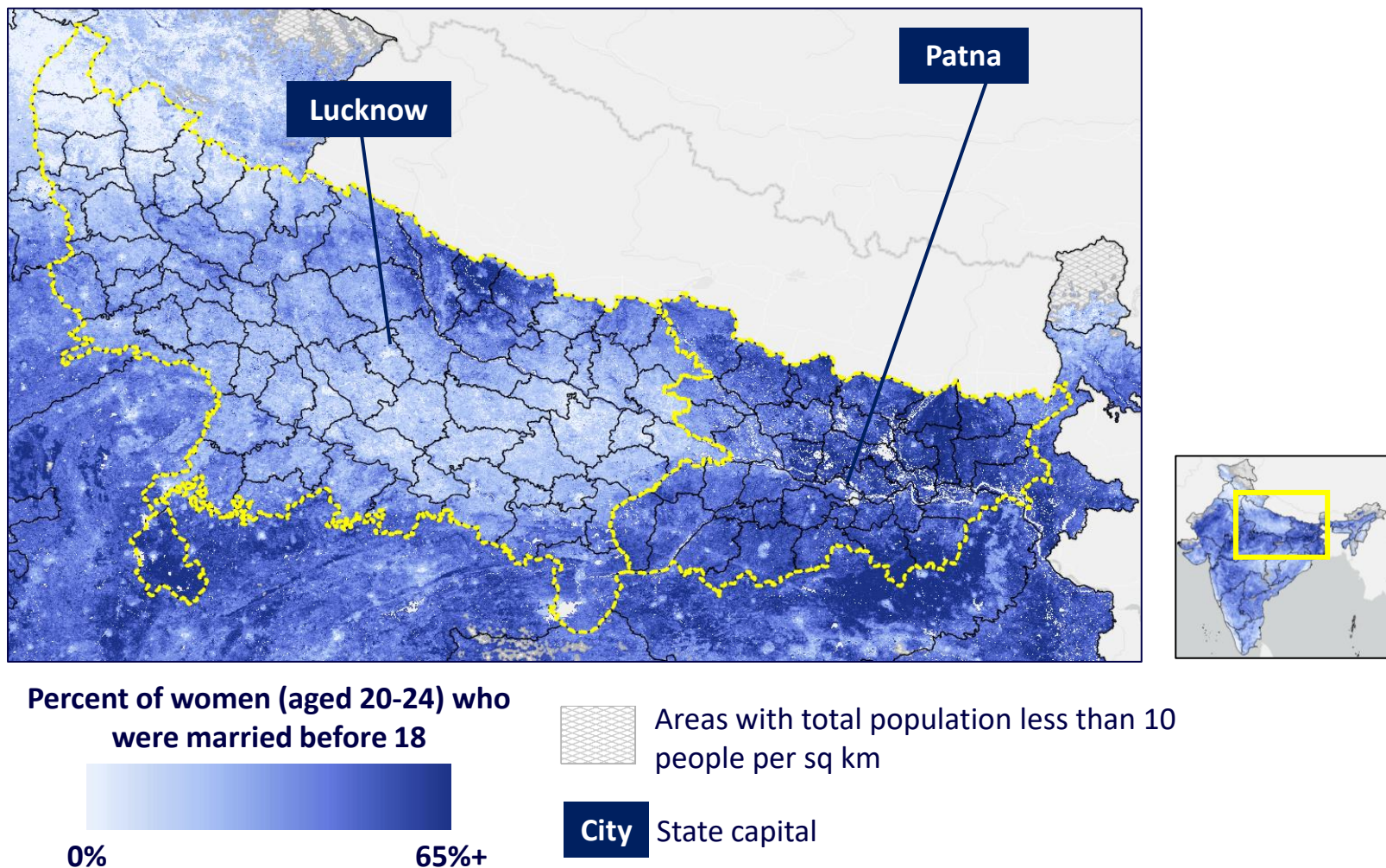
Nationally, 4 percent of women aged 20-24, or 2.2 million women, were married before age 15. Pockets of high prevalence are scattered throughout the country, whereas burden is concentrated in the more populous northeast.

Under-15 Prevalence

Delhi
Mumbai
Kolkata

Percent of women (aged 20-24) who were married before 15

0%   35%+

Under-15 Burden

Delhi
Mumbai
Kolkata

Number of women (aged 20-24) who were married before 15

0   100+

Areas with total population less than 10 people per sq km

City Large cities

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Source: Fraym, India DHS 2016

MAPPING PREVALENCE AND BURDEN || UNDER-15 BIHAR AND UTTAR PRADESH

In Uttar Pradesh, the under-15 prevalence rate is 3 percent. Under-15 prevalence is mainly concentrated in one pocket in the north. In Bihar, the under-15 prevalence rate is 7 percent and more geographically spread.
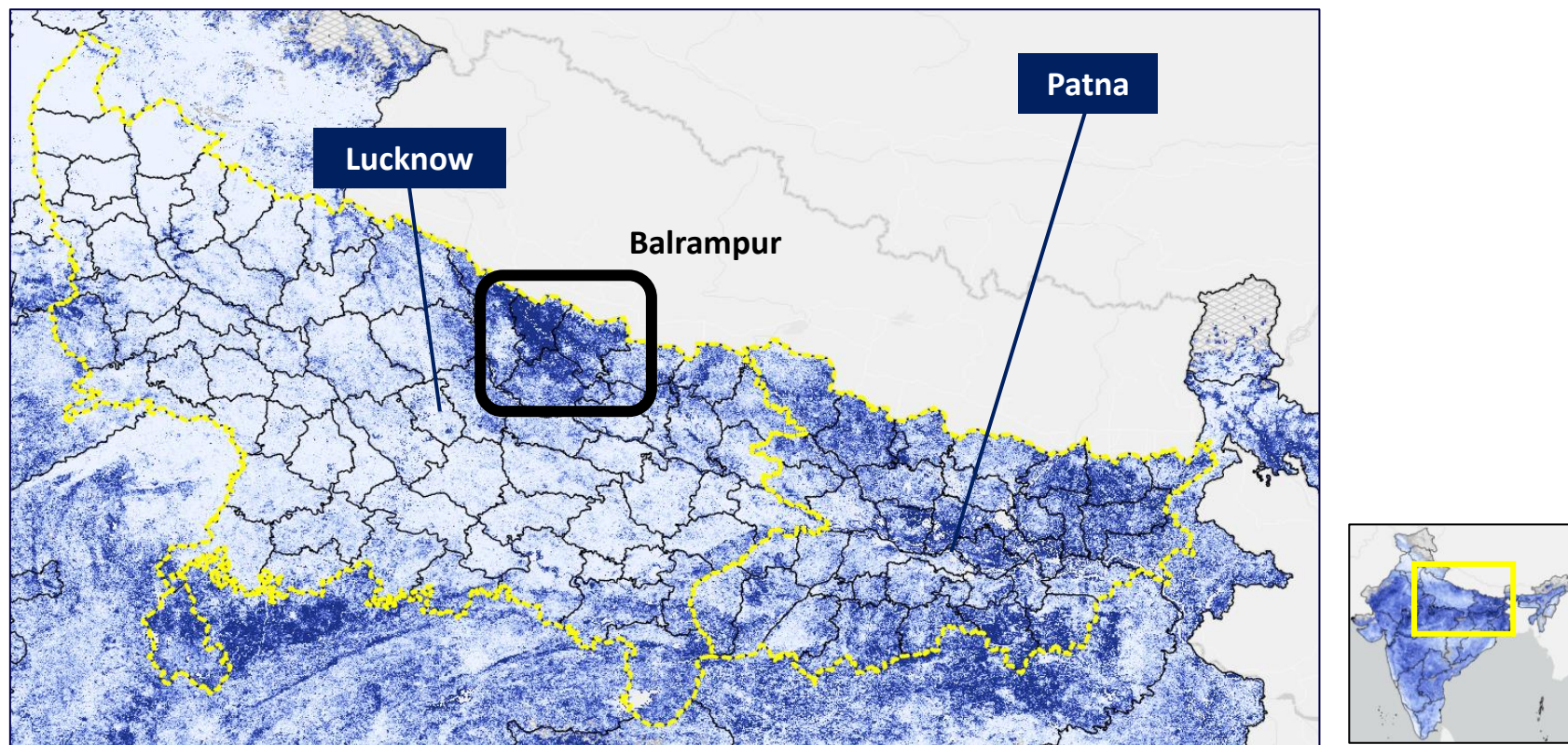
Patna

Lucknow

Balrampur

Percent of women (aged 20-24) who were married before 15

0%   65%+

City State capital

fraym

MAPPING PREVALENCE AND BURDEN || KEY TAKEAWAYS

Nationally, under-18 child marriage prevalence is concentrated in the north including Bihar, West Bengal, and Jharkhand.

1. The national under-18 prevalence rate is 25 percent. An estimated 15.1 million women (aged 20-24) were married before age 18.

2. In the focus states for this analysis, Bihar and Uttar Pradesh, the under-18 prevalence rate is 40 percent and 21 percent, respectively.

3. Nationally, the under-15 prevalence rate is 4 percent. The under-15 burden is roughly 2.2 million women (aged 20-24). Dadara & Nagar Havelli (9 percent), Assam (8 percent), and Bihar (7 percent) have the highest under-15 prevalence rates.

4. Similar to under-18, the under-15 prevalence rate in Bihar is slightly above the national rate (7 percent) and in Uttar Pradesh, the rate is just below the national rate (3 percent).

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Community Characteristics

COMMUNITY CHARACTERISTICS || SECTION OVERVIEW

Fraym assessed a variety of indicators to illuminate community contexts and their relationship with child marriage prevalence in Bihar and Uttar Pradesh.[1]

1. First, Fraym **developed a list of indicators based on feedback and discussion with child marriage experts**. Broadly, indicators capture socioeconomic characteristics and access to services.

2. More specifically, **target community-level indicators include traditionally child-marriage specific factors (employment and education) and less explored factors, such as access to electricity or improved sanitation at home**.

3. Fraym produced **hyperlocal maps of each indicator** in order to identify communities with high concentrations of these indicators.

4. Fraym also analyzed the **relationship between under-18 prevalence and each indicator at the district level.** The analysis assesses the relationship both visually as well as through the calculation of the correlation coefficient. [2]

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Fraym mapped a variety of community characteristics, then analyzed the statistical relationship with child marriage prevalence at the district level.[1]

| Socioeconomic Characteristics	
Adult Female Employment Educational Attainment by Sex	*Expected Relationship* = Areas with higher employment or educational attainment may have lower rates of child marriage prevalence.
Sexual and Reproductive Health	
Modern Contraceptive Prevalence	*Expected Relationship* = The relationship between contraceptive prevalence and child marriage is complicated given the close relationship between adolescent childbearing and child marriage.[2]
Health and Nutrition	
Child Stunting Health System Usage	*Expected Relationship* = Child stunting may be higher due to early childbearing associated with child marriage; areas with higher usage of the health system may have lower rates of child marriage prevalence.
Infrastructure	
Access to Electricity Access to Improved Sanitation	*Expected Relationship* = Areas with better infrastructure may have lower rates of child marriage prevalence.

Note 1: Analyses are bivariate and thus do not control for other factors. Please see slides 20-27 and the appendix for indicator definitions. The expected relationship is a hypothesis based on expert consultation and a review of existing literature.

Note 2: Increasing evidence suggests that many married adolescent girls report not using contraception due to a desire to become mothers. For example, see https://reproductive-health-journal.biomedcentral.com/articles/10.1186/s12978-019-0686-9
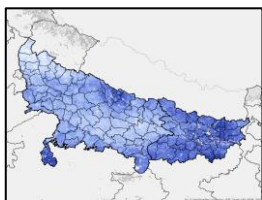
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COMMUNITY CHARACTERISTICS || ADULT FEMALE EMPLOYMENT

In districts where there is greater employment among adult females, child marriage rates are typically lower. However, the correlation coefficient indicates a modest relationship.

Adult Female Employment at the Community Level
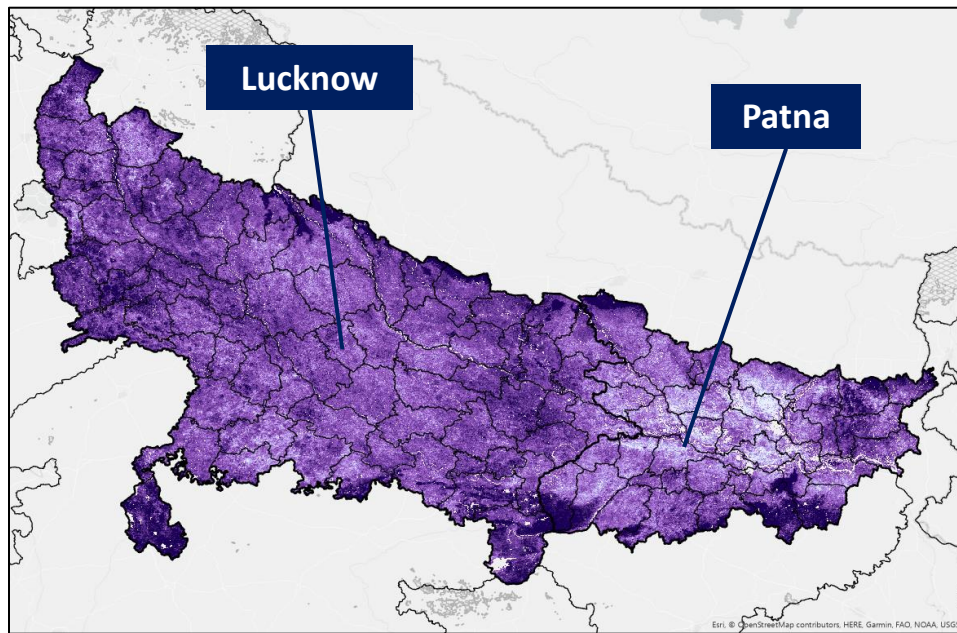
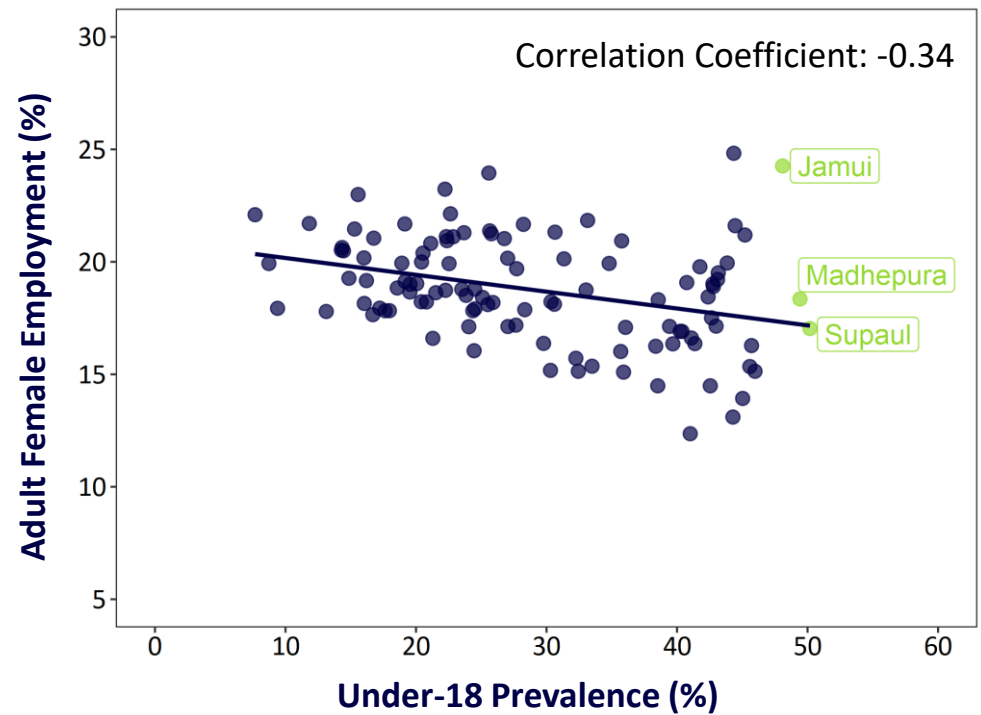Percent of women (aged 15-49) that are employed

0%   90%+

Under 18 Prevalence

City State capital

Adult Female Employment Rate and Child Marriage Prevalence
Each point represents a district.

Correlation Coefficient: -0.34

The y-axis intervals vary across indicators depending on the range of the values.

Districts with high prevalence rates tend to have low rates of female educational attainment. This relationship, captured by the correlation coefficient, is strong.

Female Educational Attainment at the Community Level
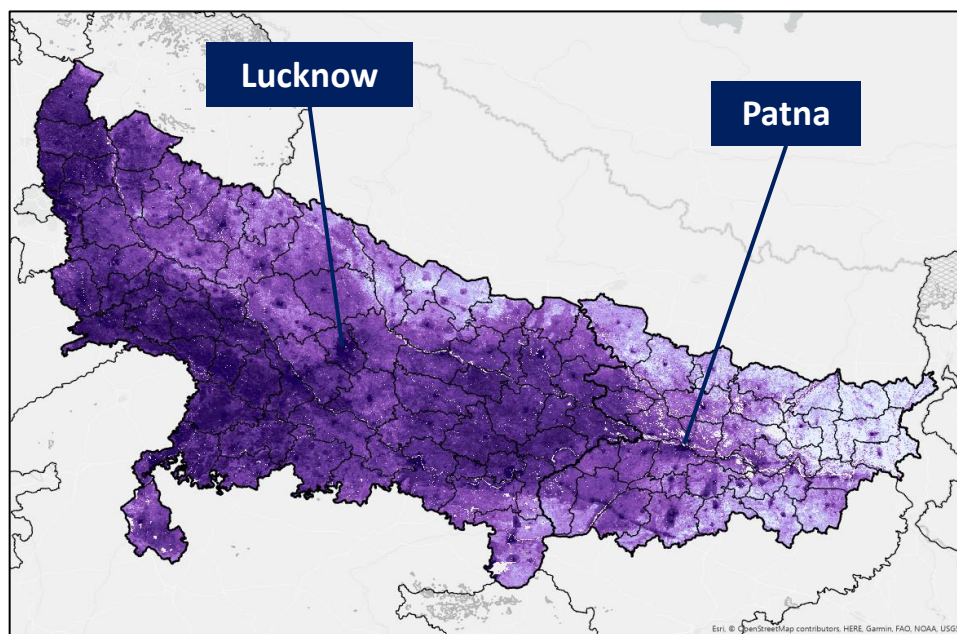
Lucknow

Patna

Esri, © OpenStreetMap contributors, HERE, Garmin, FAO, NOAA, USGS

Percent of women (aged 18-49) who completed primary school or higher

0%   100%

Under 18 Prevalence

City State capital

Female Educational Attainment and Child Marriage Prevalence

Each point represents a district.

Correlation Coefficient: -0.80

Women (aged 18-49) who completed primary school or higher (%)

Jamui
Supaul
Madhepura

Under-18 Prevalence (%)

The y-axis intervals vary across indicators depending on the range of the values.

Source: Fraym, India DHS 2016
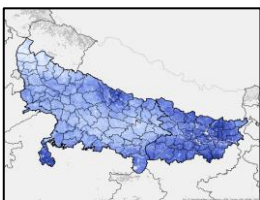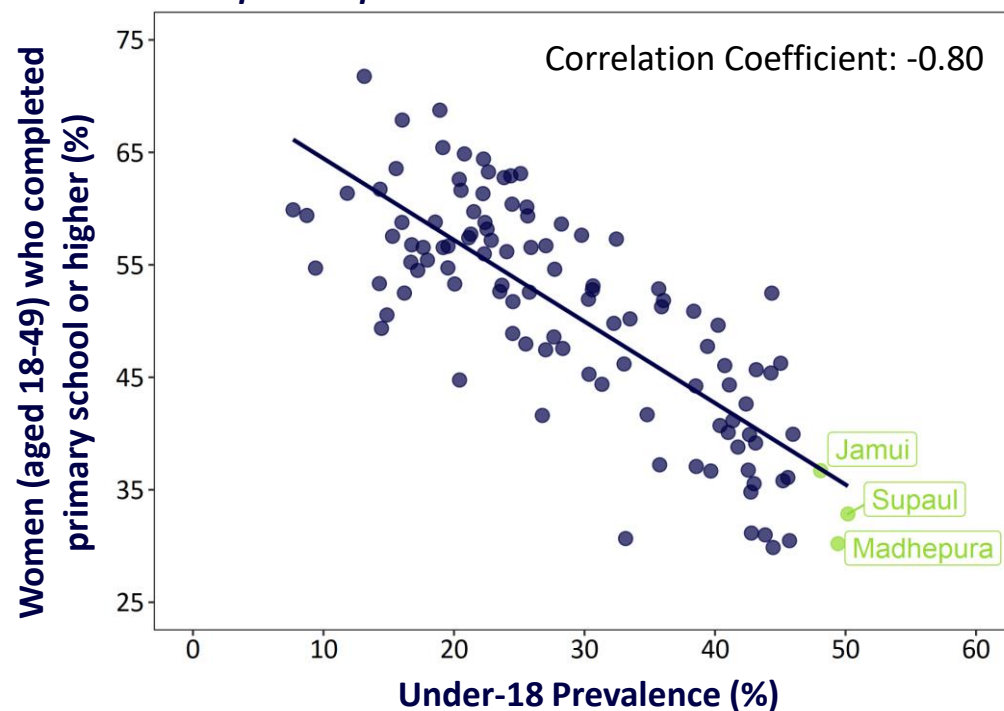
As with female education, districts with higher rates of male educational attainment tend to have lower rates of child marriage. This relationship's correlation coefficient is strong and negative.

Male Educational Attainment at the Community Level
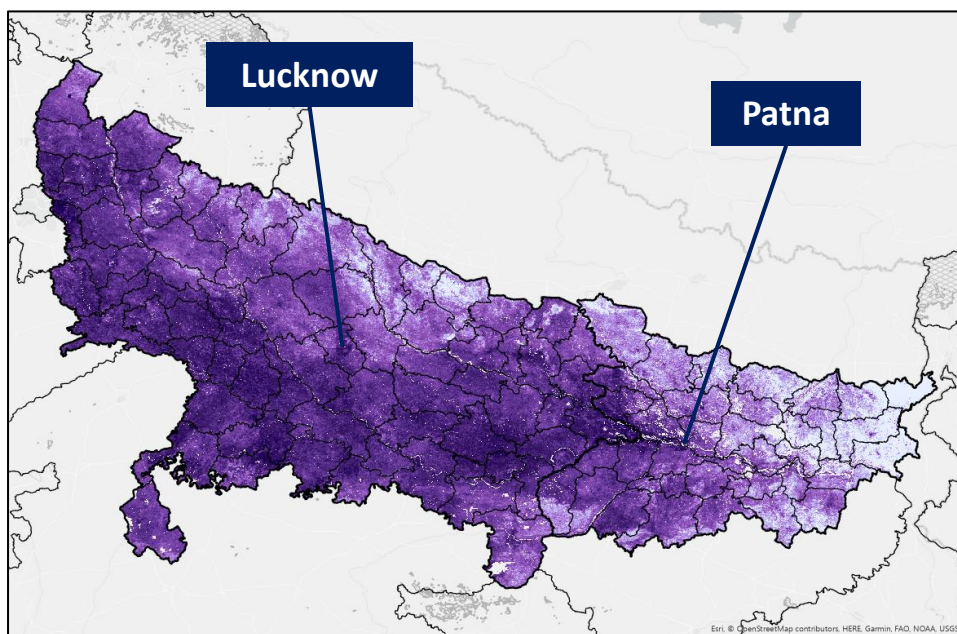
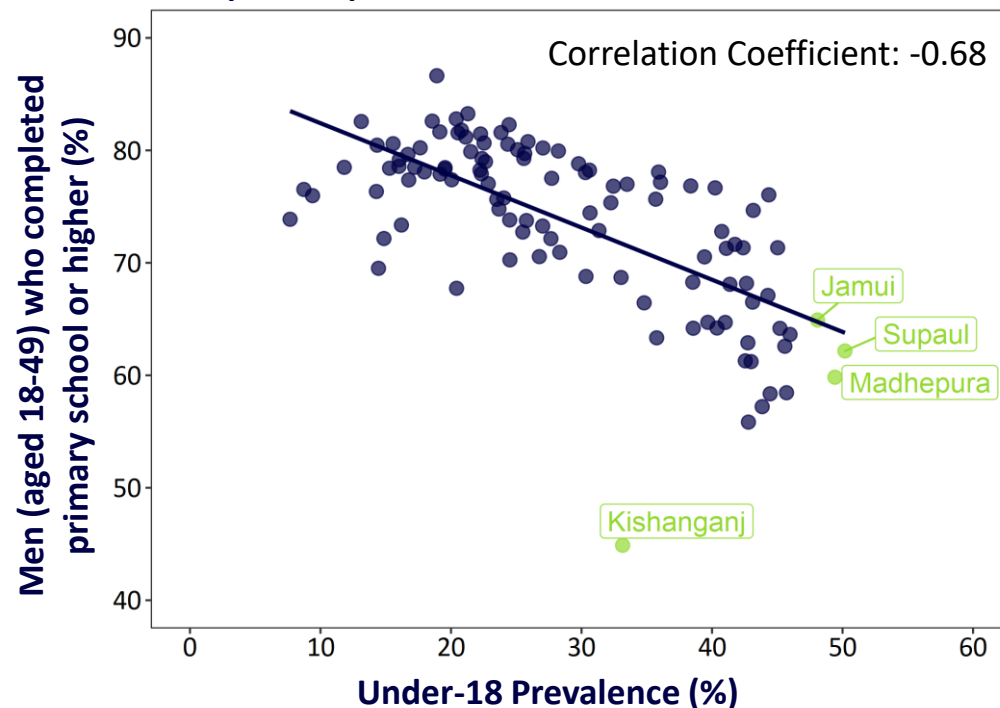Percent of men (aged 18-49) who completed primary school or higher

0%   100%
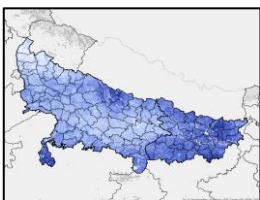
Under 18 Prevalence   City   State capital

Male Educational Attainment and Child Marriage Prevalence
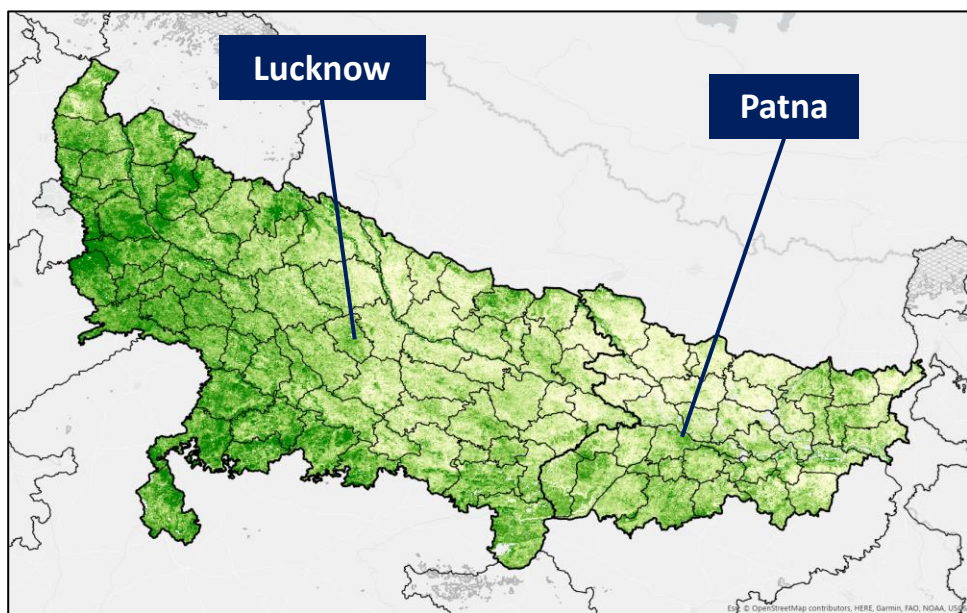*Each point represents a district.*

Correlation Coefficient: -0.68

The y-axis intervals vary across indicators depending on the range of the values.

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21

There is a negative correlation between districts with higher child marriage prevalence and lower rates of modern contraceptive use.[1]

Modern Contraceptive Use at the Community Level

Percent of women (aged 15-24) who are sexually active and use a modern contraceptive method
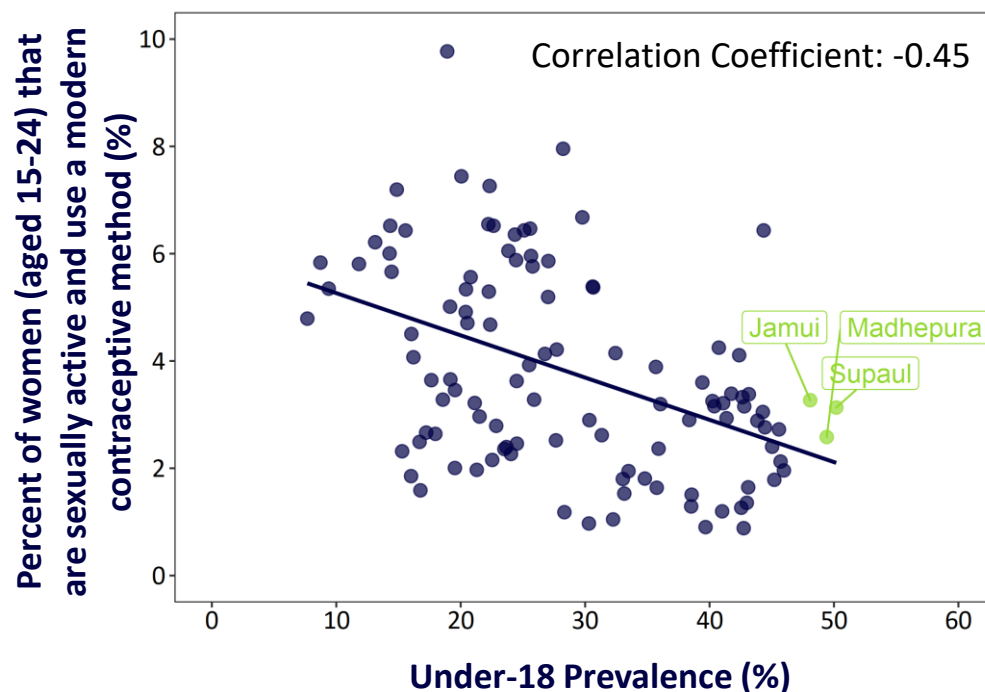
0%   55%+

Under 18 Prevalence

City   State capital

Modern Contraceptive Use and Child Marriage Prevalence

Each point represents a district.

Correlation Coefficient: -0.45

Jamui   Madhepura   Supaul

Percent of women (aged 15-24) that are sexually active and use a modern contraceptive method (%)

Under-18 Prevalence (%)

The y-axis intervals vary across indicators depending on the range of the values.
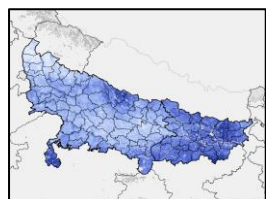
Note 1: Modern contraceptive prevalence is defined using the DHS definition, that is the percent of women (aged 15-49) that use a modern method. Modern methods exclude periodic abstinence and withdrawal, which are considered traditional methods.
Source: Fraym, India DHS 2016

22

There is a modest negative correlation between child marriage prevalence and health system usage.[1]

Health System Usage at the Community Level
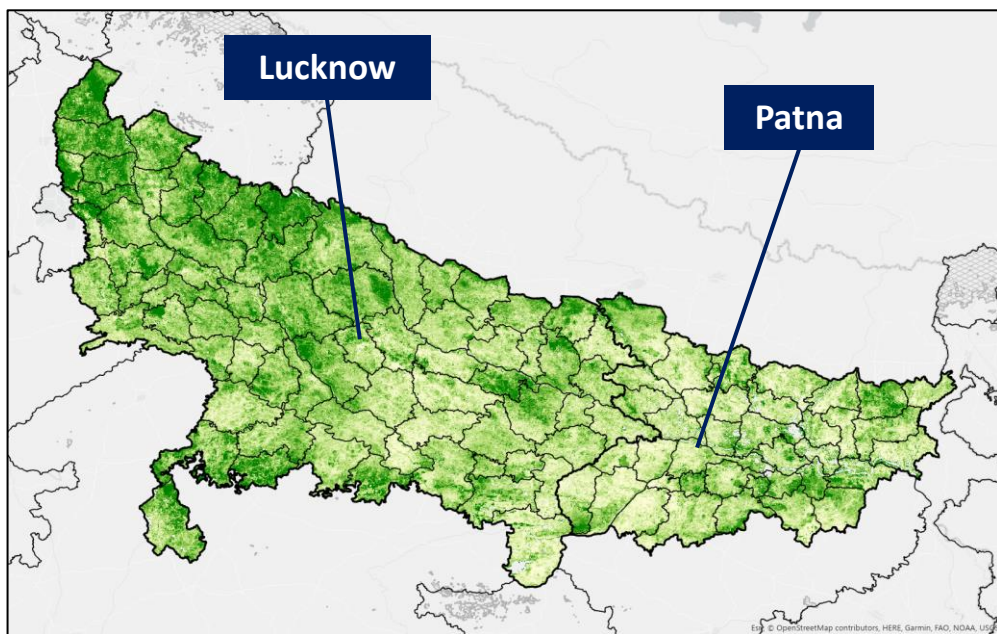
Percent of adults (aged 15-49) who use the health system

0%   100%
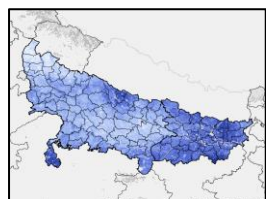
City State capital

Under 18 Prevalence

Health System Usage and Child Marriage Prevalence

Each point represents a district.

Correlation Coefficient: -0.34

Jamui
Supaul
Madhepura

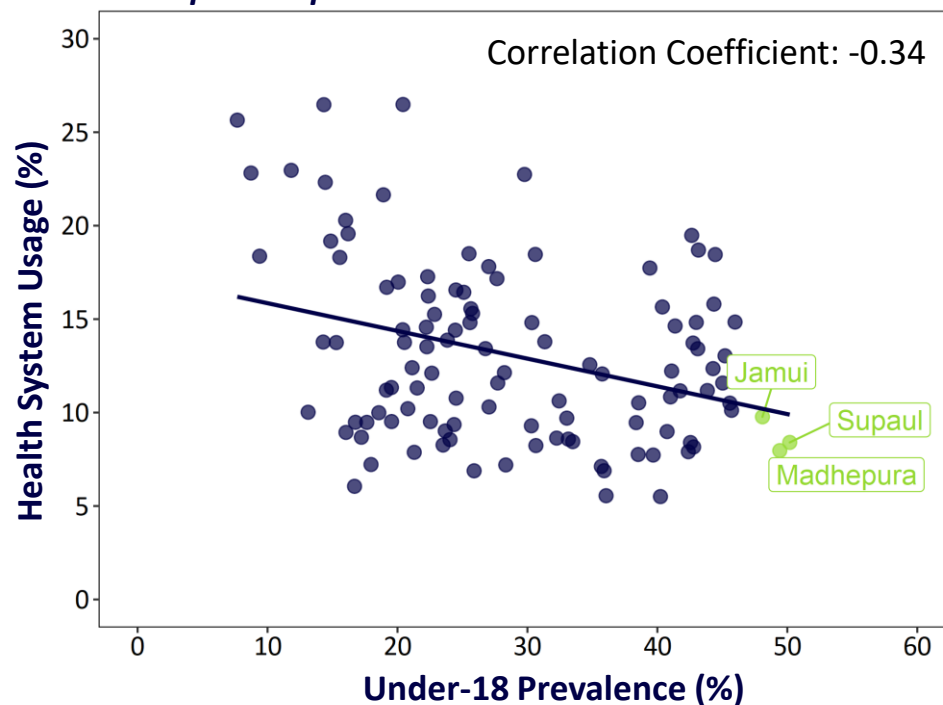*The y-axis intervals vary across indicators depending on the range of the values.*

Note 1: Health system usage is defined as adults (aged 15-49) who have visited a health facility or have been visited by a fieldworker to talk about family planning in the past 12 months.
Source: Fraym, India DHS 2016

23

There is strong, positive correlation between child marriage prevalence and child stunting, that is districts with high prevalence, tend to have high stunting rates.

Child Stunting at the Community Level
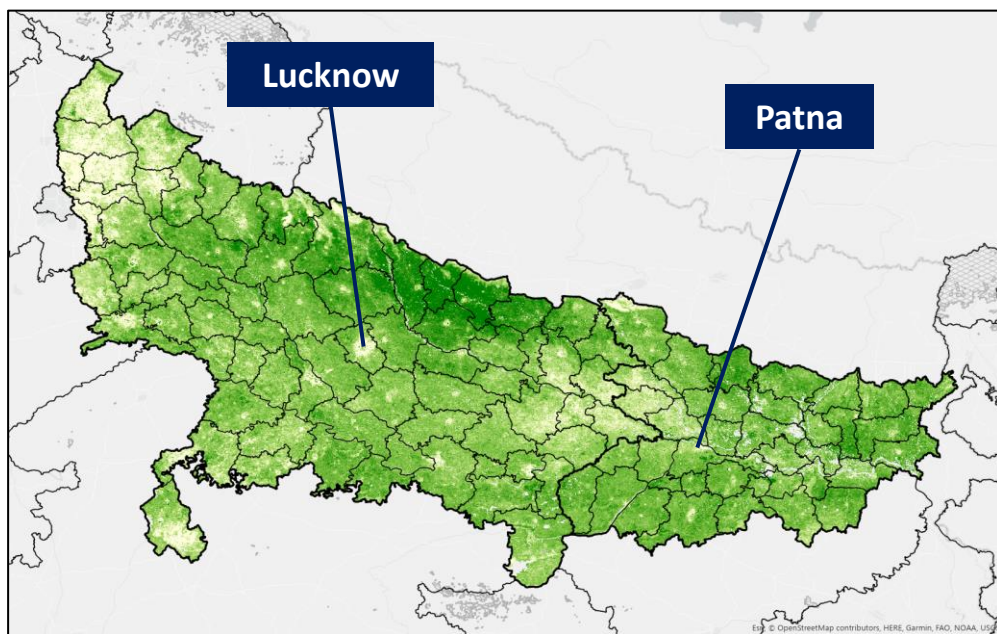
Lucknow

Patna

Percent of children under five who are stunted

0%   100%
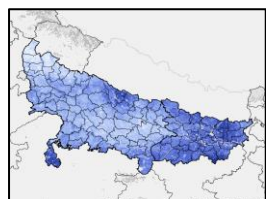
Under 18 Prevalence

City State capital

Child Stunting and Child Marriage Prevalence

Each point represents a district.

Correlation Coefficient: 0.60

Madhepura

Supaul

Jamui

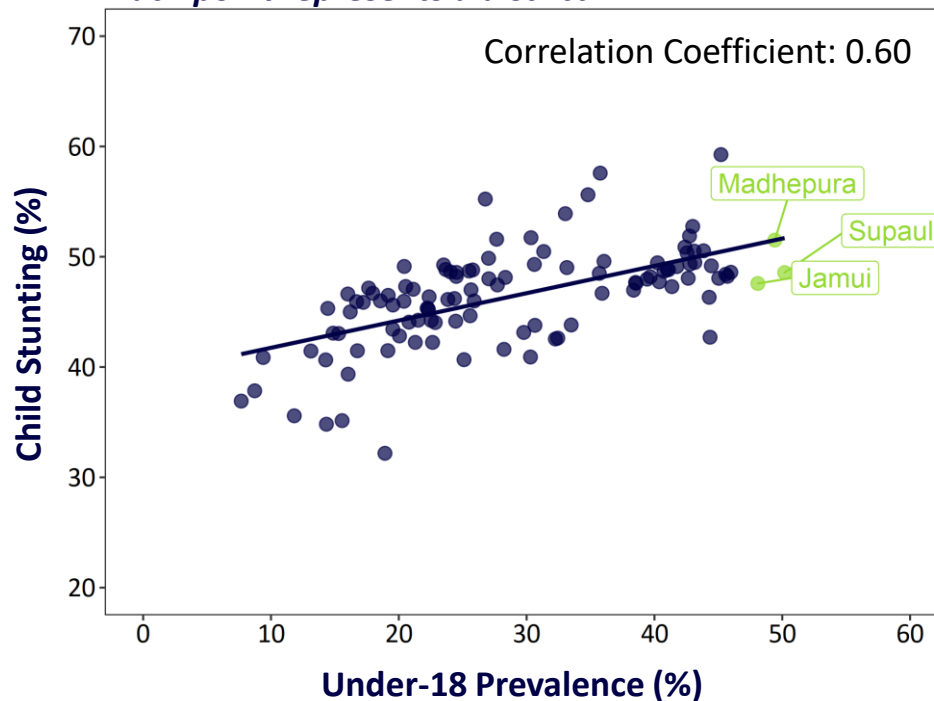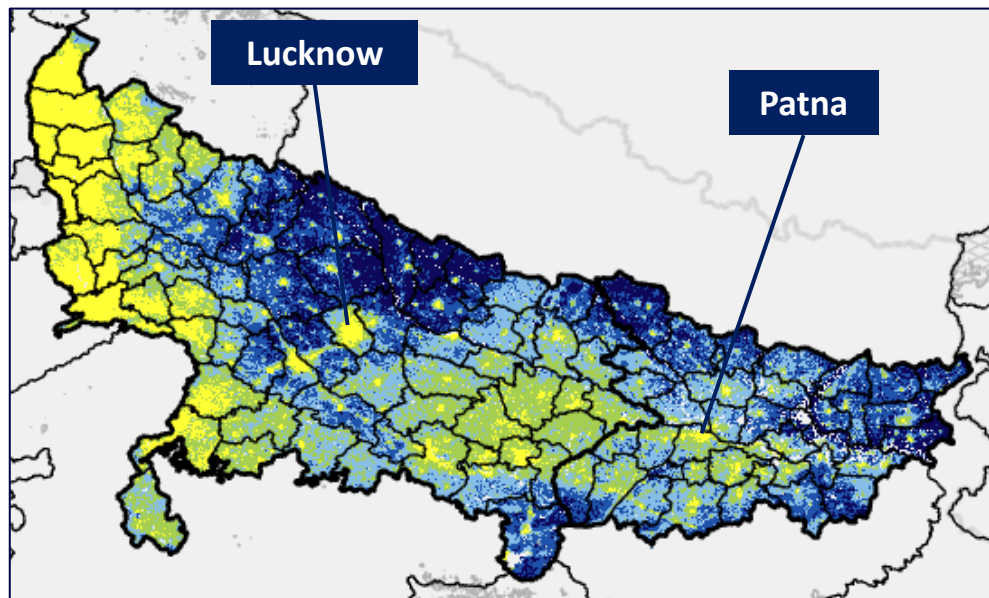*The y-axis intervals vary across indicators depending on the range of the values.*

Districts with high child marriage prevalence tend to have low rates of access to electricity.

Access to Electricity at the Community Level

Lucknow

Patna

Percent of individuals that live in households with access to electricity

0%   100%
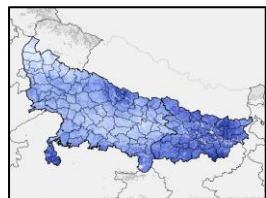
Under 18 Prevalence

City State capital

Access to Electricity and Child Marriage Prevalence

Each point represents a district.

Correlation Coefficient: -0.64

Jamui
Supaul
Madhepura

Access to Electricity (%)

Under-18 Prevalence (%)

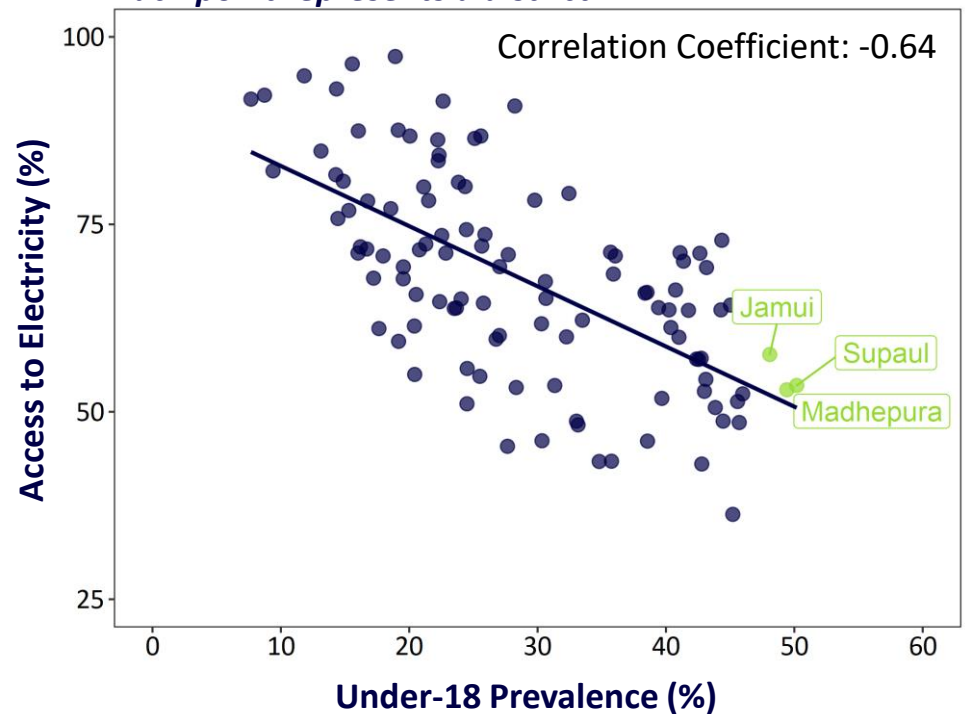*The y-axis intervals vary across indicators depending on the range of the values.*

Source: Fraym, India DHS 2016

Districts with high child marriage prevalence also tend to have low access to improved sanitation.

Flush Toilet Access at the Community Level

Lucknow

Patna

Percent of individuals that live in households with a flush toilet

0%   100%

Under 18 Prevalence
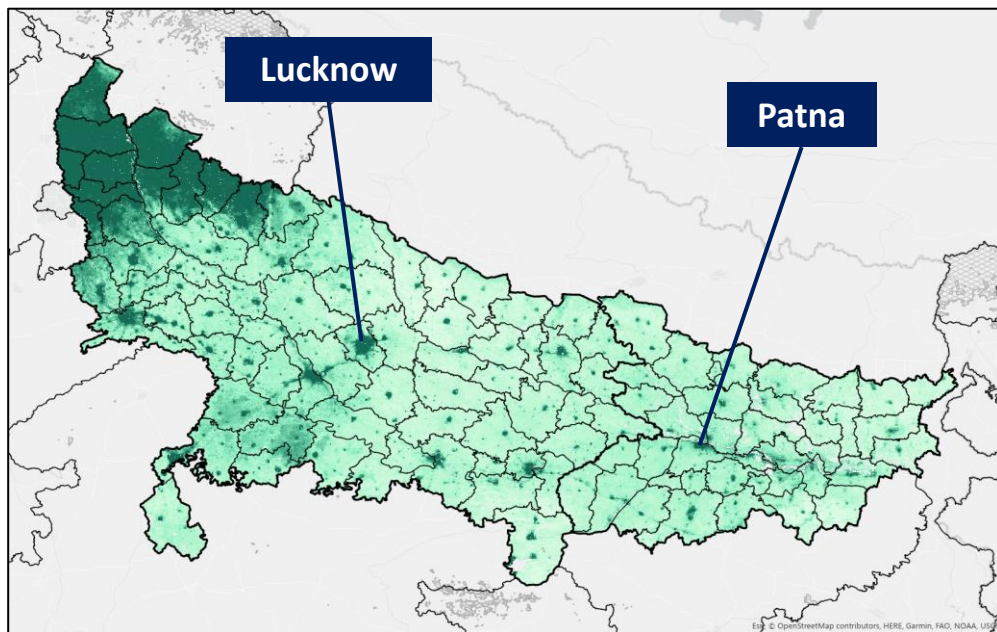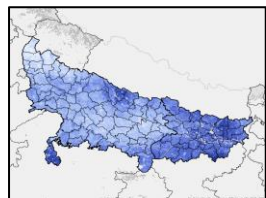
| City | State capital

Flush Toilet Access and Child Marriage Prevalence
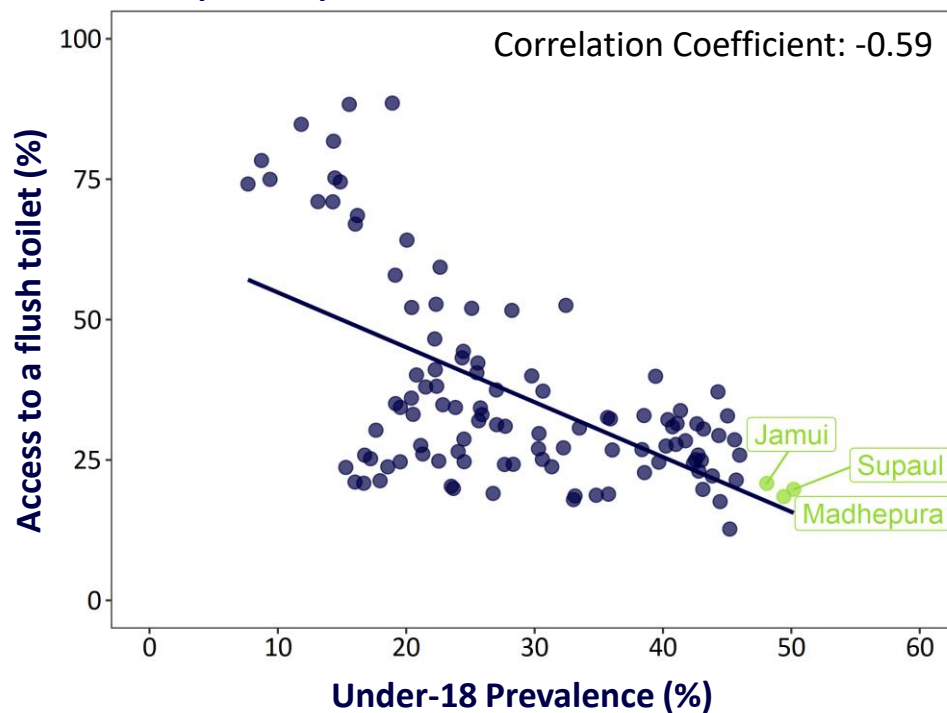
Each point represents a district.

Correlation Coefficient: -0.59

Access to a flush toilet (%)

Jamui
Supaul
Madhepura

Under-18 Prevalence (%)

The y-axis intervals vary across indicators depending on the range of the values.

Source: Fraym, India DHS 2016

The direction and magnitude of the correlation coefficient between various community indicators and child marriage is largely as expected.

1. Both **male and female (aged 18-49) education are the indicators most strongly associated with under-18 child marriage**. The direction of the relationship is negative.

2. Correlation with child marriage prevalence is weakest for female employment and health system usage.

3. Even indicators that are **not traditionally considered in the child marriage literature, such as access to electricity or flush toilets, have a strong negative relationship** with child marriage prevalence.

Correlation Coefficient with Child Marriage Prevalence at the district Level	
Socioeconomic Characteristics	
Adult Female Employment	-0.34
Female Educational Attainment	-0.80
Male Educational Attainment	-0.68
Health	
Modern Contraceptive Use	-0.45
Health System Usage	-0.34
Child Stunting	0.60
Infrastructure	
Access to Electricity	-0.64
Access to Improved Sanitation	-0.59

At-Risk Population

Fraym segmented the population of girls at risk for child marriage based on three potential risk factors: (i) pregnancy outside of marriage; (ii) poverty; and (iii) gender-inequitable attitudes and behaviors. This analysis focused on Bihar and Uttar Pradesh.

1 Based on a summary of the literature and expert consultation, Fraym **examined relevant indicators to identify the three potential risk factors**, and then mapped the presence of these risk factors across Bihar and Uttar Pradesh.

2 Fraym then **estimated the potential risk profiles at the community level (1 km²) and categorized communities** as low, medium-low, medium-high, or high-risk based upon the national distribution (e.g., quartiles).

3 Next, Fraym **estimated the population of girls aged 10 to 14** living in high-risk communities across each of the three risk profiles.

4 Finally, Fraym looked at the relationship between child marriage prevalence and risk factor profiles to better **assess whether high-risk areas are also high prevalence areas**.

5 Identifying areas where young girls are at risk for child marriage can help decision-makers better target program, policy, and advocacy efforts.

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Literature suggests that pregnancy among young women and child marriage are linked, although it is difficult to disentangle the directionality.

1. Pregnancy among young women in Bihar and Uttar Pradesh is relatively high – 24 percent of women aged 15 to 24 have given birth.

2. Birth without marriage is very uncommon in Bihar and Uttar Pradesh. Less than one percent of never-married women aged 15 to 24 have given birth. This low proportion suggests that most births occur within marriage.

3. To assess the relationship between pregnancy and child marriage, Fraym isolated pregnancy occurring outside of marriage by focusing on ever-married women who gave birth either anytime before marriage or up until six months after marriage. This framing assumes that the woman knew that she was pregnant prior to marriage and may have decided to get married as a result of the pregnancy.

Women who have given birth, by age group and marital status			
	Aged 20-24	Aged 15-19	Aged 15-24
All women	49%	4%	24%
Ever-married women[1]	72%	28%	63%
Never-married women[2]	-	-	<1%

Note 1: Ever-married women include women who are currently married, living with a partner, widowed, divorced, or are no longer living together. Fraym also looked at currently married women only and found the proportions across age groups to be similar to ever-married women.
Note 2: Proportions of never-married women who gave birth in the 20-24 age range and 15-19 age range are excluded due to sample size.
Source: Fraym, India DHS 2016

fraym

Pregnancy outside of marriage is an unlikely risk factor for child marriage in Bihar and Uttar Pradesh.

1. Only one percent of ever-married women aged 15-24 have given birth outside of marriage. In fact, the average interval between marriage and first birth among this cohort is 35 months.[1] Together, these figures suggest that pregnancy outside of marriage is uncommon.

2. If pregnancy outside of marriage was a strong risk factor of child marriage, a high proportion of women married before age 18 would be expected to have given birth outside of marriage. However, only two percent of women aged 20-24 who were married before age 18 gave birth before or within six months of marriage. Furthermore, the average interval between marriage and first birth among this cohort is 33 months, or almost three years.

Women who have given birth before or within six months of marriage, by age group and marital status			
	Aged 20-24	Aged 15-19	Aged 15-24
All women	2%	<1%	1%
Ever-married women only[2]	3%	1%	1%
Women who were married before age 18	2%	-	-

Note 1: The average interval between marriage and first birth excludes women who gave birth before marriage. The DHS does not report the number of months for negative intervals.
Note 2: Ever-married women include women who are currently married, living with a partner, widowed, divorced, or are no longer living together. Fraym also looked at currently married women only and found the proportions across age groups to be similar to ever-married women.
Source: Fraym, India DHS 2016

fraym

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Literature suggests a strong relationship between poverty and child marriage. To measure poverty, Fraym focuses on education, employment, and overall wealth.[1]

1. In Bihar and Uttar Pradesh, 78 percent of female household heads have low education (primary schooling or less) compared to 39 percent of male household heads.

2. Among household heads, women are less likely than men to be employed (26 percent), and of those female household heads that are employed, 66 percent work as laborers or in agriculture. Similarly, young women (aged 15-24) are unlikely to be employed, but of those that are, more than half work in agriculture or as laborers.[2]

Poverty-related Indicators by Sex	Female	Male
Education		
Household heads who have primary schooling or less	78%	39%
Employment		
Household heads who are currently employed	26%	88%
Employed household heads who are working in agriculture or as laborers	66%	48%
Women (aged 15-24) who are employed	13%	-
Employed women (aged 15-24) working in agriculture or as laborers	57%	-

Note 1: Risk profile indicators, particularly wealth, are explained in more detail in the appendix.
Note 2: Based on expert consultations, Fraym identified employment as a laborer or self-employment in agriculture as low opportunity jobs, or jobs that are likely to have low pay and/or poor working conditions. Fraym analyses for other country reports relied on the DHS variable of grouped occupation, whereas the India DHS only provides ungrouped occupations.
**Source:** Fraym, India DHS 2016

In Bihar and Uttar Pradesh, women aged 20-24 that married before 18 are less likely to be currently employed and more likely to fall in a lower wealth quintile. If employed, they are more likely to work in agriculture or as laborers.

Employment indicators for women aged 20-24

Indicator	Women (aged 20-24)	Women (aged 20-24) who were married before age 18
Women who are employed	13%	9%
Employed women working as laborers or in agriculture[1]	57%	78%

Distribution of women aged 20-24 by wealth quintile and under-18 prevalence[2]
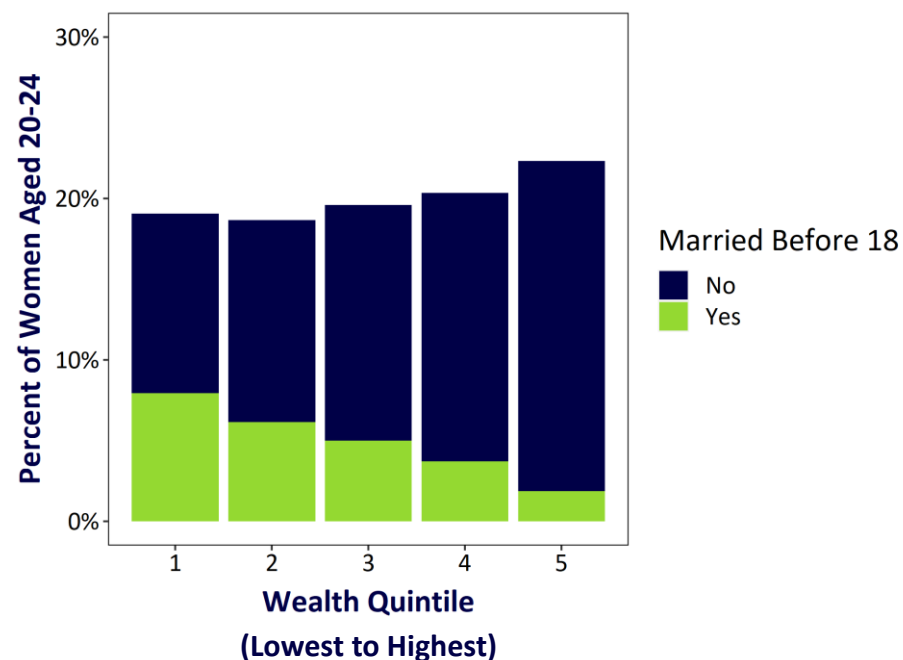
Note 1: Based on expert consultations, Fraym identified employment as a laborer or in agriculture as low opportunity jobs, or jobs that are likely to have low pay and/or poor working conditions. Fraym analyses for other country reports relied on the DHS variable of grouped occupation, whereas the India DHS only provides ungrouped occupations.

Note 2: The wealth index is a standard DHS variable. It is a composite measure of a household's cumulative living standard, calculated using information on household asset ownership, housing materials, and access to water and sanitation services. The first quintile is the poorest while the fifth quintile is the wealthiest.

Source: Fraym, India DHS 2016

# AT-RISK POPULATION || POVERTY & CHILD MARRIAGE (RISK PROFILE CONSTRUCTION)

The poverty risk profile reflects a given community's wealth, employment and education levels, which are calculated using principal component analysis.

1. Fraym **selected six indicators to capture poverty**: (i) wealth; (ii) employment for women aged 15 to 24 in agriculture or as laborers; (iii) & (iv) educational attainment of male and female household heads; and (v) & (vi) employment of male and female household heads in agriculture or as laborers.

2. Due to differences in the survey design for India as compared to other countries Fraym analyzed, Fraym modified the approach to the poverty profile by disaggregating employment and educational attainment by sex.

3. Fraym **combined the indicators into a poverty risk profile index using principal component analysis (PCA)** and estimated the risk scores at the community level (1 km^2).

4. Fraym then **classified communities into quartiles with risk categories ranging from 1 to 4.** Communities with higher index values, or more impoverished as defined by the index, are categorized as a 4 ("high risk").

5. Finally, Fraym **estimated the number of at-risk girls** by calculating the total number of girls aged 10 to 14 who live in the communities where poverty represents the highest risk factor for child marriage (categorized as a 4).

AT-RISK POPULATION || POVERTY & CHILD MARRIAGE (RISK PROFILE MAPPING)

There are an estimated 1.8 million girls aged 10 to 14 who live in communities where poverty represents a high-risk factor for child marriage.

Poverty Index Risk Category[1]

Legend:
- Low Risk
- Medium-Low Risk
- Medium-High Risk
- High Risk
- City — State capital
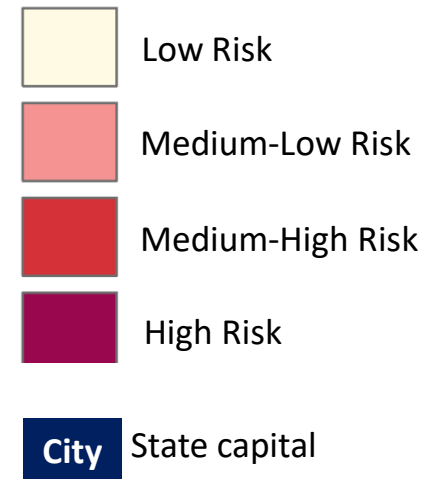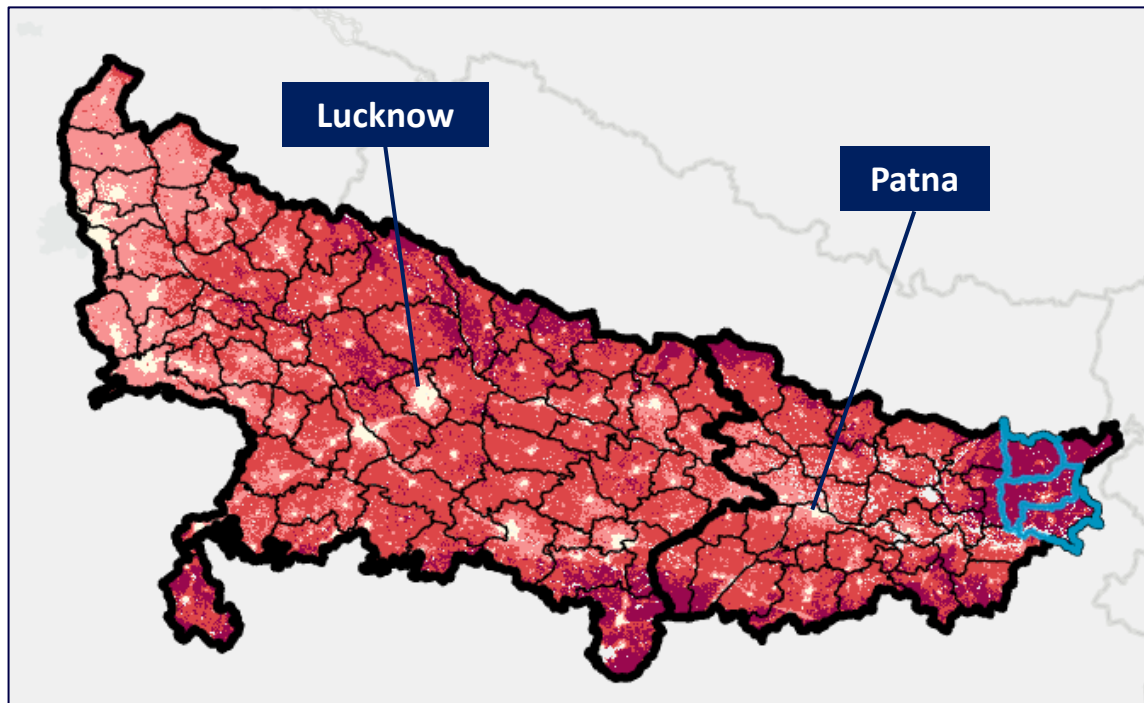
Population of at-risk girls due to poverty, highlighted districts[2]

District	Population of at-risk girls (aged 10-14)
Araria	173,300
Purnia	166,600
Katihar	135,000

Note 1: The map shows the classification of the poverty index for each 1km² cell into quartiles. The poverty index risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. See slide 34 or the appendix for more details.

Note 2: At-risk girls are defined as girls aged 10-14 who live in communities with a poverty index risk category equal to 4 (highest risk).

Source: Fraym, India DHS 2016, WorldPop 2020

AT-RISK POPULATION || POVERTY & CHILD MARRIAGE (RISK PROFILE MAPPING)

Communities with high child marriage prevalence tend to also have higher poverty levels.
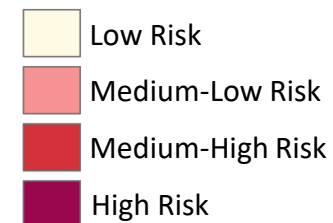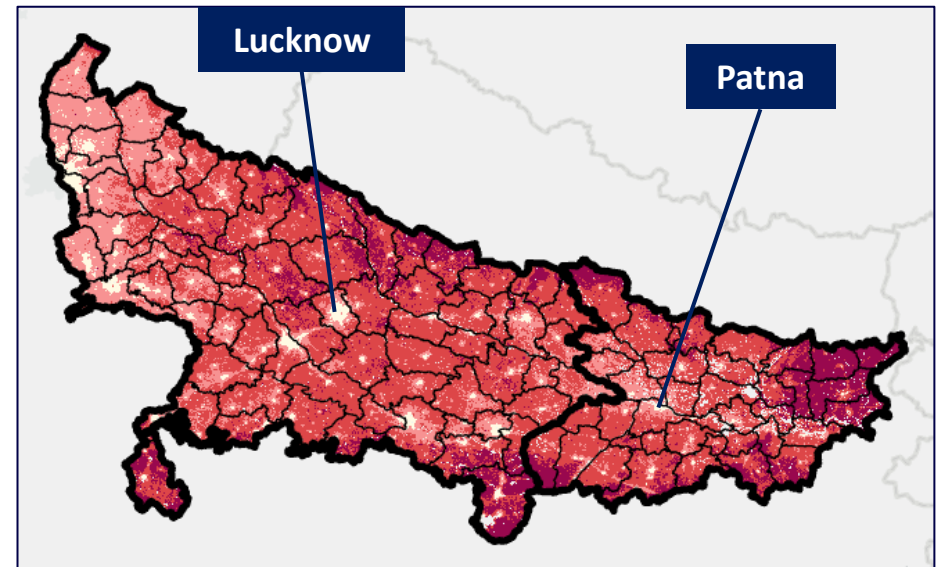
Child Marriage Prevalence

Lucknow

Patna

Percent of women (aged 20-24) who were married before 18

0%   65%+
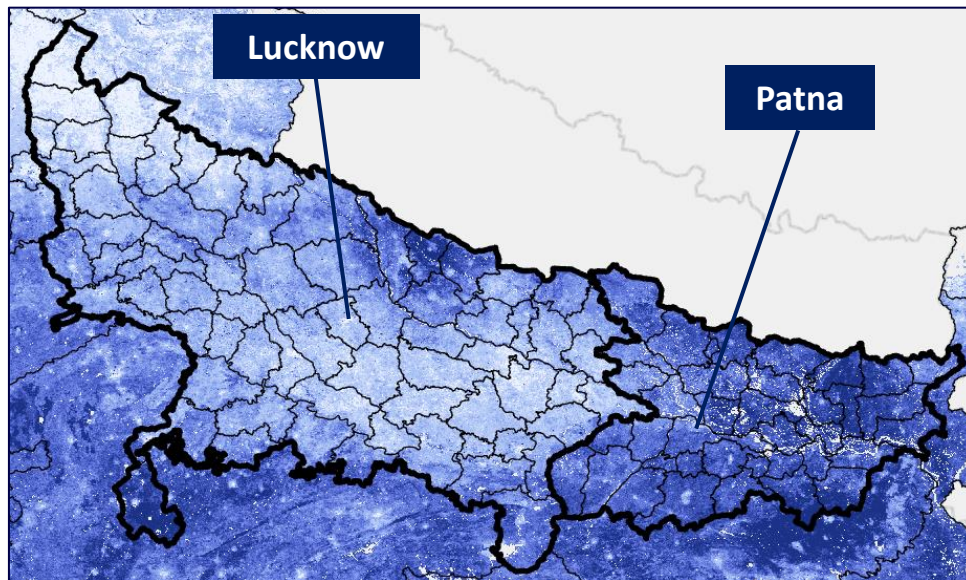
City State capital

Poverty Index Risk Category[1]

Lucknow

Patna

Low Risk

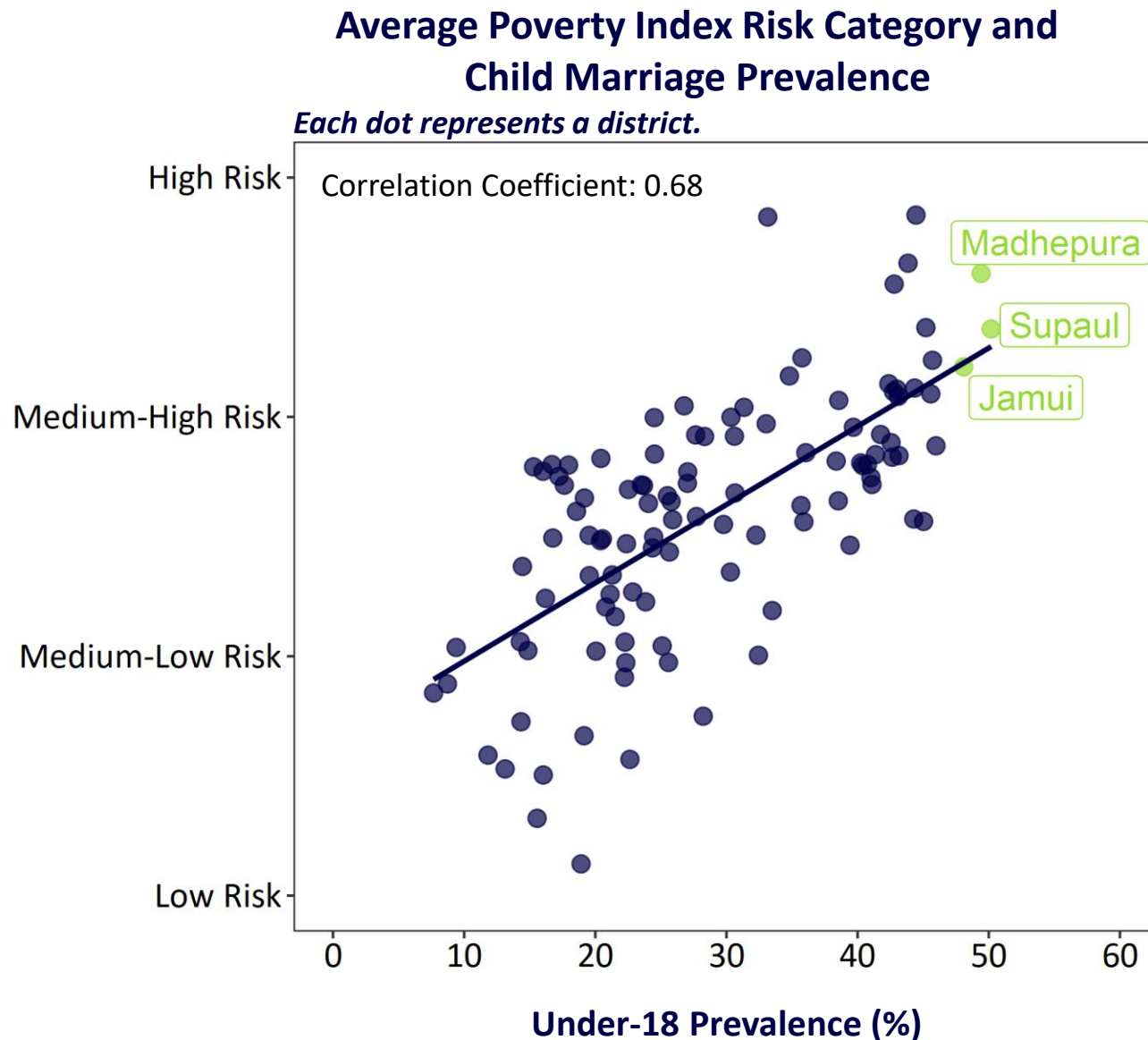Medium-Low Risk

Medium-High Risk

High Risk

Note 1: The map shows the classification of the poverty index for each 1km² cell into quartiles. The poverty index risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. See slide 34 or the appendix for more details.
Source: Fraym, India DHS 2016, WorldPop 2020

fraym

AT-RISK POPULATION || POVERTY & CHILD MARRIAGE (RISK PROFILE MAPPING)

Districts with a high prevalence rate tend to be high-risk for child marriage due to poverty. This suggest that poverty is an important risk factor.

Average Poverty Index Risk Category and Child Marriage Prevalence

Each dot represents a district.

Correlation Coefficient: 0.68

Madhepura

Supaul

Jamui

High Risk

Medium-High Risk

Medium-Low Risk

Low Risk

Under-18 Prevalence (%)

Gender-inequitable attitudes and behaviors may be associated with lower rates of child marriage.

1. To measure gender-inequitable attitudes and behaviors, Fraym used attitudes towards domestic violence and women's participation in decision-making.

2. Justification of domestic violence may be related to child marriage. Roughly one out of every four men and one out of every two women (aged 15-49) believe that there are situations where wife beating is justified.

3. Women's greater participation in decision-making may imply empowerment, and thus may be related to lower rates of child marriage. In Bihar and Uttar Pradesh, 21 precent of currently married women (aged 15-49) do not participate in any household decisions.

Attitudes and behaviors, by sex		
	Women	Men
Domestic Violence		
Believe that there is at least one reason that justifies wife beating	45%	29%
Women's Participation in Decision Making[1]		
Respondent's healthcare	70%	-
Large household purchases	69%	-
Visits to family	66%	-
Husband's earnings	68%	-
No decisions	21%	-

Note 1: Women's participation in decision-making is defined as the woman reporting that she makes the decision on her own or jointly with her partner. Questions regarding decision making are only asked to currently married individuals. Currently married men were asked about decision making on their own healthcare and major household purchases, however these figures are excluded as they do not relate to their spouse.
Source: Fraym, India DHS 2016

fraym

Communities where individuals agree that wife-beating is justified have higher child marriage prevalence rates, but the relationship is weak.

1 Fraym examined the correlation between attitudes towards wife beating and child marriage prevalence at the community level.

2 Fraym then estimated the selected indicators at the community level (1 km^2) and classified communities into quartiles with risk categories ranging from 1 to 4. Fraym then combined men's and women's attitudes risk categories and classified into quartiles. Communities with higher rates of affirming attitudes towards wife beating are categorized as a 4 ("high risk").

3 Finally, Fraym estimated the number of at-risk girls by calculating the total number of girls aged 10 to 14 who live in the communities where gender inequitable attitudes represents the highest risk for child marriage (categorized as a 4).

Indicator	Description	Correlation Coefficient with under-18 child marriage prevalence[1]	
		Women	**Men**
Domestic Violence			
Believe that there is at least one reason that justifies wife beating[2]	Proportion of women/men (aged 15-49) who agree with at least one reason that a husband is justified in hitting or beating his wife	0.10	0.11

Note 1: The correlation coefficient indicates the direction and magnitude of the relationship at the community (enumeration area) level.
**Note 2:** Please see the appendix for details of the specific reasons asked by the DHS.
Source: Fraym, India DHS 2016

AT-RISK POPULATION || ATTITUDES & CHILD MARRIAGE (RISK PROFILE MAPPING)

There are an estimated 2.6 million girls aged 10 to 14 who live in communities where gender inequitable attitudes represent a high risk for child marriage.

Attitudes towards Wife Beating Risk Category[1]

Legend:
- Low Risk
- Medium-Low Risk
- Medium-High Risk
- High Risk
- **City** State capital
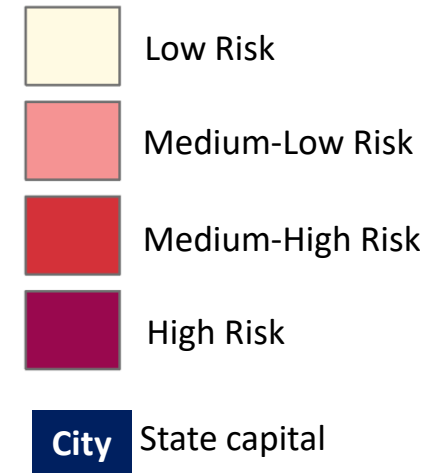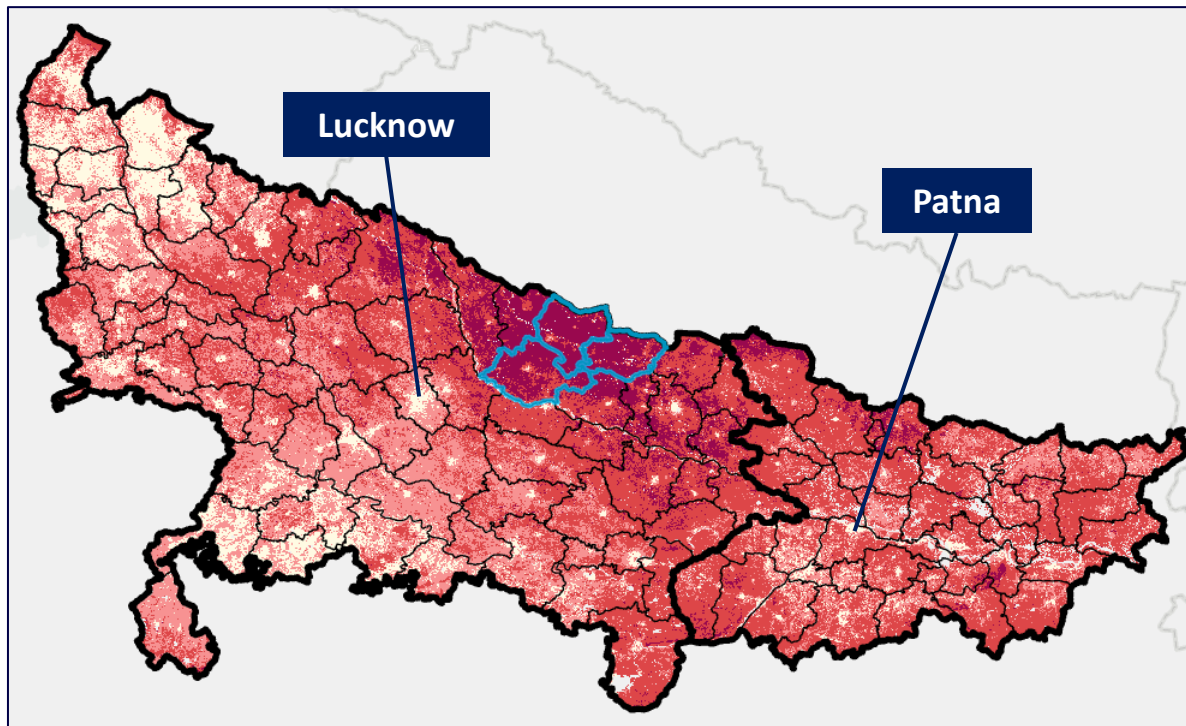
Population of at-risk girls due to attitudes towards wife beating, highlighted districts[2]

District	Total number of at-risk girls aged 10-14
Gonda	148,700
Siddharth Nagar	146,400
Balrampur	110,400

Note 1: The map shows the classification of attitudes towards wife beating for each 1km² cell into quartiles. The attitudes towards wife beating risk categories range from a 1 to 4 scale, with 4 indicating the highest level of risk. Attitudes towards wife beating is defined as belief that there is at least one reason that justifies wife beating. Please see slide 39 or the appendix for more details.
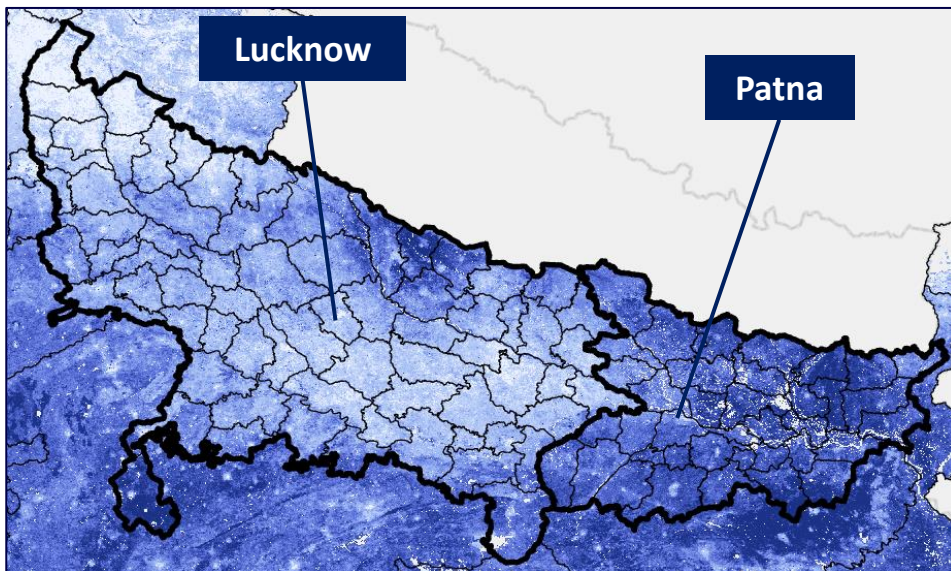
Note 2: At-risk girls are defined as girls aged 10-14 who live in communities with an attitudes towards wife beating risk category equal to 4 (highest risk).

Source: Fraym, India DHS 2016, WorldPop 2020

AT-RISK POPULATION || ATTITUDES & CHILD MARRIAGE (RISK PROFILE MAPPING)

In Bihar, communities with the highest level of inequitable gender attitudes also have high child marriage prevalence, whereas in Uttar Pradesh, communities with inequitable attitudes are more widespread.
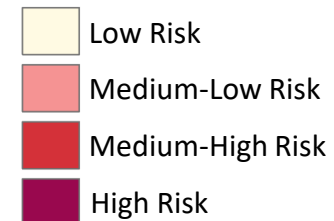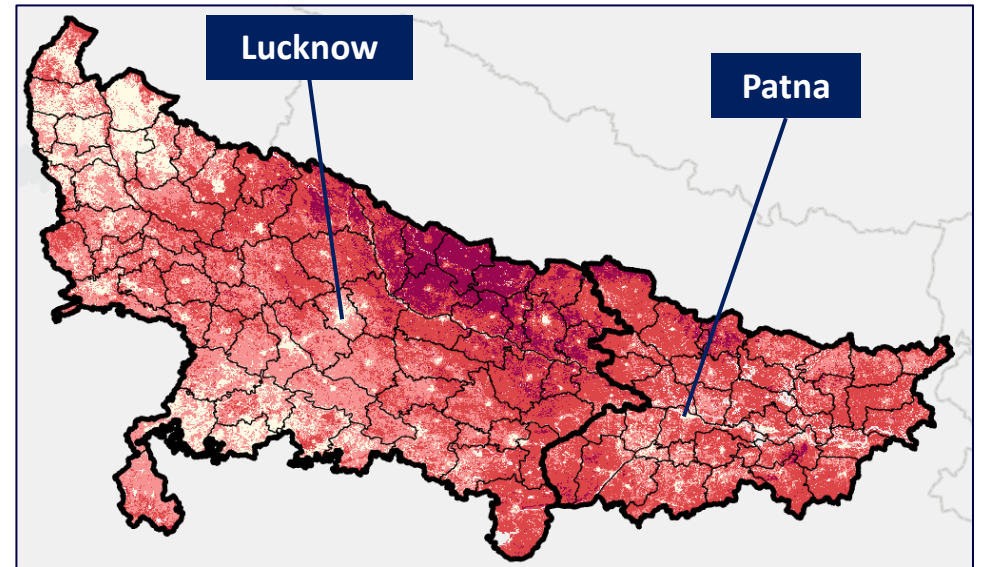
Child Marriage Prevalence

Attitudes towards Wife Beating Risk Category[1]

Lucknow

Patna

Percent of women (aged 20-24) who were married before 18

0%   65%+

City State capital

Low Risk

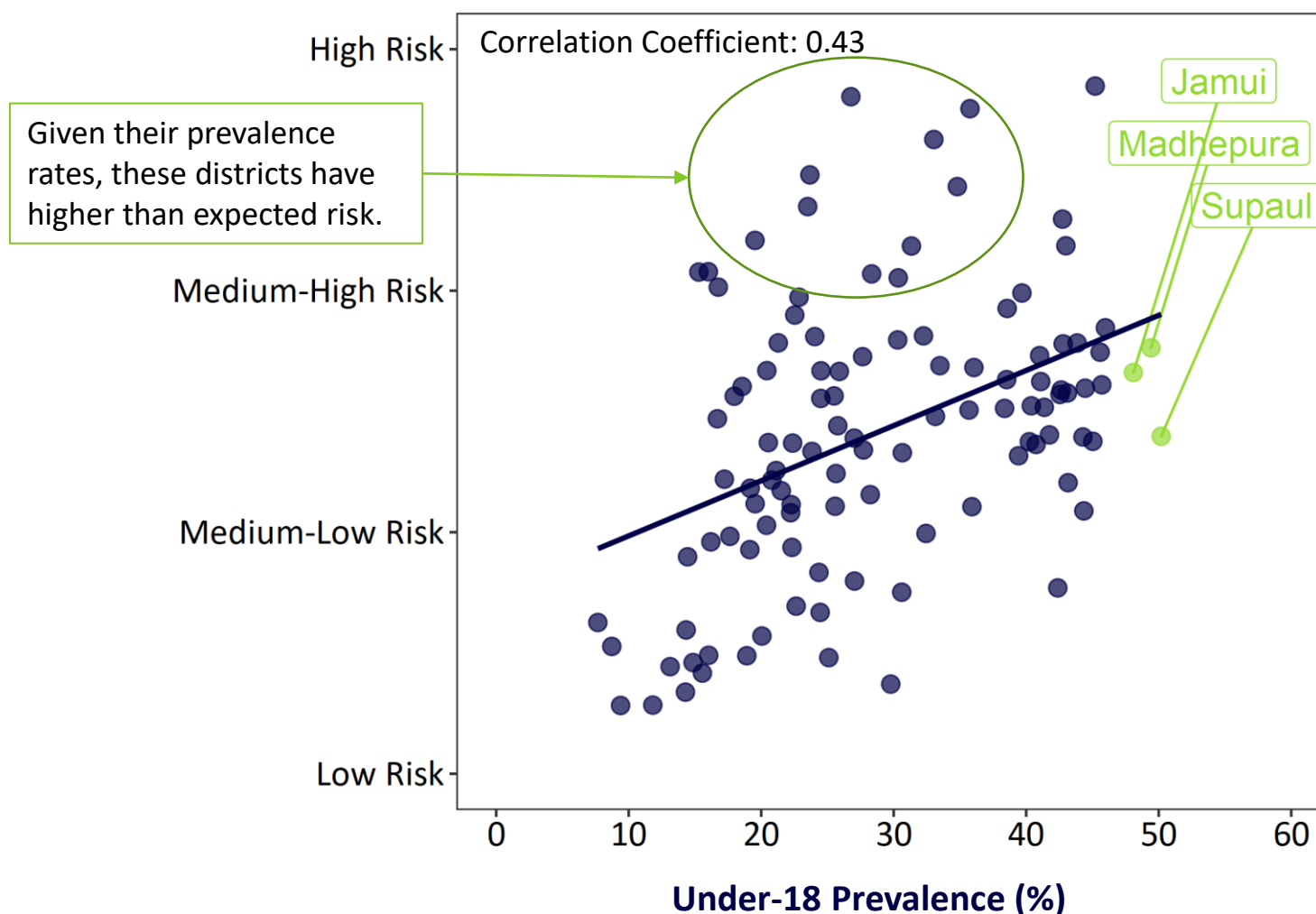Medium-Low Risk

Medium-High Risk

High Risk

Note 1: The map shows the classification of attitudes towards wife beating for each 1km[2] cell into quartiles. The attitudes towards wife beating risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. Attitudes towards wife beating is defined as belief that there is at least one reason that justifies wife beating. Please see slide 39 or the appendix for more details.
Source: Fraym, India DHS 2016, WorldPop 2020

fraym

Districts with high under-18 prevalence tend to have more inequitable attitudes on gender. However, districts with the most inequitable attitudes do not necessarily have the highest prevalence.

Average Attitudes towards Wife Beating Risk Category and Child Marriage Prevalence

Each dot represents a district.

Correlation Coefficient: 0.43

Given their prevalence rates, these districts have higher than expected risk.

Jamui

Madhepura

Supaul

High Risk

Medium-High Risk

Medium-Low Risk

Low Risk

Under-18 Prevalence (%)

Source: Fraym

42

Child marriage prevalence and women's participation in decision-making may not be related in Bihar and Uttar Pradesh.

1 Fraym examined the correlation between women's participation in decision-making and child marriage prevalence at the community level.

2 There is no relationship between communities with child marriage prevalence rates and women's participation in decision-making.

Indicator	Description	Correlation Coefficient with under-18 child marriage prevalence
Women's Participation in Decision Making[1]		
Woman's healthcare	Proportion of currently married women (aged 15-49) who make the decision about their healthcare alone or jointly with partner	-0.08
Large household purchases	Proportion of currently married women (aged 15-49) who make the decision about large household purchases alone or jointly with partner	-0.08
Visits to family	Proportion of currently married women (aged 15-49) who make the decision about visits to family alone or jointly with partner	-0.09
Husband's earnings	Proportion of currently married women (aged 15-49) who make the decision husband's earnings alone or jointly with partner	-0.09
No decisions	Proportion of currently married women (aged 15-49) who do not participate in any household decisions	0.10

Note 1: Women's participation in decision-making is defined as the woman reporting that she makes the decision on her own or jointly with her partner. Questions regarding decision making are only asked to currently married individuals. Currently married men were asked about decision making on their own healthcare and major household purchases, however these figures are excluded.
Source: Fraym, India DHS 2016

fraym

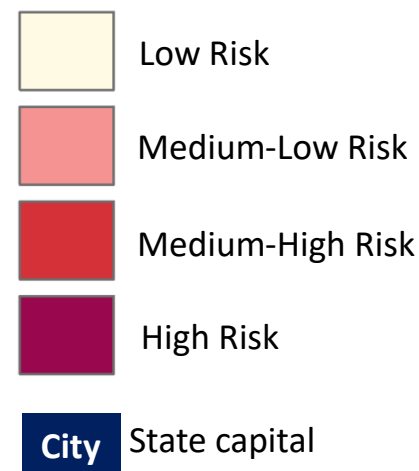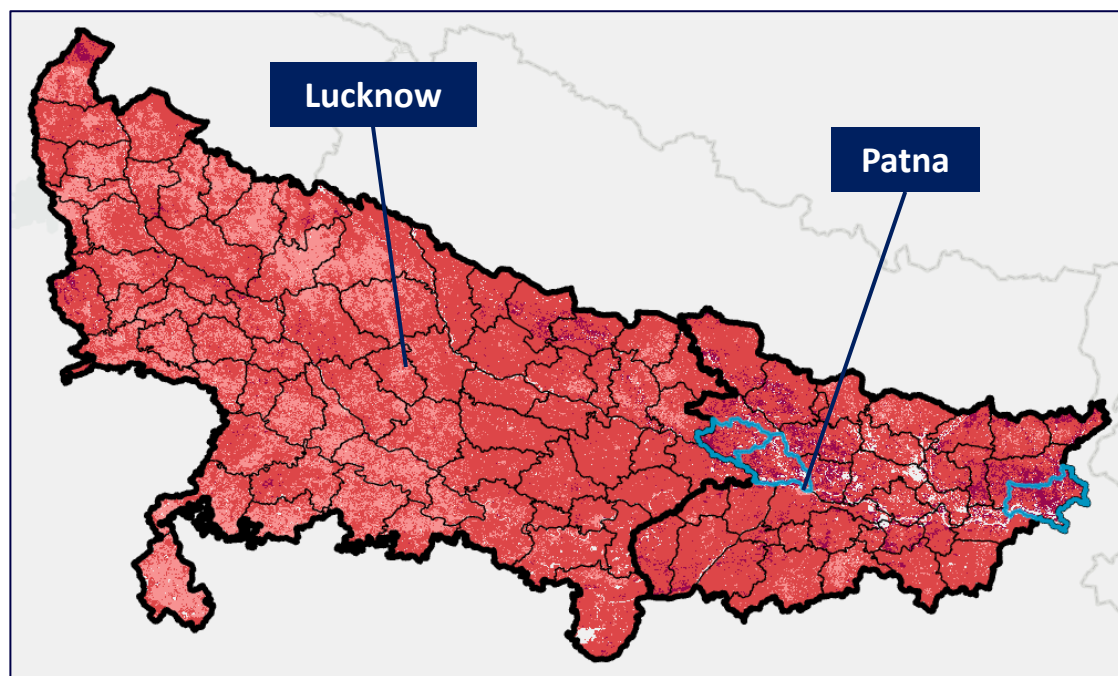# AT-RISK POPULATION || BEHAVIORS & CHILD MARRIAGE (RISK PROFILE CONSTRUCTION)

The decision-making risk profile captures the lack of women's participation in several major household decisions.

1. Fraym used **four indicators to assess women's participation in decision making in the household**: (i) woman's health care; (ii) large household purchases; (iii) visits to family; and (iv) husband's earnings.

2. Due to poor PCA results, Fraym modified the approach to the decision-making profile as compared to other countries that Fraym analyzed.

3. Fraym defined women's participation in decision-making as the **proportion of currently married women (aged 15-49) who report that they do not participate in any of these four major household decisions.**

4. Fraym **estimated the selected indicator at the community level and classified communities into quartiles with risk categories ranging from 1 to 4**. Communities with higher rates of women not participating in decision-making are categorized as a 4 ("high risk").

5. Finally, Fraym **estimated the number of at-risk girls** by calculating the total number of girls aged 10 to 14 who live in the communities where women's limited participation in household decision-making represents the highest risk for child marriage (categorized as 4) .

AT-RISK POPULATION || BEHAVIORS & CHILD MARRIAGE (RISK PROFILE MAPPING)

There are an estimated 1.5 million girls aged 10 to 14 who live in communities where women's limited participation in decision-making represents a high-risk factor for child marriage.

Women's Participation in Decision-Making Risk Category[1]

Lucknow

Patna

Legend:
- Low Risk
- Medium-Low Risk
- Medium-High Risk
- High Risk

City State capital

Population of at-risk girls due to women's lack of participation in decision-making, highlighted districts[2]

District	Population of at-risk girls (aged 10-14)
Katihar	104,400
Muzaffarpur	84,600
Purnia	82,800

Note 1: The map shows the classification of women's lack of participation in decision-making for each 1km[2] cell into quartiles. The risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. Please see slide 44 or the appendix for more details.

Note 2: At-risk girls are defined as girls aged 10-14 who live in communities with a women's participation in decision-making risk category equal to 4 (highest risk).

Source: Fraym, India DHS 2016, WorldPop 2020

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AT-RISK POPULATION || BEHAVIORS & CHILD MARRIAGE (RISK PROFILE MAPPING)

Communities classified as high risk based on women's limited participation in decision-making are most concentrated in Bihar. These communities also tend to have high child marriage prevalence rates.
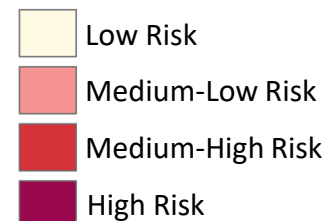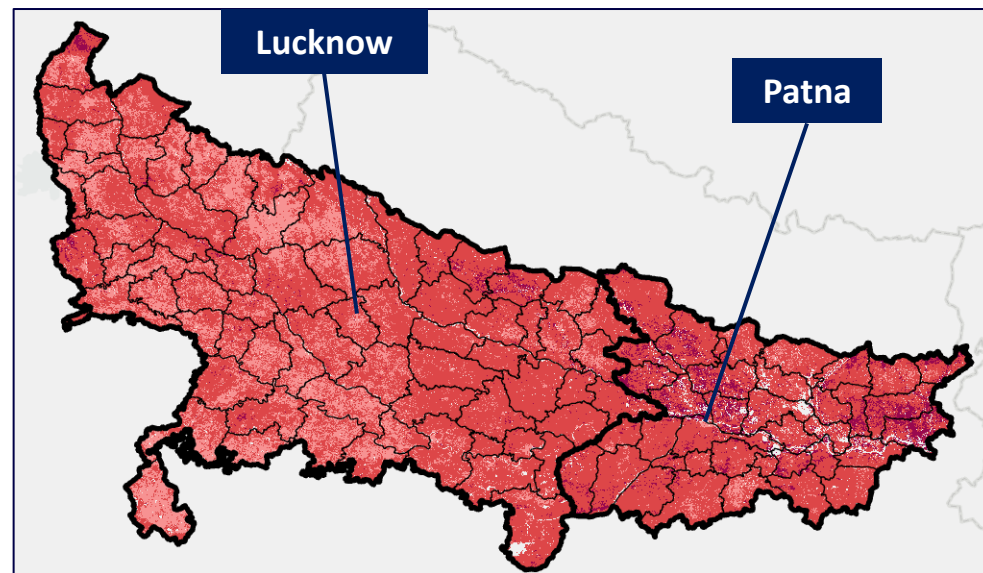
Child Marriage Prevalence
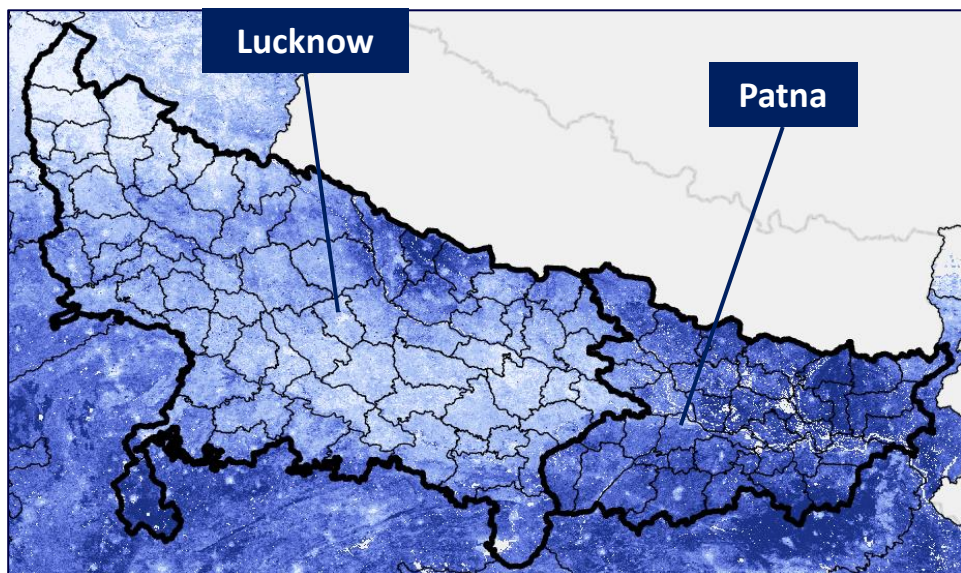
Women's Participation in Decision-Making Risk Category[1]

Percent of women (aged 20-24) who were married before 18

0%   65%+

City State capital

Low Risk

Medium-Low Risk

Medium-High Risk

High Risk

Note 1: The map shows the classification of women's participation in decision-making index for each 1km^2 cell into quartiles. The risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. Please see slide 44 or the appendix for more details.
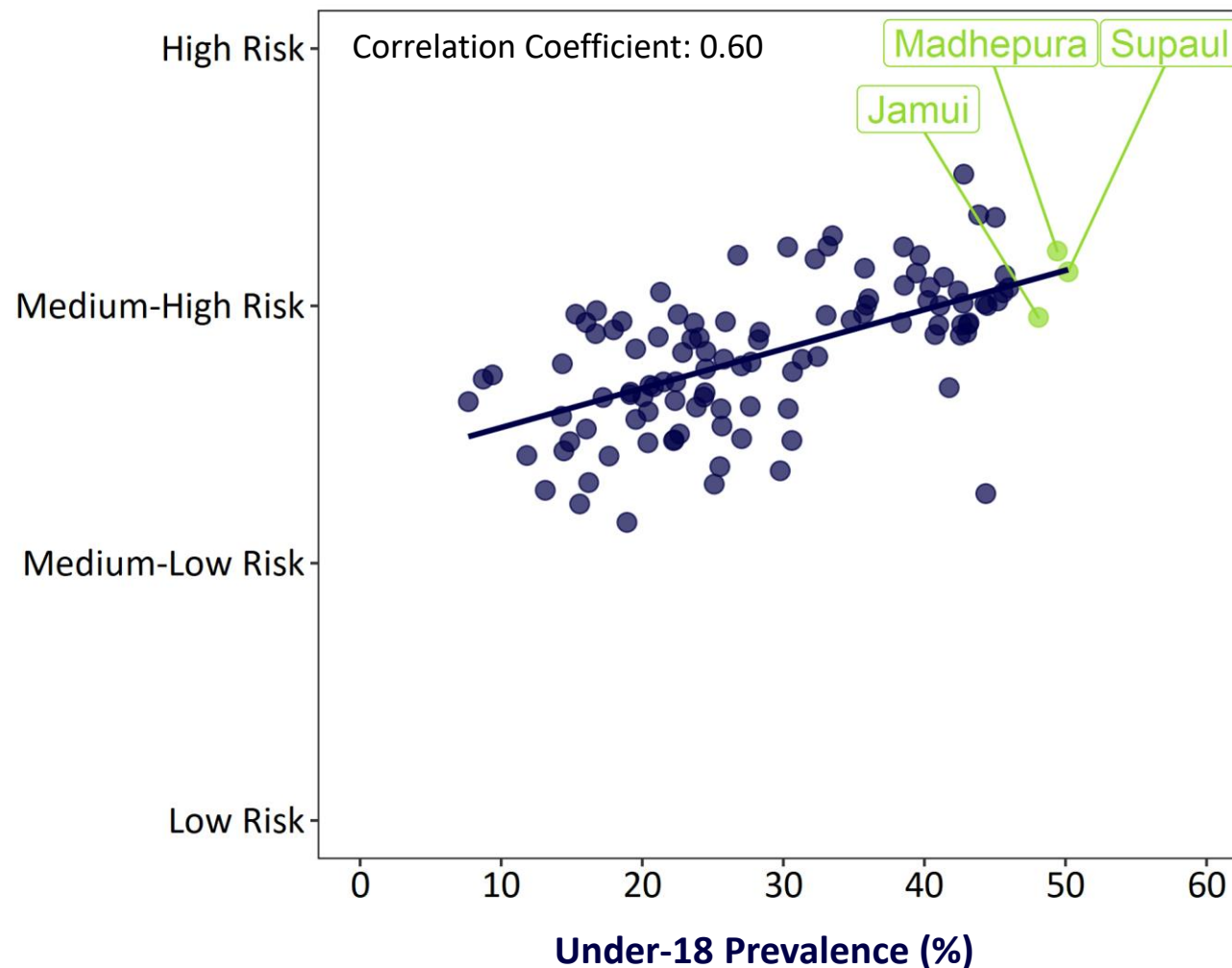**Source:** Fraym, India DHS 2016, WorldPop 2020

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AT-RISK POPULATION || BEHAVIORS & CHILD MARRIAGE (RISK PROFILE MAPPING)

Districts with higher child marriage prevalence tend to be classified as higher risk for child marriage due to women's lack of participation in decision-making.

Average Women's Lack of Participation in Decision-Making Risk Category and Child Marriage Prevalence

Each dot represents a district.

Correlation Coefficient: 0.60

Madhepura   Supaul

Jamui

Under-18 Prevalence (%)

Fraym combined each risk factor profile to assess total risk at the community level.

1. Total risk is the sum of all risk factor profiles that exhibit a relationship with child marriage prevalence, including poverty and gender equitable attitudes and behaviors. Each profile is equally weighted.

2. The total risk ranges on a 3 to 12 scale, with 12 indicating the highest level of risk. Communities with a score of 12 are classified as high risk on all profiles.

3. Communities in much of Bihar and northeastern Uttar Pradesh tend to be higher risk on all profiles.
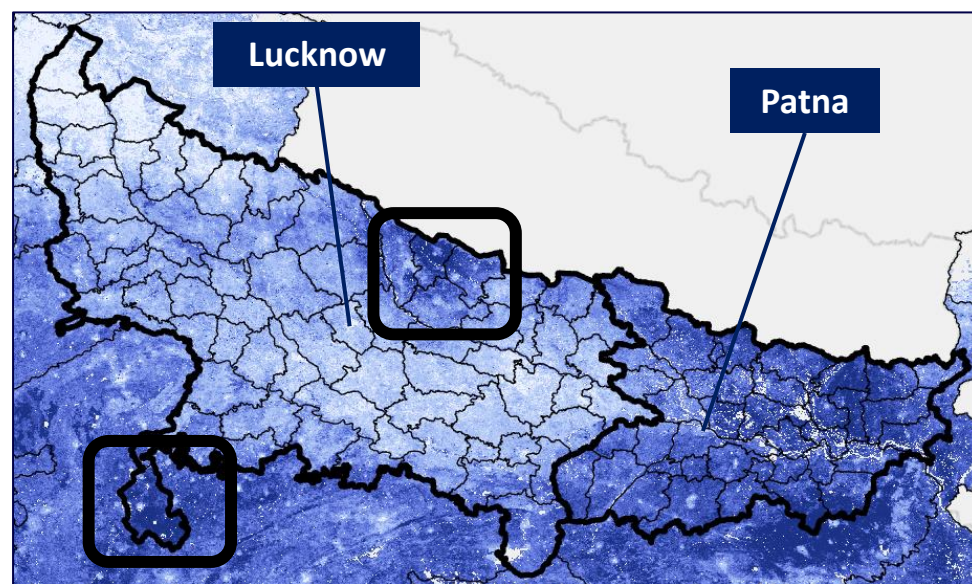
AT-RISK POPULATION || TOTAL RISK ACROSS ALL PROFILES

Many communities in Bihar exhibit high total risk levels and have high under-18 prevalence. In Uttar Pradesh, high-risk communities are concentrated in the northeast while high prevalence is concentrated in two areas in the north and south.

Total Risk
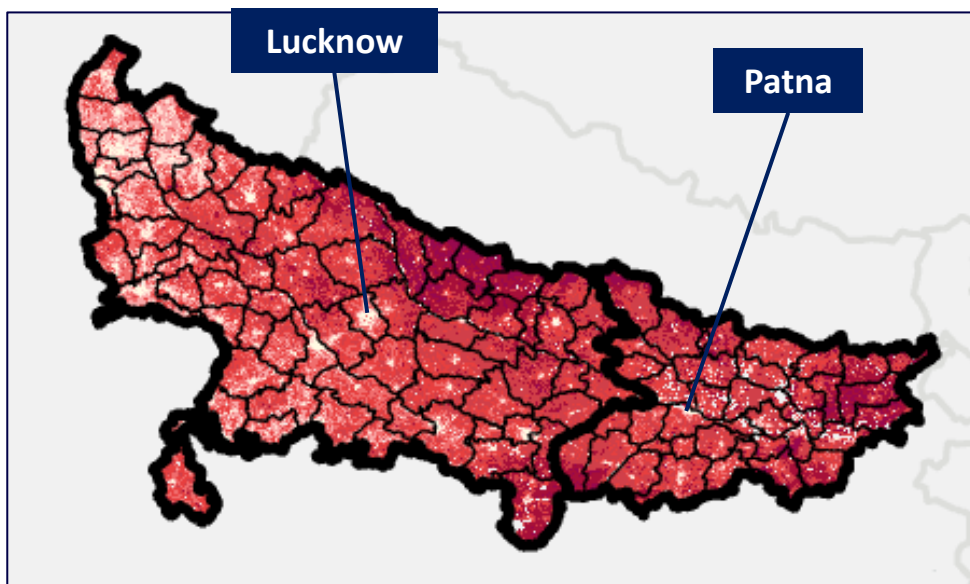
Lucknow

Patna

Total Risk

Low Risk — High Risk

City | State capital

Child Marriage Prevalence

Lucknow

Patna

Percent of women (aged 20-24) who were married before 18

0% — 65%+

Note 1: The total risk categories range on a 3 to 12 scale, with 12 indicating the highest level of risk. The index is the sum of poverty and gender equitable attitudes and decision-making, and equally weights each component.
Source: Fraym, India DHS 2016, WorldPop 2020

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AT-RISK POPULATION || KEY TAKEAWAYS

Poverty and gender inequitable attitudes and behaviors are the risk factors most strongly associated with child marriage, whereas pregnancy outside of marriage appears less critical.

1. **Pregnancy outside of marriage is largely non-existent in Bihar and Uttar Pradesh** and is thus unlikely to be a strong risk factor in child marriage.

2. **Communities with high poverty as defined by the index are concentrated in small pockets throughout Bihar and Uttar Pradesh**. There are an estimated 1.8 million girls aged 10 to 14 who live in these high-risk communities.

3. **Most communities in Bihar and northern Uttar Pradesh are classified as high risk on gender inequitable attitudes, whereas high-risk communities on women's participation in decision-making are scattered throughout northern Bihar.** There are an estimated 2.6 million girls aged 10 to 14 in communities where attitudes are a high risk and 1.5 million girls in communities where decision-making represents a high risk.

4. **In Bihar, most communities have high total risk and have a high under-18 prevalence rate**. In Uttar Pradesh, high prevalence communities are concentrated in a few districts, whereas high-risk communities are more widespread in the northeast.

# Hotspot
Analysis

HOTSPOT ANALYSIS || SECTION OVERVIEW

Bringing together the previous sections, Fraym identified two hotspots for child marriage within each state, or districts with particularly high prevalence and/or burden and high concentrations of risk factors for child marriage.

1 For both Bihar and Uttar Pradesh, there is little variation in under-18 prevalence rates among higher rate districts (top quintile). **As a result, Fraym triangulated prevalence, burden, and total population to identify hotspots of child marriage**. While selected districts may not have the highest prevalence rate in the state, the substantial under-18 burden warrants their inclusion as focus hotspots.

2 For each hotspot, Fraym zoomed into the district of interest and **summarized key indicators, assessed the population of at-risk girls for each risk factor, and mapped the presence of infrastructure** (e.g. roads and health centers). Infrastructure affects service delivery, which may have implications for child marriage.

3 Among the top five districts in Bihar with the highest under-18 prevalence, **Samastipur (Bihar) has the fifth largest under-18 prevalence rate (46 percent) and the highest under-18 burden (95,000 women).**

4 **Gaya (Bihar) has the second highest child marriage prevalence rate (41 percent) among Bihari districts where the population of women aged 20-24 is greater than 200,000.** The district has the third largest under-18 burden. Almost 10 times the number of girls live in communities in Gaya where poverty represents a high risk for child marriage compared with Samastipur.

5 **Two districts in Uttar Pradesh have both high child marriage burdens (over 100,000 girls) AND high child marriage prevalence rates (over 30 percent): Kheri and Gonda (Uttar Pradesh).** In both districts, female educational attainment also is among the lowest in Uttar Pradesh.

Among high prevalence districts, Samastipur has the highest child marriage burden.

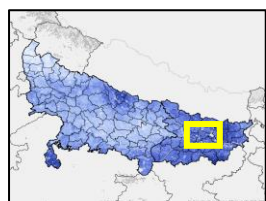**Nearly 1 of every 2 women (ages 20-24) in Samastipur was married before age 18**

Samastipur
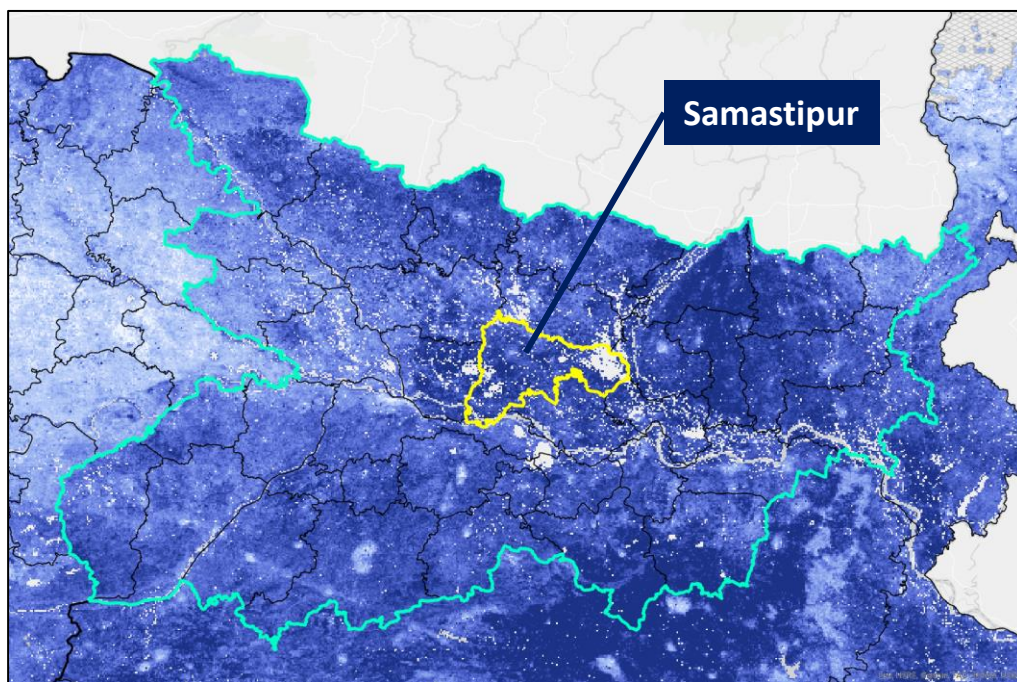
Percent of women (aged 20-24) who were married before 18

0%   65+%

City   District headquarters

Under 18 Prevalence

Key Indicators	
Under-18 Prevalence	46%
Under-18 Burden	95,100
Percent of women (aged 15-49) who are employed	15%
Percent of women (aged 18-49) who completed primary education or higher	40%
Percent of men (aged 18-49) who completed primary education or higher	64%
Percent of women (aged 15-24) who are sexually active and use a modern contraceptive method	2%
Percent of individuals in households with access to electricity	52%
Percent of individuals in households with a flush toilet	26%

Source: Fraym, India DHS 2016

HOTSPOT ANALYSIS || SAMASTIPUR DISTRICT, BIHAR (RISK PROFILE MAPPING)

In Samastipur, few girls live in communities categorized as very poor or within the high-risk category, indicating that poverty is an unlikely risk factor for child marriage.
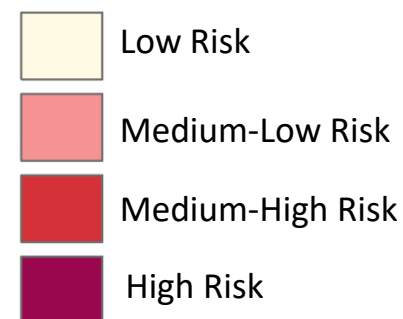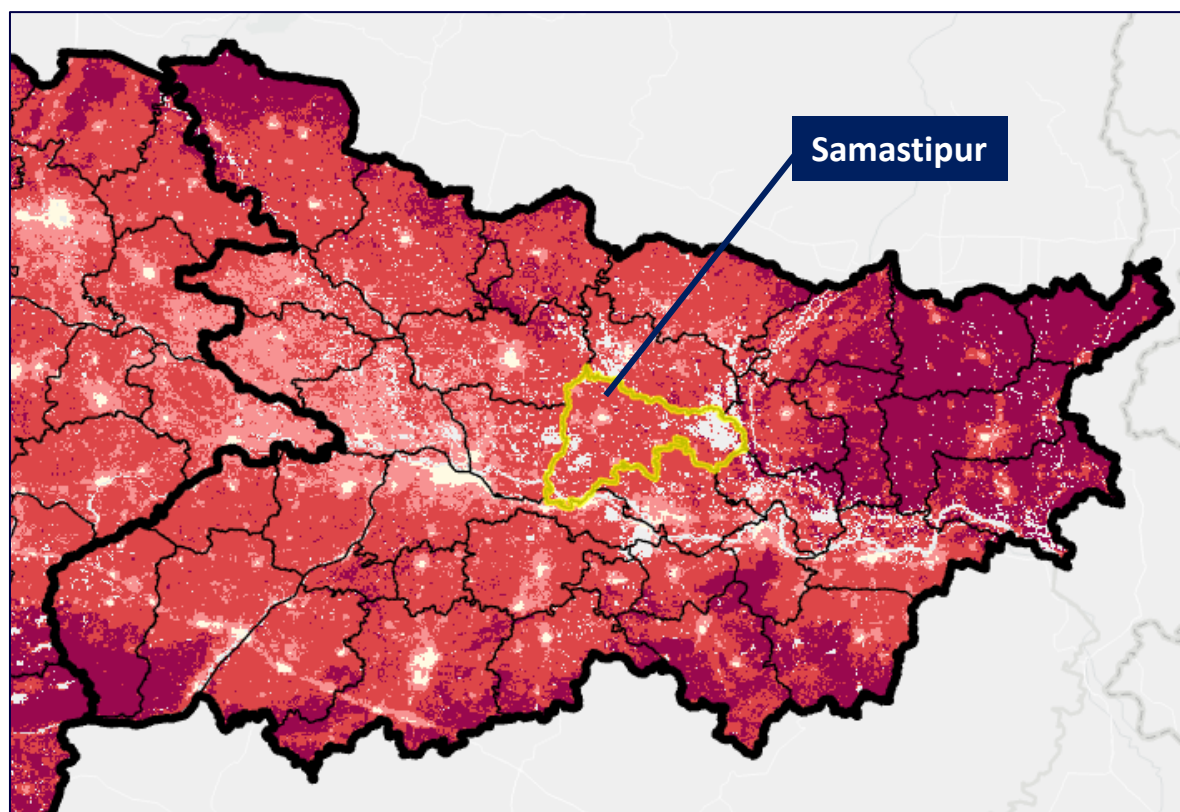
Poverty Index Risk Category[1]

Samastipur

Low Risk

Medium-Low Risk

Medium-High Risk

High Risk

City District headquarters

Population of at-risk girls (aged 10-14) due to poverty as a factor[2]	5,200

Note 1: The map shows the classification of the poverty index for each 1km² cell into quartiles. The poverty index risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. See slide 34 or the appendix for more details.
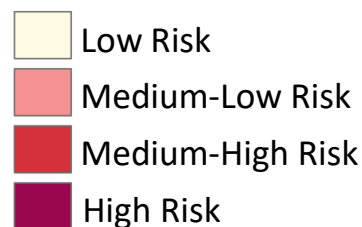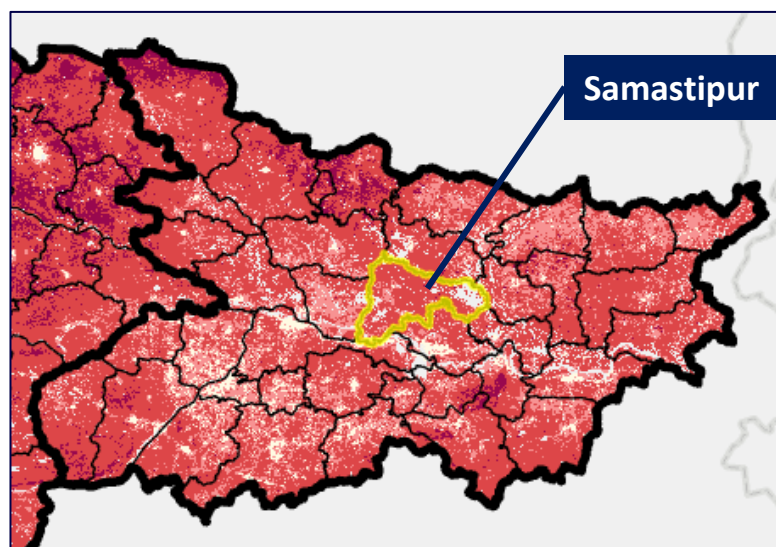**Note 2:** At-risk girls are defined as girls at risk for child marriage, that is girls aged 10-14 who live in communities with a poverty index risk category equal to 4 (highest risk).
Source: Fraym, India DHS 2016, WorldPop 2020

Few communities in Samastipur are classified as high risk due to gender inequitable attitudes towards wife beating and limited women's participation in decision-making.
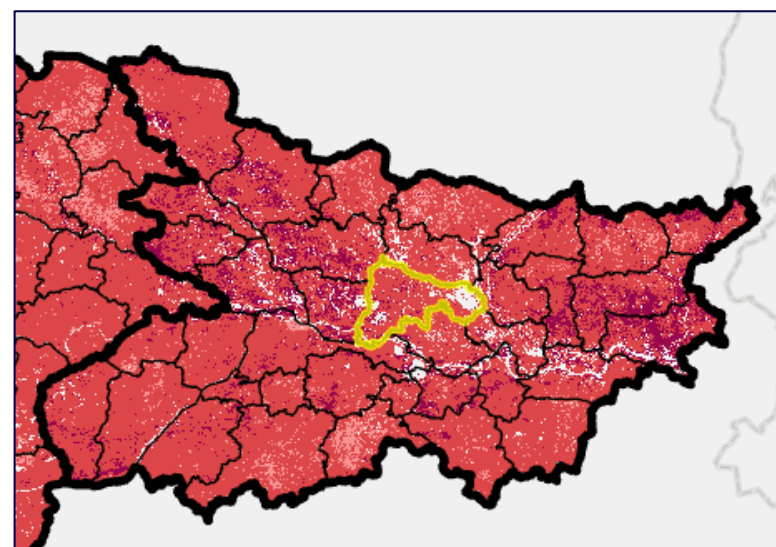
Attitudes Towards Wife Beating Risk Category[1]

Women's Lack of Participation in Decision-Making Risk Category[2]

Samastipur

Low Risk

Medium-Low Risk

Medium-High Risk

High Risk

City District headquarters

Population of at-risk girls (aged 10-14) due to <u>attitudes</u> as a factor[3]	1,300

Population of at-risk girls (aged 10-14) due to <u>decision-making</u> as a factor[3]	25,200

Note 1: The map shows the classification of attitudes towards wife beating for each 1km² cell into quartiles. The attitudes towards wife beating risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. Attitudes towards wife beating is defined as belief that there is at least one reason that justifies wife beating. Please see slide 39 or the appendix for more details.

Note 2: The map shows the classification of women's participation in decision-making index for each 1km² cell into quartiles. The risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. Please see slide 44 or the appendix for more details.

Note 3: At-risk girls are defined as girls at risk for child marriage, that is girls aged 10-14 who live in communities with an attitudes towards wife beating risk category or limited decision-making risk category equal to 4 (highest risk).

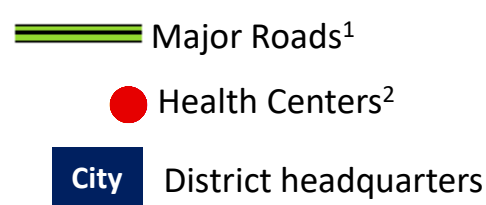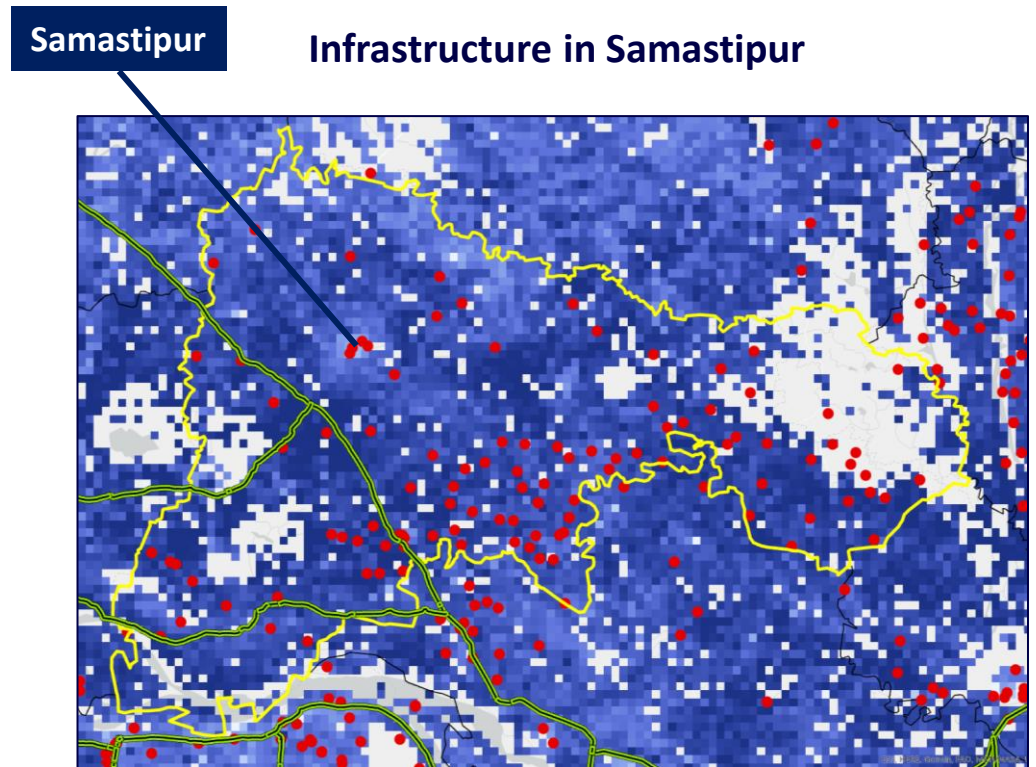**Source:** Fraym, India DHS 2016, WorldPop 2020

fraym

55

Infrastructure affects service delivery, which may have implications for child marriage. Most communities in Samastipur have limited major transportation infrastructure; health center coverage is slightly below the state average.

Samastipur

Infrastructure in Samastipur

1. Most communities live far from the district's major highways, including some high prevalence areas in the central part of the district. Disconnected communities may have negative implications for child marriage.

2. There are roughly 8 public health centers per 100,000 people, which is slightly below the state rate (11 per 100,000 people). There are more health centers in the southern part of the district and in the district capital.

━━ Major Roads[1]

● Health Centers[2]

City District headquarters

Percent of women (aged 20-24) who were married before 18

0%   65+%

Note 1: Major roads include motorways, and trunk roads, which are the most important roads in a country's road network.
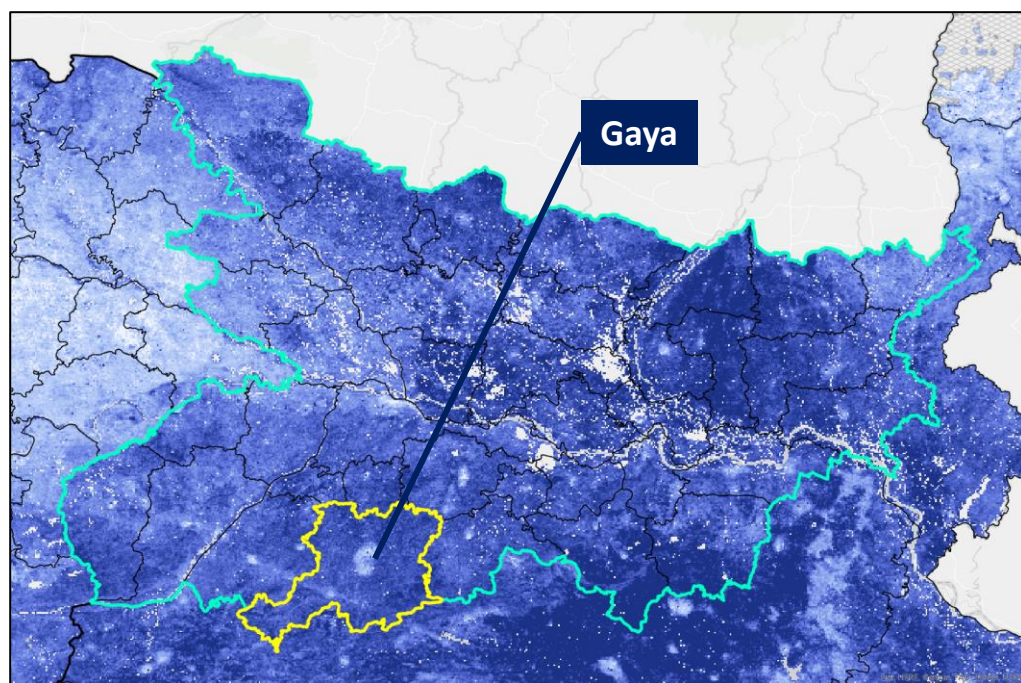**Note 2:** Public health centers come from the Government of India Open Data Portal.
Source: Fraym, India DHS 2016, OpenStreetMaps

fraym

56

Gaya has a child marriage prevalence rate slightly over 40% and the second highest child marriage burden of districts in Bihar.

About 2 out of every 5 women (ages 20-24) in Gaya were married before age 18
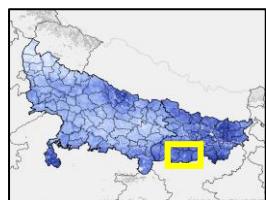

Percent of women (aged 20-24) who were married before 18

0%   65+%

*Under 18 Prevalence*

City District headquarters

Key Indicators	
Under-18 Prevalence	41%
Under-18 Burden	84,400
Percent of women (aged 15-49) who are employed	19%
Percent of women (aged 18-49) who completed primary education or higher	46%
Percent of men (aged 18-49) who completed primary education or higher	73%
Percent of women (aged 15-24) who are sexually active and use a modern contraceptive method	4%
Percent of individuals in households with access to electricity	66%
Percent of individuals in households with a flush toilet	31%

Source: Fraym, India DHS 2016

In Gaya, many communities in the South are categorized as very poor or within the high-risk category.

Poverty Index Risk Category[1]

Low Risk

Medium-Low Risk

Medium-High Risk

High Risk
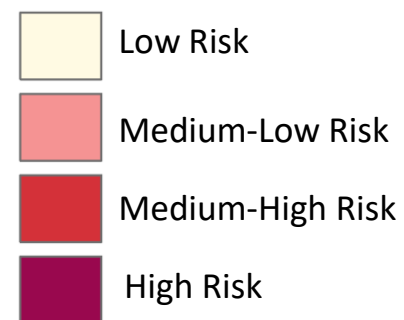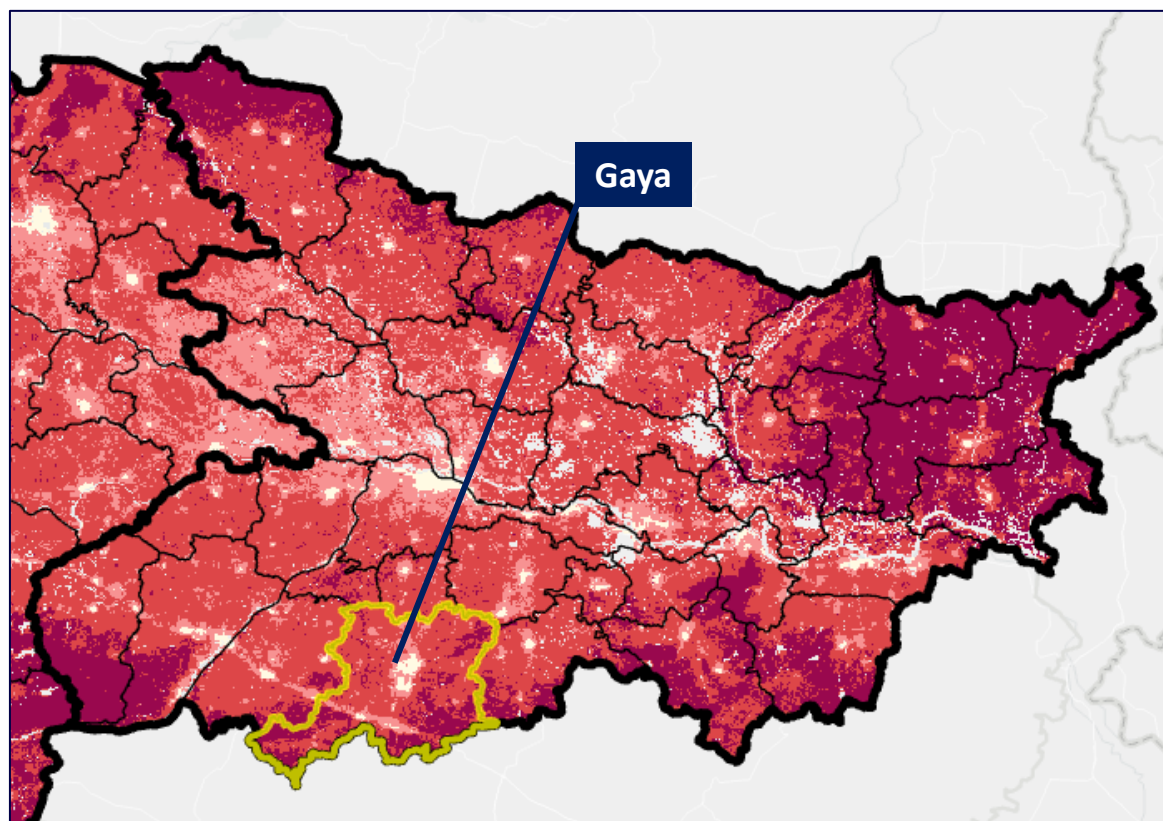
City District headquarters

Population of at-risk girls (aged 10-14) due to poverty as a factor[2] | 43,400

Note 1: The map shows the classification of the poverty index for each 1km^2 cell into quartiles. The poverty index risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. See slide 34 or the appendix for more details.

Note 2: At-risk girls are defined as girls at risk for child marriage, that is girls aged 10-14 who live in communities with a poverty index risk category equal to 4 (highest risk).

Source: Fraym, India DHS 2016, WorldPop 2020

fraym

# HOTSPOT ANALYSIS || GAYA DISTRICT, BIHAR (RISK PROFILE MAPPING)

In Gaya, most communities are classified as medium-low risk for child marriage due to limited women's participation in decision-making and gender inequitable attitudes.

Attitudes Towards Wife Beating Risk Category[1]
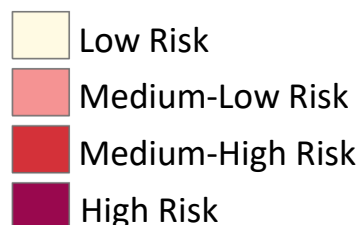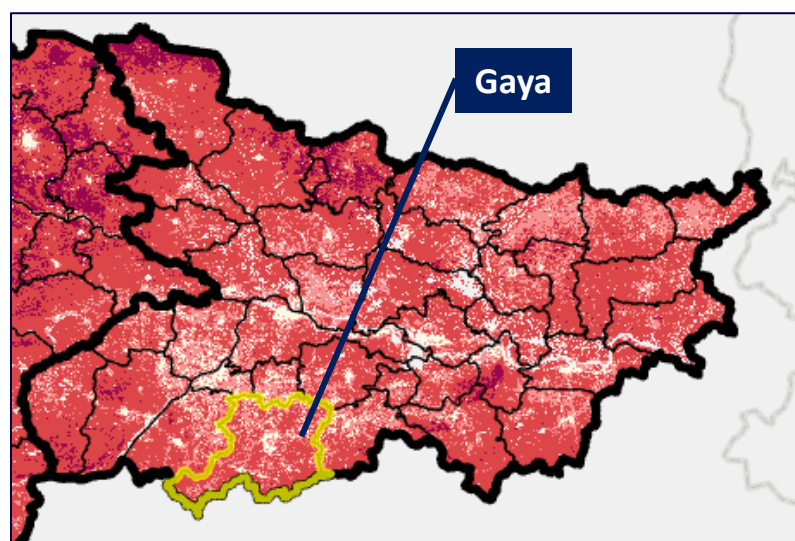
Gaya

Women's Lack of Participation in Decision-Making Risk Category[2]

Low Risk
Medium-Low Risk
Medium-High Risk
High Risk

City District headquarters
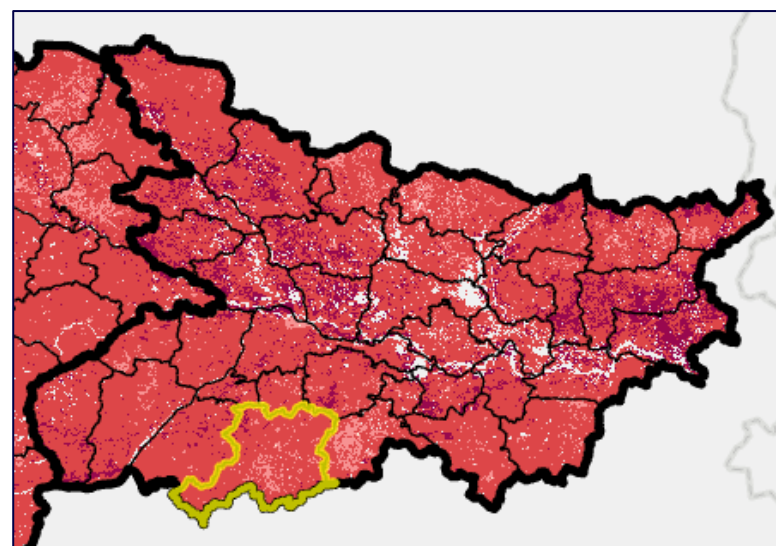
Population of at-risk girls (aged 10-14) due to __attitudes__ as a factor[3]	250

Population of at-risk girls (aged 10-14) due to __decision-making__ as a factor[3]	3,300

Note 1: The map shows the classification of attitudes towards wife beating for each 1km[2] cell into quartiles. The attitudes towards wife beating risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. Attitudes towards wife beating is defined as belief that there is at least one reason that justifies wife beating. Please see slide 39 or the appendix for more details.

Note 2: The map shows the classification of women's participation in decision-making for each 1km[2] cell into quartiles. The risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. Please see slide 44 or the appendix for more details.

Note 3: At-risk girls are defined as girls at risk for child marriage, that is girls aged 10-14 who live in communities with an attitudes towards wife beating risk category or limited decision-making risk category equal to 4 (highest risk).

Source: Fraym, India DHS 2016, WorldPop 2020

fraym

Most communities in Gaya have limited major transportation infrastructure. Health center coverage is slightly above the state average.

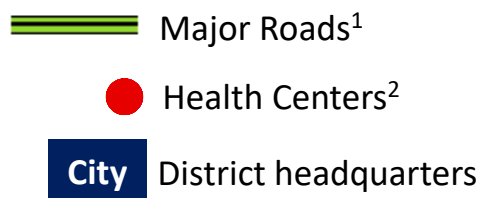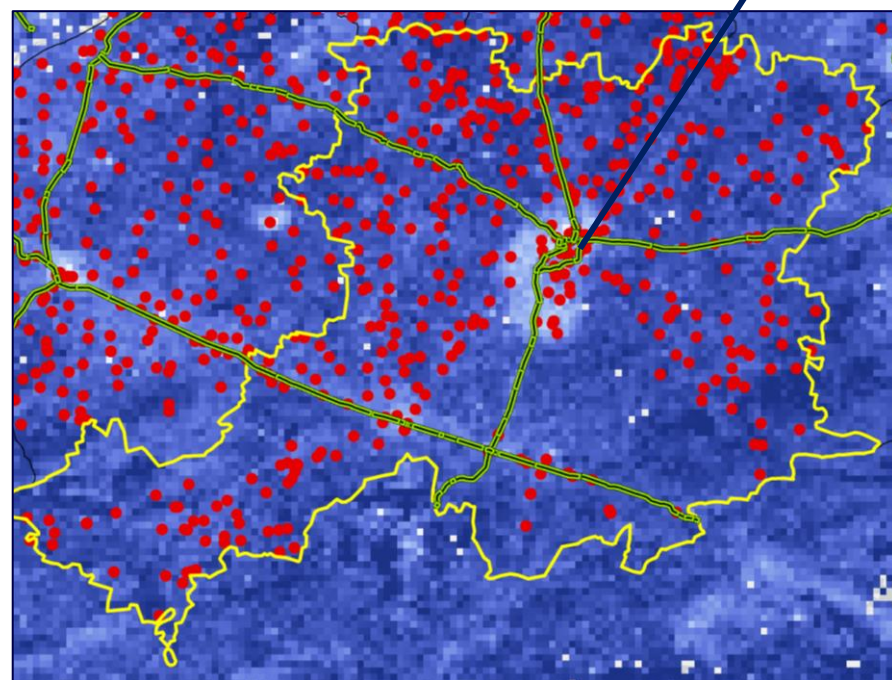**Infrastructure in Gaya**

Gaya

1 Most communities lie far from major highways, which may impede access to critical health services. High prevalence areas in the southeastern part of the district are disconnected and have fewer health centers.

2 There are roughly 11 public health centers per 100,000 people, which is on par with the state rate (11 per 100,000 people). Health centers are evenly distributed, apart from the central southern area of the district.

Major Roads[1]

● Health Centers[2]

City District headquarters

Percent of women (aged 20-24) who were married before 18

0%   65+%

**Note 1:** Major roads include motorways, and trunk roads, which are the most important roads in a country's road network.
Note 2: Public health centers come from the Government of India Open Data Portal.
Source: Fraym, India DHS 2016, WHO, OpenStreetMaps

fraym

60

Kheri has the highest child marriage burden amongst the ten districts in Uttar Pradesh with the highest child marriage prevalence rates.

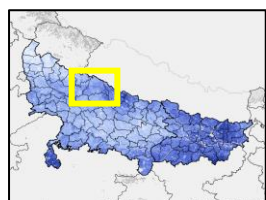**Nearly 1 out of every 3 women (ages 20-24) in Kheri were married before age 18**
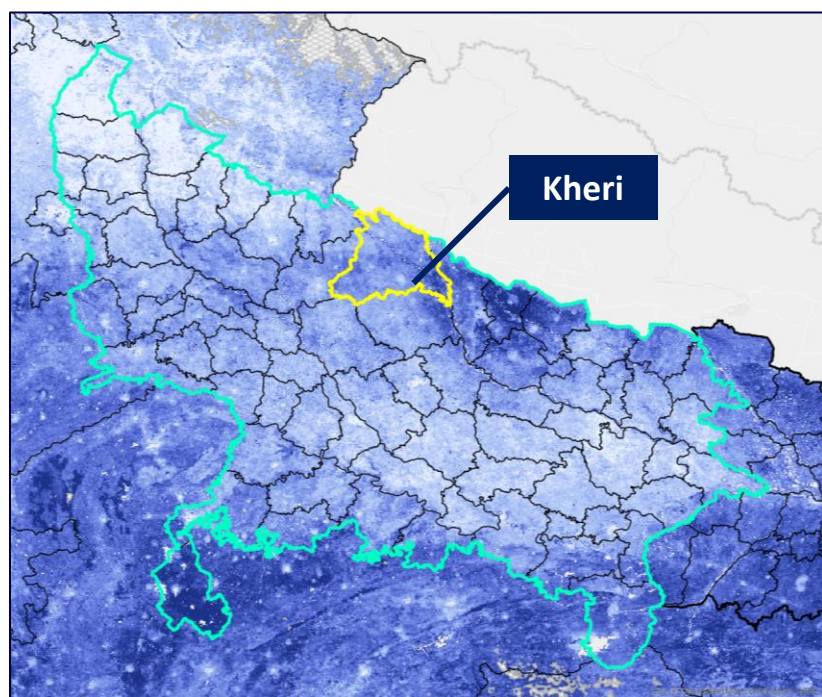
Kheri

Percent of women (aged 20-24) who were married before 18

0%   65+%

Under 18 Prevalence

City   District headquarters

Key Indicators	
Under-18 Prevalence	30%
Under-18 Burden	53,000
Percent of women (aged 15-49) who are employed	18%
Percent of women (aged 18-49) who completed primary education or higher	45%
Percent of men (aged 18-49) who completed primary education or higher	69%
Percent of women (aged 15-24) who are sexually active and use a modern contraceptive method	3%
Percent of individuals in households with access to electricity	46%
Percent of individuals in households with a flush toilet	30%

Source: Fraym, India DHS 2016

HOTSPOT ANALYSIS || KHERI DISTRICT, UTTAR PRADESH (RISK PROFILE MAPPING)

In Kheri, communities in the northwest are categorized as very poor or within the high-risk category, indicating that poverty is a risk factor for child marriage.
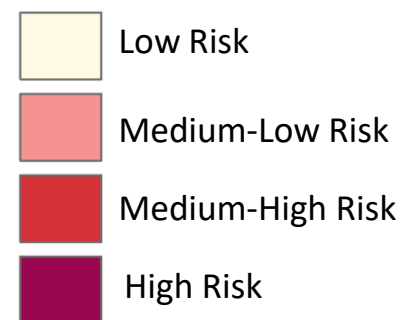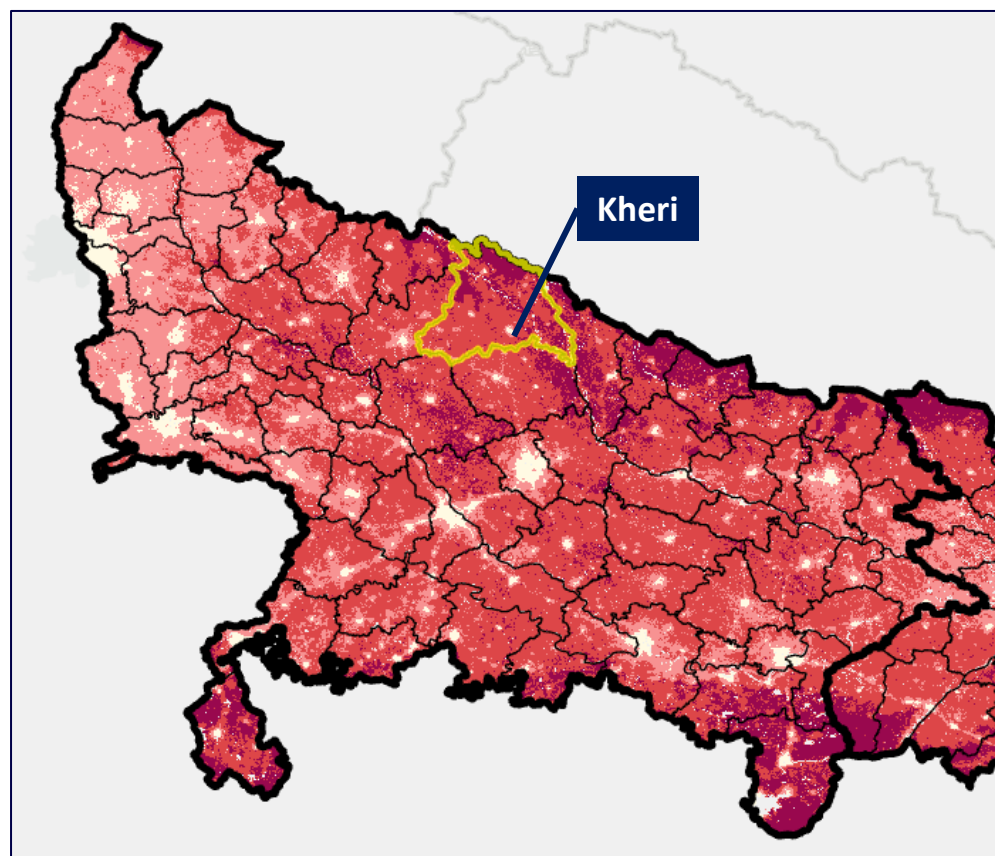
Poverty Index Risk Category[1]

Low Risk

Medium-Low Risk

Medium-High Risk

High Risk

City District headquarters

Population of at-risk girls (aged 10-14) due to poverty as a factor[2] | 44,300

Note 1: The map shows the classification of the poverty index for each 1km² cell into quartiles. The poverty index risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. See slide 34 or the appendix for more details.

Note 2: At-risk girls are defined as girls at risk for child marriage, that is girls aged 10-14 who live in communities with a poverty index risk category equal to 4 (highest risk).

Source: Fraym, India DHS 2016, WorldPop 2020

# HOTSPOT ANALYSIS || KHERI DISTRICT, UTTAR PRADESH (RISK PROFILE MAPPING)

Many communities in Kheri are categorized as high risk for child marriage due to gender inequitable attitudes, whereas there are very few communities that fell within the high risk category for women's participation in decision-making.
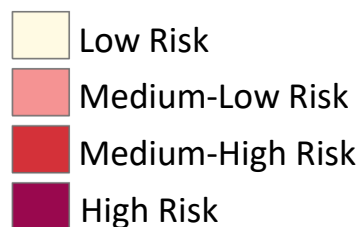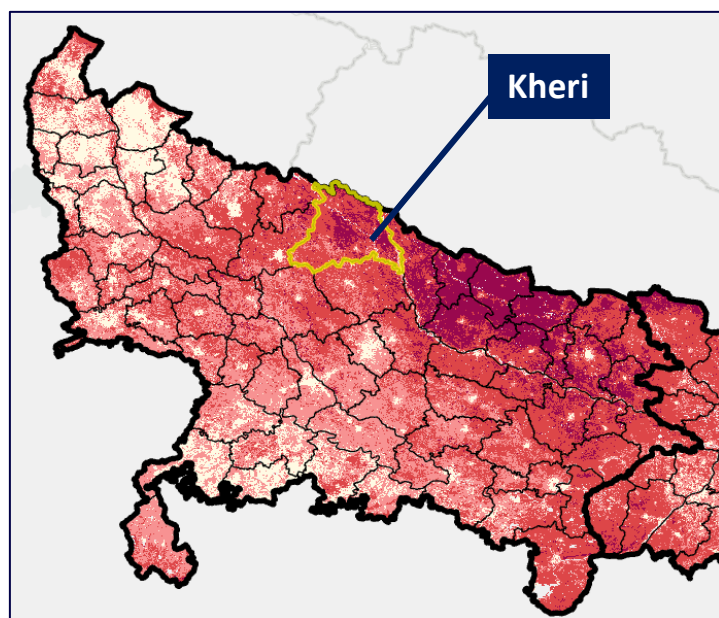
Attitudes Towards Wife Beating Risk Category[1]

Kheri

Women's Limited Participation in Decision-Making Risk Category[2]

Low Risk
Medium-Low Risk
Medium-High Risk
High Risk

City — District headquarters
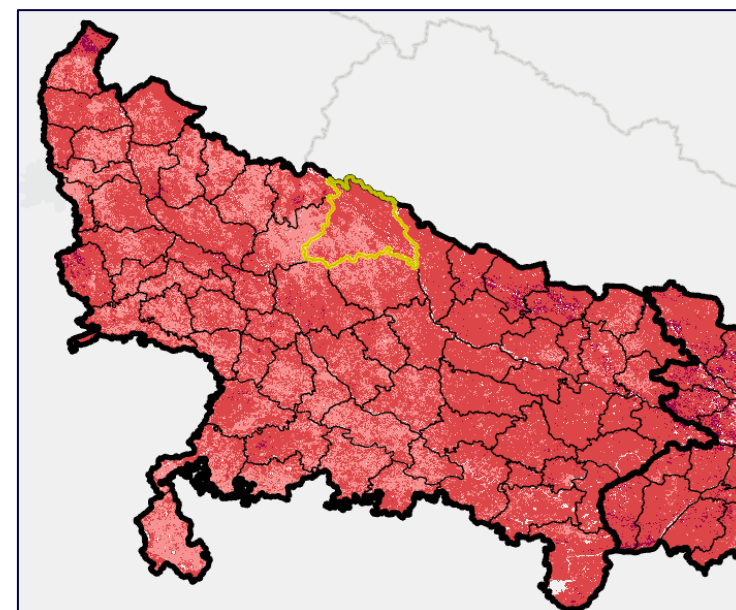
Population of at-risk girls (aged 10-14) due to attitudes as a factor[3]	60,300

Population of at-risk girls (aged 10-14) due to decision-making as a factor[3]	170

Note 1: The map shows the classification of attitudes towards wife beating for each 1km² cell into quartiles. The attitudes towards wife beating risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. Attitudes towards wife beating is defined as belief that there is at least one reason that justifies wife beating. Please see slide 39 or the appendix for more details.

Note 2: The map shows the classification of women's participation in decision-making for each 1km² cell into quartiles. The risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. Please see slide 44 or the appendix for more details.

Note 3: At-risk girls are defined as girls at risk for child marriage, that is girls aged 10-14 who live in communities with an attitudes towards wife beating risk category or limited decision-making risk category equal to 4 (highest risk).

Source: Fraym, India DHS 2016, WorldPop 2020

Most communities in Kheri have limited major transportation infrastructure while health center coverage is on par with the state average.

Infrastructure in Kheri

1. National Highway 730 cuts through the southern half of the district and is one of the few major roads in the area.

2. There are roughly 12 public health centers per 100,000 people, which is about the same as the state-wide rate (12 per 100,000 people). Health centers are evenly distributed throughout the region, apart from a small area in the north.
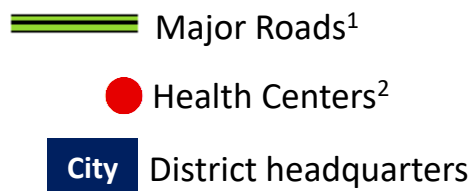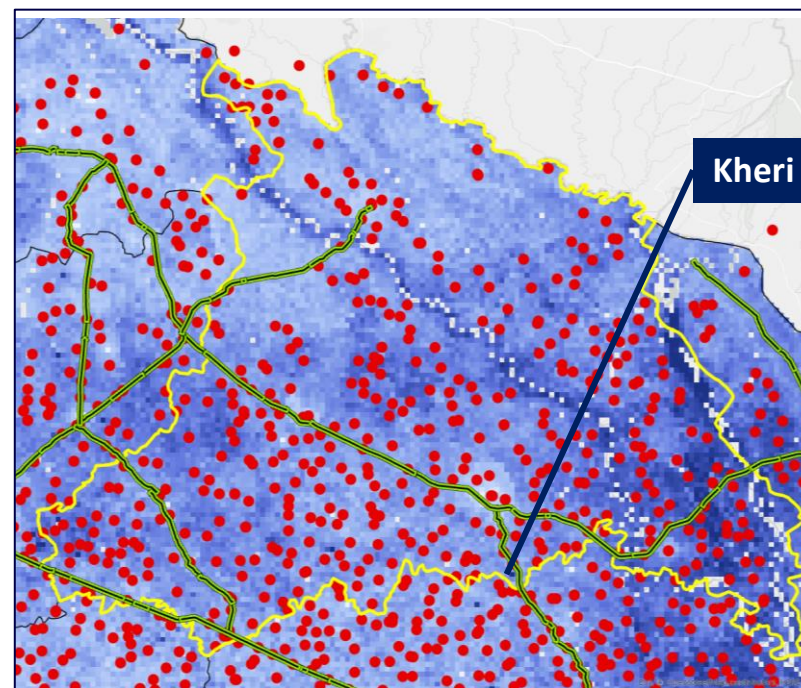
Major Roads[1]

Health Centers[2]

City District headquarters

Percent of women (aged 20-24) who were married before 18

0%   65+%

Note 1: Major roads include motorways, and trunk roads, which are the most important roads in a country's road network.
Note 2: Public health centers come from the Government of India Open Data Portal.
Source: Fraym, India DHS 2016, WHO, OpenStreetMaps

fraym

Gonda has the second highest child marriage burden amongst the ten districts in Uttar Pradesh with the highest child marriage prevalence rates.

About 1 out of every 3 women (ages 20-24) in Gonda were married before age 18
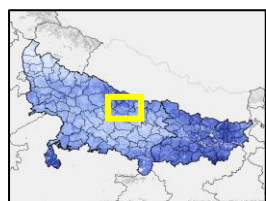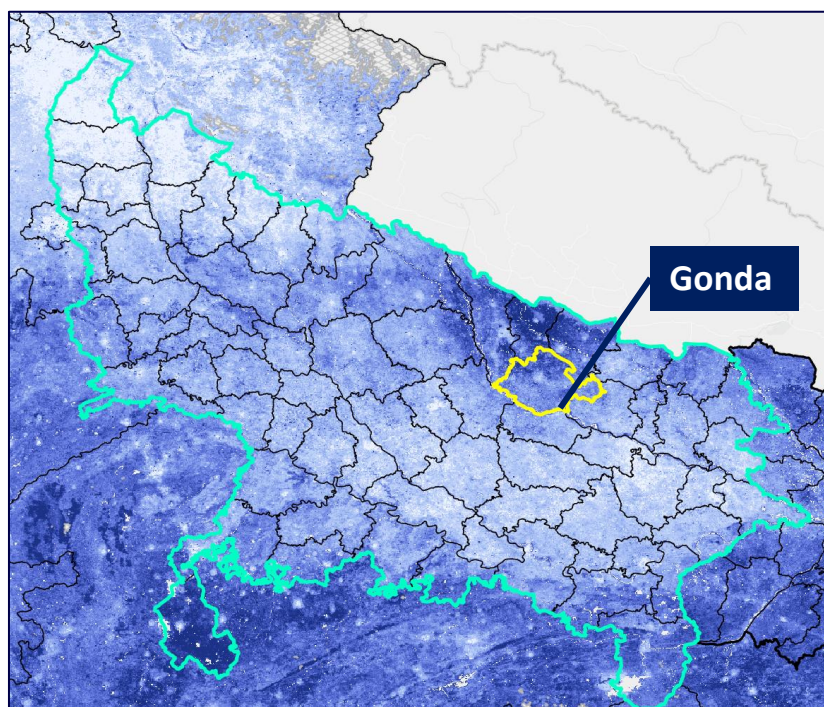
Gonda

Percent of women (aged 20-24) who were married before 18

Under 18 Prevalence

0%   65+%

City   District headquarters

Key Indicators	
Under-18 Prevalence	33%
Under-18 Burden	52,000
Percent of women (aged 15-49) who are employed	19%
Percent of women (aged 18-49) who completed primary education or higher	46%
Percent of men (aged 18-49) who completed primary education or higher	69%
Percent of women (aged 15-24) who are sexually active and use a modern contraceptive method	2%
Percent of individuals in households with access to electricity	49%
Percent of individuals in households with a flush toilet	18%

Source: Fraym, India DHS 2016

HOTSPOT ANALYSIS || GONDA DISTRICT, UTTAR PRADESH (RISK PROFILE MAPPING)

In Gonda, only a few communities are categorized as very poor or within the high-risk category.
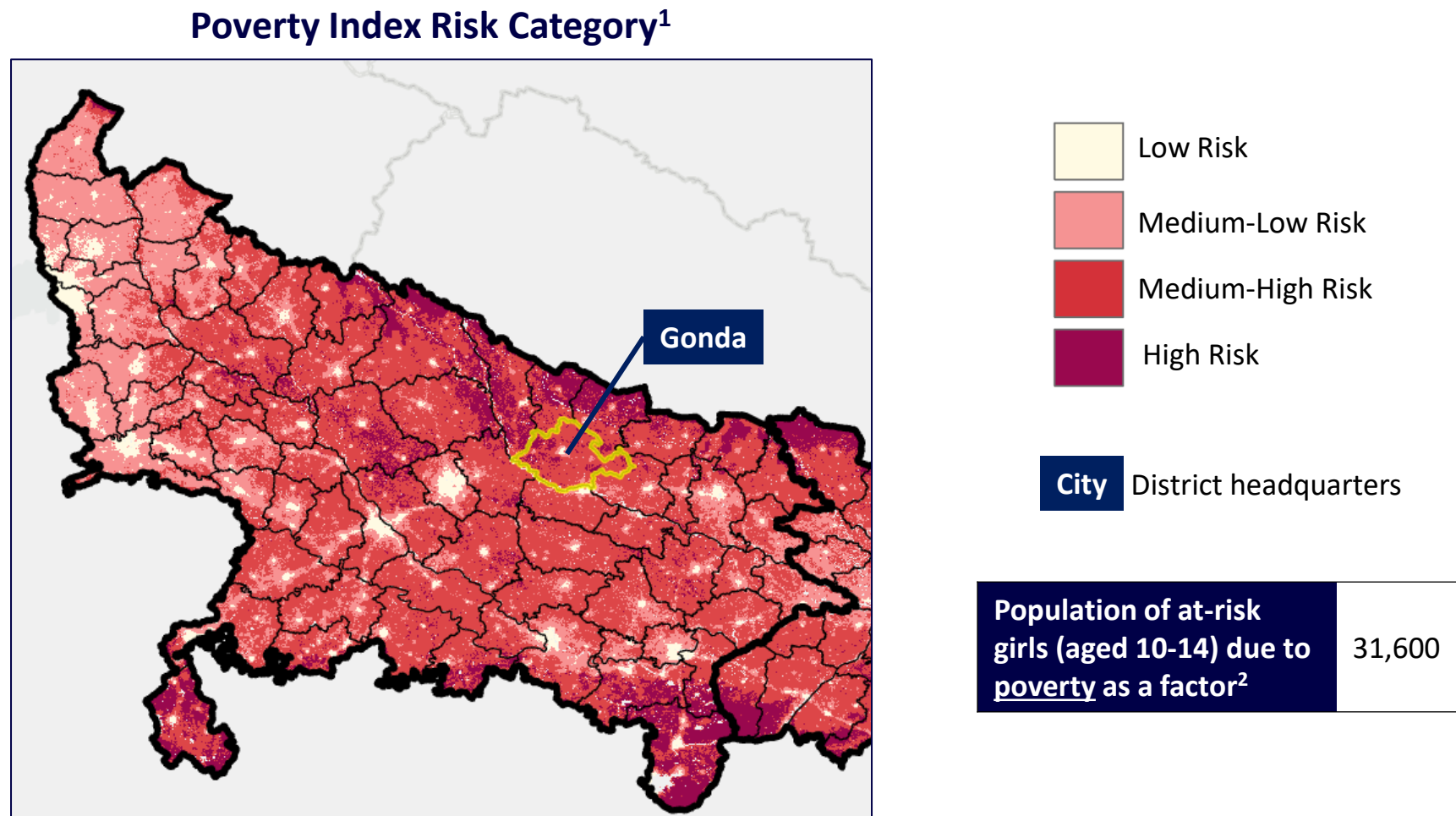
Poverty Index Risk Category[1]

Low Risk

Medium-Low Risk

Medium-High Risk

High Risk

City District headquarters

Population of at-risk girls (aged 10-14) due to poverty as a factor[2]	31,600

Note 1: The map shows the classification of the poverty index for each 1km² cell into quartiles. The poverty index risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. See slide 34 or the appendix for more details.
Note 2: At-risk girls are defined as girls at risk for child marriage, that is girls aged 10-14 who live in communities with a poverty index risk category equal to 4 (highest risk).
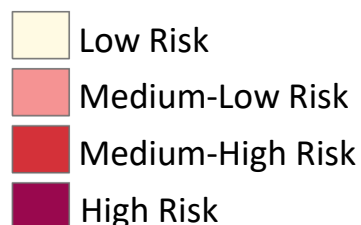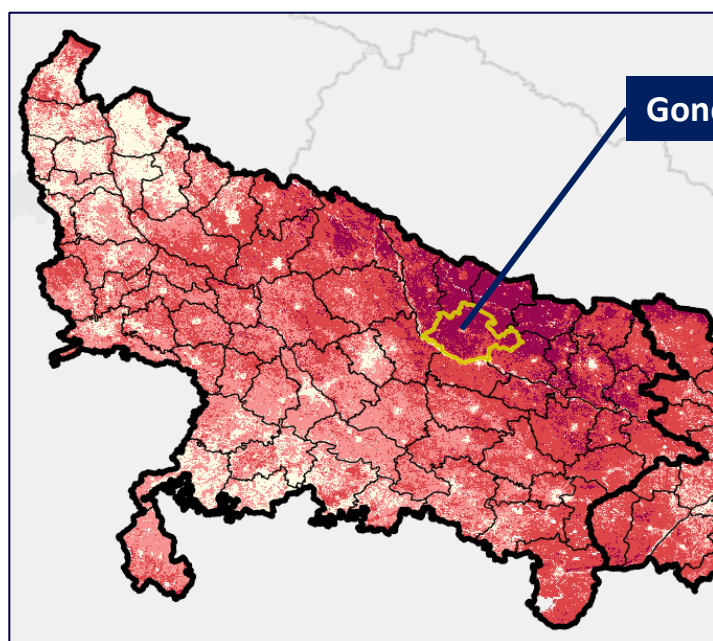**Source:** Fraym, India DHS 2016, WorldPop 2020

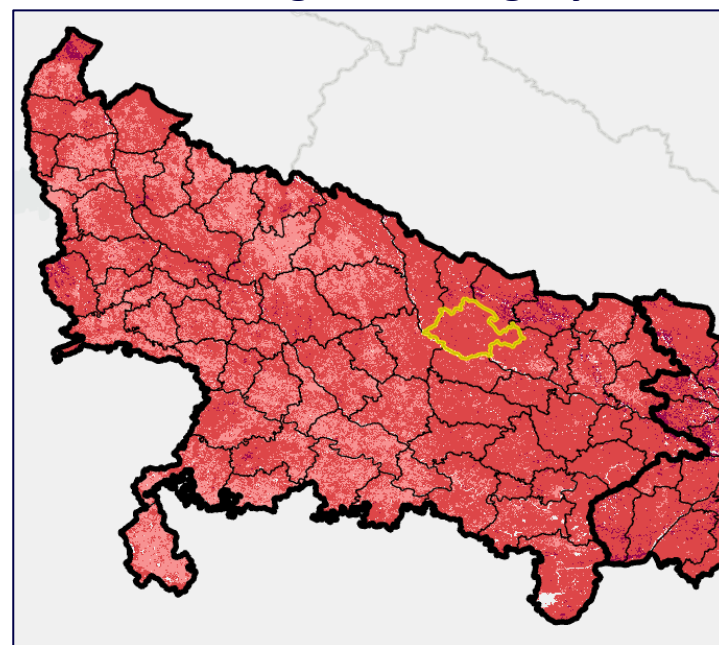# HOTSPOT ANALYSIS || GONDA DISTRICT, UTTAR PRADESH (RISK PROFILE MAPPING)

Most communities in Gonda are categorized as high risk on attitudes towards wife beating. Very few communities are high risk on women's participation in decision-making.

Attitudes Towards Wife Beating Risk Category[1]

Gonda

Low Risk
Medium-Low Risk
Medium-High Risk
High Risk

City — District headquarters

Population of at-risk girls (aged 10-14) due to attitudes as a factor[3]	148,700

Women's Participation in Decision-Making Risk Category[2]

Population of at-risk girls (aged 10-14) due to decision-making as a factor[3]	2,200

Note 1: The map shows the classification of attitudes towards wife beating for each 1km^2 cell into quartiles. The attitudes towards wife beating risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. Attitudes towards wife beating is defined as belief that there is at least one reason that justifies wife beating. Please see slide 39 or the appendix for more details.

Note 2: The map shows the classification of women's participation in decision-making for each 1km^2 cell into quartiles. The risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. Please see slide 44 or the appendix for more details.

Note 3: At-risk girls are defined as girls at risk for child marriage, that is girls aged 10-14 who live in communities with an attitudes towards wife beating risk category or limited decision-making risk category equal to 4 (highest risk).

Source: Fraym, India DHS 2016, WorldPop 2020

fraym

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Most communities in Gonda have limited major transportation infrastructure. Health center coverage is below the state average.

Infrastructure in Gonda

Gonda

1 The district's main road is National Highway 330, which forks at the district capital. Communities in the south of Gonda have less road infrastructure and lower prevalence of child marriage.

2 There are about 10 public health centers per 100,000 people, which is less than the state rate (12 per 100,000 people). Health centers are evenly distributed throughout the region.

Major Roads[1]

Health Centers[2]

City District headquarters

Percent of women (aged 20-24) who were married before 18

0%
65+%
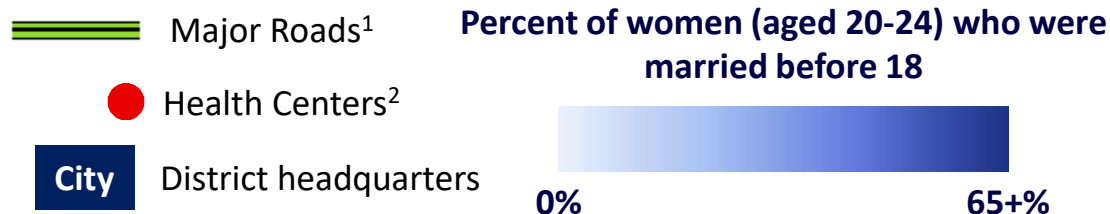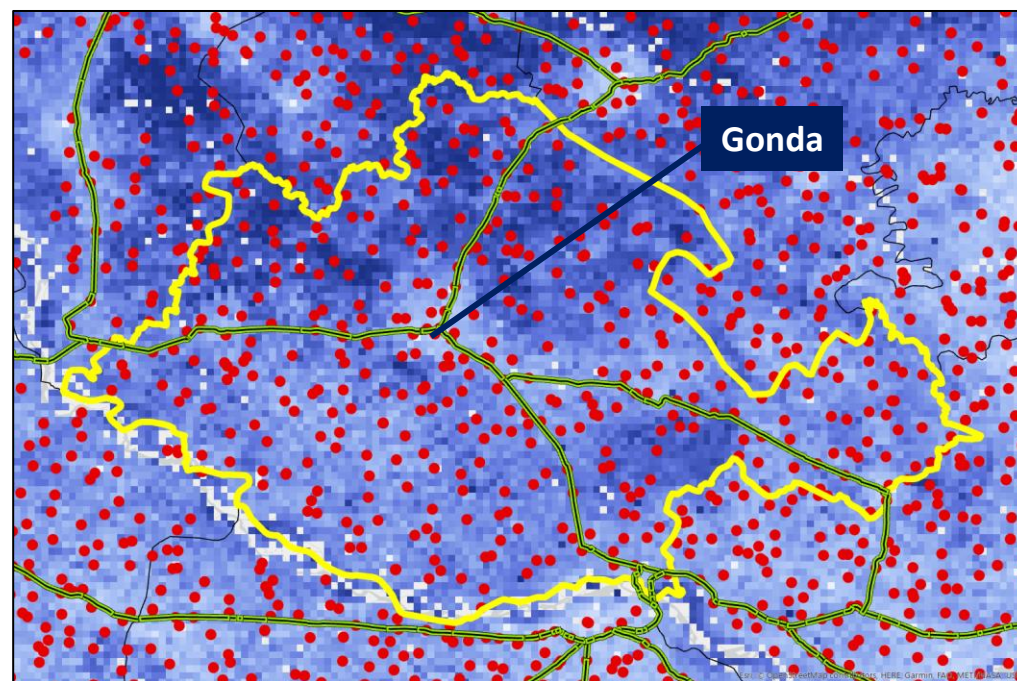
Note 1: Major roads include motorways, and trunk roads, which are the most important roads in a country's road network.
Note 2: Public health centers come from the Government of India Open Data Portal.
Source: Fraym, India DHS 2016, OpenStreetMaps

fraym

Samastipur has the highest under-18 prevalence rate among the four districts selected as hotspots and the lowest female employment and education rates in the two states.

Indicator	Samastipur (Bihar)	Gaya (Bihar)	Kheri (Uttar Pradesh)	Gonda (Uttar Pradesh)
Child Marriage				
Under-18 Prevalence	46%	41%	30%	33%
Population of At-Risk Girls, by Profile[1]				
Poverty	5,200	43,400	44,300	31,600
Gender Inequitable Attitudes	1,300	250	60,300	148,700
Lack of Decision-Making	25,200	3,300	170	2,200
Community Characteristics				
Total Population	5.6 million	5.5 million	5.0 million	4.2 million
Number of Health Centers Per 100,000 People	8.2	11.4	12.4	10
Percent of women (aged 15-49) who are employed	15%	19%	18%	19%
Percent of women (aged 18-49) who completed primary education or higher	40%	46%	45%	46%

Note 1: The total number of at-risk girls for pregnancy outside of marriage is exclude as it was determined to be an unlikely risk factor for child marriage in India.
Source: Fraym

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Appendix

I.   **Definitions**

II.   **Data and Methodology**

APPENDIX | | DEFINITIONS

Indicator	Description
Child Marriage	
Under-18 Child Marriage Prevalence	Percent of women (aged 20-24) who were married before age 18. Women married before age 18 include both those who are currently married and formerly married. Per the DHS, those who report that they are married or living with a partner are considered in union and therefore this indicator is based off the age at first marriage or co-habitation.
Under-18 Child Marriage Burden	The number of women (aged 20-24) who were married before age 18. Burden is calculated using population data from WorldPop.
Under-15 Child Marriage Prevalence	Percent of women (aged 20-24) who were married before age 15. Women married before age 15 include both those who are currently married and formerly married. Per the DHS, those who report that they are married or living with a partner are considered in union and therefore this indicator is based off the age at first marriage or co-habitation.
Under-15 Child Marriage Burden	The number of women (aged 20-24) who were married before age 15. Burden is calculated using population data from WorldPop.

fraym

Note: All indicators are from the 2016 India DHS.

APPENDIX || DEFINITIONS

Indicator	Description
Community Context	
Adult Female Employment	Percent of women (aged 15-49) who are employed. A woman is employed if she reports working in the last 7 days.
Female Educational Attainment	Percent of women (ages 18-49) who completed primary school or higher.
Male Educational Attainment	Percent of men (aged 18-49) who completed primary school or higher.
Modern Contraceptive Use	Percent of women (aged 15-24) who are sexually active and use a modern contraceptive method. Per the DHS, modern methods exclude periodic abstinence and withdrawal, which are considered traditional methods.
Health System Usage	Percent of adults (aged 15-49) who visited a health facility or have been visited by a fieldworker to talk about family planning in the past 12 months.
Child Stunting	Percent of children under five who are stunted.
Access to Electricity	Percent of individuals that live in a household with access to electricity.
Flush Toilet	Percent of individuals that live in a household with a flush toilet.

fraym   **Note:** All indicators are from the 2016 India DHS.

APPENDIX|| DEFINITIONS

Indicator	Description
Risk Profiles	
Poverty	Fraym selected six indicators to capture poverty: (i) wealth; (ii) employment for women aged 15 to 24 in agriculture or as laborers; (iii) & (iv) educational attainment of male and female household heads; and (v) & (vi) employment of male and female household heads in agriculture or as laborers. Due to differences in the survey design for India as compared to other countries Fraym analyzed, Fraym modified the approach to the poverty profile by disaggregating employment and educational attainment by sex. Fraym then combined these indicators using a principal components analysis (PCA) to produce an index. The poverty index risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk.
Attitudes towards Wife Beating	Attitudes towards wife beating is defined as the percent of women/men aged 15 to 49 who agree with at least one reason that a husband is justified in hitting or beating his wife. Respondents were asked whether a husband is justified in beating his wife under a series of circumstances: if the wife burns the food, argues with him, goes out without telling him, neglects the children, or refuses sexual relations. Due to differences in the survey design for India as compared to other countries Fraym analyzed, Fraym modified the approach by disaggregating attitudes towards wife beating by sex. Men's and women's attitudes towards wife beating are classified into quartiles separately then combined to get attitudes towards wife beating risk categories across both sexes. The attitudes towards wife beating risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk.
Women's Limited Participation in Decision Making	Women's limited participation in decision-making is defined as the percent of currently married women aged 15 to 49 who report that they do not participate in any of the four major household decisions: (i) woman's health care; (ii) large household purchases; (iii) visits to family; and (iv) husband's earnings. Due to differences in the survey design for India as compared to other countries Fraym analyzed, Fraym modified the approach to this profile by using a single indicator rather than using PCA to create an index. The women's participation in decision-making index risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk.

Note: All indicators are from the 2016 India DHS.

APPENDIX || DATA AND METHODOLOGY

Fraym Data Sources

The Fraym platform weaves together the latest satellite imagery and geostatistical datasets with professionally enumerated household surveys. This allows for the disaggregation and re-aggregation of large datasets to cover any geographically bounded area.

For this report, indicators at the individual and household levels were sourced from the 2015-2016 India Demographic and Health Survey (DHS), also known as the 2015-16 National Family Health Survey (NFHS-4).

Additionally, granular population distribution data comes from WorldPop, a publicly available and detailed population distribution and composition data source that leverages existing census data to produce 100m x 100m resolution estimates of population density. In order to build its datasets, WorldPop relies on census data as the main primary data input, and large geotagged household surveys when they are not available. In order to project into the future from the latest census of a given country, WorldPop uses subnational and urban rural growth rates that are reconciled with UN estimates. For this report, population estimates from 2020 were used.

Fraym Methodology

Fraym data scientists closely examine representativeness, sampling frames, questionnaire coverage, periodicity, and a range of other factors. **Fraym obtains microdata**, e.g. individual rows of responses of survey data, in order to avoid any manipulation that could potentially occur during the analysis phase.

In India, the survey were implemented by the International Institute for Population Sciences (IIPS), Mumbai with financial, technical, and managerial support by large **internationally respected organizations**, including the US Agency for International Development, the United Kingdom Department for International Development, the Gates Foundation, UNICEF, UNFPA, the MacArthur Foundation, and the Government of India. These surveys are designed to be representative of both the *de jure* and *de facto* populations.

These surveys typically use a **stratified, two-stage cluster design** that ensures representative samples for the national and subnational levels. After data collection, *post-hoc* sampling weights are created to account for any oversampling and ensure representativeness particularly at hyperlocal levels.
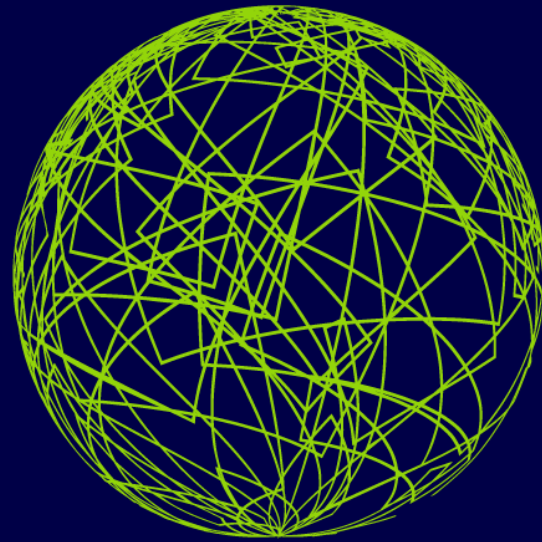
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