

fraym

**Analyzing Girl Child Marriage: Bangladesh
Deep Dive**

**Prepared for the Child Marriage Learning
Partners Consortium**

With Support from the Bill & Melinda Gates Foundation

22 March 2021

Table of Contents

- I. About Fraym
- II. Report Overview
- III. Mapping Prevalence and Burden
- IV. Community Characteristics
- V. Mapping At-Risk Populations
- VI. Hotspot Analysis
- VII. Appendix

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 1km² even in remote areas.

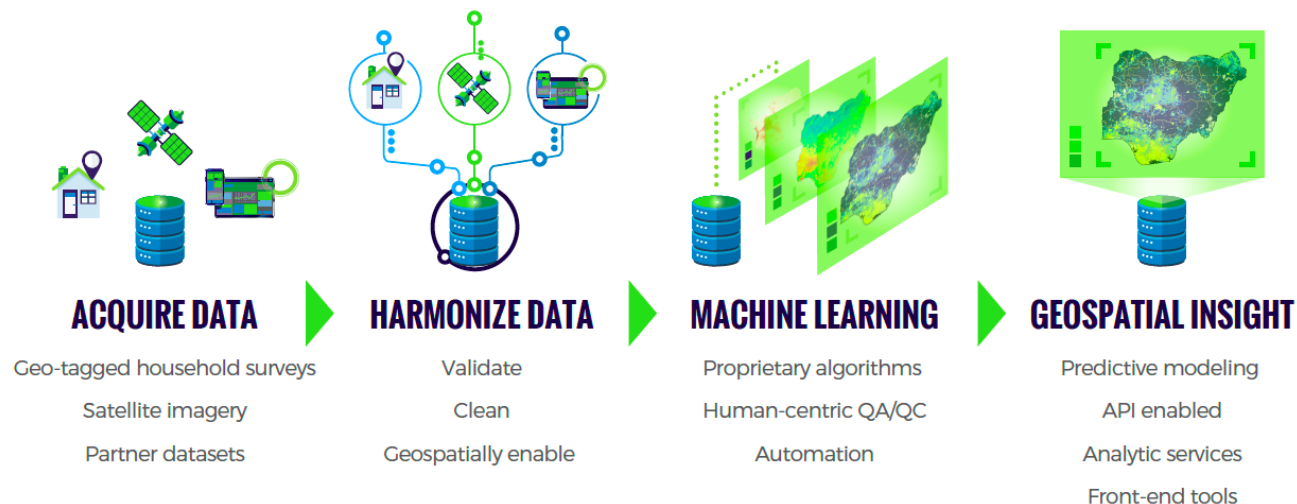
ABOUT FRAYM || METHODOLOGICAL APPROACH

Fraym has built machine learning (ML) software that weaves together geo-tagged household survey data with satellite imagery to create localized population information (1 km²).

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



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 || ANALYTICAL FRAMEWORK

Fraym produced hyperlocal visualizations of girl child marriage prevalence and burden, community contexts, and potential risk factors to child marriage in Bangladesh.

1 Fraym **mapped the prevalence and burden of under-18 and under-15 girl child marriage and analyzed spatiotemporal trends** from 2007, 2011, and 2014 in Bangladesh.

2 Additionally, Fraym assessed a variety of indicators that help to **illuminate community contexts and their relationship with child marriage prevalence**. 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, 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-equitable 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** and more deeply exploring the risk profiles and community context.

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




REPORT OVERVIEW || KEY FINDINGS

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

- 1 **Under-18 child marriage prevalence has been declining across the country** (with especially high rates of decline in Dhaka) but remains high at the national level (59 percent) with rates as high as 65 percent in some regions.
- 2 Fraym **identified two divisions as hotspots of child marriage:** (i) Rajshahi; and (ii) Rangpur. Both divisions have some of the highest under-18 and under-15 prevalence rates in the country.
- 3 Across risk profiles, **pregnancy is most strongly associated with child marriage at the district level, although the direction of the relationship is negative** – that is districts with higher prevalence tend be lower risk on pregnancy as a risk factor. Poverty appears to be less important, although high-risk communities are more widespread.
- 4 The relationship between child marriage and other community characteristics is mixed. Results do not consistently align with existing literature.

Mapping Prevalence and Burden



MAPPING PREVALENCE AND BURDEN || SECTION OVERVIEW

Fraym mapped the prevalence and burden of under-18 and under-15 child marriage and analyzed spatiotemporal trends spanning from 2007 to 2014.

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 (2014), **Fraym mapped under-18 and under-15 child marriage prevalence and burden at the national, division, district, and community level (1km²)**.

3

Next, Fraym examined two previous survey intervals (2007 and 2011) in order to **assess spatiotemporal trends across the full time period (2007 to 2014), as well as in shorter intervals (2007 to 2011 and 2011 to 2014)**.

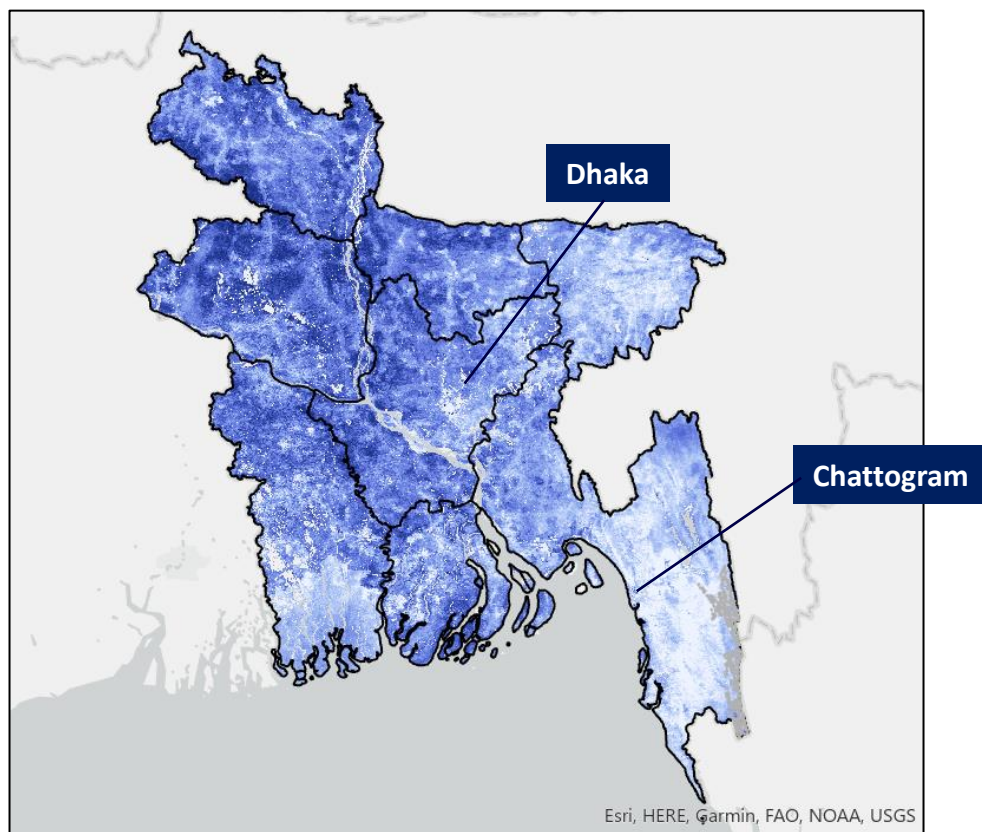
4

This mapping and associated analysis can help researchers, policymakers, and other decision-makers to target their future activities and resource allocation to reach areas with the highest need.

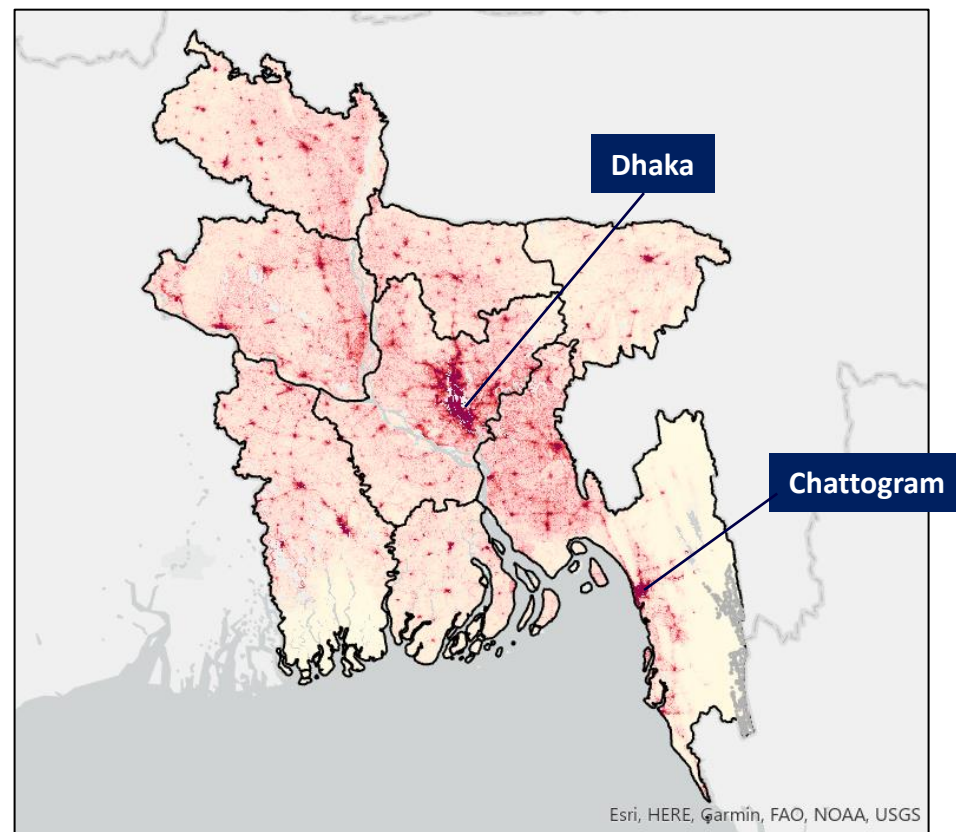
MAPPING PREVALENCE AND BURDEN || UNDER-18 (2014)

Nationally, 59 percent of women aged 20-24, or 5 million women, were married before age 18. Prevalence, while high throughout Bangladesh, is concentrated in the West and North, whereas burden is concentrated more in population-dense cities.

Under-18 Prevalence



Under-18 Burden



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



Areas with total population fewer than 10 people per sq km



City Large cities

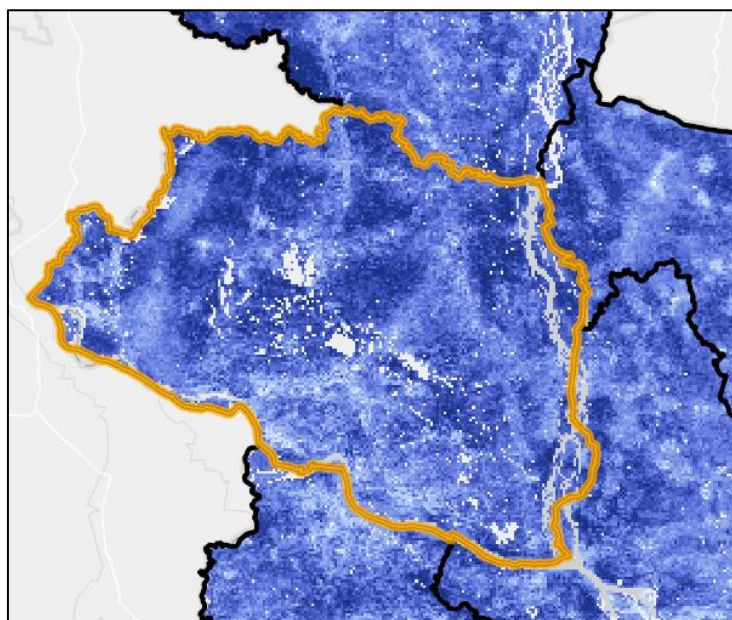
Number of women (aged 20-24) who were married before 18



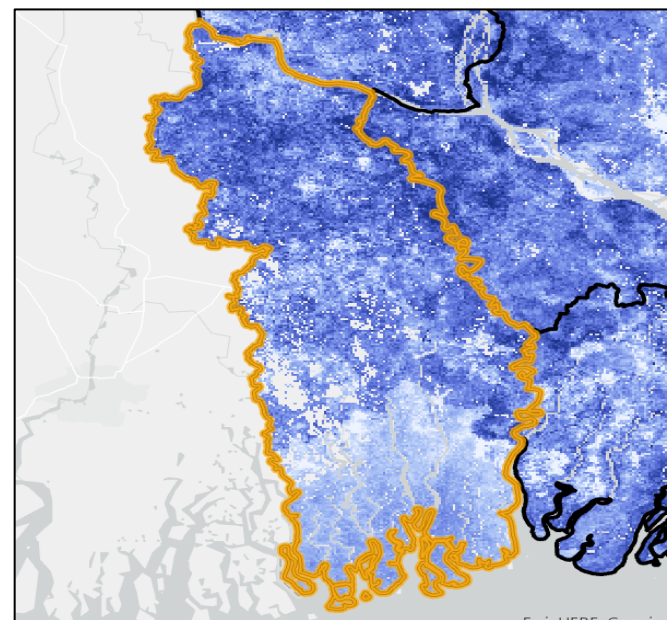
MAPPING PREVALENCE AND BURDEN || HIGH PREVALENCE DIVISION EXAMPLES

Within a division, the prevalence of child marriage can vary significantly. In Rajshahi, high prevalence is widespread, while in Khulna, it is concentrated in the north.

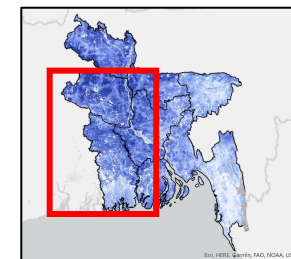
The Rajshahi division has the highest under-18 prevalence rate – 65 percent.



In Khulna, the under-18 prevalence rate is 61 percent, on par with the national rate of 59 percent



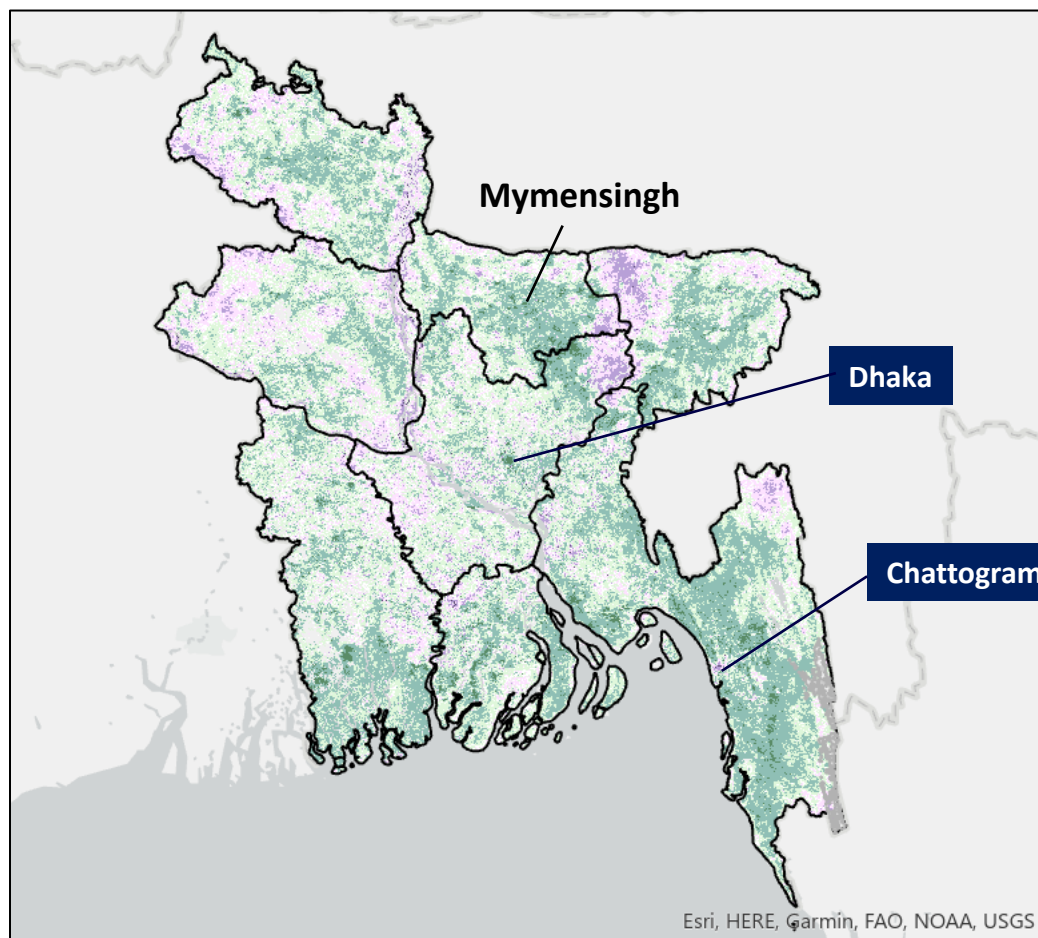
Percent of women (aged 20-24) who were married before 18



MAPPING PREVALENCE AND BURDEN || UNDER-18 TIME SERIES (2007 to 2014)

Overall, most of Bangladesh experienced improvements in under-18 child marriage rates from 2007 to 2014, most notably in the Dhaka and Mymensingh divisions.

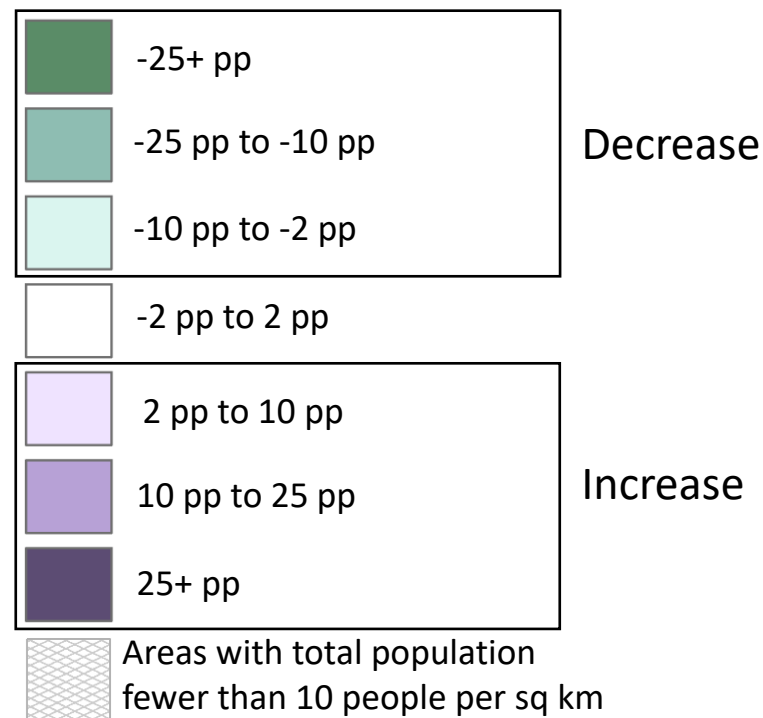
Change in the Prevalence of Under-18 Child Marriage: 2007 to 2014



National Under-18 Prevalence

2007	2014
66.2%	58.6%

Percentage Point (pp) Change in Under 18 Prevalence from 2007 to 2014

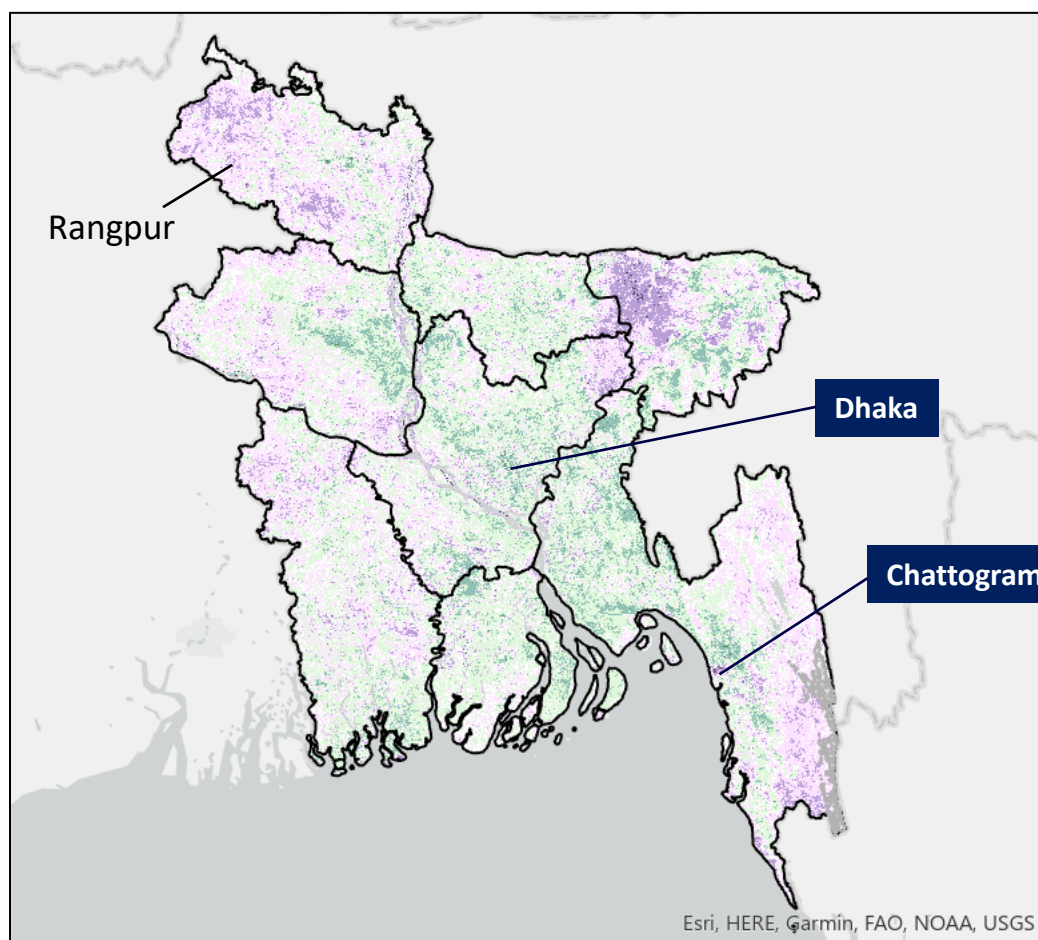


City Large cities

MAPPING PREVALENCE AND BURDEN || UNDER-18 TIME SERIES INTERVAL (2007 to 2011)

Between 2007 and 2011, child marriage prevalence decreased slightly nationally. Still, many communities in divisions such as Rangpur saw rates increase.

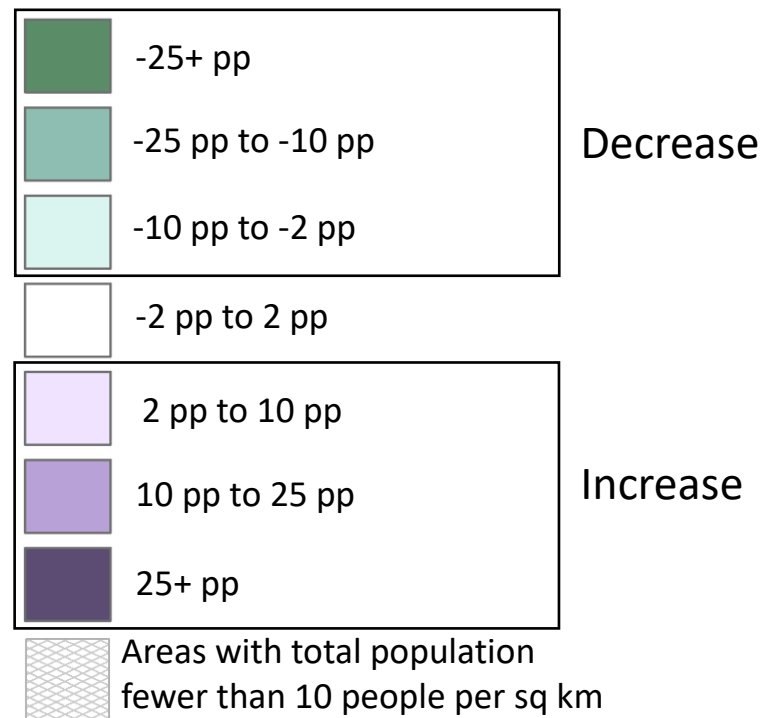
Change in the Prevalence of Under-18 Child Marriage: 2007 to 2011¹



National Under-18 Prevalence

2007	2011
66.2%	64.9%

Percentage Point (pp) Change in Under 18 Prevalence from 2007 to 2011



City Large cities

Note 1: Modeled estimates at the sq km level for Sylhet in 2011 do not meet Fraym quality standards. As a result, estimates in this division should be considered as less precise and interpreted with caution. For this area, Fraym will not present statistics below the division level.

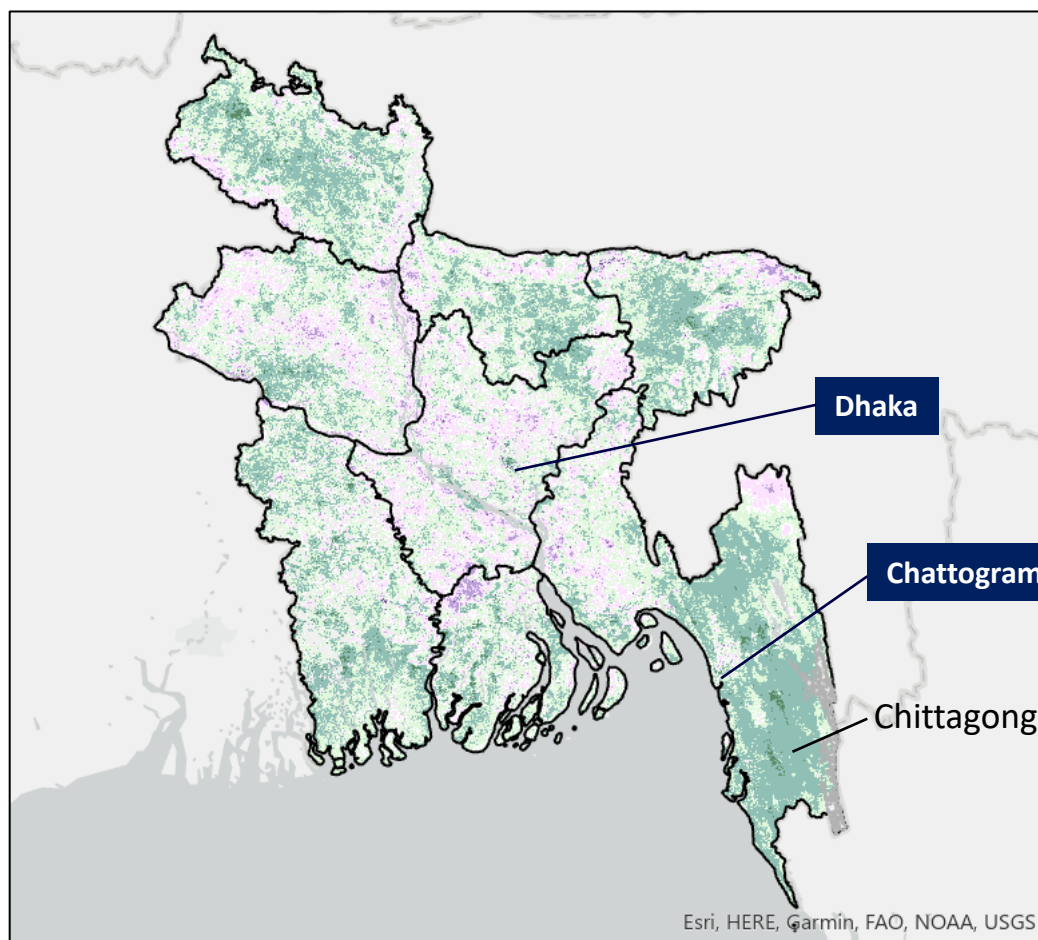
Source: Fraym, Bangladesh DHS (2011 and 2007)



MAPPING PREVALENCE AND BURDEN || UNDER-18 TIME SERIES INTERVAL (2011 to 2014)

In the next phase of analysis (2011 – 2014), the prevalence of child marriage decreased across almost all of Bangladesh, especially in Chittagong.

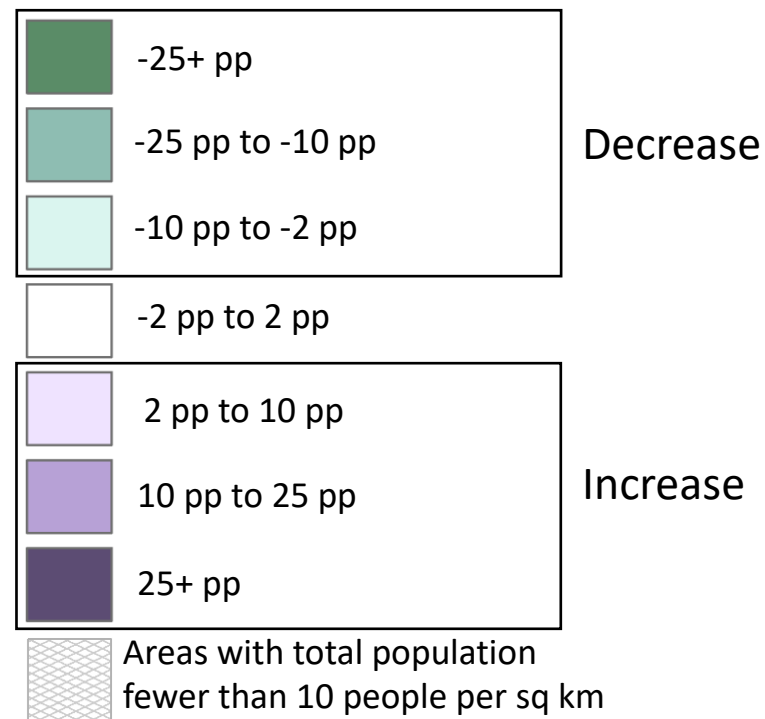
Change in the Prevalence of Under-18 Child Marriage: 2011 to 2014



National Under-18 Prevalence

2011	2014
64.9%	58.6%

Percentage Point (pp) Change in Under 18 Prevalence from 2011 to 2014

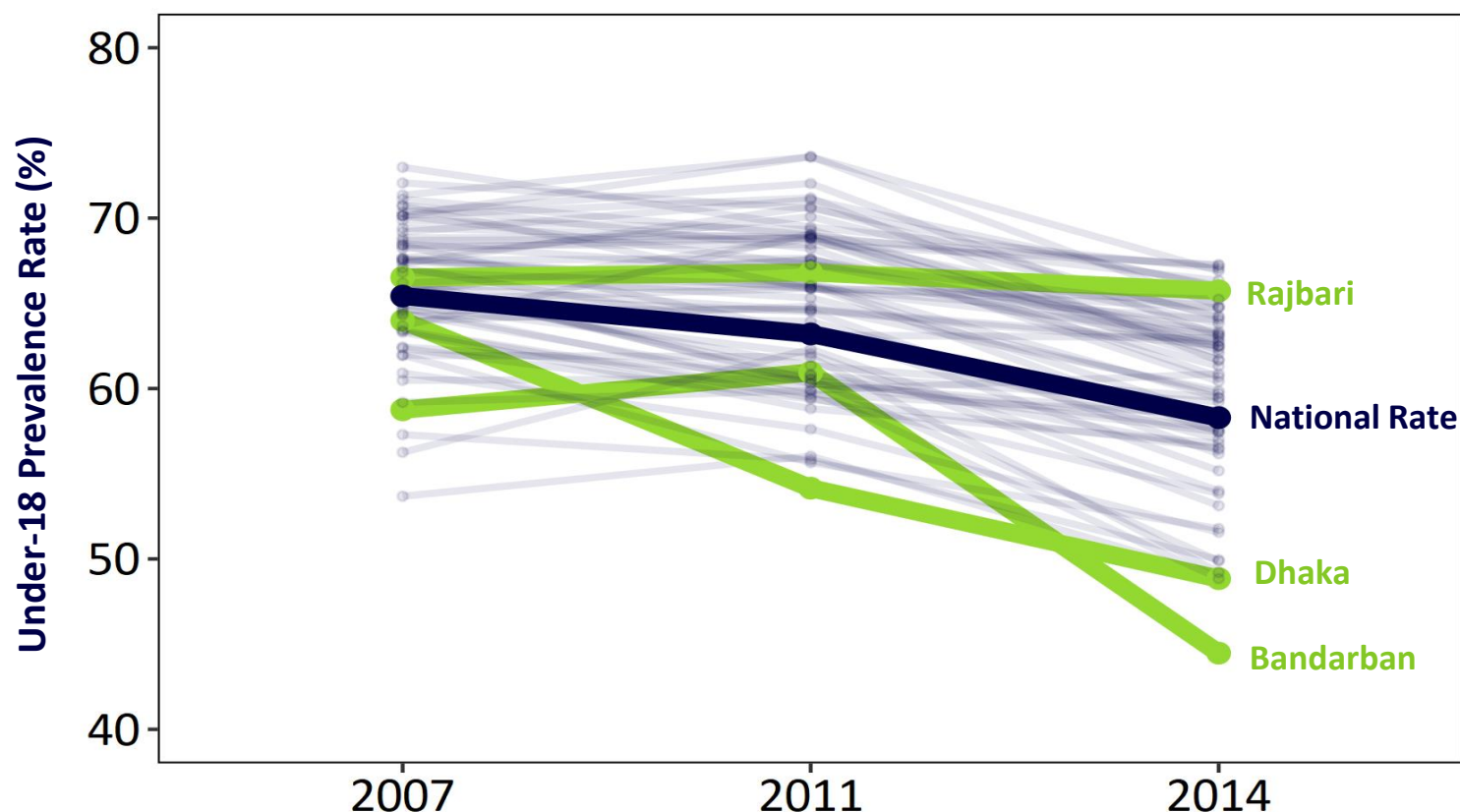


City Large cities

MAPPING PREVALENCE AND BURDEN || UNDER-18 TIME SERIES (DISTRICT-LEVEL)

At the district level, trends of under-18 prevalence vary over time but trend downwards. Bandarban and Dhaka saw the largest decrease between 2007 and 2014. Rajbari saw the smallest decrease. No districts recorded an increase.

Change in the Under-18 Child Marriage Prevalence Rate, by District¹



Note 1: Modeled estimates at the sq km level for Sylhet in 2011 do not meet Fraym quality standards. As a result, estimates in this division should be considered as less precise and interpreted with caution. For this area, Fraym will not present statistics below the division level.

Source: Fraym, Bangladesh DHS (2007, 2011, and 2014)

MAPPING PREVALENCE AND BURDEN || DISTRICTS WITH LARGEST INCREASE/DECREASE

From 2007 to 2014, while no districts experienced increases, there were nine districts that experienced double-digit decreases.¹

Smallest Percentage Point (pp) Decrease in Under-18 Prevalence (2007 to 2014)

Rajbari (Dhaka)	- 1 pp
Magura (Khulna)	- 1 pp
Faridpur (Dhaka)	- 1 pp
Thakurgaon (Rangpur)	- 1 pp
Gopalganj (Dhaka)	- 1 pp
Nawabganj (Rajshahi)	- 2 pp

Largest Percentage Point (pp) Decrease in Under-18 Prevalence (2007 to 2014)

Dhaka (Dhaka)	- 15 pp
Bandarban (Chittagong)	- 14 pp
Khagrachhari (Chittagong)	- 13 pp
Bhola (Barisal)	- 11 pp
Cox's Bazar (Chittagong)	- 10 pp
Kishoreganj (Dhaka)	- 10 pp
Rangamati (Chittagong)	- 10 pp
Mymensingh (Mymensingh)	- 10 pp
Narayanganj (Dhaka)	- 10 pp

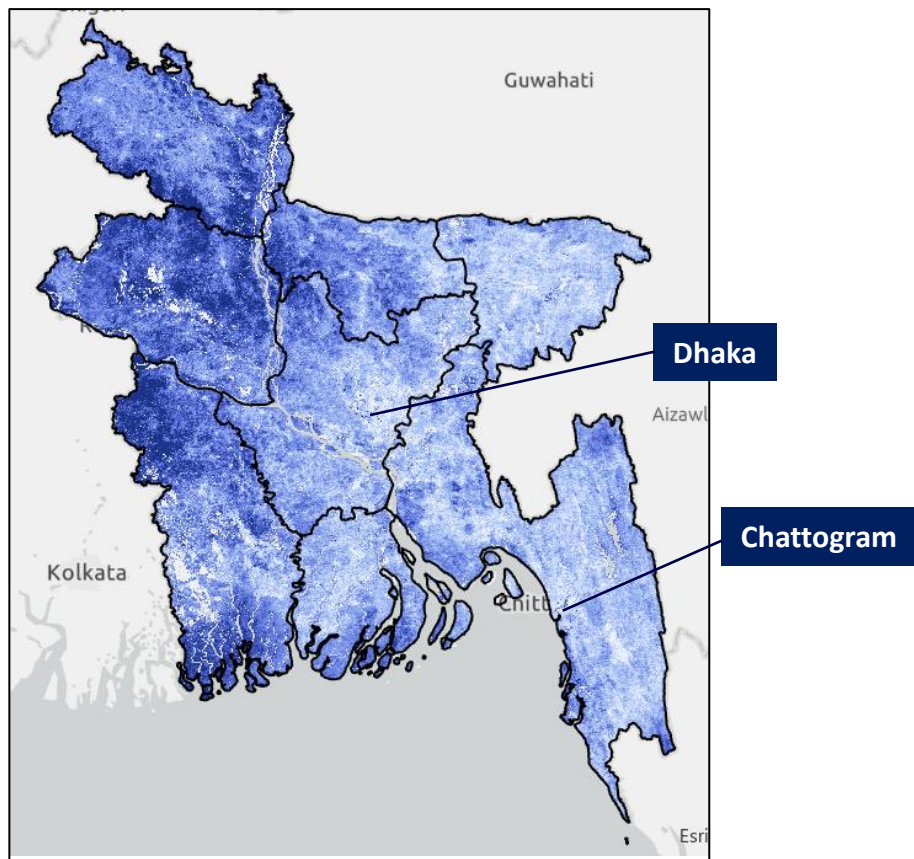
Note 1: Fraym calculated the percentage point (pp) difference between 2007 and 2014 to determine whether a district witnessed an increase or decrease in under-18 prevalence. In the tables above, the division is listed in parentheses.

Source: Fraym, Bangladesh DHS (2014, 2007)

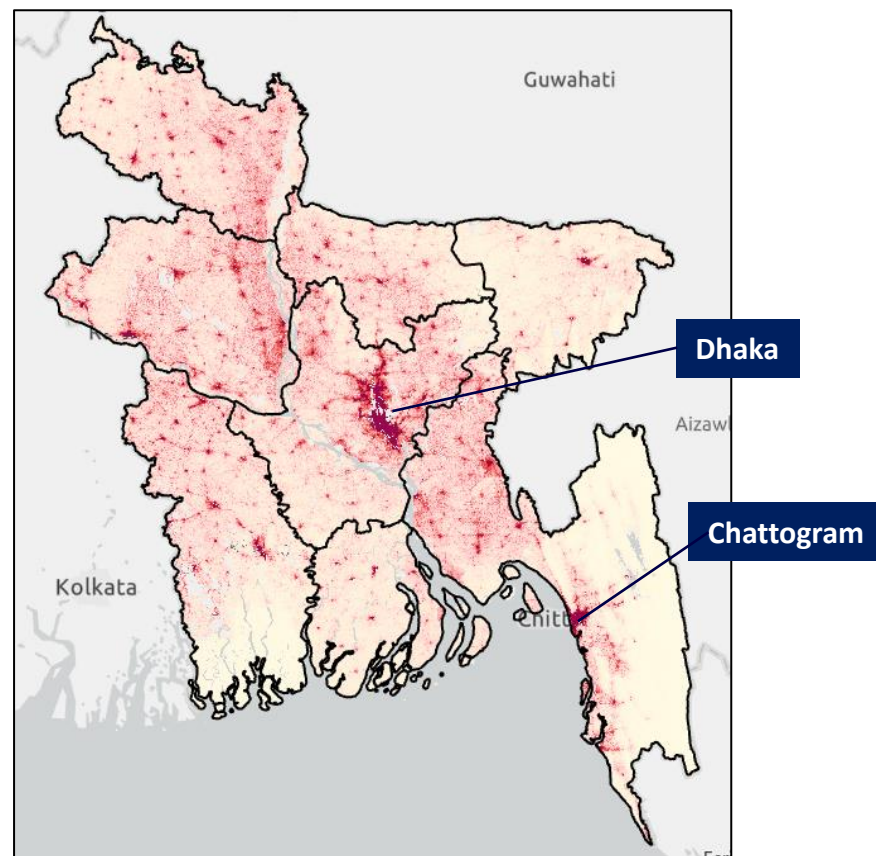
MAPPING PREVALENCE AND BURDEN || UNDER-15 (2014)

Nationally, 23 percent of women aged 20-24, or roughly 2 million women, were married before age 15. Under-15 marriage prevalence is especially high in the North and West, whereas burden is concentrated in the cities.

Under-15 Prevalence



Under-15 Burden



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



Areas with total population fewer than 10 people per sq km



City Large cities

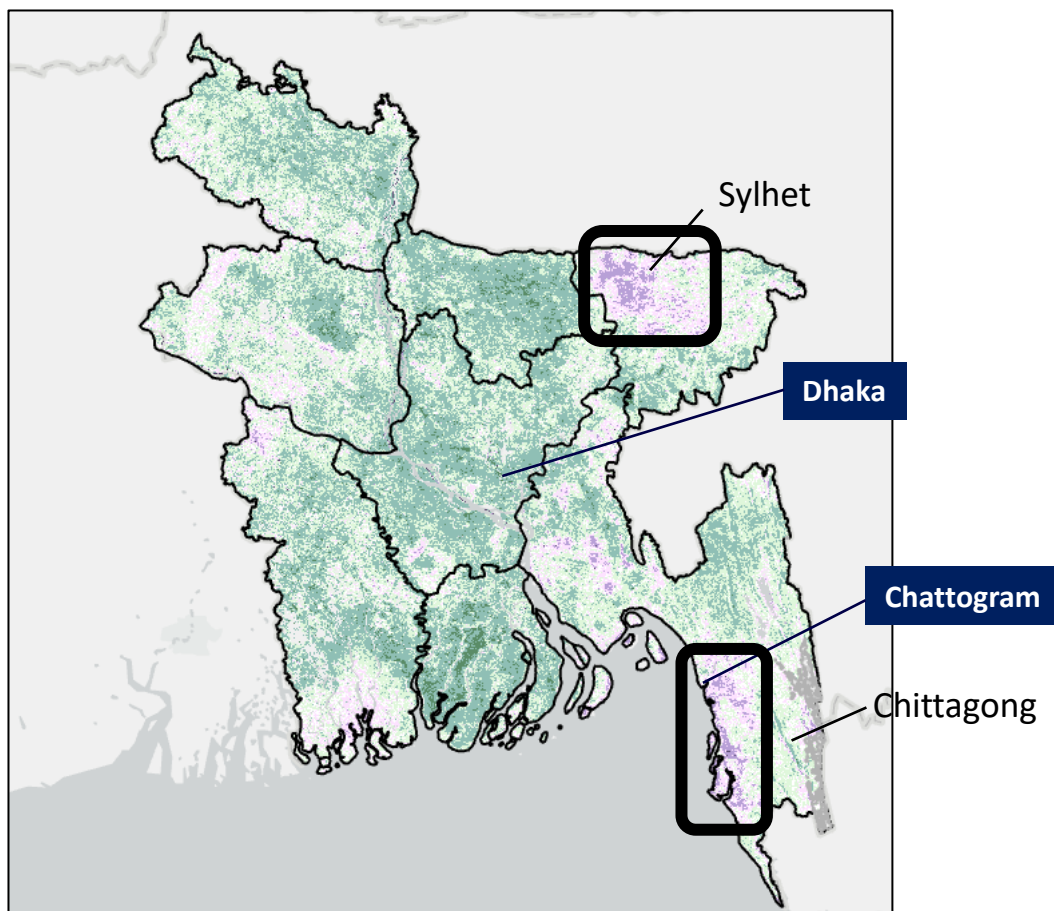
Number of women (aged 20-24) who were married before 15



MAPPING PREVALENCE AND BURDEN || UNDER-15 TIME SERIES (2007 to 2014)

From 2007 to 2014, most communities witnessed a decrease in under-15 prevalence, however some communities in Sylhet and Chittagong experienced increases.

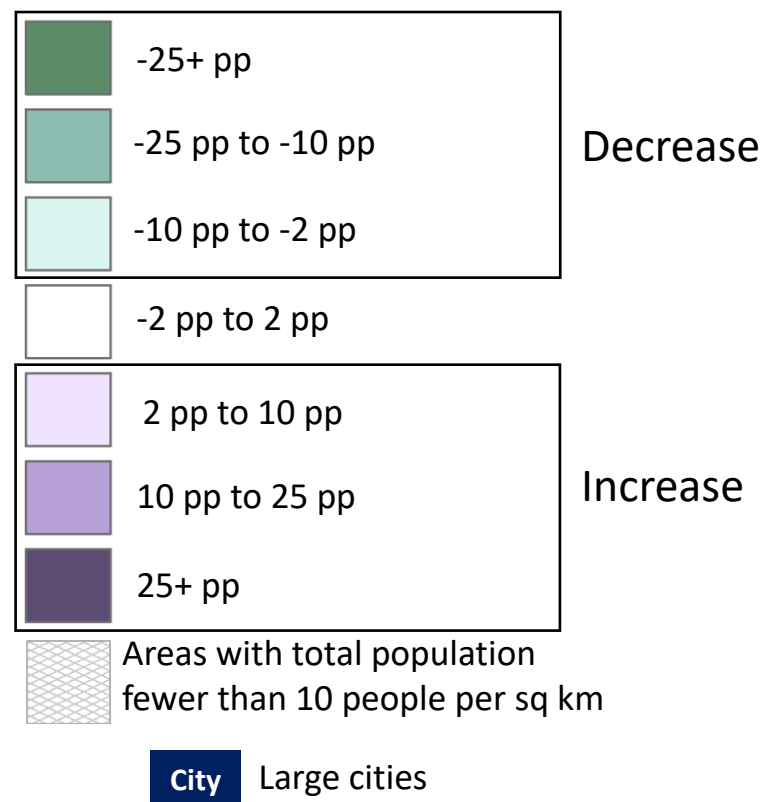
Change in the Prevalence of Under-15 Child Marriage: 2007 to 2014



National Under-15 Prevalence

2007	2014
32.3%	22.4%

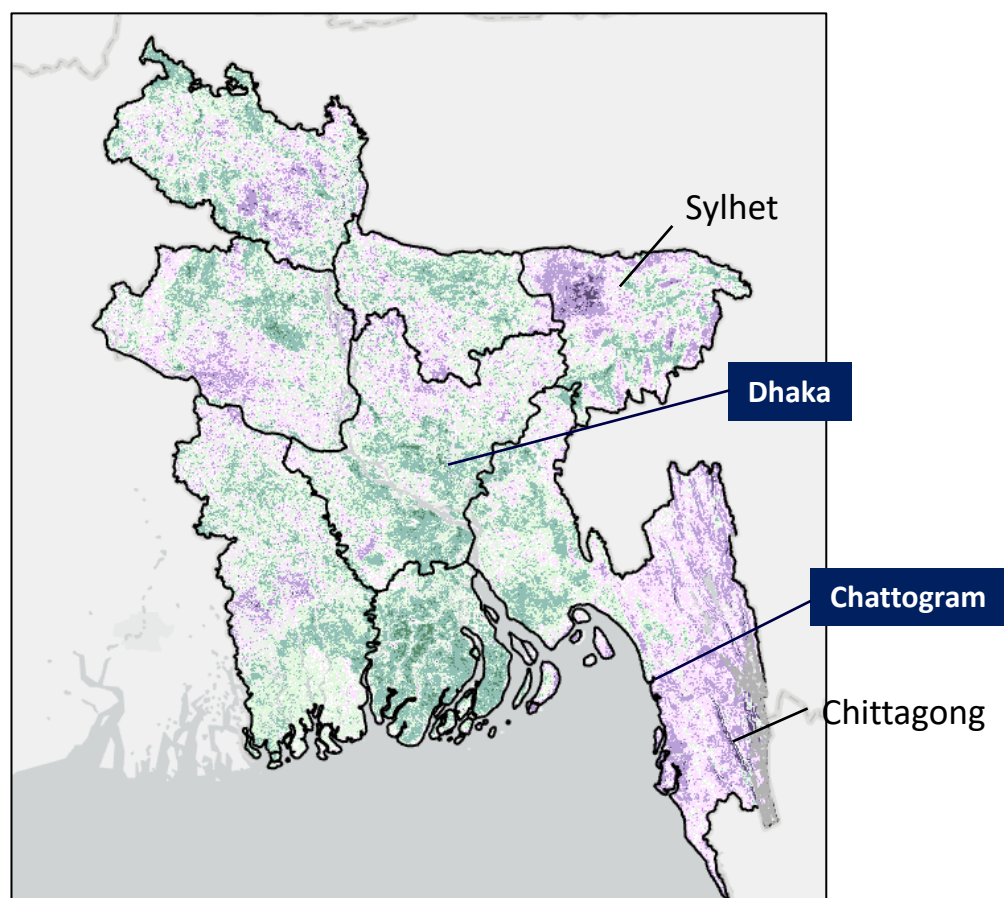
Percentage Point (pp) Change in Under-15 Prevalence from 2007 to 2014



MAPPING PREVALENCE AND BURDEN || UNDER-15 TIME SERIES INTERVAL (2007 to 2011)

Between 2007 and 2011, there were significant spatio-temporal differences in under-15 marriage rates. Barisal and Dhaka saw notable decreases, but Chittagong and Sylhet had sharp increases in some communities.

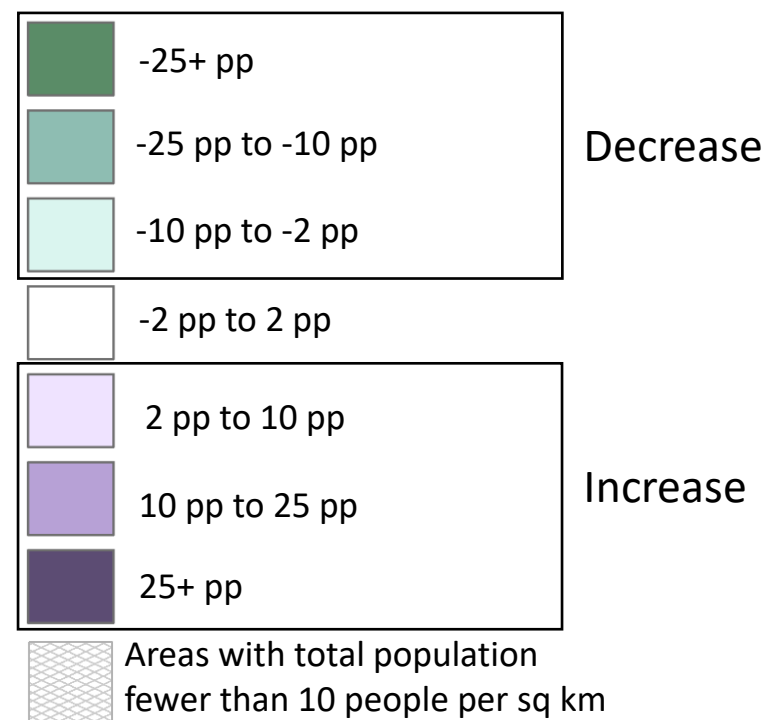
Change in the Prevalence of Under-15 Child Marriage: 2007 to 2011



National Under-15 Prevalence

2007	2011
32.3%	29.1%

Percentage Point (pp) Change in Under-15 Prevalence from 2007 to 2011

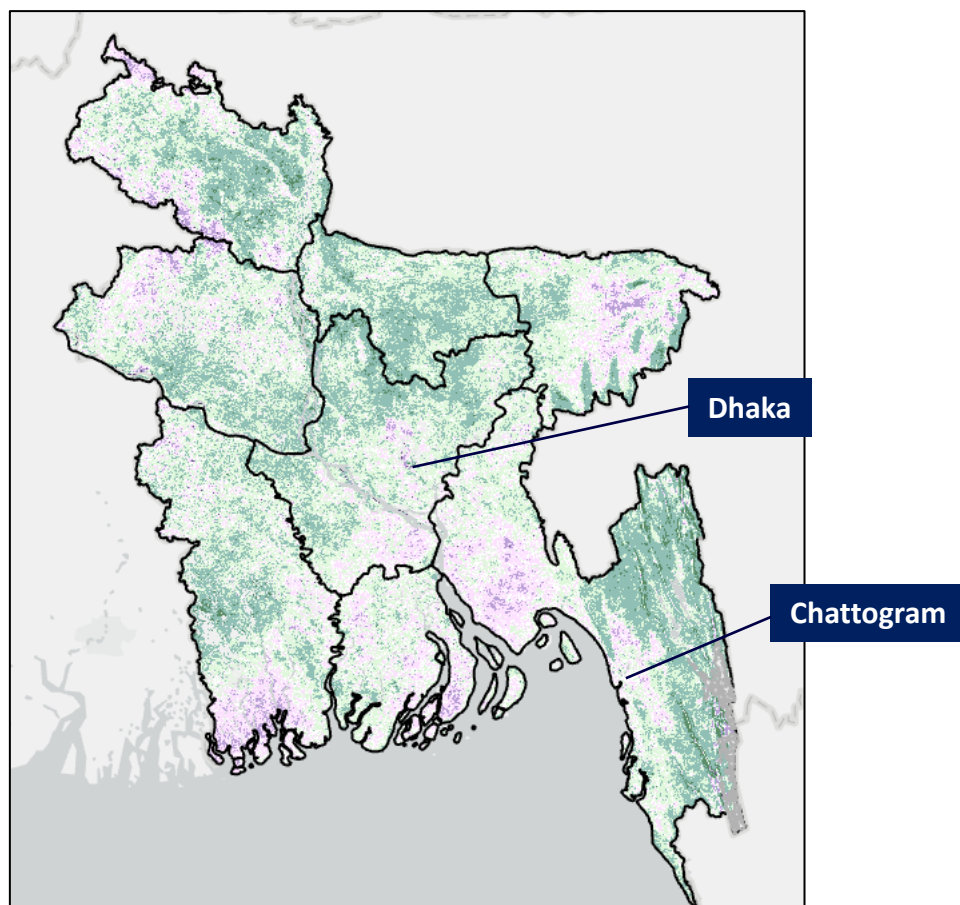


City Large cities

MAPPING PREVALENCE AND BURDEN || UNDER-15 TIME SERIES INTERVAL (2011 to 2014)

In the second phase of analysis (2011 to 2014), most communities across Bangladesh saw a significant decline in under-15 child marriage rates.

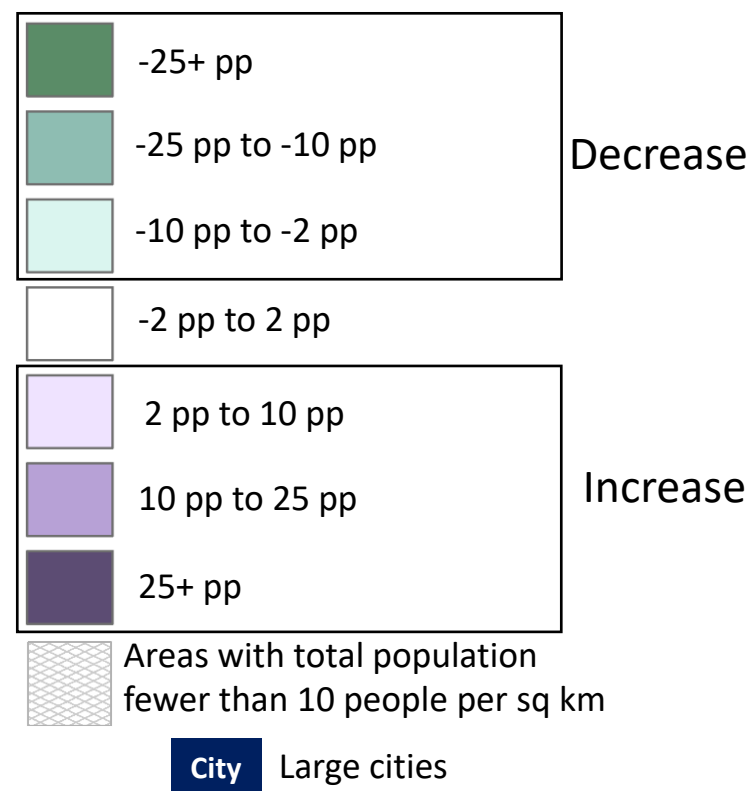
Change in the Prevalence of Under-15 Child Marriage: 2011 to 2014



National Under-15 Prevalence

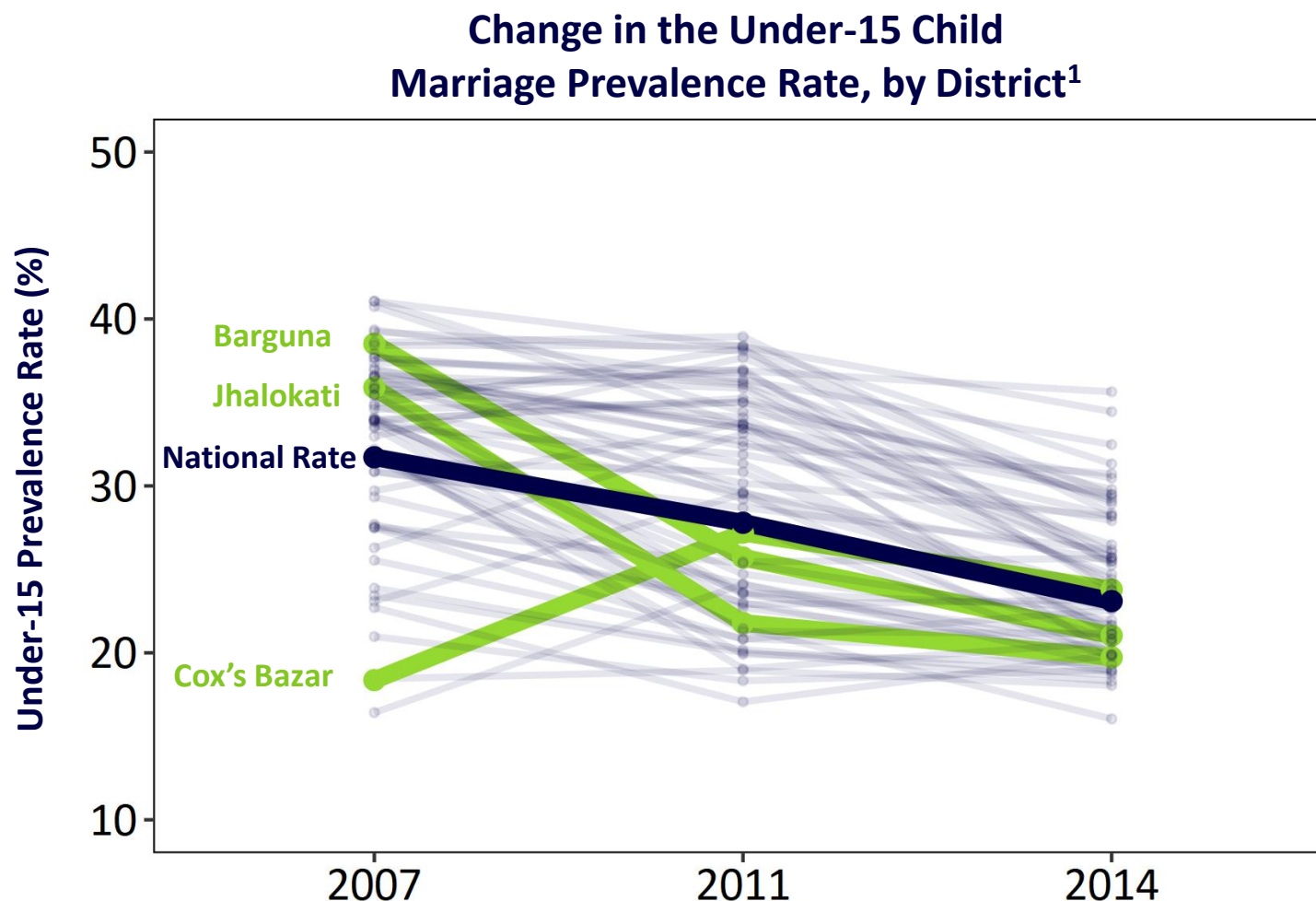
2011	2014
29.1%	22.4%

Percentage Point (pp) Change in Under-15 Prevalence from 2011 to 2014



MAPPING PREVALENCE AND BURDEN || UNDER-15 TIME SERIES (DISTRICT-LEVEL)

Generally, district rates of under-15 child marriage decreased between 2007 and 2014. Barguna and Jhalokati experienced significant decreases, the sharpest of which occurred between 2007 and 2011. Cox's Bazar experienced a sizeable increase, especially between 2007 and 2011.



Note 1: Modeled estimates at the sq km level for Sylhet do not meet Fraym quality standards. As a result, estimates in this division should be considered as less precise and interpreted with caution. For this area, Fraym will not present statistics below the division level.

Source: Fraym, Bangladesh DHS (2014, 2011, and 2007)

MAPPING PREVALENCE AND BURDEN || DISTRICTS WITH LARGEST INCREASE/DECREASE

Only Cox's Bazar saw an increase in under-15 prevalence between 2007 and 2014, while 62 districts achieved decreases, 28 of which were double-digit decreases.^{1,2}

<u>Largest Percentage Point (pp) Increase or Smallest Decrease in Under-15 Prevalence (2007 to 2014)</u>	
Cox's Bazar (Chittagong)	+ 5 pp
Chittagong (Chittagong)	+ 0 pp
Meherpur (Khulna)	- 1 pp
Noakhali (Chittagong)	- 3 pp
Bandarban (Chittagong)	- 3 pp

<u>Largest Percentage Point (pp) Decrease in Under-15 Prevalence (2007 to 2014)</u>	
Barguna (Barisal)	- 17 pp
Jhalokati (Barisal)	- 16 pp
Narayanganj (Dhaka)	- 16 pp
Netrakona (Mymensingh)	- 14 pp
Manikganj (Dhaka)	- 14 pp
Pirojpur (Barisal)	- 13 pp
Faridpur (Dhaka)	- 13 pp
Barisal (Barisal)	- 13 pp
Patuakhali (Barisal)	- 13 pp

Note 1: Fraym calculated the percentage point (pp) difference between 2007 and 2014 to determine whether a county witnessed an increase or decrease in under-15 prevalence. In the tables above, the division is listed in parentheses.

Note 2: Modeled estimates at the sq km level in Sylhet do not meet Fraym quality standards. As a result, estimates in this division should be considered as less precise and interpreted with caution. Statistics for districts in this division are not presented.

Source: Fraym, Bangladesh DHS (2014, 2007)

MAPPING PREVALENCE AND BURDEN || KEY TAKEAWAYS

Both under-18 and under-15 prevalence rates changed substantially over time. Improvements were widespread, and most notably concentrated in Dhaka, Chittagong and Barisal.

- 1 In 2014, the national under-18 prevalence rate was 59 percent, and an estimated 5 million women (aged 20-24) were married before age 18.
- 2 From 2007 to 2014, the under-18 prevalence rate decreased from 65 percent to 59 percent. **Spatiotemporal analysis indicates that the decrease was widespread, most notably in Dhaka and Chittagong, and the largest decreases occurred between 2011 and 2014.**
- 3 Nationally, the under-15 prevalence rate was 23 percent in 2014. The under-15 burden was roughly 2 million women (aged 20-24).
- 4 The under-15 prevalence rate at the national level has decreased 9 percentage points from 2007 to 2014. **All but one district (Cox's Bazar) witnessed a decrease in the under-15 prevalence rate during this period.**
- 5 The **Barisal and Dhaka** divisions experienced the largest decreases in under-15 prevalence and the **Dhaka and Mymensingh** divisions experienced the largest decreases in under-18 prevalence.

Community Characteristics



COMMUNITY CHARACTERISTICS || SECTION OVERVIEW

Fraym assessed a variety of indicators that help to illuminate community contexts and their relationship with child marriage prevalence.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** such as employment and education, as well as 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

COMMUNITY CHARACTERISTICS || METHODOLOGICAL OVERVIEW

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 Female Educational Attainment	<i>Expected Relationship</i> = Areas with higher employment or educational attainment may have lower rates of child marriage prevalence.
Sexual and Reproductive Health	
Modern Contraceptive Prevalence	<i>Expected Relationship</i> = 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	<i>Expected Relationship</i> = Child stunting may be higher due to early childbearing associated with child marriage.
Infrastructure	
Access to Electricity Access to Improved Sanitation	<i>Expected Relationship</i> = Areas with better infrastructure may have lower rates of child marriage prevalence.

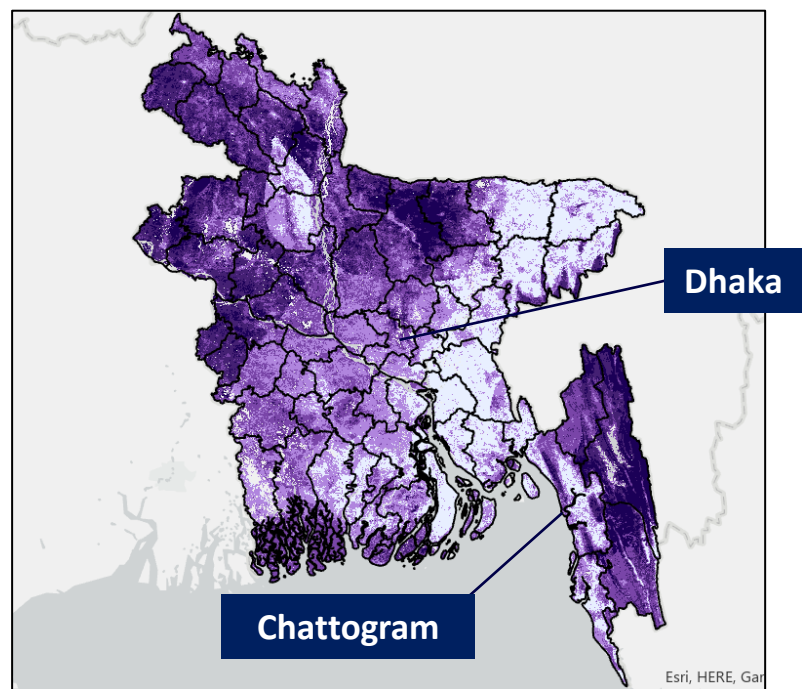
Note 1: Analyses are bivariate and thus do not control for other factors. Please see slides 29-34 and the appendix for indicator definitions. The expected relationship is a hypothesis based on expert consultation and a review of existing literature.

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>

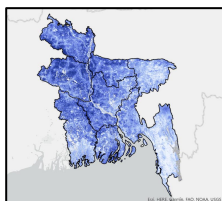
COMMUNITY CHARACTERISTICS || ADULT FEMALE EMPLOYMENT

In Bangladesh, districts with higher rates of child marriage prevalence tend to have higher rates of female employment. However, the relationship is weak.

Adult Female Employment at the Community Level

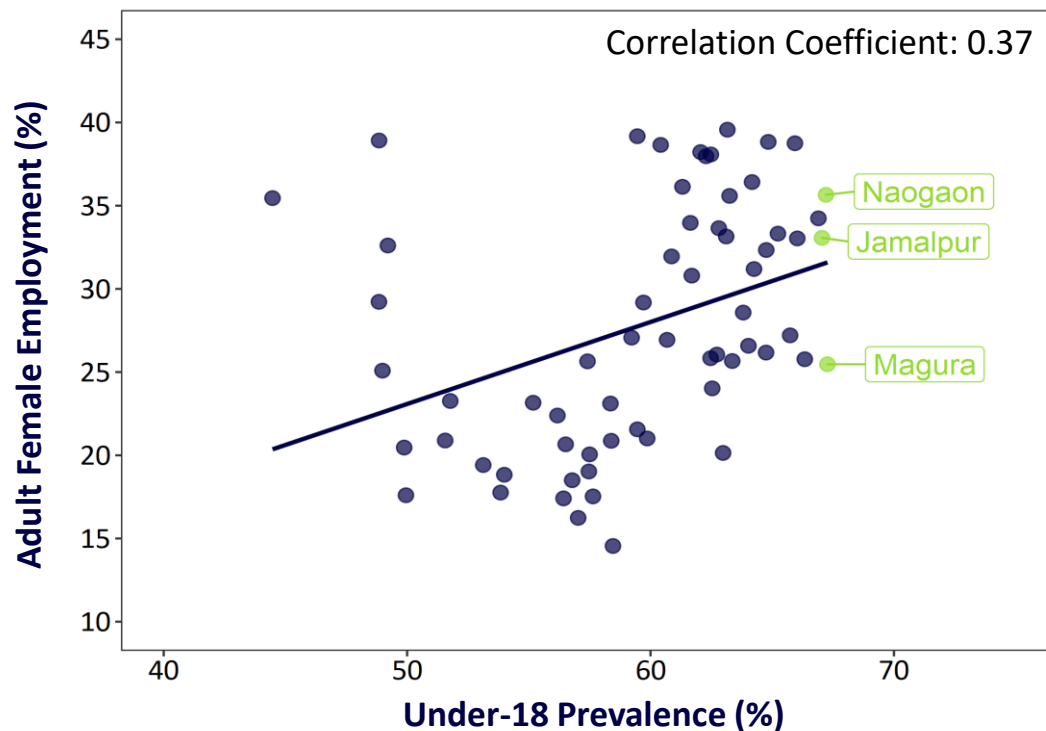


Percent of women (aged 15-49) that are employed



Adult Female Employment Rate and Child Marriage Prevalence

Each point represents a district.



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

Under 18 Prevalence

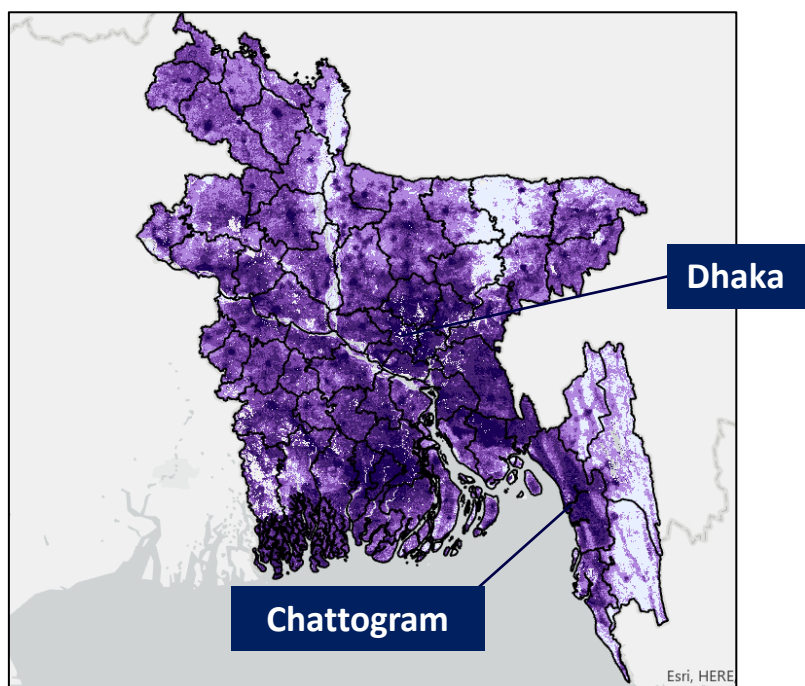
City Large cities



COMMUNITY CHARACTERISTICS || FEMALE EDUCATION

The relationship between child marriage prevalence and female educational attainment is weak.

Female Educational Attainment at the Community Level

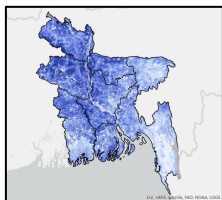


Percent of women (aged 18-49) who completed primary school or higher



0%

90%+

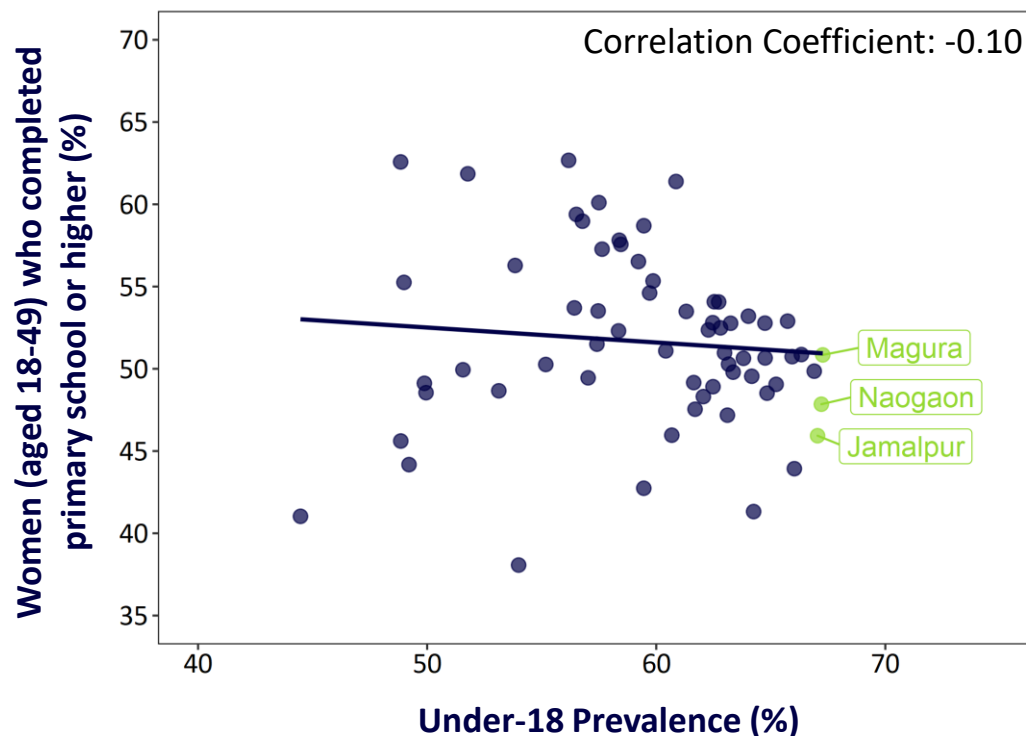


Under 18 Prevalence

City Large cities

Female Educational Attainment and Child Marriage Prevalence

Each point represents a district.

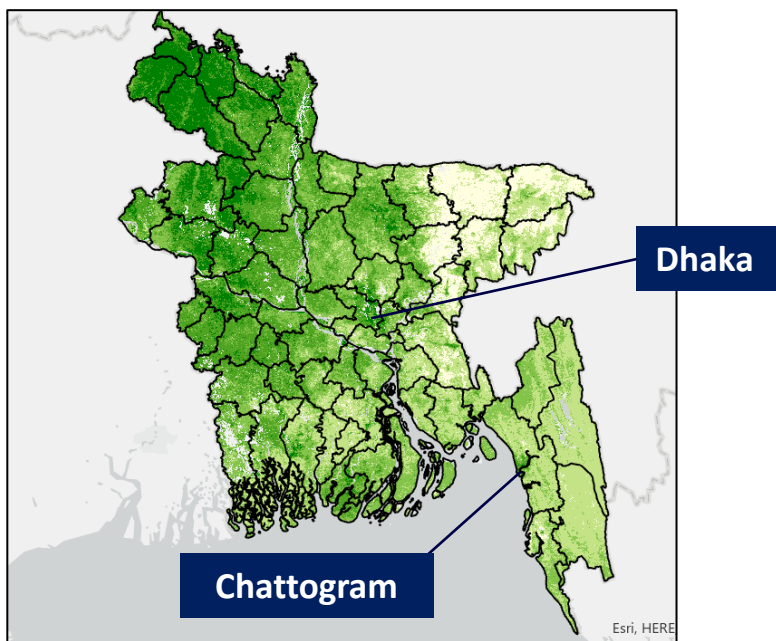


The y-axis intervals vary across indicators depending on the range of the values.

COMMUNITY CHARACTERISTICS || CONTRACEPTIVE USE

There is a strong positive correlation at the district level between child marriage prevalence and rates of modern contraceptive use.¹

Modern Contraceptive Use at the Community Level

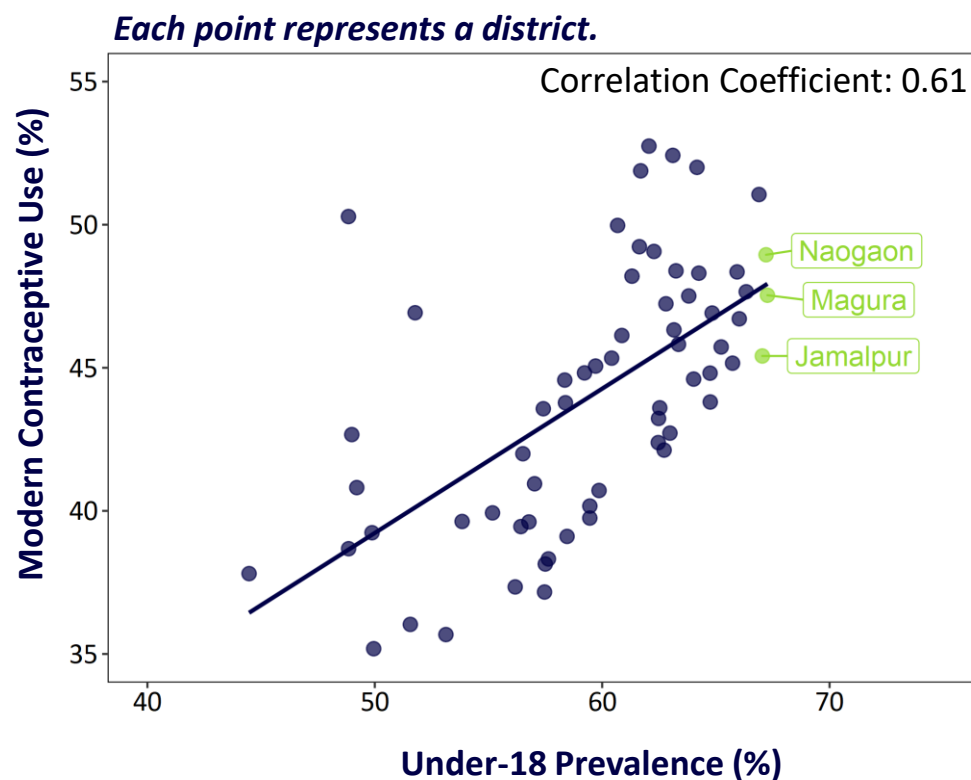


Percent of women (aged 15-24) who are sexually active and use a modern contraceptive method



City Large cities

Modern Contraceptive Use and Child Marriage Prevalence



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

Under 18 Prevalence

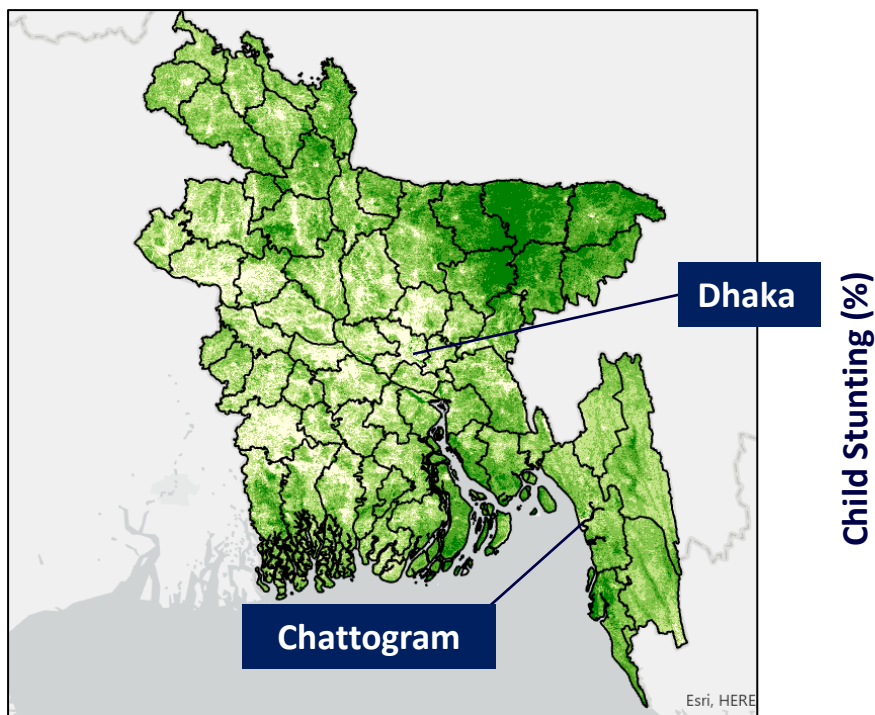
Note 1: Modern contraceptive prevalence is defined using the DHS definition, that is the percent of women (aged 15-24) that use a modern method. Modern methods exclude periodic abstinence and withdrawal, which are considered traditional methods.

Source: Fraym, Bangladesh DHS 2014

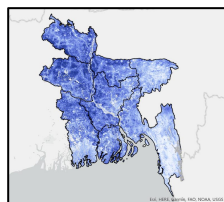
COMMUNITY CHARACTERISTICS || CHILD STUNTING

Districts with higher child marriage prevalence tend to have lower rates of child stunting, although the correlation coefficient indicates a weak relationship.

Child Stunting at the Community Level

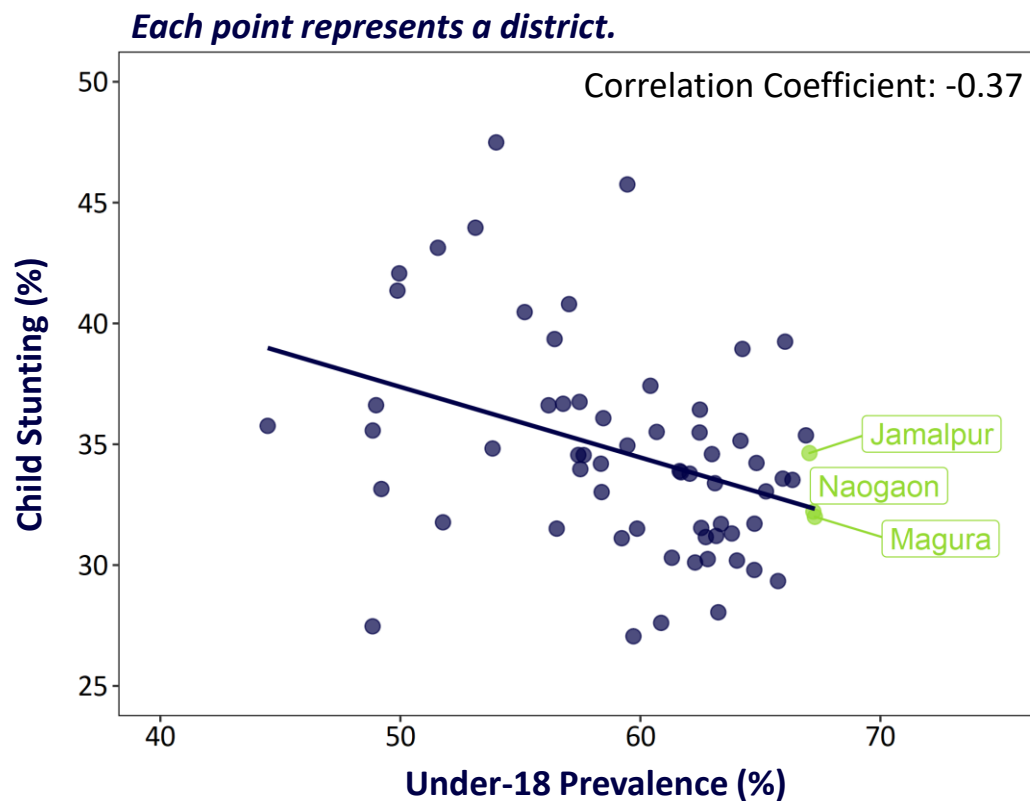


Percent of children under five who are stunted



Under 18 Prevalence

Child Stunting and Child Marriage Prevalence

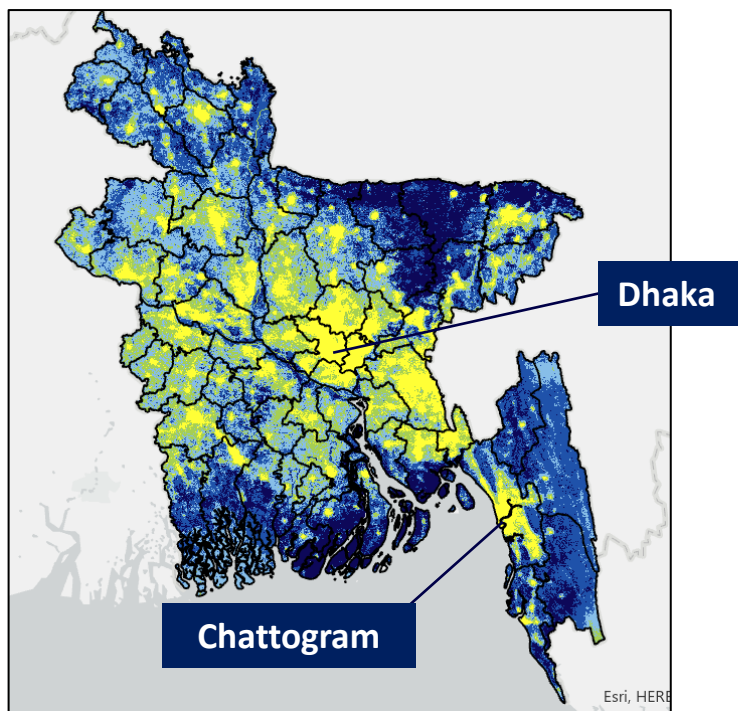


The y-axis intervals vary across indicators depending on the range of the values.

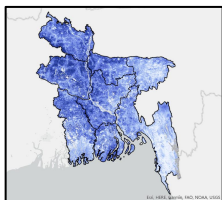
COMMUNITY CHARACTERISTICS || ELECTRICITY ACCESS

There is no clear relationship at the district level between access to electricity and child marriage.

Access to Electricity at the Community Level



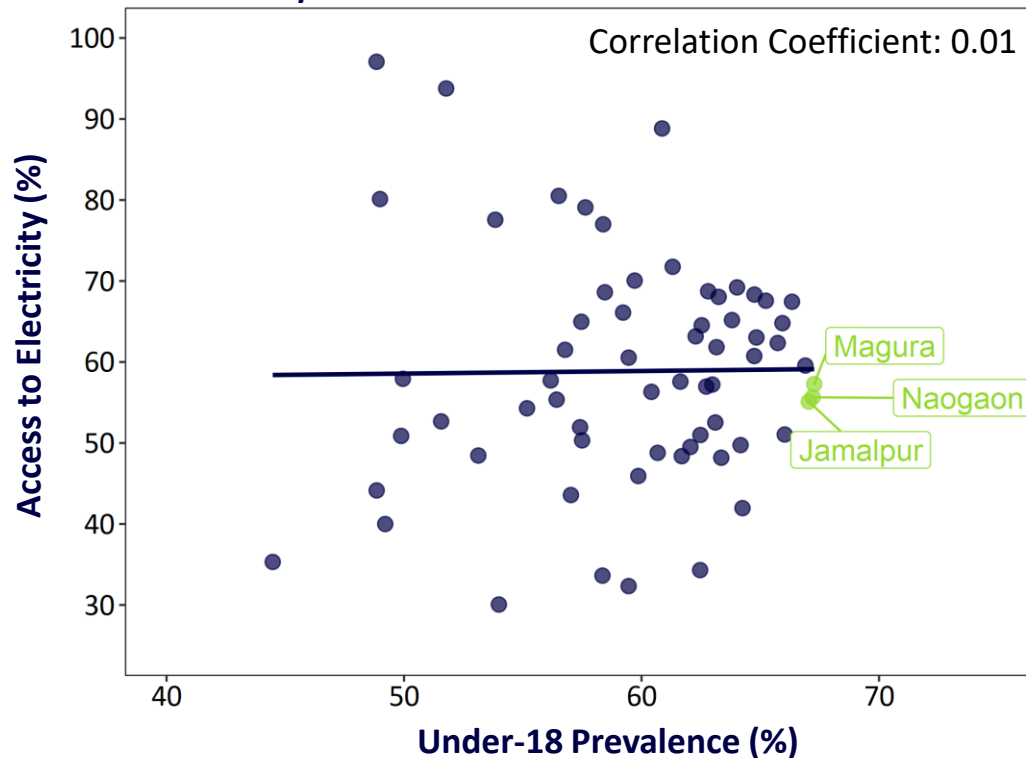
Percent of individuals that live in household with access to electricity



Under 18 Prevalence **City** Large cities

Access to Electricity and Child Marriage Prevalence

Each dot represents a district.

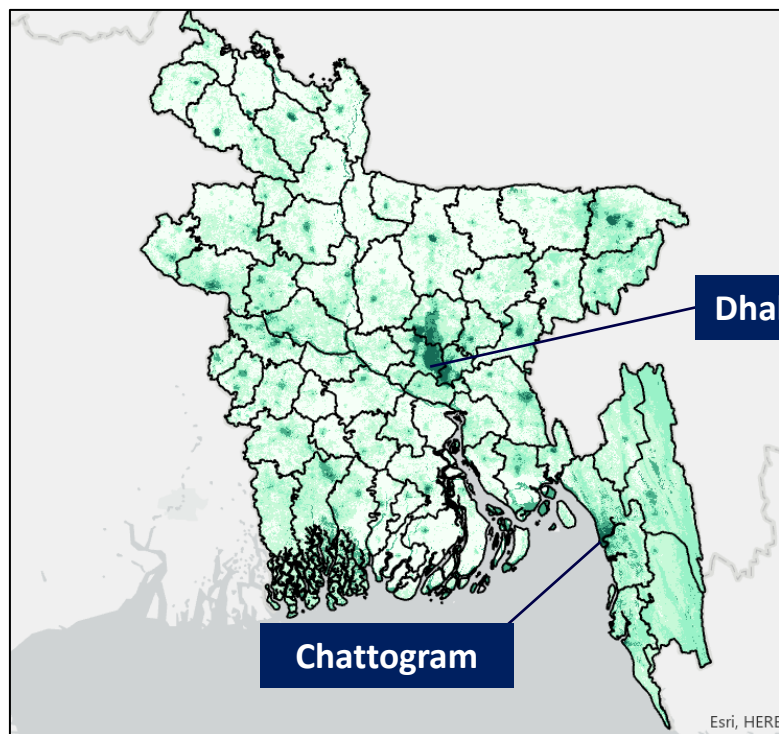


The y-axis intervals vary across indicators depending on the range of the values.

COMMUNITY CHARACTERISTICS || IMPROVED SANITATION

Most districts in Bangladesh have very limited access to a flush toilet. In general, there is higher prevalence of child marriage in districts with poorer sanitation.

Flush Toilet Access at the Community Level



Percent of individuals that live in a household with a flush toilet

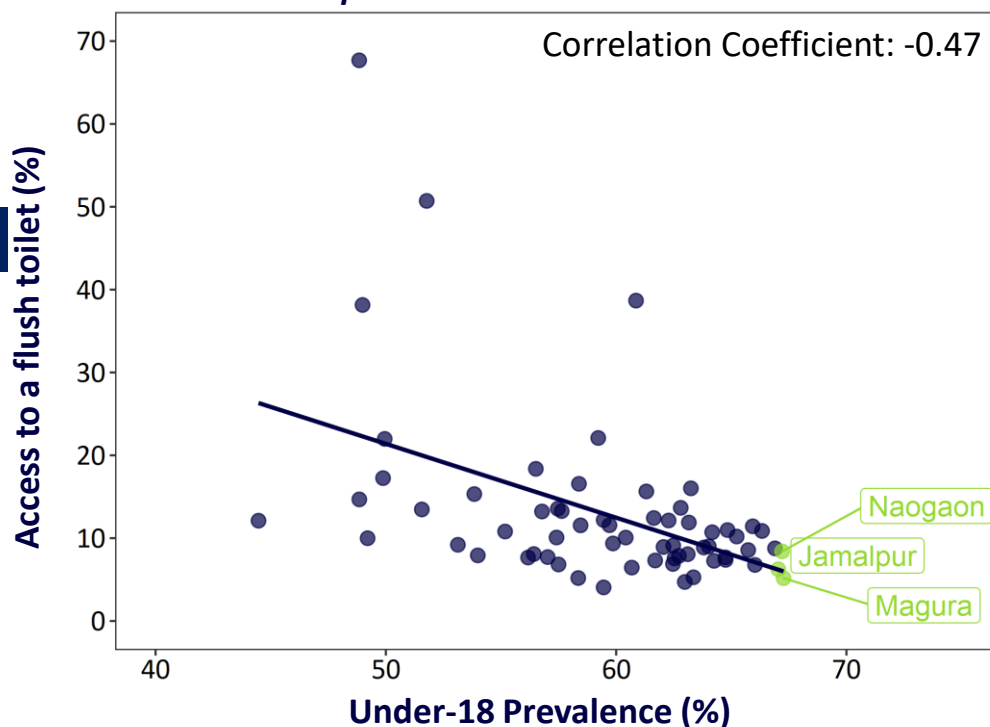


City Large cities

Under 18 Prevalence

Flush Toilet Access and Child Marriage Prevalence

Each dot represents a district.



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

COMMUNITY CHARACTERISTICS || KEY TAKEAWAYS

The direction and magnitude of some of the correlation coefficients between various community indicators and child marriage in Bangladesh do not align with previous expectations.

1

Modern contraceptive use is most strongly associated with child marriage, **whereas female educational attainment is one of the most weakly correlated indicators.**

2

The relationship between child marriage and the indicators of female employment and child stunting have **correlation coefficients that run counter to prior expectations.** With employment, this may indicate that the relationship may change based on the type of employment.

3

In areas with access to improved sanitation, rates of child marriage are lower. Access to electricity, however, is not related to child marriage.

Correlation Coefficient with Child Marriage Prevalence at the District Level	
Socioeconomic Characteristics	
Female Employment	0.37
Female Educational Attainment	-0.10
Health	
Modern Contraceptive Use	0.61
Child Stunting	-0.37
Infrastructure	
Access to Electricity	0.01
Access to Improved Sanitation	-0.47

**At-Risk
Population**

A vertical green line is positioned to the right of the text, extending from the top of the text area down to the bottom of the text area.

AT-RISK POPULATION || SECTION OVERVIEW

Fraym segmented the population of girls at risk of child marriage based on three potential risk factors: (i) pregnancy outside of marriage, (ii) poverty; and (iii) gender-equitable attitudes and behaviors.

- 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 Bangladesh.
- 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 at-risk population of girls aged 10 to 14 by isolating the high risk areas** across each of the risk profiles and calculating the total number of girls aged 10-14 that live in those communities.
- 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 of child marriage can help decision-makers better target program, policy, and advocacy efforts.

AT-RISK POPULATION || PREGNANCY & CHILD MARRIAGE (ANALYTIC FRAMEWORK)

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 Bangladesh is quite high – 47 percent of women aged 15 to 24 have given birth.

2

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 ¹	72%	25%	47%
Ever-married women ²	86%	54%	74%

Note 1: The 2014 Bangladesh DHS only enumerated ever-married women. To calculate statistics as a percentage of all women, the DHS uses an inflation factor. However, it is assumed that never-married women have never given birth.

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, Bangladesh DHS 2014

AT-RISK POPULATION || PREGNANCY & CHILD MARRIAGE (NATIONAL CONTEXT)

Among women who were married as children, 14 percent gave birth either before or within six months of marriage, which is large enough to suggest that pregnancy outside of marriage and child marriage may be related.

1 Only seven 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 27 months.¹

2 However, among women aged 20-24 who were married before age 18, 14 percent have given birth either before marriage or within six months of marriage. This relatively high proportion suggests pregnancy outside of marriage may be an important risk factor for child marriage in Bangladesh.

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	11%	4%	7%
Ever-married women ³	14%	9%	12%
Women who were married before age 18	14%	-	-

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. While the exclusion of women who become pregnant prior to marriage inflates the average interval, the fact that pre-marital pregnancy is uncommon in Bangladesh indicates that this inflation is likely quite small.

Note 2: The 2014 Bangladesh DHS only enumerated ever-married women. To calculate statistics as a percentage of all women, the DHS uses an inflation factor. However, it is assumed that never-married women have never given birth.

Note 3: 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, Bangladesh DHS 2014

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

The risk profile focuses on pregnancy outside of marriage, which includes giving birth either before or up until six months after marriage.

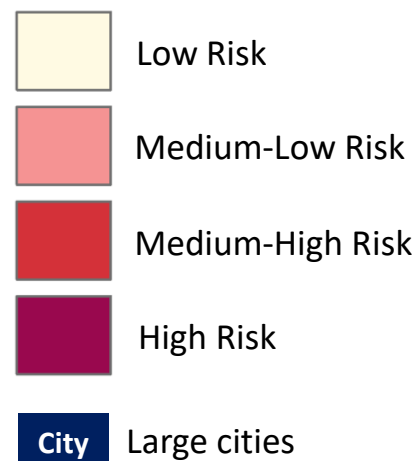
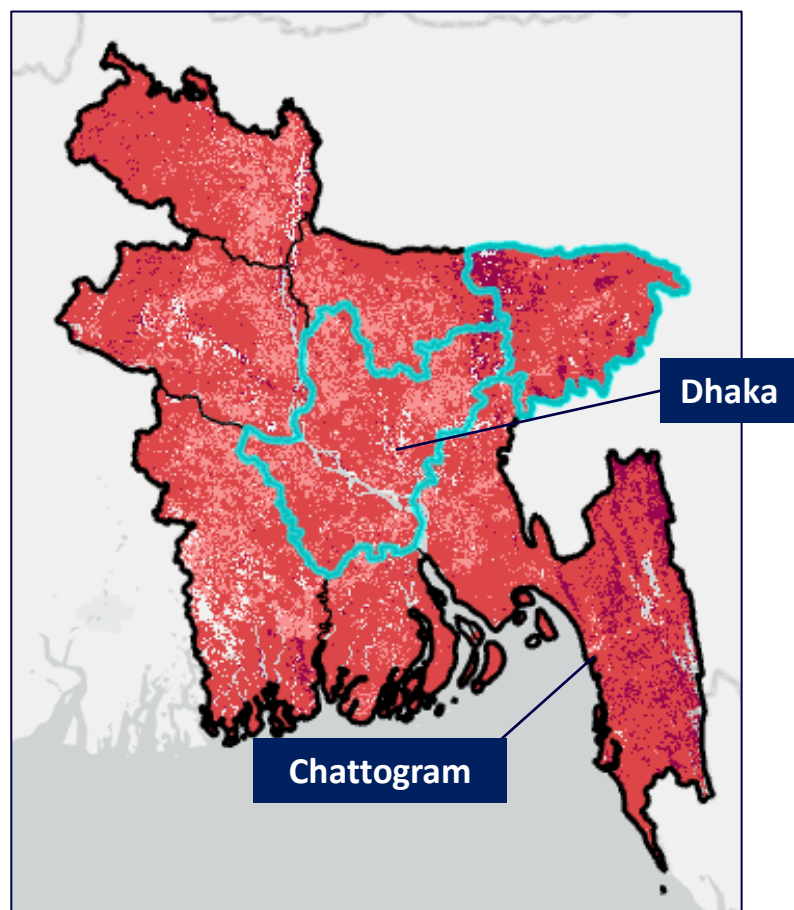
- 1 When considering a pregnancy profile measure, Fraym examined a range of possible approaches based upon the correlations between pregnancy and birth, sexual activity, and use of contraception indicators.
- 2 Based on expert feedback and analysis, Fraym focused on a single indicator – **the proportion of women aged 15 to 24 who experienced a pregnancy outside of marriage, which is defined as giving birth anytime before marriage or up until six months after marriage.**¹
- 3 Fraym then **estimated the selected indicator at the community level (1 km²) and classified communities into quartiles with risk categories ranging from 1 to 4.** Communities with higher rates of pregnancy outside of marriage are categorized as a 4 (“high risk”).
- 4 Finally, Fraym **estimated the number of *currently* at-risk girls** by calculating the total number of girls aged 10 to 14 who live in the communities with the highest risk of pregnancy outside of marriage (categorized as a 4).

Note 1: By definition, a women who experienced pregnancy outside of marriage is ever-married. Therefore, never-married women who gave birth are not considered to have experienced a pregnancy outside of marriage.

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

There are an estimated 328,000 girls aged 10-14 who live in communities where pregnancy outside of marriage represents a high risk. The population of at-risk girls is only four percent of the total population of girls aged 10-14.

Pregnancy Outside of Marriage Risk Category¹



Population of at-risk girls due to pregnancy outside of marriage, highlighted divisions²

Division	Total Number of girls aged 10-14
Dhaka	99,300
Sylhet	92,900

Note 1: The map shows the classification of pregnancy outside of marriage for each 1km² cell into quartiles. The pregnancy outside of marriage risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. See slide 39 or the appendix for more details. Areas with total population less than 10 people per 1km² are removed from the map.

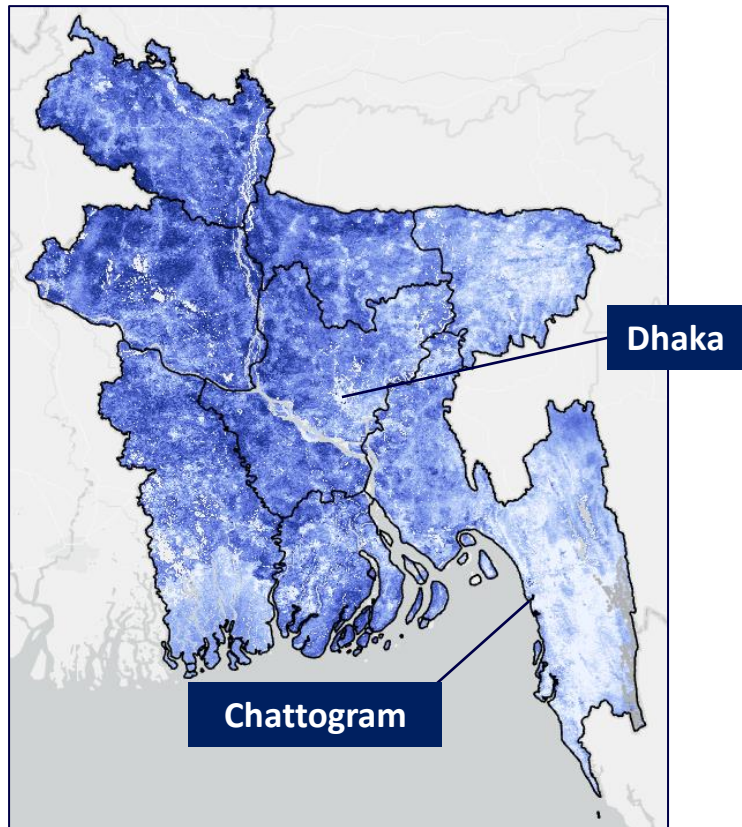
Note 2: At-risk girls are defined as girls at risk for child marriage, that is girls aged 10-14 who live in communities with a pregnancy outside of marriage risk category equal to 4 (highest risk).

Source: Fraym, Bangladesh DHS 2014, WorldPop 2020

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

Areas with a high prevalence of child marriage are concentrated in the northwest, whereas pregnancy outside of marriage is concentrated in small pockets in the east.

Child Marriage Prevalence



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

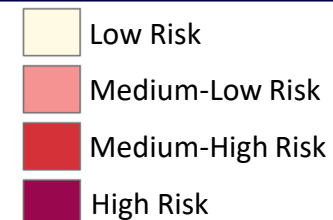
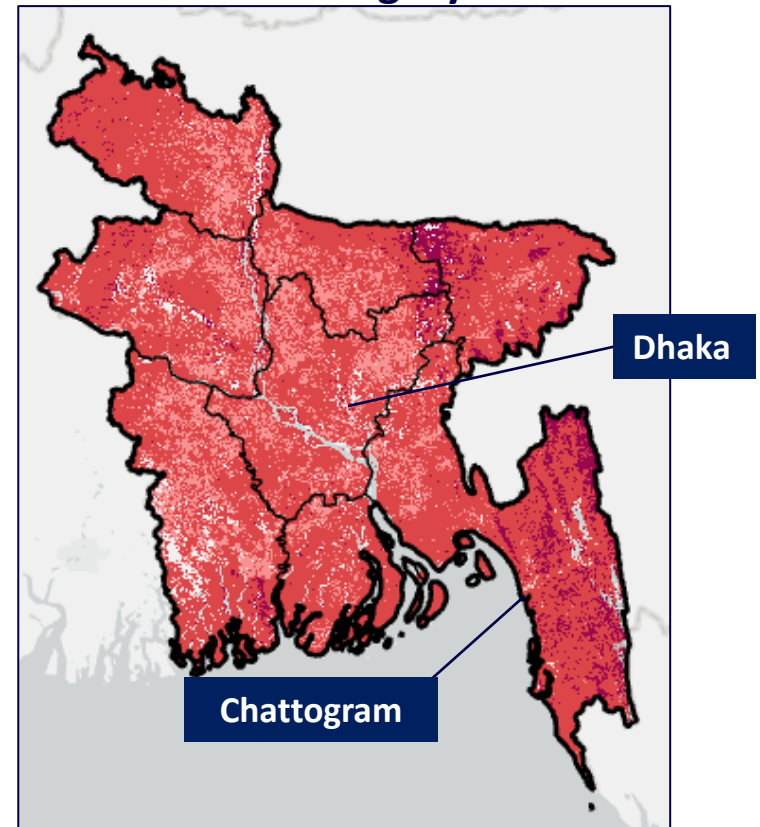


0%

70%+

City Large cities

Pregnancy Outside of Marriage Risk Category¹

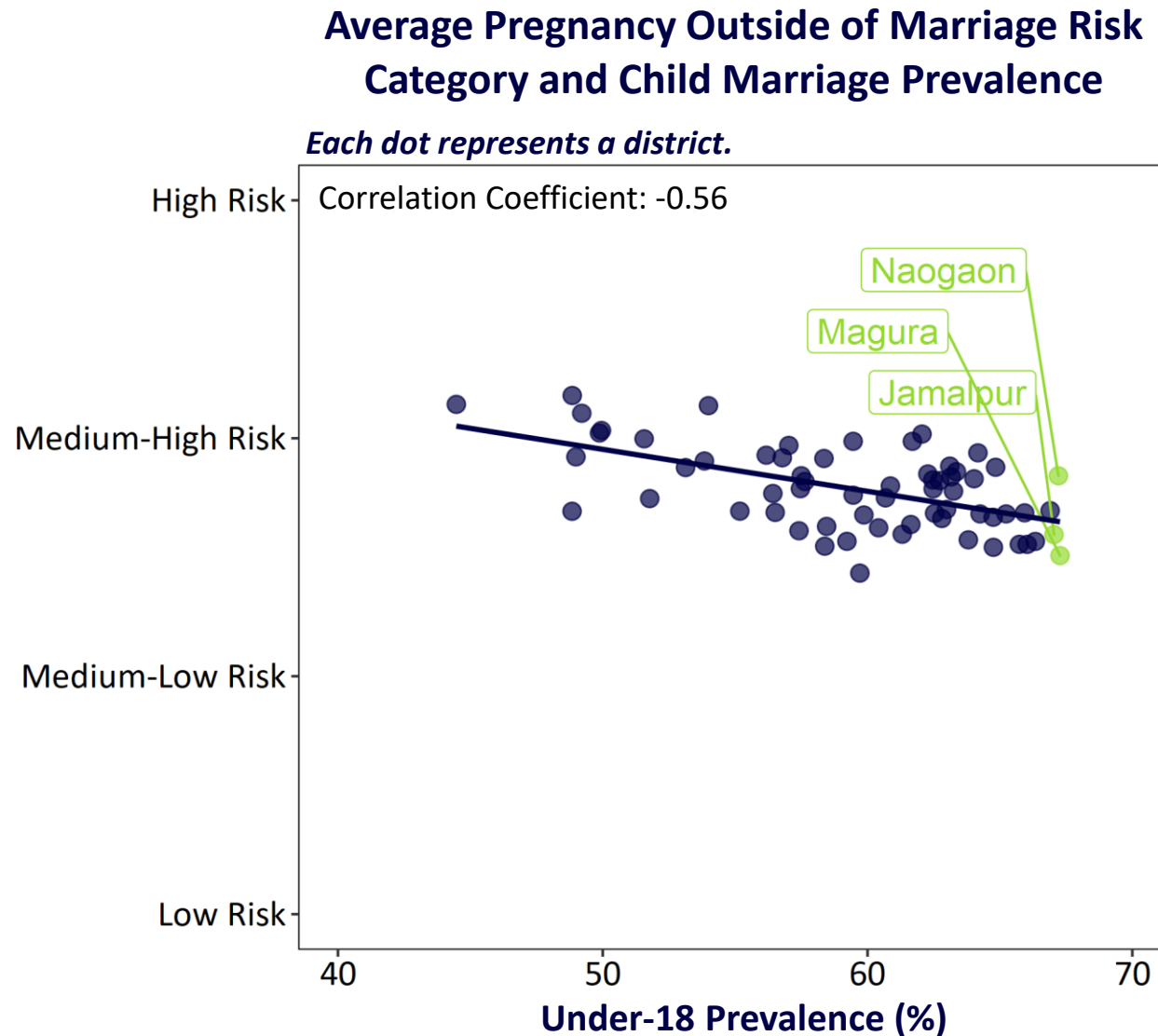


Note 1: The map shows the classification of pregnancy outside of marriage for each 1km² cell into quartiles. The pregnancy outside of marriage risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. See slide 39 or the appendix for more details. Areas with total population less than 10 people per 1km² are removed from the map.

Source: Fraym, Bangladesh DHS 2014, WorldPop 2020

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

Divisions with high prevalence tend to have lower average risk of child marriage due to pregnancy outside of marriage. However, there is not much variation in risk, as most districts are between medium-low and medium-high.



AT-RISK POPULATION || POVERTY AND CHILD MARRIAGE (ANALYTIC FRAMEWORK)

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

- 1 **Education:** 52 percent of household heads with daughters have not completed primary school.
- 2 **Employment:** About 22 percent of women aged 15-24 are employed, and nearly half of those who are employed work in unskilled manual labor or are self-employed in agriculture.^{1,2}

Poverty-related Indicators	
Education	
Household heads with daughters, and who have primary school or less	52%
Employment	
Women (aged 15-24) who are employed	22%
Employed women (aged 15-24) working in unskilled manual labor or self-employed in agriculture	48%

Note 1: Risk profile indicators, particularly wealth, are explained in more detail in the appendix.

Note 2: Based on expert consultations, Fraym identified employment in unskilled manual labor or self-employment in agriculture as low opportunity jobs, or jobs that are likely to have low pay and/or poor working conditions.

Note 3: The 2014 Bangladesh DHS does not enumerate men, so male employment cannot be calculated.

Source: Fraym, Bangladesh DHS 2014

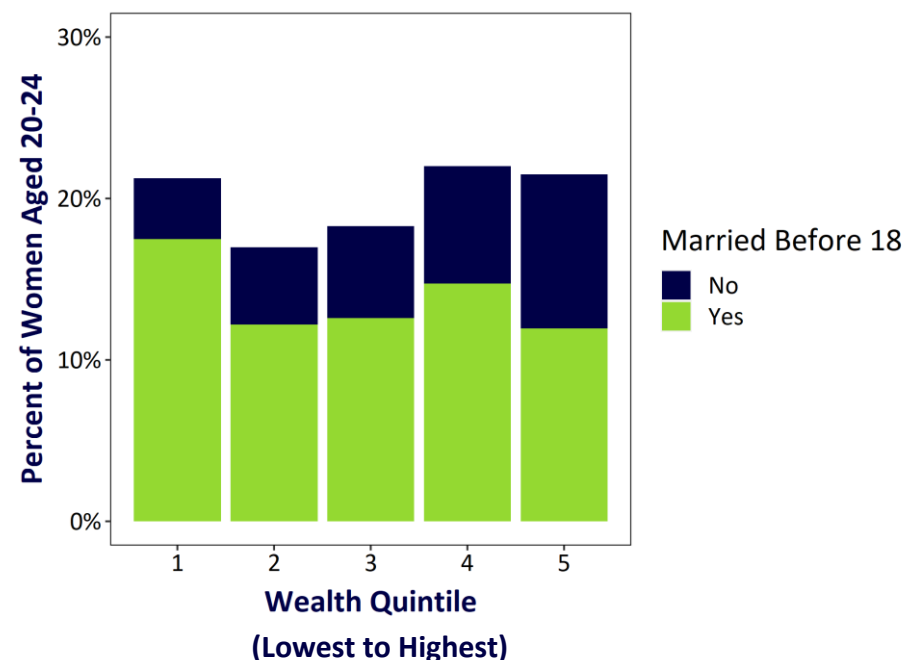
AT-RISK POPULATION || POVERTY AND CHILD MARRIAGE (NATIONAL CONTEXT)

In Bangladesh, women who were married as children are more likely to be employed, and if employed, working in unskilled manual labor or self-employment in agriculture as compared to all women in the same age range. Across wealth quintiles, a larger proportion of women aged 20-24 were married before 18.

Employment indicators for women aged 20-24

Indicator	All Women (aged 20-24)	Women (aged 20-24) who were married before age 18
Women who are employed	22%	30%
Employed women working in unskilled manual labor or self-employed in agriculture ²	48%	52%

Distribution of women aged 20-24 by wealth quintile and under-18 prevalence¹



Note 1: 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.

Note 2: Based on expert consultations, Fraym identified employment in unskilled manual labor or self-employment in agriculture as low opportunity jobs, or jobs that are likely to have low pay and/or poor working conditions.

Source: Fraym, Bangladesh DHS 2014

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

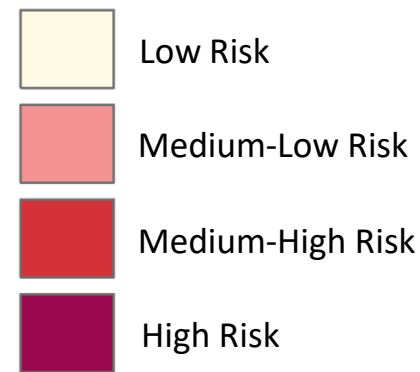
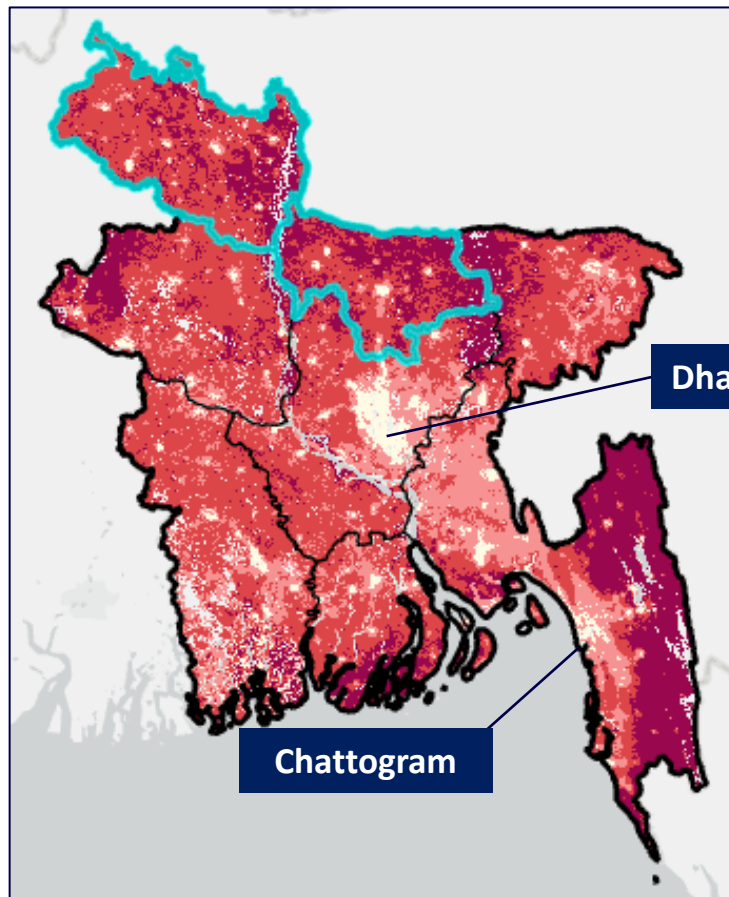
The poverty risk profile reflects a given community's wealth, employment and education levels and was calculated using principal component analysis.

- 1 Based on expert consultation, Fraym **selected three indicators to capture poverty**: (i) wealth; (ii) employment in unskilled manual labor or self-employment in agriculture for women aged 15 to 24; and (iii) educational attainment of the household head.
- 2 Due to differences in the survey design for Bangladesh as compared to other countries Fraym analyzed, Fraym modified the approach to the poverty profile by excluding employment of the household head because male employment is not available in the survey.
- 3 Fraym **combined the indicators into a poverty risk profile index using principal component analysis (PCA)** and estimated the index scores at the community level (1 km²).
- 4 Fraym then **classified communities into quartiles with risk categories ranging from 1 to 4**. Communities with higher risk 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 for child marriage (categorized as a 4).

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

Fraym categorized communities into quartiles to identify communities at a high risk for child marriage due to poverty. There are an estimated 1 million girls aged 10 to 14 who live in these high-risk communities.

Poverty Index Risk Category¹



City Large cities

Population of at-risk girls due to poverty, highlighted divisions²

Division	Population of at-risk girls (aged 10-14)
Mymensingh	249,000
Rangpur	228,600

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 45 or the appendix for more details. Areas with total population less than 10 people per 1km² are removed from the map.

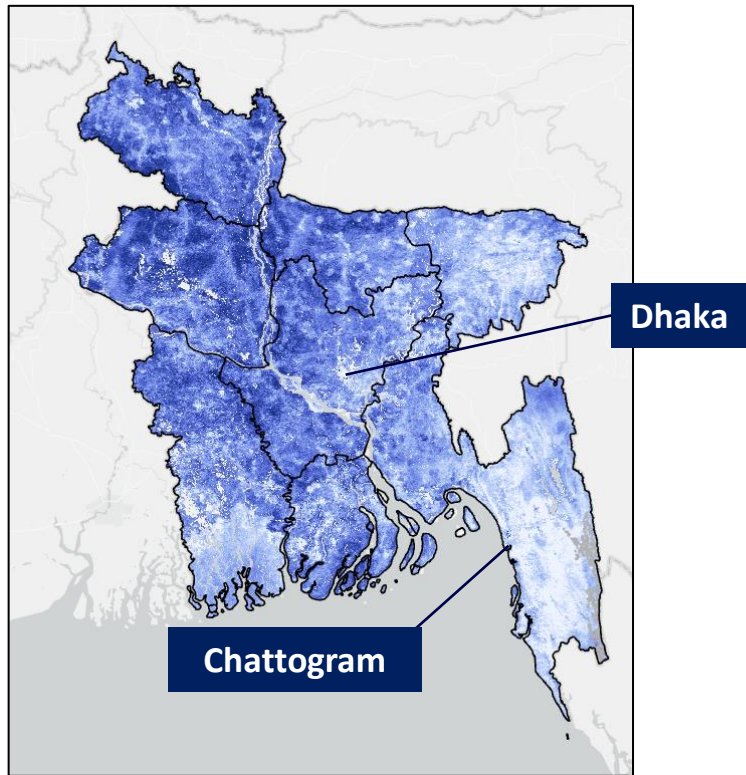
Note 2: At-risk girls are defined as girls at risk for child marriage, that is girls aged 10-14 who live in communities with a poverty index risk category equal to 4 (highest risk).

Source: Fraym, Bangladesh DHS 2014, WorldPop 2020

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

Communities with high under-18 child marriage prevalence are concentrated in the West, whereas communities categorized as having a high risk for child marriage due to poverty are mainly concentrated in the East.

Child Marriage Prevalence

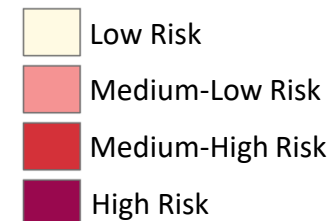
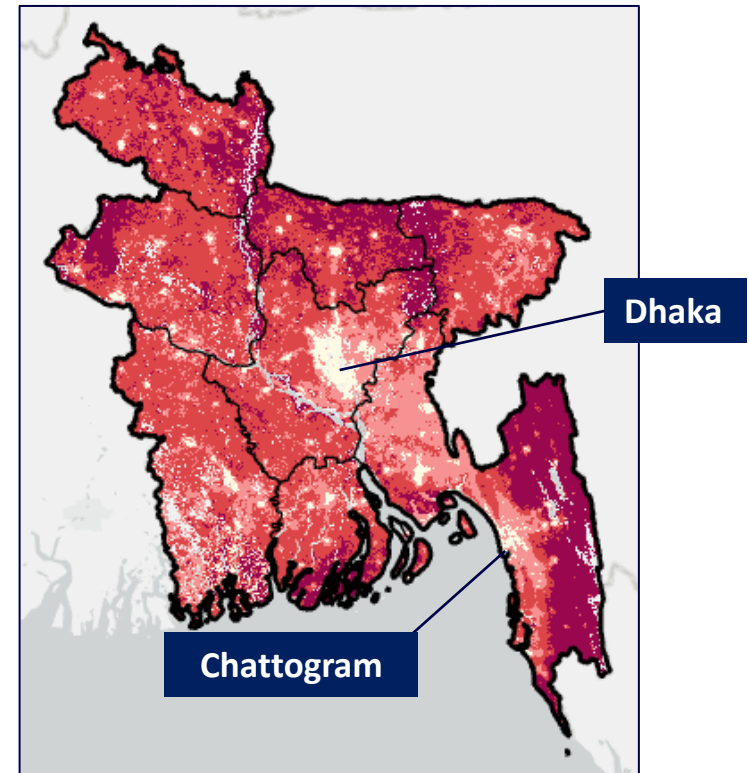


Percent of women (aged 20-24) who were married before 18



City Large cities

Poverty Index Risk Category¹



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 45 or the appendix for more details. Areas with total population less than 10 people per 1km² are removed from the map.

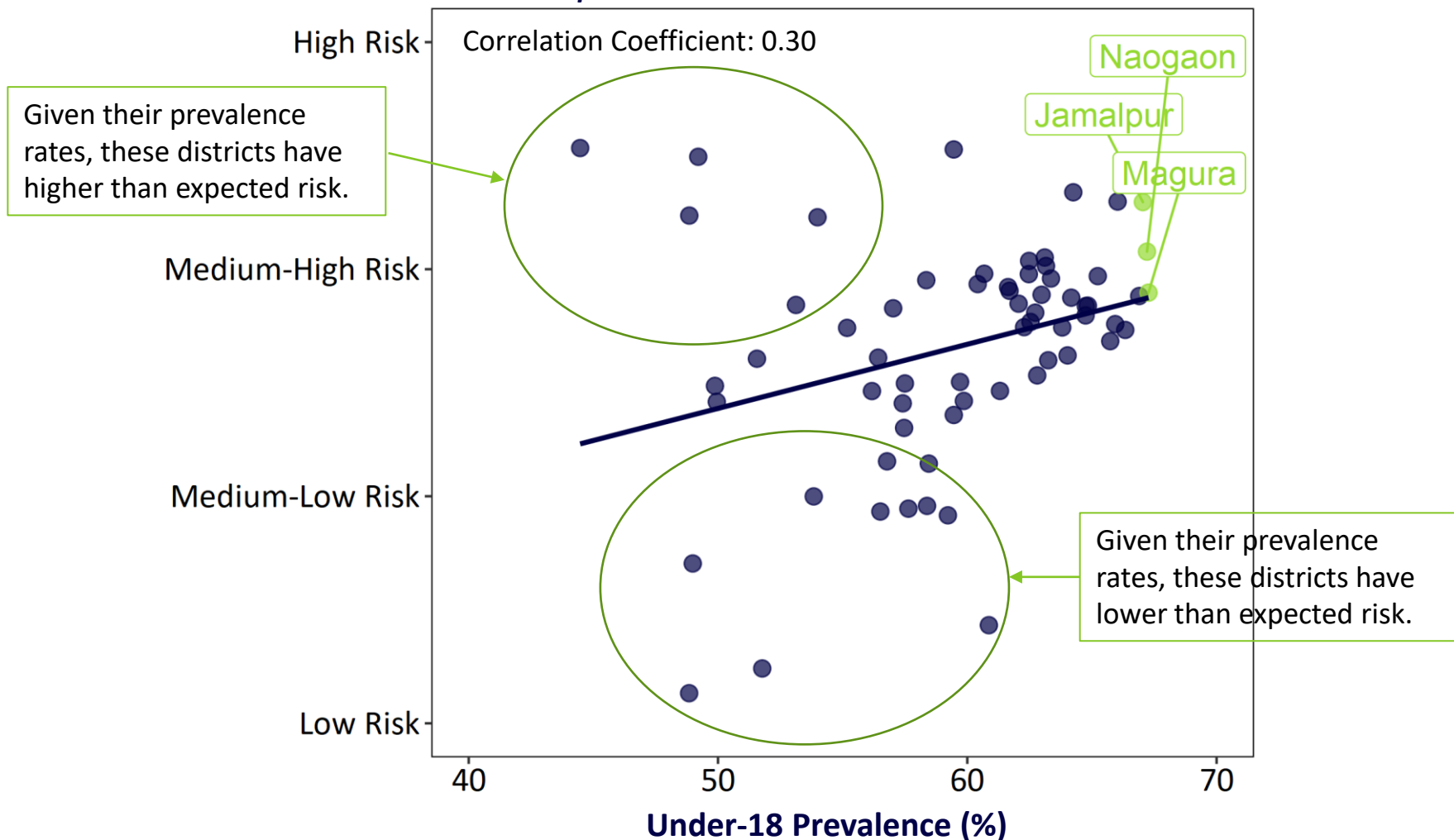
Source: Fraym, Bangladesh DHS 2014

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

There are several high prevalence districts that also are categorized as higher risk on the poverty index. Yet, the correlation coefficient indicates a weak relationship as evidenced by the handful of districts with similar prevalence rates, but varying risk.

Average Poverty Index Risk Category and Child Marriage Prevalence

Each dot represents a district.



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

- 1 To measure gender-equitable 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 higher rates of child marriage. In Bangladesh, roughly one out of every four women (aged 15-49) believe that there are situations wherein wife beating is justified.¹
- 3 Women’s greater participation in decision-making may imply empowerment, and thus may be related to lower rates of child marriage. In Bangladesh, nearly a quarter currently married women do not participate in any household decisions.

Attitudes and behaviors	
Attitudes towards Domestic Violence	
Believe that there is at least one reason that justifies wife beating	24%
Women’s Participation in Decision Making²	
Woman’s healthcare	65%
Large household purchases	61%
Visits to family	63%
All three decisions	47%
No decisions	22%

Note 1: The 2014 Bangladesh DHS does not enumerate men.

Note 2: 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.

Source: Fraym, Bangladesh DHS 2014

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

There is a very weak relationship between attitudes towards wife beating and child marriage prevalence, suggesting that attitudes towards wife-beating is not a key risk factor for child marriage in Bangladesh.

- 1 Fraym examined the correlation between attitudes towards wife beating and child marriage prevalence at the community level.
- 2 Given the weak correlation between child marriage prevalence and gender inequitable attitudes, as measured by attitudes towards wife beating, attitudes are an unlikely risk factor for child marriage.

Indicator	Description	Correlation Coefficient with under-18 child marriage prevalence ¹
Attitudes towards Domestic Violence		
Believe that there is at least one reason that justifies wife beating ²	Proportion of women (aged 15-49) who agree with at least one reason that a husband is justified in hitting or beating his wife	0.13

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.

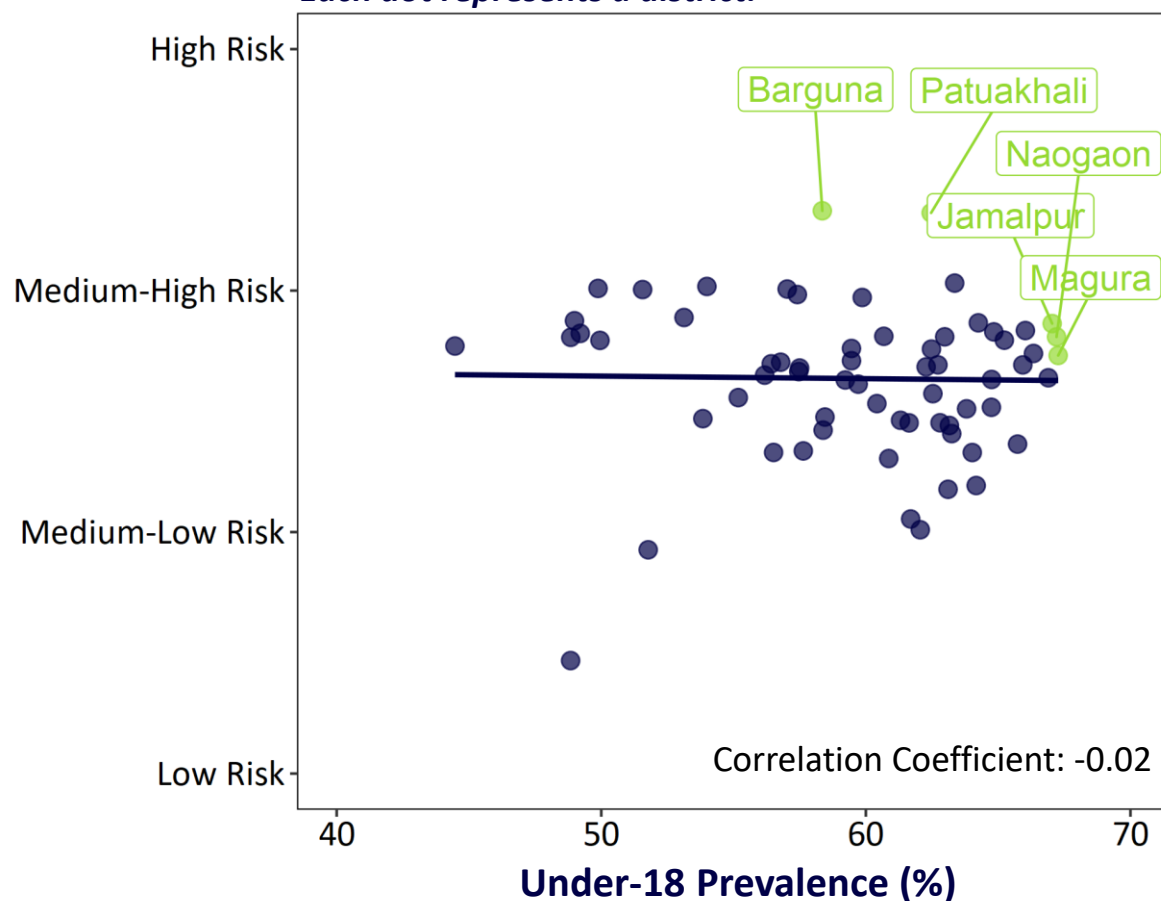
Source: Fraym, Bangladesh DHS 2014

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

Analysis at the district level further indicates there is no relationship between women's attitudes towards wife beating and child marriage prevalence.

Average Women's Attitudes towards Wife Beating Risk Category and Child Marriage Prevalence

Each dot represents a district.



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

Communities where women are more likely to report participating in decision-making tend to have lower child marriage prevalence.

- 1 Fraym examined the correlation between women's participation in decision-making and child marriage prevalence at the community level.
- 2 Communities with high prevalence rates tend to have low rates of women's participation in decision-making. The relationships between prevalence and decisions on large household purchases and women's healthcare are strongest.

Indicator	Description	Correlation Coefficient with under-18 child marriage prevalence
Women's Participation in Decision Making¹		
Woman's healthcare	Proportion of currently married women (aged 15-49) who make the decision about their healthcare alone or jointly with partner	-0.40
Large household purchases	Proportion of currently married women (aged 15-49) who make the decision about large household purchases alone or jointly with partner	-0.40
Visits to family	Proportion of currently married women (aged 15-49) who make the decision about visits to family alone or jointly with partner	-0.15
None of the decisions	Proportion of currently married women (aged 15-49) who make none of the three household decisions	0.05

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.

Source: Fraym, Bangladesh DHS 2014

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

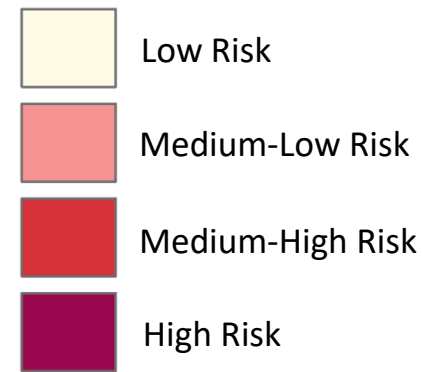
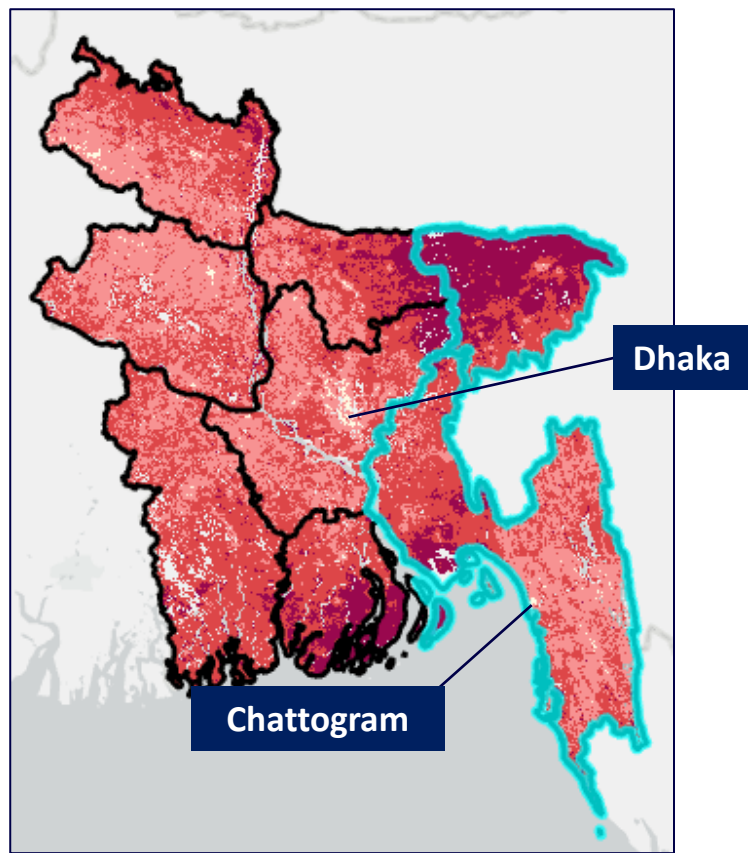
The decision-making risk profile reflects the lack of women's participation in several household decisions.

- 1 Fraym used **three indicators to assess women's participation in decision making in the household, including decisions on:** (i) woman's health care; (ii) large household purchases; and (iii) family visits.
- 2 Due to questionnaire differences and 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 three 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 million girls aged 10 to 14, or roughly 11 percent, who live in communities where women’s participation in decision-making represents a high-risk for child marriage. Most at-risk girls live in Sylhet and Chittagong.

Women’s Limited Participation in Decision-Making Risk Category¹



City Large cities

Population of at-risk girls due to women’s participation in decision-making, highlighted divisions²

Division	Population of at-risk girls (aged 10-14)
Sylhet	390,600
Chittagong	219,600

Note 1: The map shows the classification of currently married women aged 15 to 49 who report that they do not participate in any household decisions 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 slides 53 or the appendix for more details.

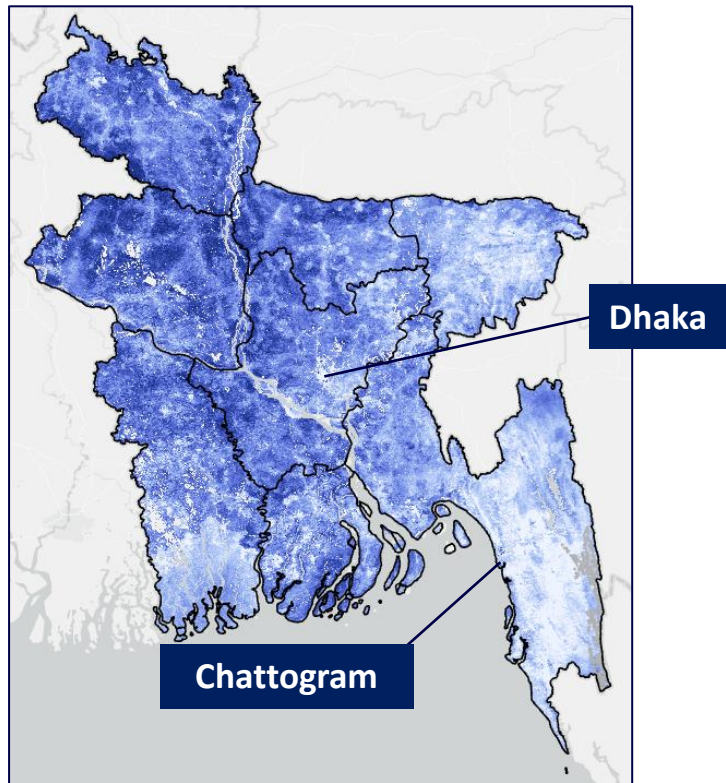
Note 2: At-risk girls are defined as girls at risk for child marriage, that is girls aged 10-14 who live in communities with a women’s participation in decision-making risk category equal to 4 (highest risk).

Source: Fraym, Bangladesh DHS 2014, WorldPop 2020

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

While communities with the most limited women's participation in decision-making are concentrated in Sylhet, child marriage prevalence rates are relatively lower in this region.

Child Marriage Prevalence



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

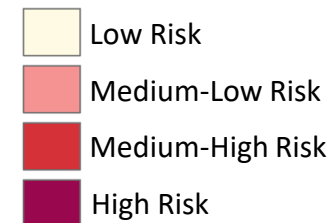
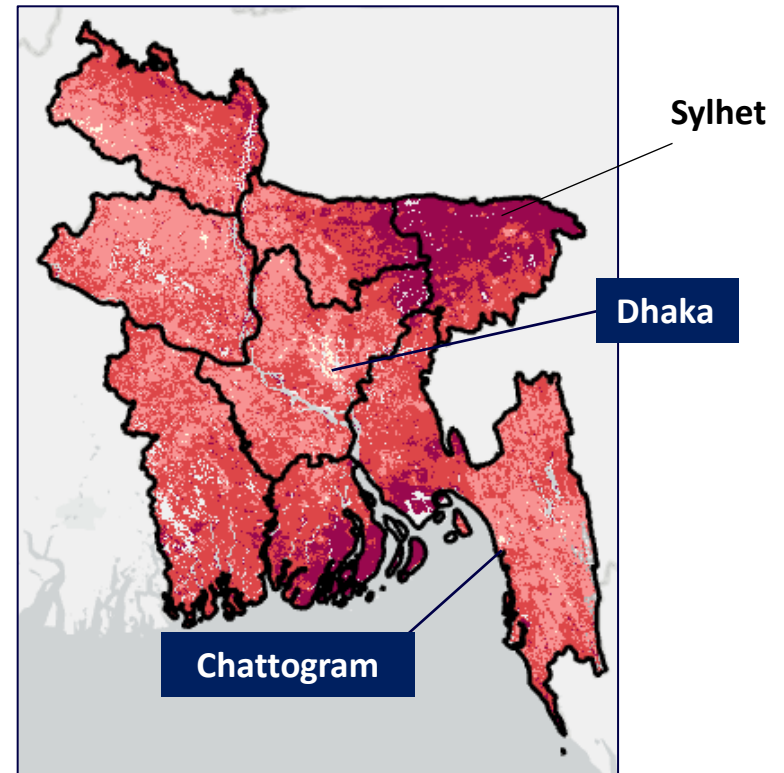


0%

70%+

City Large cities

Women's Limited Participation in Decision-Making Risk Category¹

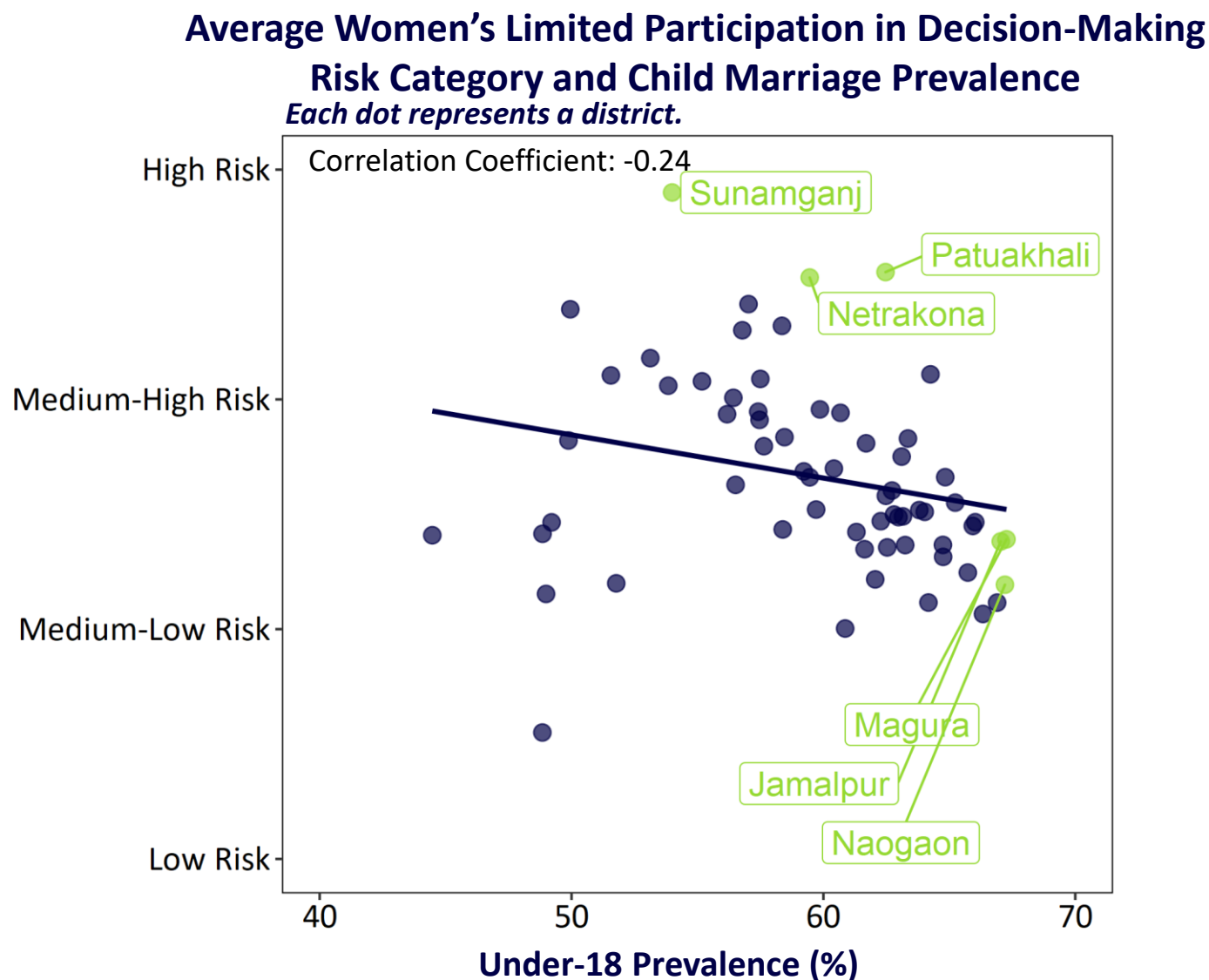


Note 1: The map shows the classification of currently married women aged 15 to 49 who do not participate in any household decisions for each 1km² cell into quartiles. The risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. Please see slides 53 or the appendix for more details.

Source: Fraym, Bangladesh DHS 2014, WorldPop 2020

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

Districts with higher child marriage prevalence tend to be categorized as lower risk for child marriage due to women's limited participation in decision-making. While counter to the expected direction of the relationship, the correlation coefficient is still small in magnitude.



AT-RISK POPULATION || TOTAL RISK ACROSS ALL PROFILES

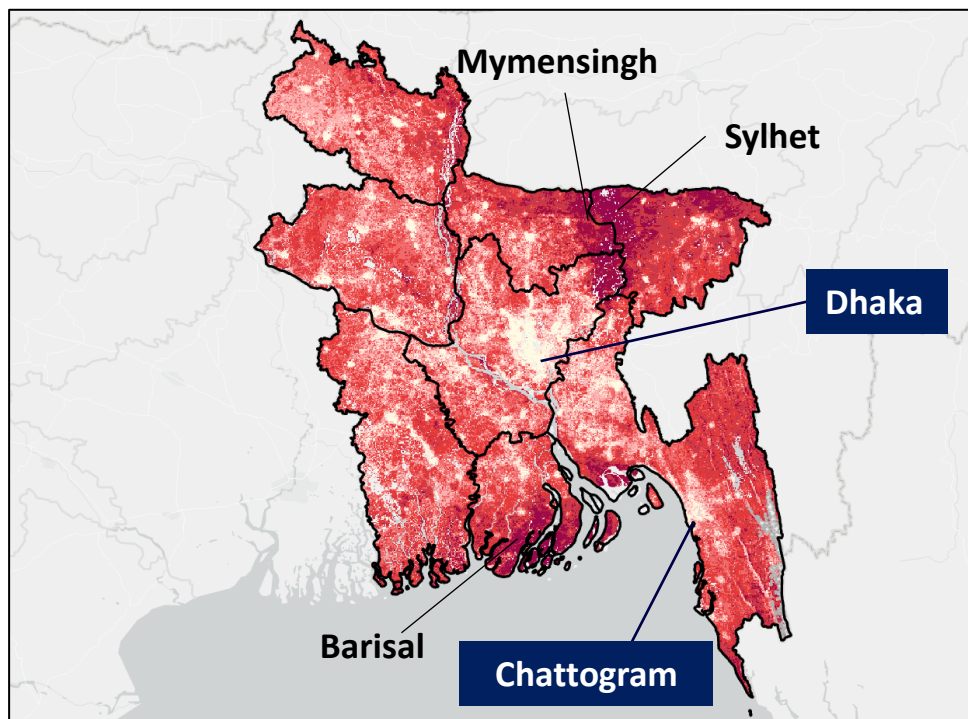
Fraym combined each risk factor profile to assess total risk at the community level.

- 1 Total risk is the sum of all risk factor profiles: pregnancy outside of marriage, poverty, and gender equitable attitudes and behaviors. Each profile is equally weighted.
- 2 The total risk categories range on a 4 to 16 scale, with 16 indicating the highest level of risk. Communities with a score of 16 are classified as high risk on all profiles.
- 3 Several communities are classified as high risk across all profiles. In the North, these communities are clustered along the border between Mymensingh and Sylhet. In the South, they lie on the coast of Barisal.

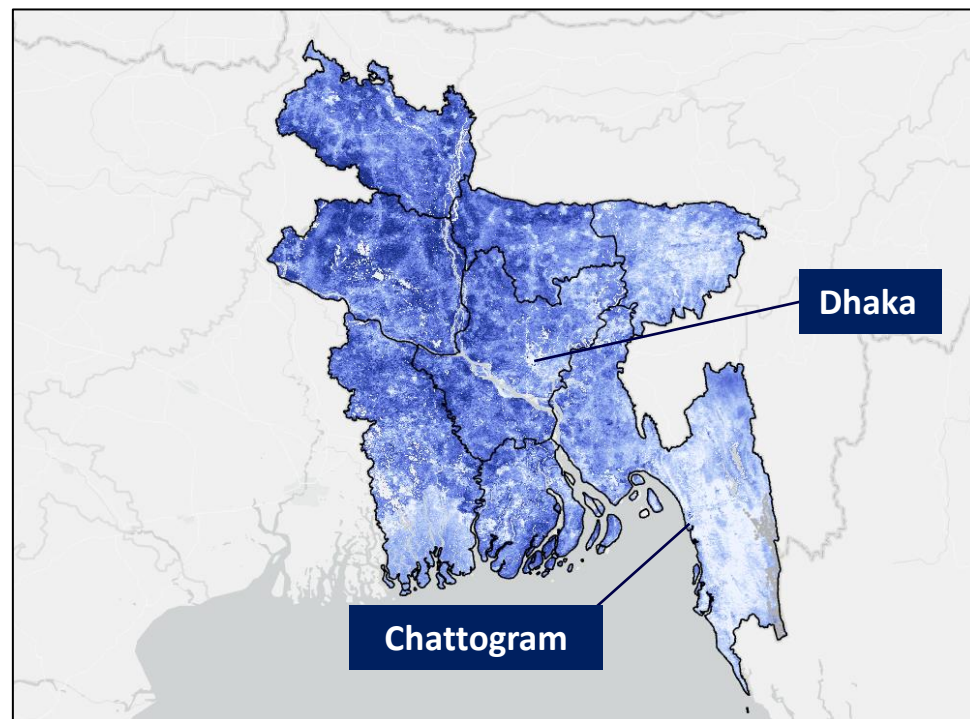
AT-RISK POPULATION || TOTAL RISK ACROSS ALL PROFILES

Pockets of communities in Mymensingh and Sylhet in the North and Barisal in the South are high-risk across all profiles. Yet, these areas do not have particularly high child marriage prevalence.

Total Risk



Child Marriage Prevalence



Total Risk



City Large cities

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



Note 1: The total risk categories range on a 4 to 16 scale, with 16 indicating the highest level of risk. The index is the sum of pregnancy outside of marriage, poverty, and gender equitable attitudes and decision-making, and equally weights each component.

Source: Fraym, Bangladesh DHS 2014, WorldPop 2020

AT-RISK POPULATION || KEY TAKEAWAYS

Across risk profiles, pregnancy is most strongly associated with child marriage at the district level, although the direction of the relationship is negative.

1

There are few communities where pregnancy represents a high risk for child marriage. Surprisingly, districts with higher under-18 prevalence tend to be classified as lower risk on pregnancy outside of marriage.

2

Communities with high poverty as defined by the index are concentrated in the northeast and Chittagong in the southeast. There are an estimated 1 million girls aged 10 to 14 who live in these high-risk communities.

3

Communities where decision-making behavior represents a high risk are located predominantly in Sylhet. There are an estimated 1 million girls aged 10 to 14 in communities where limited decision-making represents a high risk. Gender inequitable attitudes, as measured by women's attitudes towards wife beating, are not a strong risk factor for child marriage in Bangladesh.

4

Communities with the highest total risk do not consistently have the highest child marriage prevalence.

Hotspot Analysis



HOTSPOT ANALYSIS || SECTION OVERVIEW

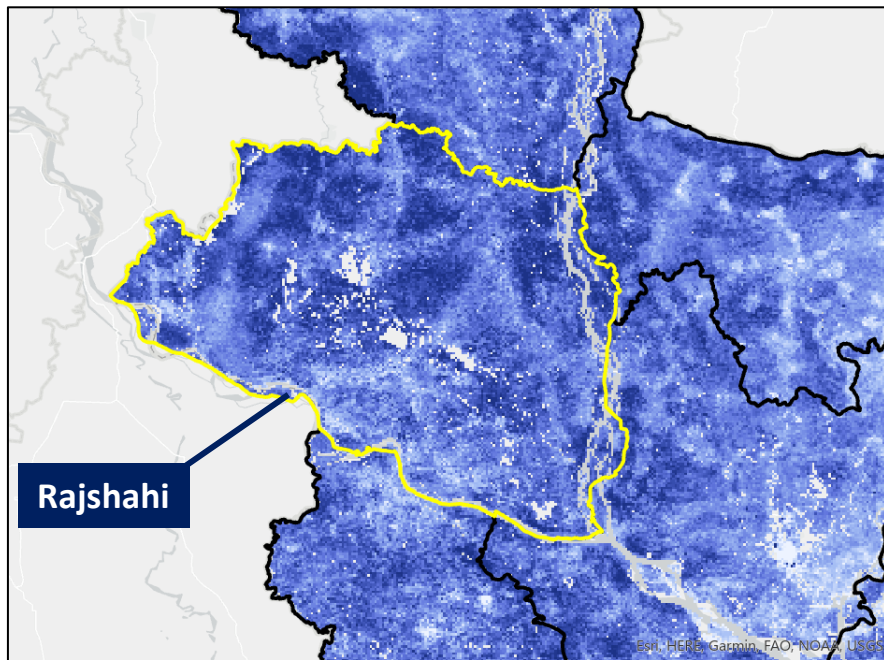
Bringing together the previous sections, Fraym identified two hotspots for child marriage: Rajshahi and Rangpur divisions.

- 1 Fraym defined hotspots as divisions with particularly high child marriage prevalence and/or burden, and high concentrations of risk factors for child marriage.
- 2 For each hotspot, Fraym zoomed into the division 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 The **Rajshahi** division has the highest under-18 and under-15 prevalence of child marriage in 2014, 65 percent and 29 percent, respectively. The division also has the most limited access to health care in the country, as evidenced by the health center to population ratio in the country, which is less than one health center per 100,000 people.
- 4 The **Rangpur** division has the second highest prevalence for both under-18 and under-15 child marriage, 63 percent and 27 percent, respectively. Like Rajshahi, the division also has one of the lower health center to population ratios in the country with less than one health center per person. Furthermore, more than quarter of girls aged 10 to 14 live in communities where poverty poses a high risk for child marriage.

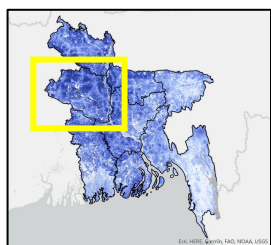
HOTSPOT ANALYSIS || RAJSHAHI DIVISION (OVERVIEW)

Rajshahi has the highest prevalence of both under-18 and under-15 marriage in the country.

Rajshahi has the highest prevalence of under-18 child marriage – 65%



Key Indicators	
Under-18 Prevalence	65%
Under-18 Burden	730,000
Percent of women (aged 15-49) who are employed	34%
Percent of women (aged 18-49) who completed primary education or higher	51%
Percent of women (aged 15-24) who are sexually active and use a modern contraceptive method	48%
Percent of individuals in a household with access to electricity	65%
Percent of individuals in a household with a flush toilet	12%



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



0%

70%+

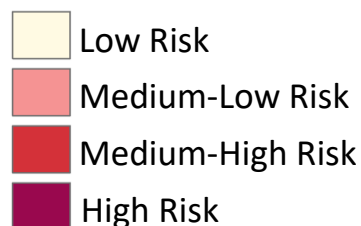
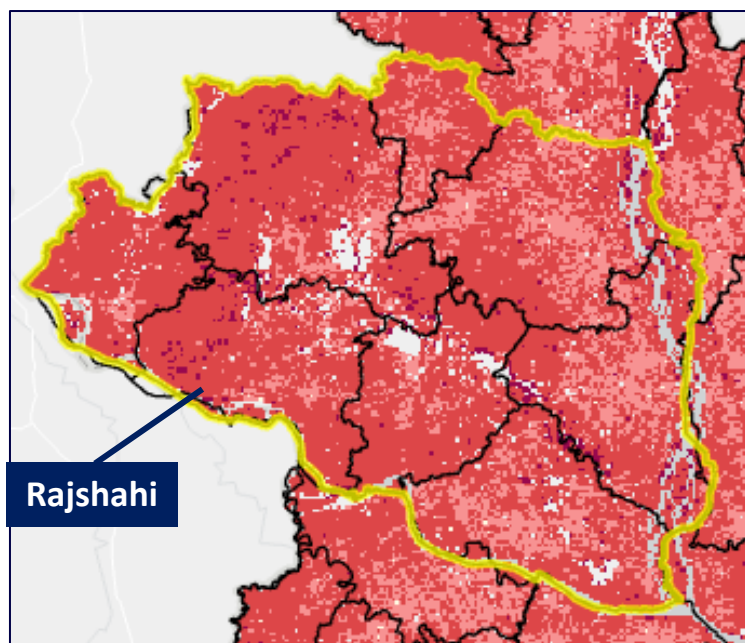
Under 18 Prevalence

City Division capital

HOTSPOT ANALYSIS || RAJSHAHI DIVISION (RISK PROFILE MAPPING)

In Rajshahi, many communities are in the high-risk category due to poverty. There are few communities where pregnancy outside of marriage is a high-risk factor for child marriage.

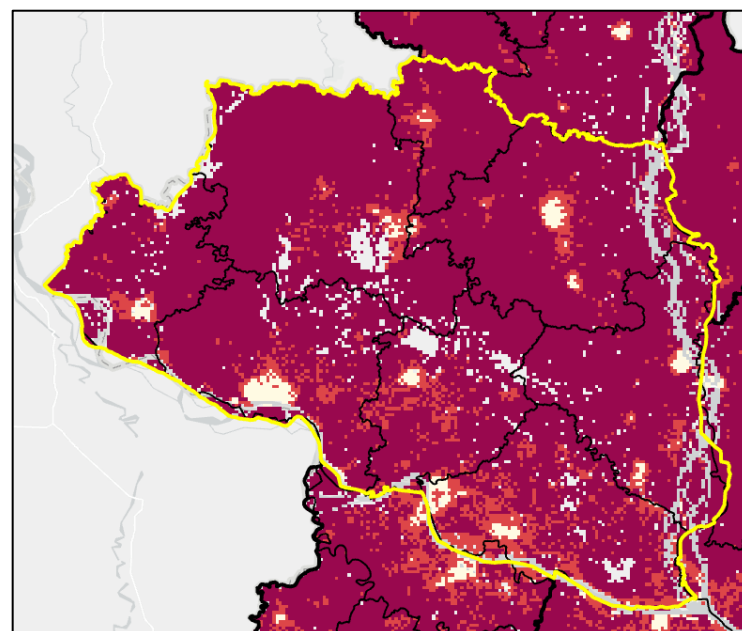
Pregnancy Outside of Marriage Risk Category¹



City Division capital

Population of at-risk girls (aged 10-14) due to pregnancy as a factor³ 21,400

Poverty Index Risk Category¹



Population of at-risk girls (aged 10-14) due to poverty as a factor³ 150,000

Note 1: The map shows the classification of pregnancy outside of marriage for each 1km² cell into quartiles. The pregnancy outside of marriage risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. See slide 39 or the appendix for more details.

Note 2: 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 45 or the appendix for more details.

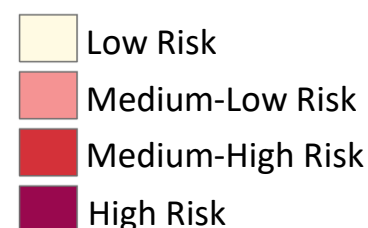
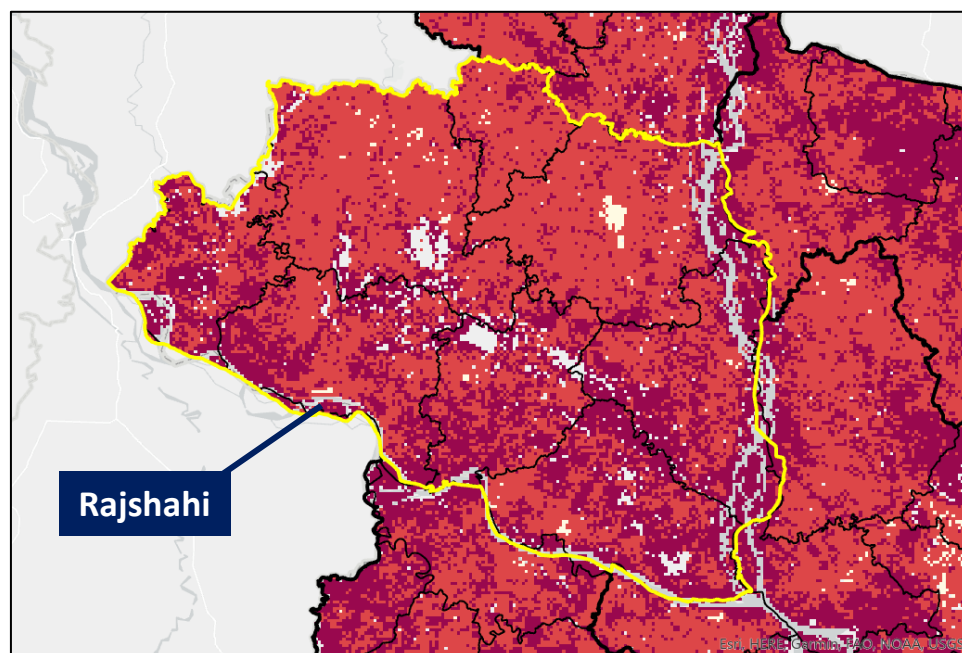
Note 3: At-risk girls are defined as girls at risk for child marriage, that is girls aged 10-14 who live in communities with a poverty index risk category or pregnancy outside of marriage risk category equal to 4 (highest risk).

Source: Fraym, Bangladesh DHS 2014, WorldPop 2020

HOTSPOT ANALYSIS || RAJSHAHI DIVISION (RISK PROFILE MAPPING)

Most communities in Rajshahi are categorized as medium-high risk for child marriage due to women's limited participation in decision-making.

Women's Limited Participation in Decision-Making Risk Category¹



City Division capital

Population of at-risk girls (aged 10-14) due to <u>decision-making</u> as a factor ²	16,300
---	--------

Note 1: The map shows the classification of currently married women aged 15 to 49 who report that they do not participate in any household decisions 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 slides 53 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 decision-making risk category equal to 4 (highest risk).

Source: Fraym, Bangladesh DHS 2014, WorldPop 2020

HOTSPOT ANALYSIS || RAJSHAHI DIVISION (INFRASTRUCTURE AND SERVICES)

While major roads run through many cities, some communities in Rajshahi, including high prevalence areas, may have limited major transportation infrastructure.

1

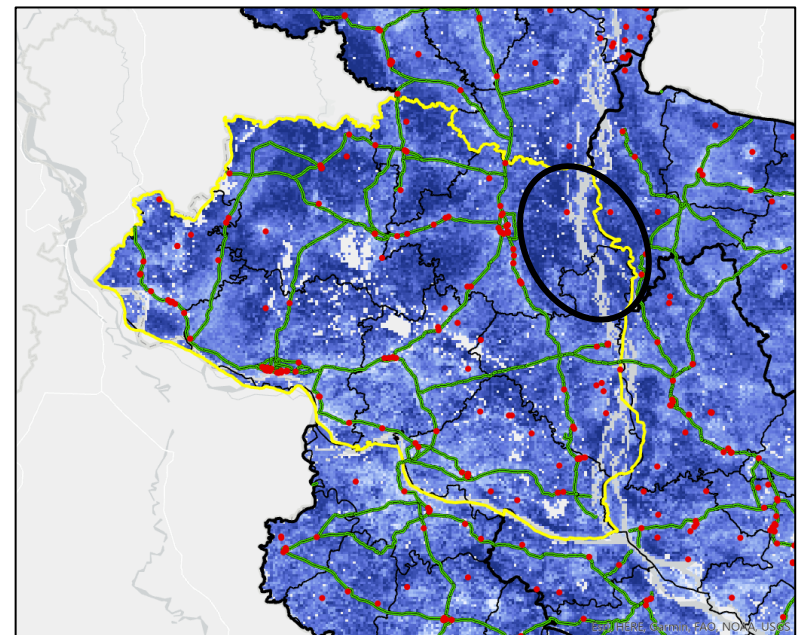
Many larger communities and health centers are connected by major roads. However, there are still many pockets of high prevalence communities that may have limited connectivity.

2

There are roughly 0.7 public health centers per 100,000 people, which is the lowest in the country. Health centers are evenly distributed throughout the division, apart from a small area in the east.

Infrastructure in Rajshahi

Major Roads¹ Health Centers²



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



Note 1: Major roads include motorways, trunk roads, and primary roads, which are the most important roads in a country's road network.

Note 2: Public health center data is from the Humanitarian Data Exchange: <https://data.humdata.org/dataset/bangladesh-healthsites>

Source: Fraym, Bangladesh DHS 2014, OpenStreetMaps, Humanitarian Data Exchange, and the Local Government Engineering Department (LGED) of Bangladesh.

HOTSPOT ANALYSIS || RAJSHAHI DIVISION (DISTRICT-LEVEL DATA)

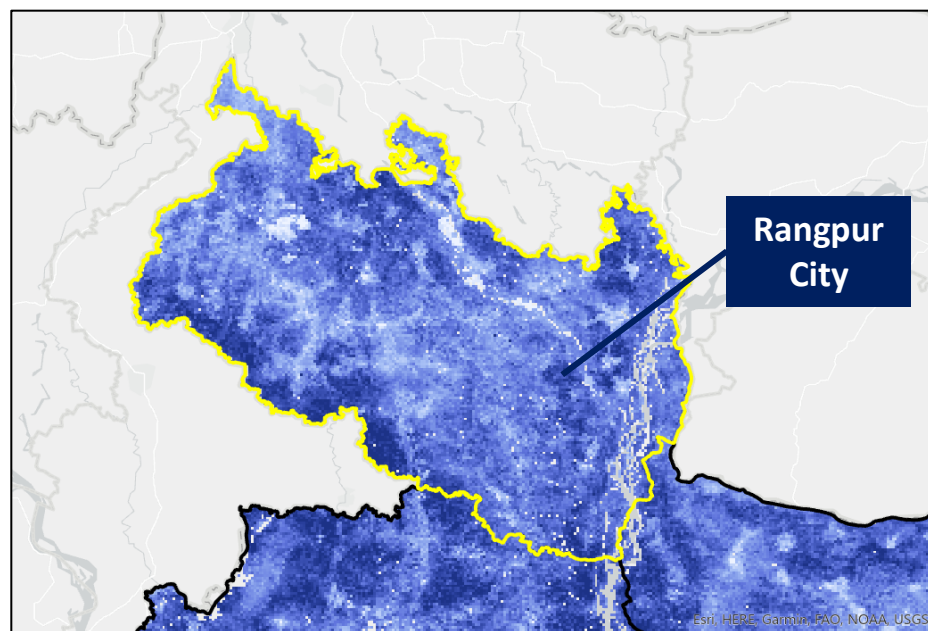
In Rajshahi, Naogaon district has the highest under-18 prevalence rate and the lowest female primary education rate in the division.

Indicator	Bogra	Joypurhat	Naogaon	Natore	Nawabganj	Pabna	Rajshahi	Sirajganj
Child Marriage								
Under-18 Prevalence	66%	67%	67%	62%	63%	63%	63%	65%
Population of At-Risk Girls (aged 10-14), by Profile								
Pregnancy	1,700	44	4,900	1,300	1,100	2,300	3,800	6,200
Poverty	13,100	2,900	34,400	2,600	32,200	5,600	13,700	42,800
Limited Decision-Making	1,500	230	340	100	2,500	1,900	670	7,900
Community Characteristics								
Total Population	3,870,000	970,000	2,870,000	1,970,000	1,930,000	2,980,000	3,080,000	3,770,000
Number of Health Centers Per 100,000 People	0.8	0.5	0.5	0.6	0.9	0.9	1	0.4
Percent of women (aged 15-49) who are employed	26%	34%	36%	38%	40%	34%	36%	33%
Percent of women (aged 18-49) who completed primary education or higher	51%	50%	48%	52%	50%	52%	53%	49%

HOTSPOT ANALYSIS || RANGPUR DIVISION (OVERVIEW)

Rangpur has the second highest under-18 prevalence rate. High prevalence areas are most concentrated in the southwest along the border with India (West Bengal) and the northeast.

Rangpur has the second highest prevalence of under-18 child marriage – 63%



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

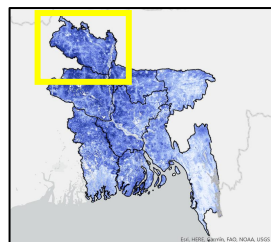


0%

70%+

Key Indicators

Under-18 Prevalence	63%
Under-18 Burden	575,000
Percent of women (aged 15-49) who are employed	33%
Percent of women (aged 18-49) who completed primary education or higher	27%
Percent of women (aged 15-24) who are sexually active and use a modern contraceptive method	50%
Percent of individuals in a household with access to electricity	50%
Percent of individuals in a household with a flush toilet	9%



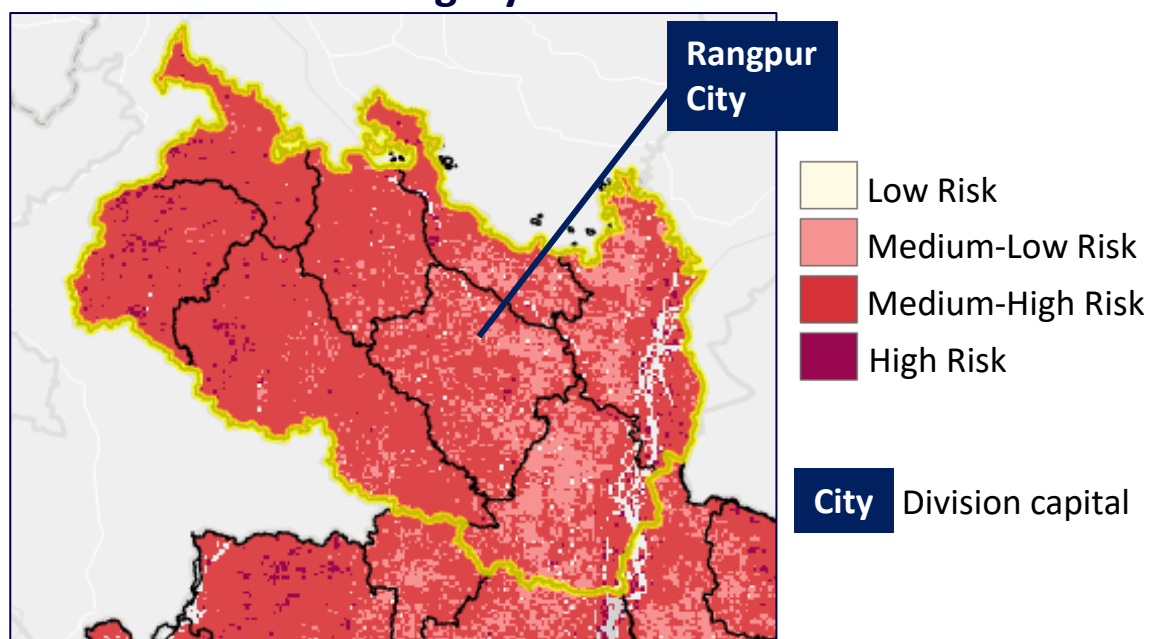
Under 18 Prevalence

City Division capital

HOTSPOT ANALYSIS || RANGPUR DIVISION (RISK PROFILE MAPPING)

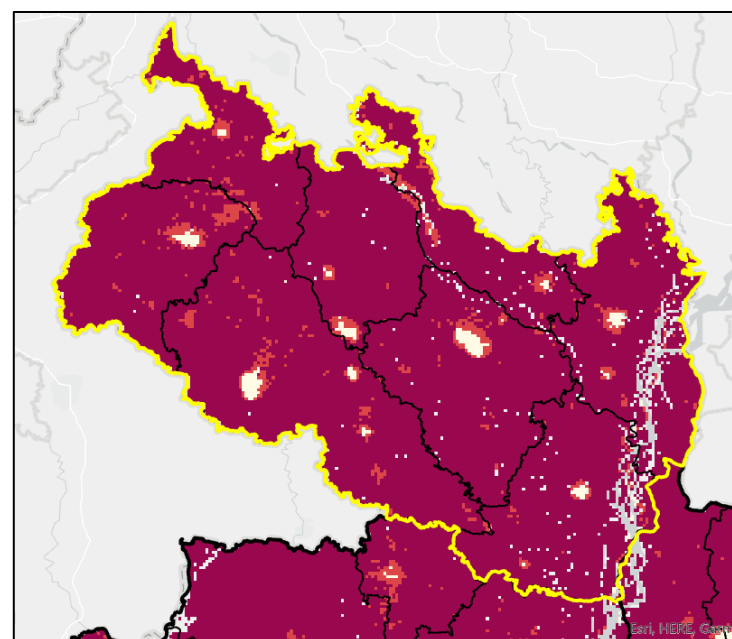
Rangpur has the second highest population of at-risk girls due to poverty as a risk factor for child marriage among all divisions in Bangladesh. There are few communities where pregnancy represents a high-risk for child marriage.

**Pregnancy Outside of Marriage
Risk Category¹**



Population of at-risk girls (aged 10-14) due to pregnancy as a factor 16,000

Poverty Index Risk Category²



Population of at-risk girls (aged 10-14) due to poverty as a factor 229,000

Note 1: The map shows the classification of pregnancy outside of marriage for each 1km² cell into quartiles. The pregnancy outside of marriage risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. See slide 39 or the appendix for more details.

Note 2: 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 45 or the appendix for more details.

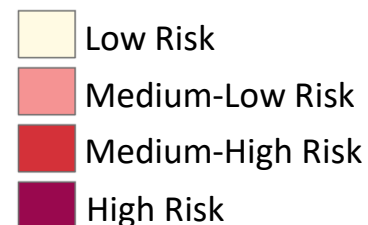
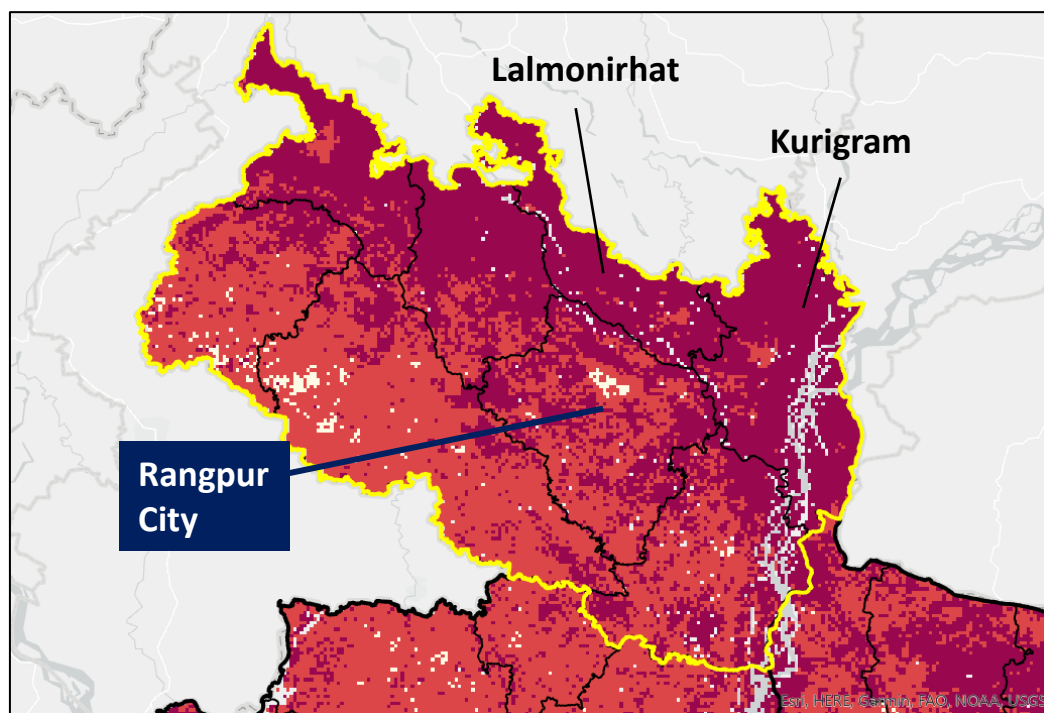
Note 3: At-risk girls are defined as girls at risk for child marriage, that is girls aged 10-14 who live in communities with a poverty index risk category or pregnancy outside of marriage risk category equal to 4 (highest risk).

Source: Fraym, Bangladesh DHS 2014, WorldPop 2020

HOTSPOT ANALYSIS || RANGPUR DIVISION (RISK PROFILE MAPPING)

Lalmonirhat and Kurigram districts are categorized as high-risk for child marriage due to women's limited participation in decision-making.

Women's Limited Participation in Decision-Making Risk Category²



City Division capital

Population of at-risk girls (aged 10-14) due to decision-making as a factor² 42,800

Note 1: The map shows the classification of currently married women aged 15 to 49 who report that they do not participate in any household decisions 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 slides 53 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 decision-making risk category equal to 4 (highest risk).

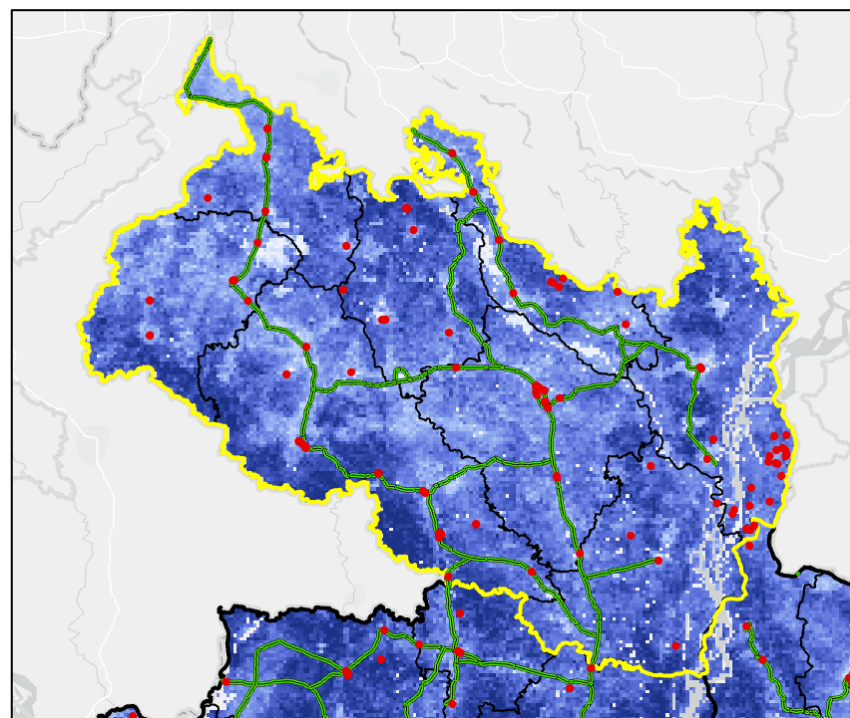
Source: Fraym, Bangladesh DHS 2014, WorldPop 2020

HOTSPOT ANALYSIS || RANGPUR DIVISION (INFRASTRUCTURE AND SERVICES)

Although 17.5 million people live in Rangpur, there are a limited number of health centers and major roads, especially in the west.

Infrastructure in Rangpur

Major Roads¹ Health Centers²



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



1

There is some major road infrastructure throughout Rangpur, which runs through most major cities. However, many communities in the west have high prevalence and limited transportation access and are disconnected from major roadways.

2

There are roughly 0.7 public health centers per 100,000 people, which is the second lowest in the country. Lack of access to health services could have negative implications for women married as children.

Note 1: Major roads include motorways, trunk roads, and primary roads, which are the most important roads in a country's road network.

Note 2: Public health center data is from the Humanitarian Data Exchange. <https://data.humdata.org/dataset/bangladesh-healthsites>

Source: Fraym, Bangladesh DHS 2014, OpenStreetMaps, Humanitarian Data Exchange, and the Local Government Engineering Department (LGED) of Bangladesh.

HOTSPOT ANALYSIS || RANGPUR DIVISION (DISTRICT-LEVEL DATA)

In Rangpur, Gaibandha district has the highest under-18 prevalence rate, and the second largest number of at-risk girls for poverty.

Indicator	Dinajpur	Gaibandha	Kurigram	Lalmonirhat	Nilphamari	Panchagarh	Rangpur	Thakurgaon
Child Marriage								
Under-18 Prevalence	64%	66%	64%	61%	63%	62%	62%	62%
Population of At-Risk Girls (aged 10-14), by Profile								
Pregnancy	4,400	1,500	2,800	1,200	1,100	800	500	3,600
Poverty	21,300	54,600	62,000	10,100	30,700	3,700	38,300	7,300
Limited Decision-Making	1,200	3,000	26,300	3,800	6,000	710	280	1,300
Community Characteristics								
Total Population	3,300,000	2,750,000	2,460,000	1,420,000	2,020,000	1,120,000	3,260,000	1,560,000
Number of Health Centers Per 100,000 People	1	0.2	1	0.7	0.5	0.7	1	0.5
Percent of women (aged 15-49) who are employed	36%	33%	31%	27%	33%	31%	34%	38%
Percent of women (aged 18-49) who completed primary education or higher	50%	44%	41%	46%	47%	48%	49%	48%

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.

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.
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.
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.

APPENDIX || DEFINITIONS

Indicator	Description
Risk Profiles	
Pregnancy Outside of Marriage	Pregnancy outside of marriage is defined as the percent of women aged 15 to 24 who experienced a pregnancy outside of marriage, which includes women who have given birth before marriage or up until six months after marriage. By definition, a women who experienced pregnancy outside of marriage is ever-married. Therefore, never-married women who gave birth are not considered to have experienced a pregnancy outside of marriage. The pregnancy outside of marriage risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk.
Poverty	Fraym selected three indicators to capture child marriage related poverty: (i) wealth index; (ii) employment in unskilled manual labor or self-employment in agriculture for women aged 15 to 24; and (iii) educational attainment of the household head. Fraym then combined these indicators using principal components analysis (PCA) to produce an index. Fraym estimated the risk scores at the community level, then categorized into quartiles. The poverty index risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. Due to differences in the survey design for Bangladesh as compared to other countries Fraym analyzed, Fraym modified the approach to the poverty profile by excluding household head employment because male employment is not available in the survey.
Attitudes towards Wife Beating	Attitudes towards wife beating is defined as the percent of women aged 15 to 49 who agree with at least one reason that a husband is justified in hitting or beating his wife. Women 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. Men were not enumerated in the Bangladesh DHS, and therefore this profile only captures women’s attitudes. 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 three major household decisions: (i) woman’s health care; (ii) large household purchases; and (iii) visits to family. Due to differences in the survey design for Bangladesh 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.

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 2014 Bangladesh Demographic and Health Survey (DHS), 2011 DHS, and 2007 DHS. The Bangladesh surveys enumerate ever-married women, and therefore requires the use of an inflation factor to calculate proportions for all women.

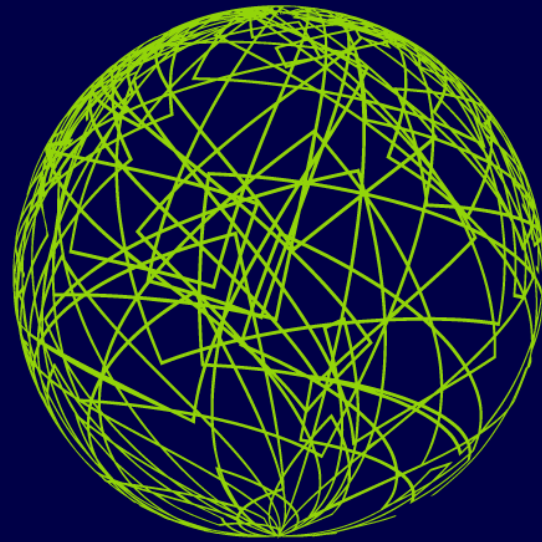
Additionally, granular population distribution data comes from WorldPop, a publicly available and detailed population distribution and composition data source that leverages existing census data to produce 100m x 100m resolution estimates of population density. In order to build its datasets, WorldPop 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 for the community context indicators and risk profiles. For prevalence and burden, population data corresponding to the year of the survey was used (2014, 2011, and 2007).

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 Bangladesh, the surveys were implemented by the National Institute of Population Research and Training with financial, technical, and managerial support by large **internationally respected organizations**, including the US Agency for International Development. 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.



fraym

Contact:

info@fraym.io

+1.202.869.0878