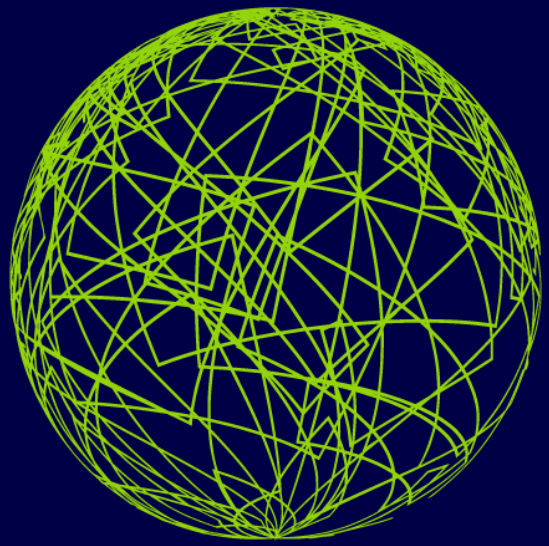


fraym

Analyzing Girl Child Marriage: Malawi Deep Dive

Prepared for the Child Marriage Learning Partners Consortium

With Support from the Bill & Melinda Gates Foundation

22 March 2021

Table of Contents

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.

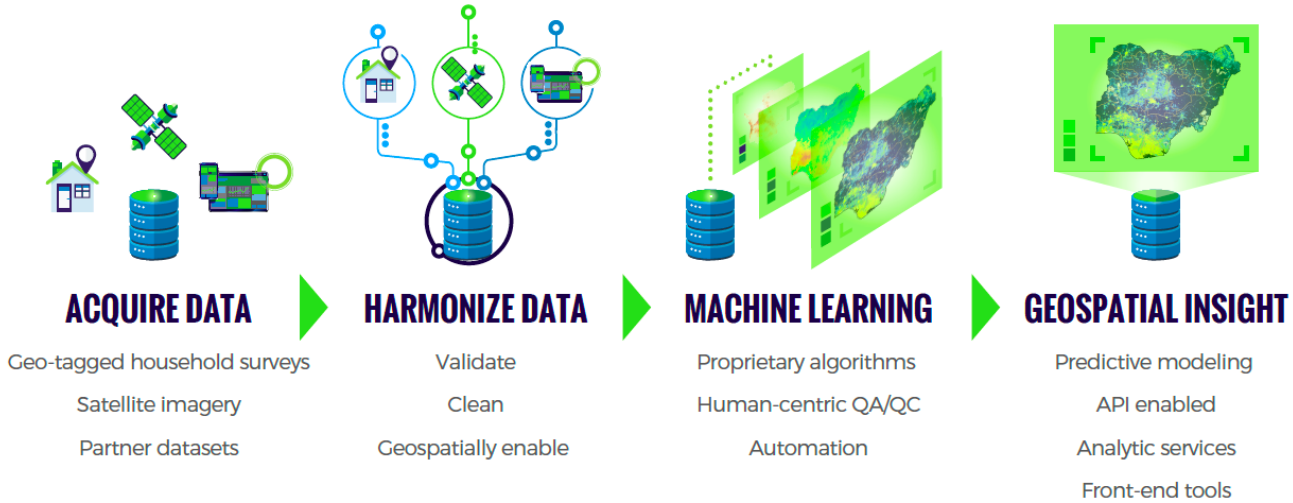
ABOUT FRAYM || METHODOLOGICAL APPROACH

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



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 in Malawi.

1. Fraym **mapped the prevalence and burden of under-18 and under-15 girl child marriage and analyzed spatiotemporal trends** from 2004, 2010, and 2016 in Malawi.

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 chid marriage prevalence and/or burden,** to more deeply explore the risk profiles and community context.

5. In addition to Malawi, Fraym used this same analytical framework to produce country reports for Bangladesh, Ethiopia, India, Kenya, 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.

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

1. Spatiotemporal analysis indicates that decreases in child marriage prevalence, for both under-18 and under-15, were widespread across Malawi, with the **largest decreases occurring between 2010 and 2016**.

2. Fraym **identified three districts as hotspots of child marriage**: (i) Phalombe; (ii) Chitipa; and (iii) Salima. Phalombe district has the highest under-18 prevalence rate in the Southern region and the country. Chitipa and Salima districts have the highest prevalence rates of their respective regions – Northern and Central.

3. **Poverty represents the most important risk factor in Malawi,** putting 104,000 girls aged 10 to 14 at risk for child marriage. Pregnancy outside of marriage, while less widespread, is also an important factor.

4. The magnitude of the correlation coefficients between several community indicators and child marriage is weak, indicating there is no clear relationship.

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 2004 to 2016 in Malawi.

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, regional, district, and community level (1km^2)**.

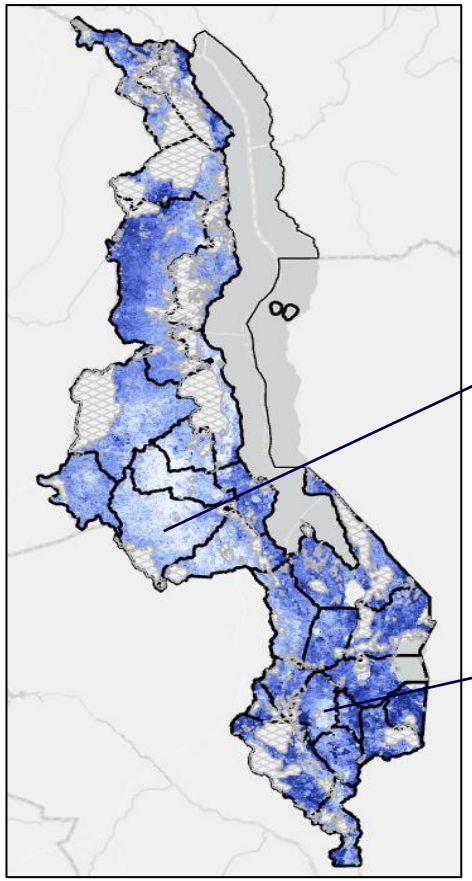
3. Next, Fraym examined two previous survey intervals (2004 and 2010) in order to **assess spatiotemporal trends across the full time period (2007 to 2014), as well as in shorter intervals (2004 to 2010 and 2010 to 2016).**

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

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

MAPPING PREVALENCE AND BURDEN || UNDER-18 (2016)

Nationally, 42 percent of women aged 20-24, or roughly 330,000 women, were married before age 18. Prevalence is concentrated in the southeast and northwest of the country, whereas burden is concentrated more in population-dense areas.

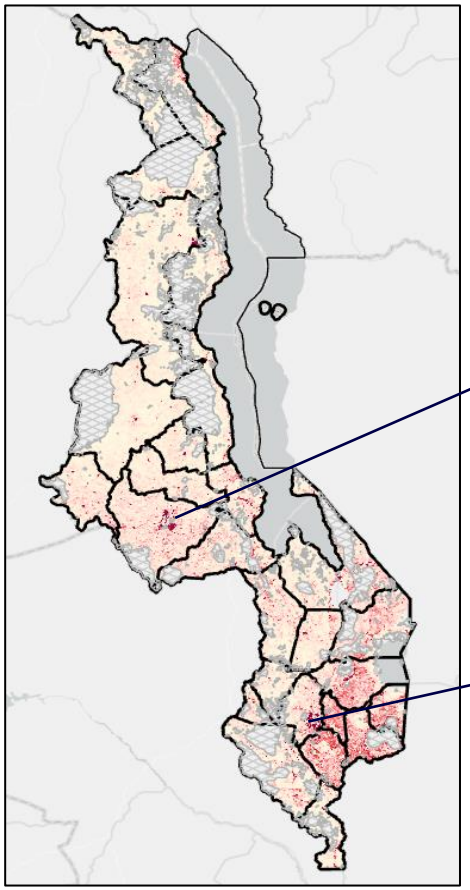


Percent of women (aged 20-24) who were married before 18

0% **70%+**

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

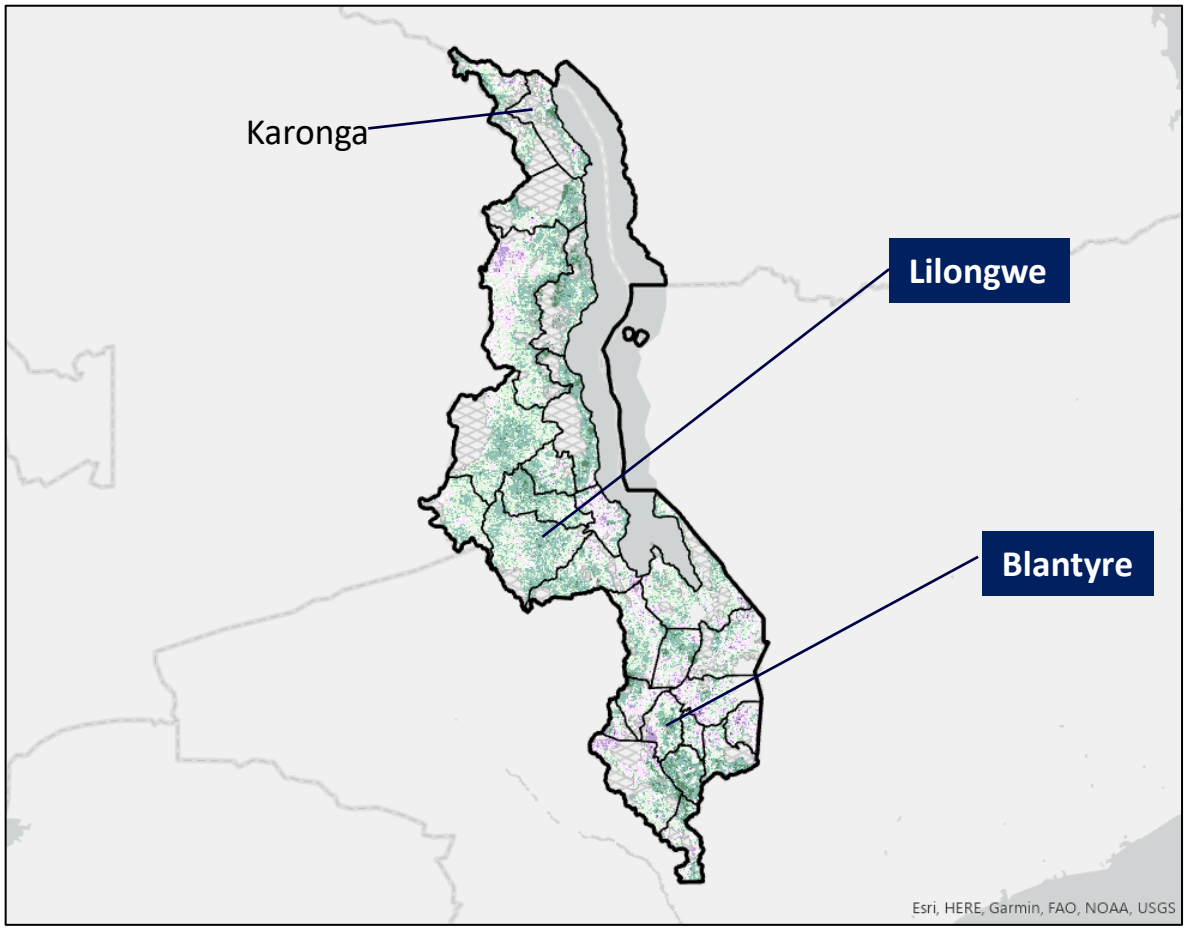
0 **8,000+**

Source: Fraym, Malawi DHS 2016, WorldPop 2016

MAPPING PREVALENCE AND BURDEN || UNDER-18 TIME SERIES (2004 to 2016)

Across Malawi, communities on average experienced significant improvements in under-18 child marriage rates between 2004 to 2016.

Change in the Prevalence of Under-18 Child Marriage: 2004 to 2016[1]



National Under-18 Prevalence

2004	2016
51.1%	42.2%

Percentage Point (pp) Change in Under 18 Prevalence from 2004 to 2016

- -25+ pp
- -25 pp to -10 pp
- -10 pp to -2 pp

Decrease

- -2 pp to 2 pp

- 2 pp to 10 pp
- 10 pp to 25 pp
- 25+ pp

Increase

Areas with total population fewer than 10 people per sq km

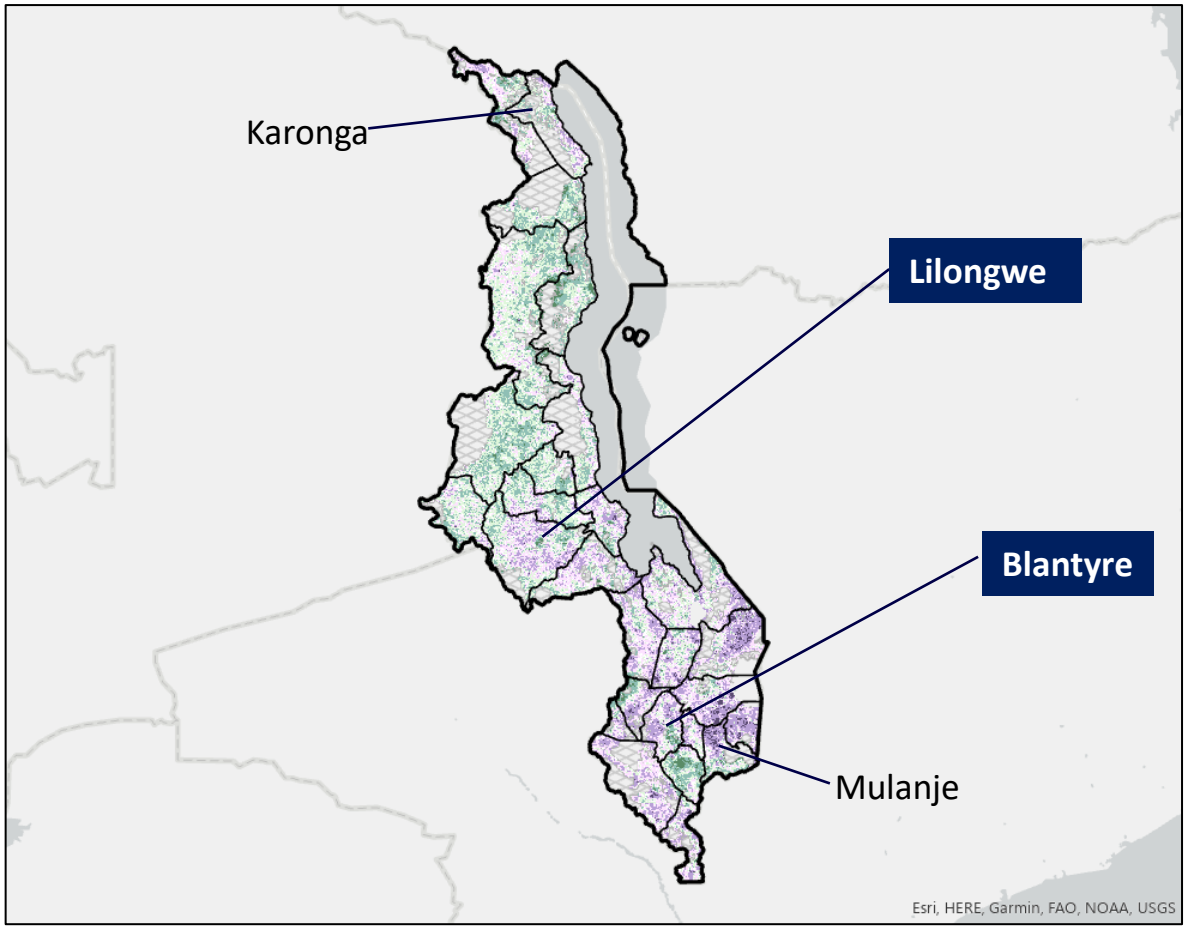
City Large cities

Note 1: Modeled estimates at the sq km level for Karonga do not meet Fraym quality standards. As a result, estimates in this district should be considered as less precise and interpreted with caution. For this area, Fraym will not present statistics below the district level.
Source: Fraym, Malawi DHS (2004 and 2016)

MAPPING PREVALENCE AND BURDEN || UNDER-18 TIME SERIES INTERVAL (2004 to 2010)

Between 2004 and 2010, child marriage prevalence remained roughly the same nationally. Still, there was some variation throughout the country, with communities in the South, like Mulanje, experiencing increases in prevalence rates.

Change in the Prevalence of Under-18 Child Marriage: 2004 to 2010[1]



National Under-18 Prevalence

2004	2010
51.1%	51.2%

Percentage Point (pp) Change in Under 18 Prevalence from 2004 to 2010

- -25+ pp
- -25 pp to -10 pp
- -10 pp to -2 pp

Decrease

- -2 pp to 2 pp

- 2 pp to 10 pp
- 10 pp to 25 pp
- 25+ pp

Increase

Areas with total population fewer than 10 people per sq km

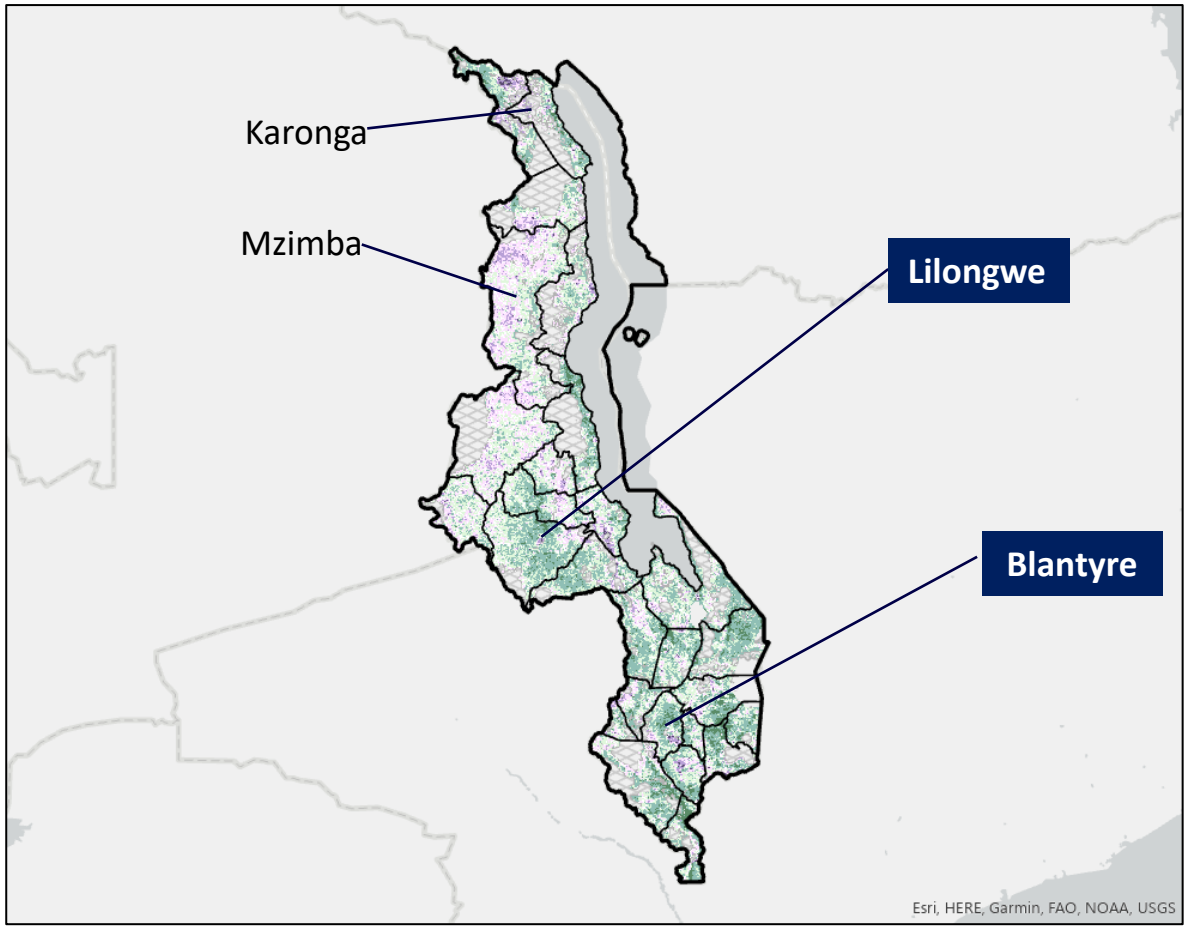
City Large cities

Note 1: Modeled estimates at the sq km level for Karonga do not meet Fraym quality standards. As a result, estimates in this district should be considered as less precise and interpreted with caution. For this area, Fraym will not present statistics below the district level.
Source: Fraym, Malawi DHS (2004 and 2010)

MAPPING PREVALENCE AND BURDEN || UNDER-18 TIME SERIES INTERVAL (2010 to 2016)

In the next phase (2010 – 2016), the prevalence of child marriage decreased across almost all of Malawi, with a few exceptions like the Mzimba district.

Change in the Prevalence of Under-18 Child Marriage: 2010 to 2016[1]



National Under-18 Prevalence

2010	2016
51.2%	42.2%

Percentage Point (pp) Change in Under 18 Prevalence from 2010 to 2016

- -25+ pp
- -25 pp to -10 pp
- -10 pp to -2 pp

Decrease

- -2 pp to 2 pp

- 2 pp to 10 pp
- 10 pp to 25 pp
- 25+ pp

Increase

Areas with total population fewer than 10 people per sq km

City Large cities

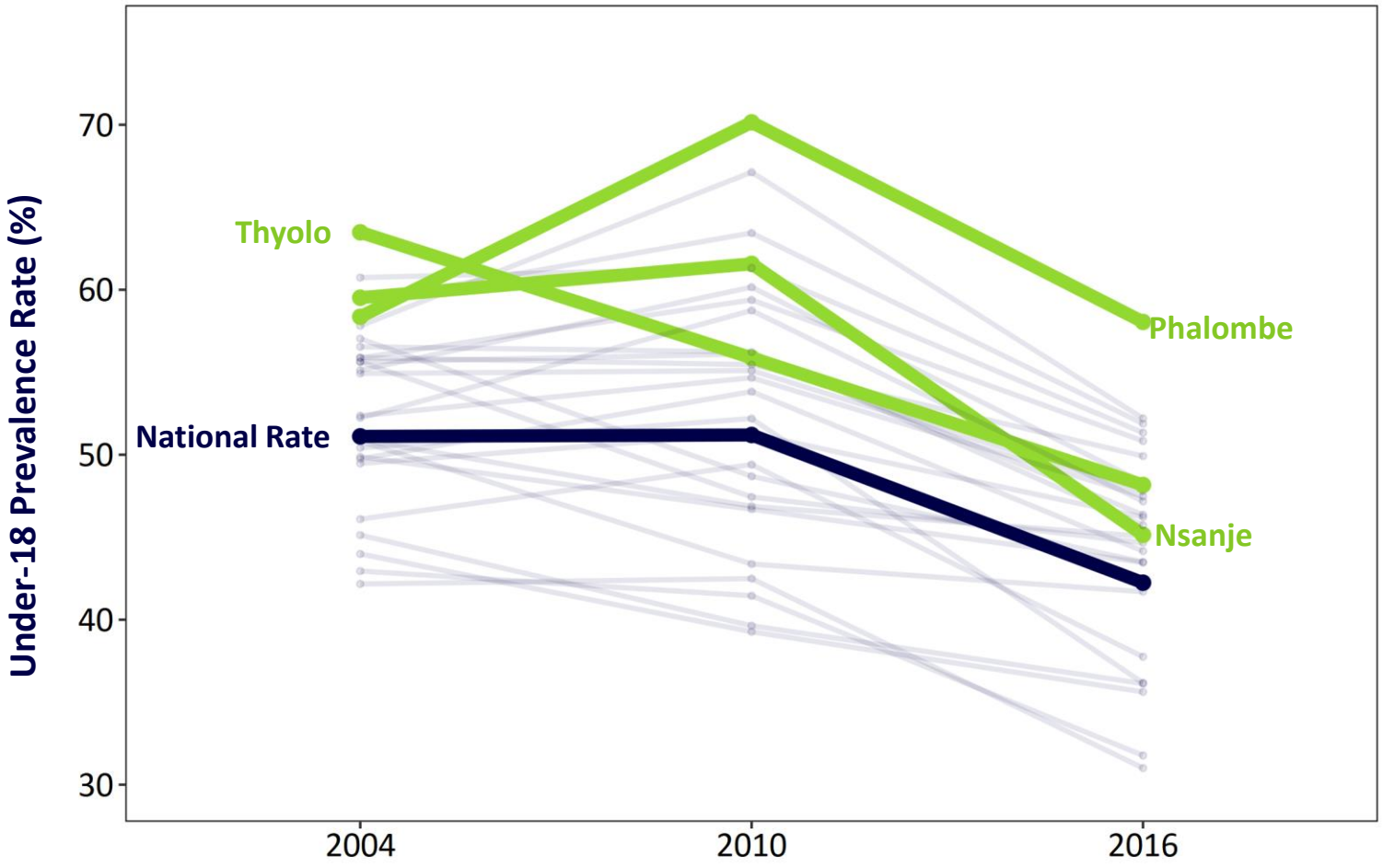
Note 1: Modeled estimates at the sq km level for Karonga do not meet Fraym quality standards. As a result, estimates in this district should be considered as less precise and interpreted with caution. For this area, Fraym will not present statistics below the district level.

Source: Fraym, Malawi DHS (2010 and 2016)

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

Between 2004 and 2016 all districts in Malawi experienced decreases in under-18 prevalence rates. Thyolo and Nsanje districts saw the largest decreases and Phalombe had the smallest decrease.

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



Source: Fraym, Malawi DHS (2004, 2010, and 2016)

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

From 2004 to 2016, child marriage rates dropped in Malawi across all districts. Eight out of twenty-eight districts experienced double-digit decreases across the twelve-year time period.[1,2]

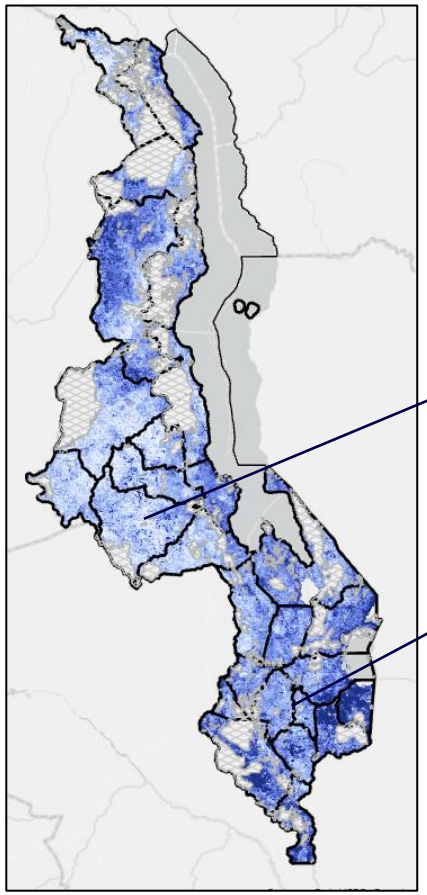
Smallest Percentage Point (pp) Decrease in Under-18 Prevalence (2004 to 2016)	
Phalombe (Southern)	- 0 pp
Mwanza (Southern)	- 3 pp
Salima (Central)	- 4 pp
Chiradzulu (Southern)	- 5 pp
Zomba (Southern)	- 5 pp
Ntcheu (Central)	- 6 pp
Machinga (Southern)	- 6 pp

Largest Percentage Point (pp) Decrease in Under-18 Prevalence (2004 to 2016)	
Thyolo (Southern)	- 15 pp
Nsanje (Southern)	- 14 pp
Nkhotakota (Central)	- 14 pp
Nkhata Bay (Northern)	- 14 pp
Dowa (Central)	- 11 pp
Lilongwe (Central)	- 11 pp
Rumphi (Northern)	- 11 pp
Balaka (Southern)	- 11 pp

Note 1: Fraym calculated the percentage point (pp) difference between 2004 and 2016 to determine whether a district witnessed an increase or decrease in under-18 prevalence. In the tables above, the region is listed in parentheses.
Note 2: Modeled estimates at the sq km level in Karonga do not meet Fraym quality standards. As a result, estimates in this district should be considered as less precise and interpreted with caution. Statistics for this district are not presented.
Source: Fraym, Malawi DHS (2004, 2016)

MAPPING PREVALENCE AND BURDEN || UNDER-15 (2016)

Nationally, 9 percent of women aged 20-24, or roughly 69,000 women, were married before age 15. Under-15 marriage prevalence is especially high in the north and west, whereas burden is concentrated in the south.

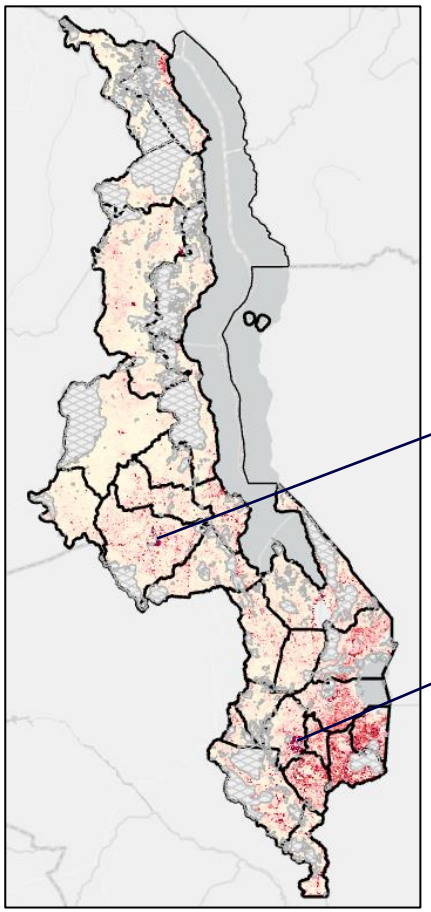


Percent of women (aged 20-24) who were married before 15

0% **50%+**

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

0 **5,000+**

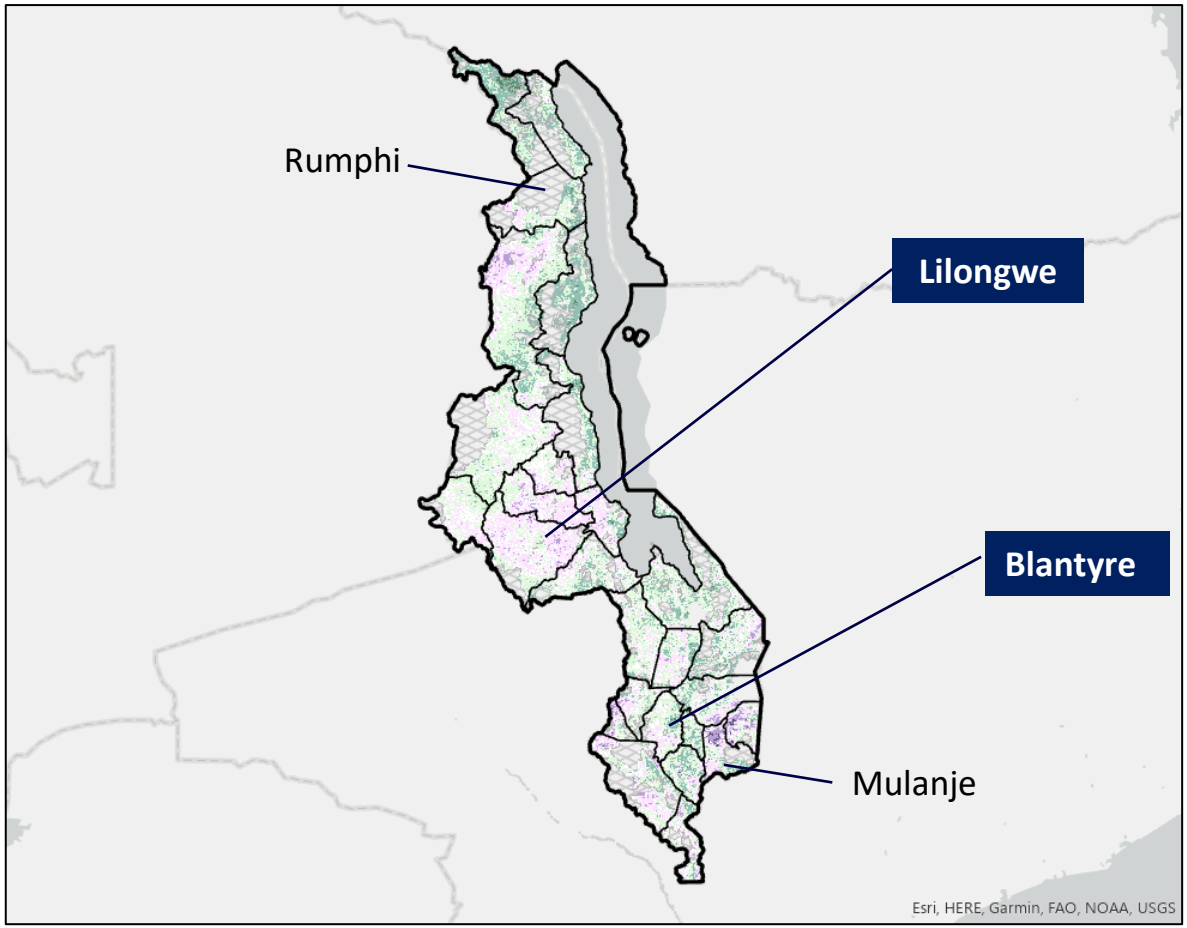
fraym

Source: Fraym, Malawi DHS 2016, WorldPop 2016

MAPPING PREVALENCE AND BURDEN || UNDER-15 TIME SERIES (2004 to 2016)

From 2004 to 2016, many communities witnessed a decrease in under-15 prevalence, however areas in Lilongwe and Mulanje districts experienced increases.

Change in the Prevalence of Under-15 Child Marriage: 2004 to 2016[1]



National Under-15 Prevalence

2004	2016
11.7%	8.8%

Percentage Point (pp) Change in Under-15 Prevalence from 2004 to 2016

- -25+ pp
- -25 pp to -10 pp
- -10 pp to -2 pp

Decrease

- -2 pp to 2 pp
- 2 pp to 10 pp
- 10 pp to 25 pp
- 25+ pp

Increase

Areas with total population fewer than 10 people per sq km

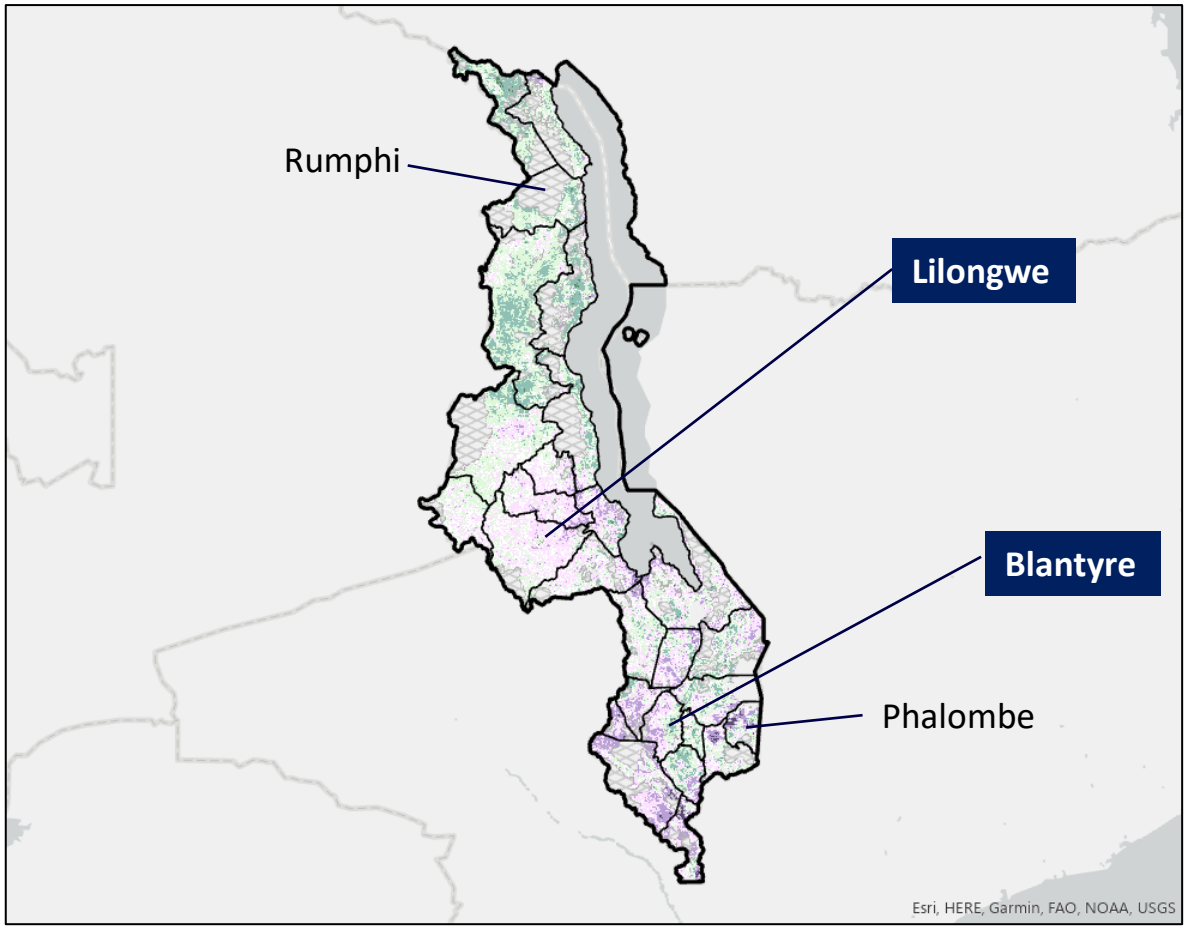
City Large cities

Note 1: Modeled estimates at the sq km level in Rumphi in 2004 do not meet Fraym quality standards. As a result, estimates in this district should be considered as less precise and interpreted with caution. Statistics for this district are not presented.
Source: Fraym, Malawi DHS (2004 and 2016)

MAPPING PREVALENCE AND BURDEN || UNDER-15 TIME SERIES INTERVAL (2004 to 2010)

Between 2004 and 2010, under-15 prevalence rates decreased slightly nationally. Many communities around Lilongwe and Blantyre saw no change or increased.

Change in the Prevalence of Under-15 Child Marriage: 2004 to 2010[1]



National Under-15 Prevalence

2004	2010
11.7%	11.4%

Percentage Point (pp) Change in Under-15 Prevalence from 2004 to 2010

- -25+ pp
- -25 pp to -10 pp
- -10 pp to -2 pp

Decrease

- -2 pp to 2 pp

- 2 pp to 10 pp
- 10 pp to 25 pp
- 25+ pp

Increase

Areas with total population fewer than 10 people per sq km

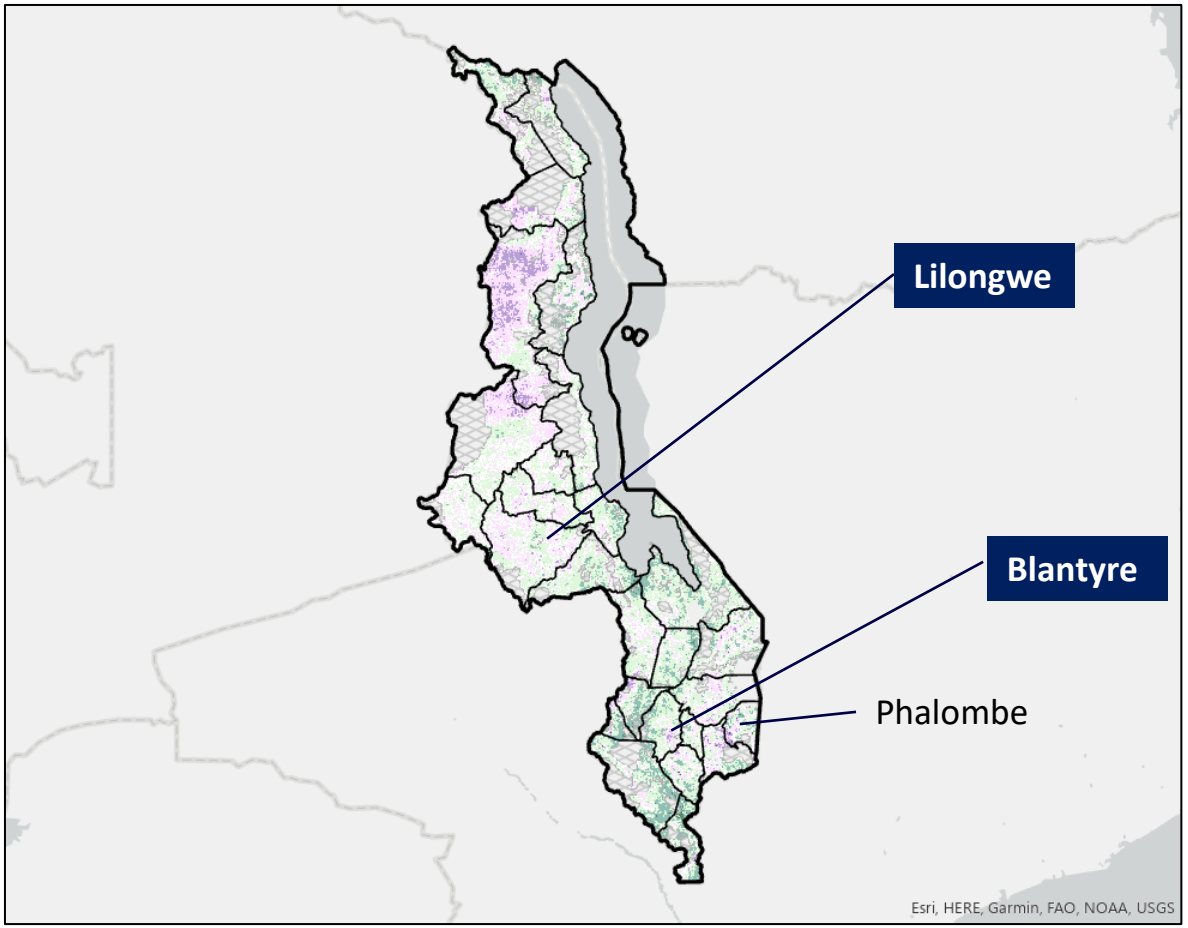
City Large cities

Note 1: Modeled estimates at the sq km level in Rumphi in 2004 and Phalombe in 2010 do not meet Fraym quality standards. As a result, estimates in these districts should be considered as less precise and interpreted with caution. Statistics for these districts are not presented.
Source: Fraym, Malawi DHS (2004 and 2010)

MAPPING PREVALENCE AND BURDEN || UNDER-15 TIME SERIES INTERVAL (2010 to 2016)

In the second phase of analysis (2010 to 2016), national prevalence rates continued their decline, however the improvements were not uniformly dispersed throughout the country.

Change in the Prevalence of Under-15 Child Marriage: 2010 to 2016[1]



National Under-15 Prevalence

2010	2016
11.4%	8.8%

Percentage Point (pp) Change in Under-15 Prevalence from 2010 to 2016

- -25+ pp
- -25 pp to -10 pp
- -10 pp to -2 pp

Decrease

- -2 pp to 2 pp
- 2 pp to 10 pp
- 10 pp to 25 pp
- 25+ pp

Increase

- Areas with total population fewer than 10 people per sq km
- City — Large cities

Note 1: Modeled estimates at the sq km level in Phalombe in 2010 do not meet Fraym quality standards. As a result, estimates in this district should be considered as less precise and interpreted with caution. Statistics for this district are not presented.
Source: Fraym, Malawi DHS (2016 and 2010)

Generally, district rates of under-15 child marriage prevalence decreased between 2004 and 2016. Nkhata Bay and Chitipa experienced significant decreases, the sharpest of which occurred between 2004 and 2010. Mwanza witnessed the largest increase.

Change in the Under-15 Child Marriage Prevalence Rate, by District

Source: Fraym, Malawi DHS (2016, 2010, and 2004)

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

There were improvements in under-15 child marriage rates for many districts. All but four saw a decrease in child marriage prevalence rates with one district, Chitipa, witnessing decreases in the double digits.

Largest Percentage Point (pp) Increase in Under-15 Prevalence (2004 to 2016)	
Mwanza (Southern)	+ 3 pp
Dowa (Central)	+ 2 pp
Phalombe (Central)	+ 1 pp
Ntchisi (Central)	+1 pp
Mchinji (Central)	0 pp
Lilongwe (Central)	0 pp

Largest Percentage Point (pp) Decrease in Under-15 Prevalence (2004 to 2016)	
Chitipa (Northern)	- 12 pp
Nkhata Bay (Northern)	- 9 pp
Nsanje (Southern)	- 8 pp
Nkhotakota (Central)	- 7 pp
Chiradzulu (Southern)	- 7 pp
Mangochi (Southern)	- 6 pp
Karonga (Northern)	- 6 pp
Balaka (Southern)	- 5 pp

Note 1: Fraym calculated the percentage point (pp) difference between 2004 and 2016 to determine whether a county witnessed an increase or decrease in under-15 prevalence. In the tables above, the region is listed in parentheses.
Note 2: Modeled estimates at the sq km level in Rumphi in 2004 and Phalombe in 2010 do not meet Fraym quality standards. As a result, estimates in these districts should be considered as less precise and interpreted with caution. Statistics for these districts are not presented.
Source: Fraym, Malawi DHS (2016, 2004)

MAPPING PREVALENCE AND BURDEN || KEY TAKEAWAYS

While child marriage prevalence has decreased substantially over time, especially regarding under-18 marriage rates, some districts in Malawi have seen only slight decreases, or even growth, in under-15 marriage rates.

1. From 2004 to 2016, **the national under-18 prevalence rate fell from 51 percent to 42 percent**. During this time, the number of women aged 20-24 who were married before 18 increased from 280,000 to 330,000.

2. Spatiotemporal analysis indicates that the decrease in under-18 rates was widespread across the country, with the **largest decreases occurring between 2010 and 2016**.

3. Nationally, **the under-15 prevalence rate for women aged 20-24 fell from 12 percent in 2004 to 9 percent in 2016**. Overall, the total number of women (aged 20-24) who were married before the age of 15 increased from 64,800 to 69,000 women.

4. **Most districts experienced a decrease in under-15 child marriage prevalence rates**, particularly between 2010 and 2016. On average, the prevalence rate decreased by four percentage points at the district level.

5. The **Chitipa and Nkhata Bay** districts experienced the largest decreases in under-15 prevalence and the **Thyolo and Nsanje** districts 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 (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]

Note 1: For the remainder of this report, child marriage prevalence refers to under-18 prevalence unless otherwise noted.
Note 2: Analyses are bivariate and thus do not control for other factors.

COMMUNITY CHARACTERISTICS || METHODOLOGICAL OVERVIEW

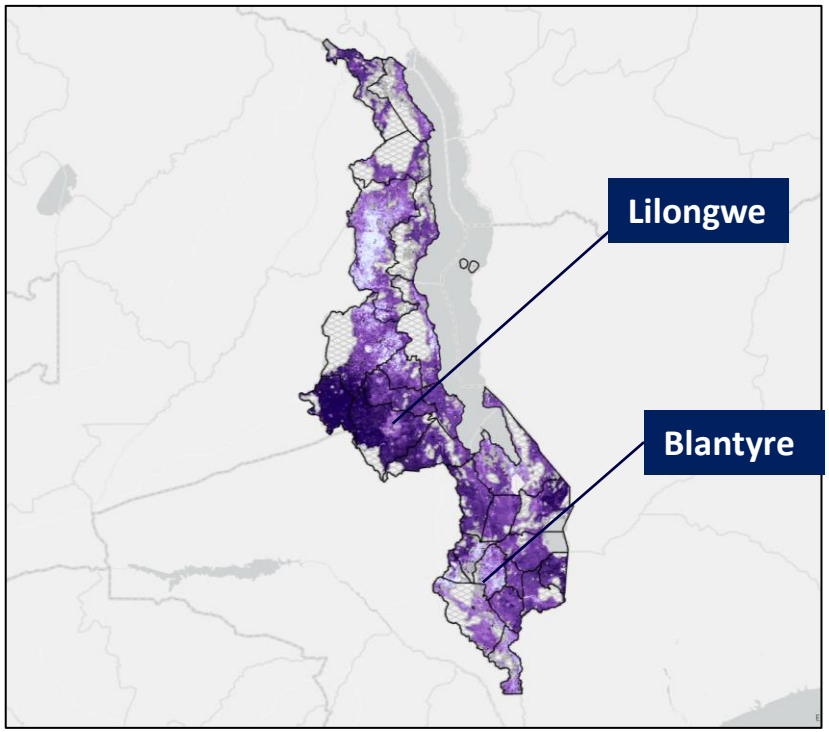
Fraym mapped a variety of community characteristics, then analyzed the statistical relationship with child marriage prevalence at the district level.[1]

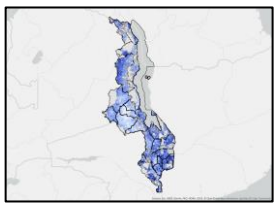
Socioeconomic Characteristics	
Adult Employment Adult Female Employment Educational Attainment by Sex	*Expected Relationship* = Areas with higher employment or educational attainment may have lower rates of child marriage prevalence.
Sexual and Reproductive Health	
Modern Contraceptive Prevalence	*Expected 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	*Expected Relationship* = Child stunting may be higher due to early childbearing associated with child marriage.
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 29-34 and the appendix for indicator definitions.
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

In Malawi, there is no clear relationship between under-18 prevalence and adult employment, as indicated by the correlation coefficient.

Adult Employment at the Community Level





Under 18 Prevalence

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

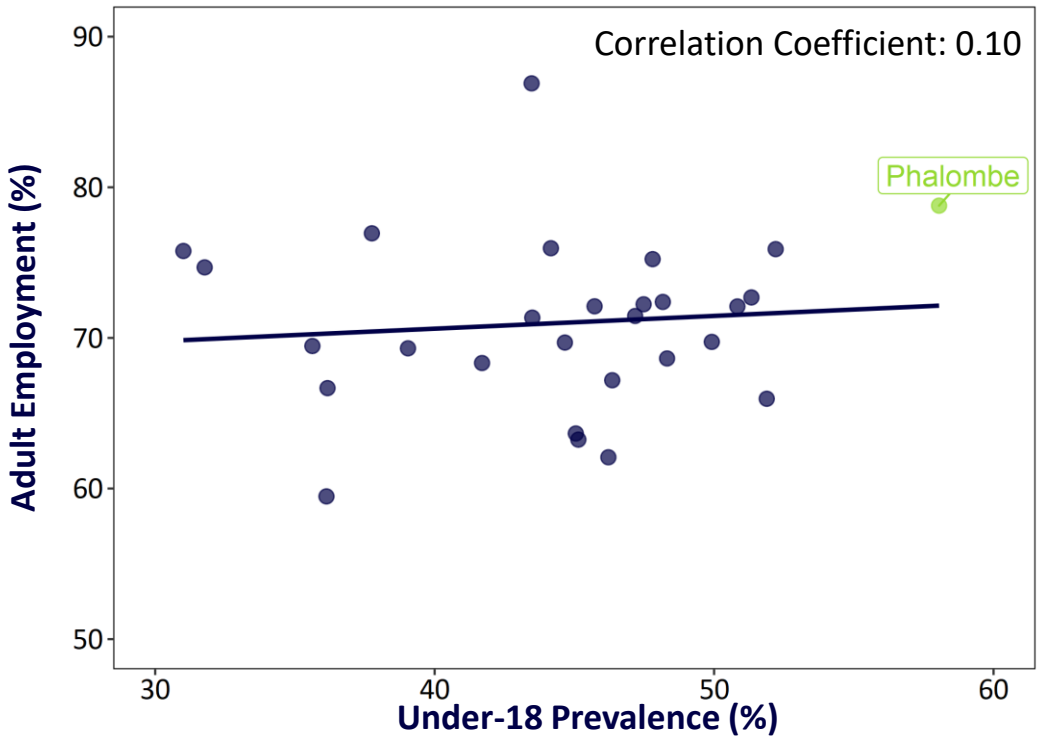
0% — **75%+**

City Large cities

Areas with total population less than 10 people per sq km

Adult Employment Rate and Child Marriage Prevalence

Each point represents a district.

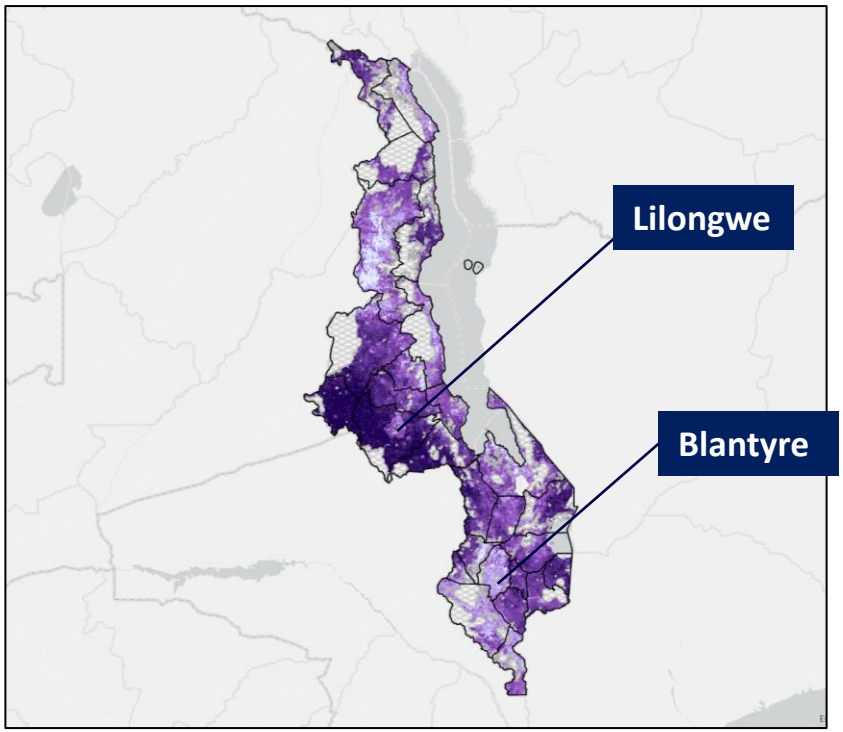


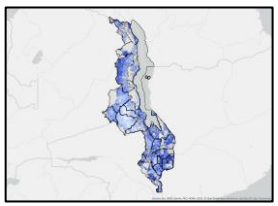
The y-axis intervals vary across indicators depending on the range of the values.

Source: Fraym, Malawi DHS 2016

The magnitude of the correlation coefficient indicates there is no clear relationship between female employment and child marriage.

Adult Female Employment





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

0% 75%+

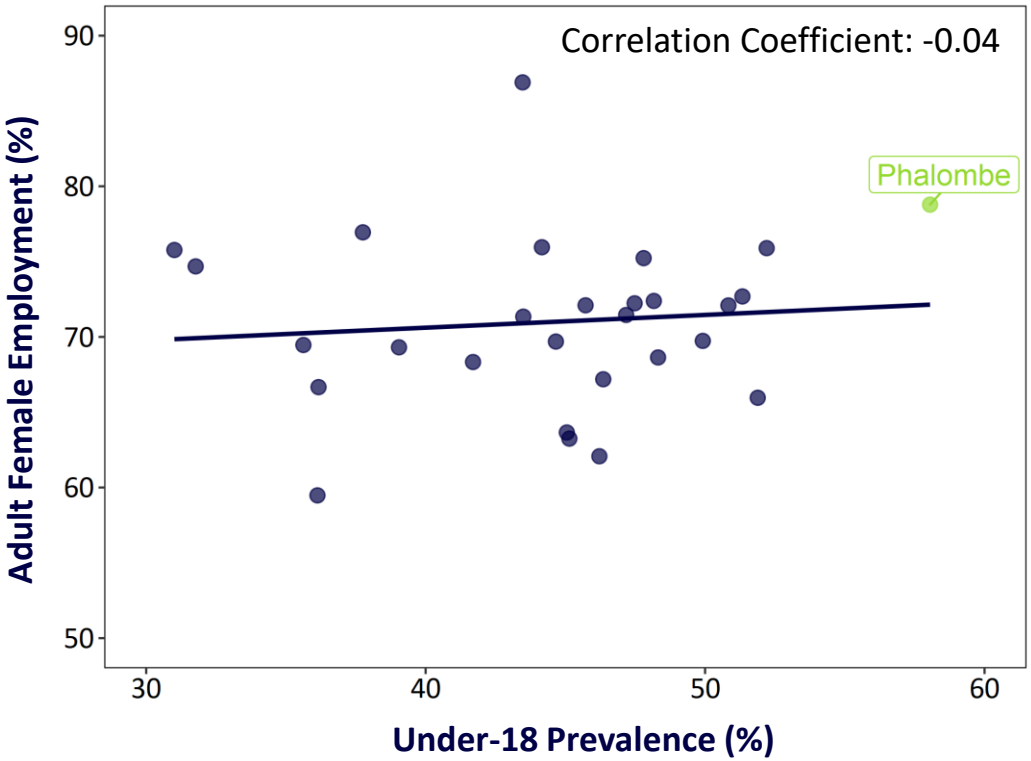
Under 18 Prevalence

City Large cities

Areas with total population less than 10 people per sq km

Adult Female Employment Rate and Child Marriage Prevalence

Each point represents a district.

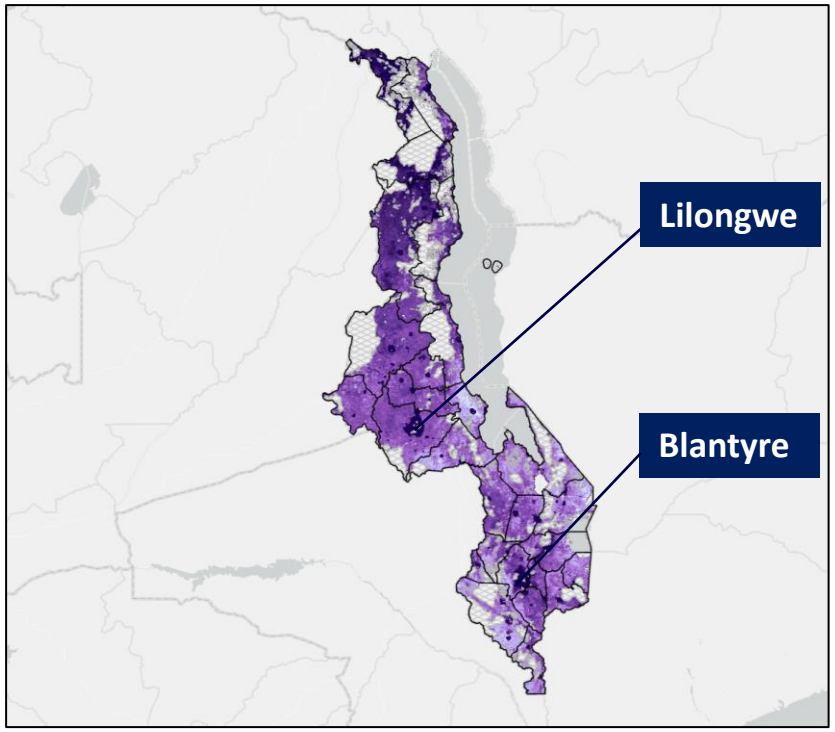


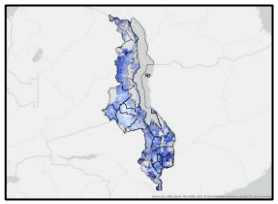
The y-axis intervals vary across indicators depending on the range of the values.

Source: Fraym, Malawi DHS 2016

Districts with higher child marriage rates tend to have lower levels of female educational attainment.

Female Educational Attainment at the Community Level





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

0% 90%+

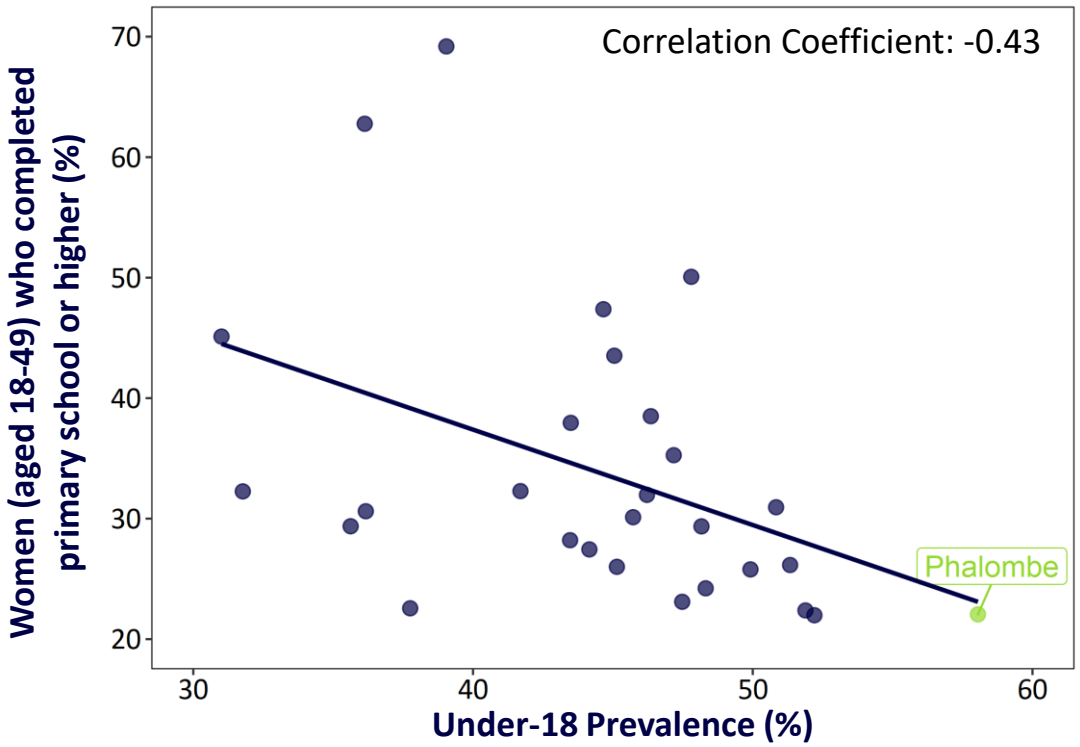
Under 18 Prevalence

City Large cities

Areas with total population less than 10 people per sq km

Female Educational Attainment and Child Marriage Prevalence

Each point represents a district.

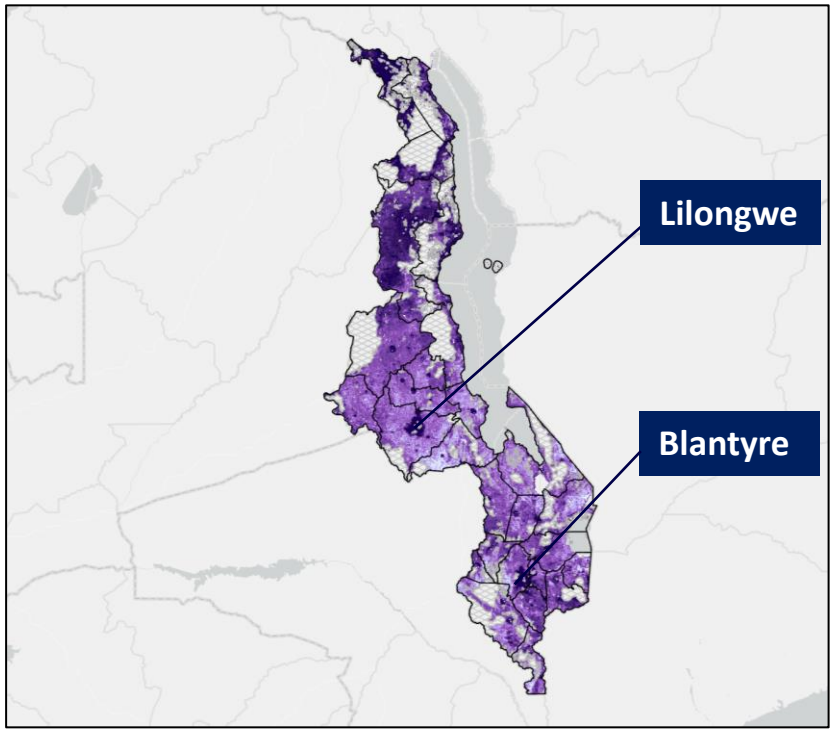


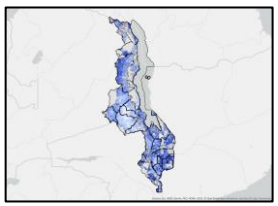
The y-axis intervals vary across indicators depending on the range of the values.

Source: Fraym, Malawi DHS 2016

The same pattern is true for male educational attainment, but the relationship is weaker.

Male Educational Attainment Community Level





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

0% 90%+

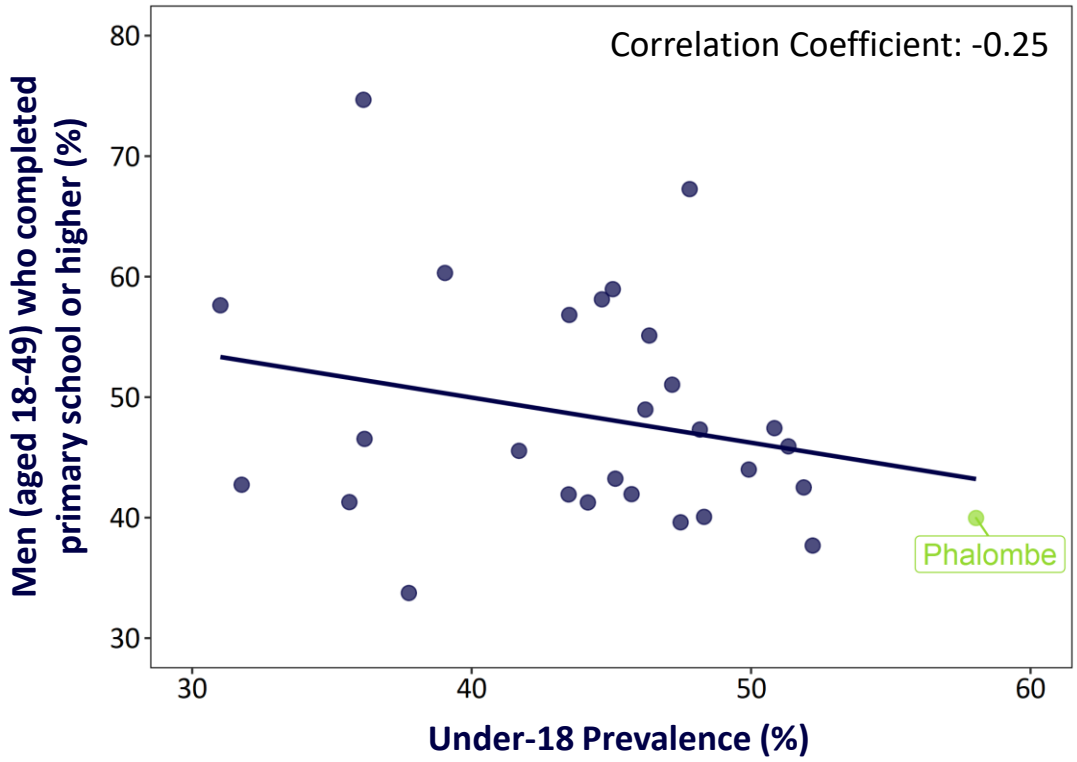
Under 18 Prevalence

City Large cities

Areas with total population less than 10 people per sq km

Male Educational Attainment and Child Marriage Prevalence

Each point represents a district.



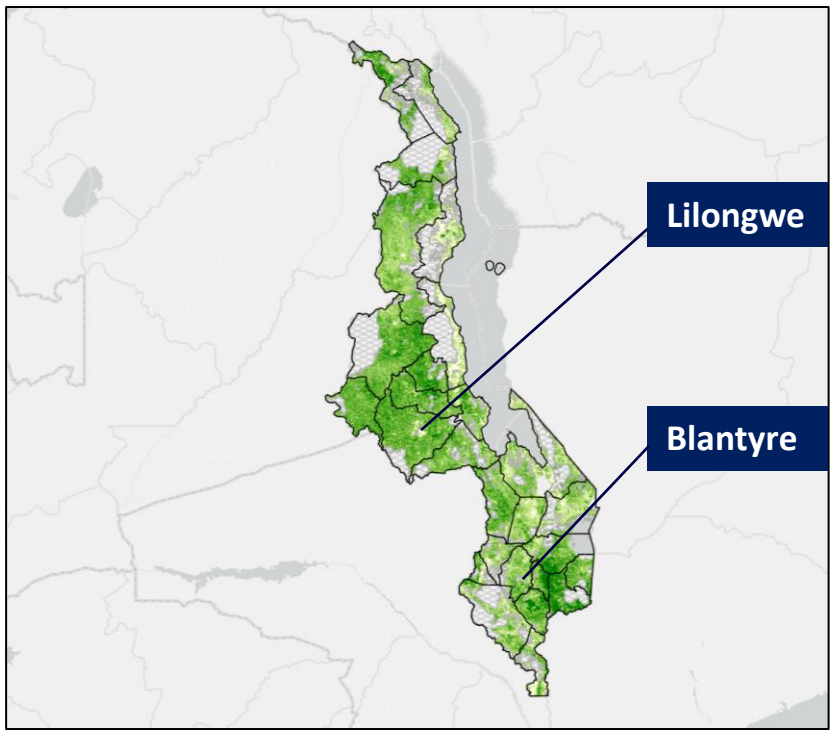
The y-axis intervals vary across indicators depending on the range of the values.

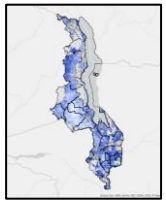
fraym

Source: Fraym, Malawi DHS 2016

There is no clear relationship between modern contraceptive use and child marriage prevalence as evidenced by the small correlation coefficient.[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% — **25%+**

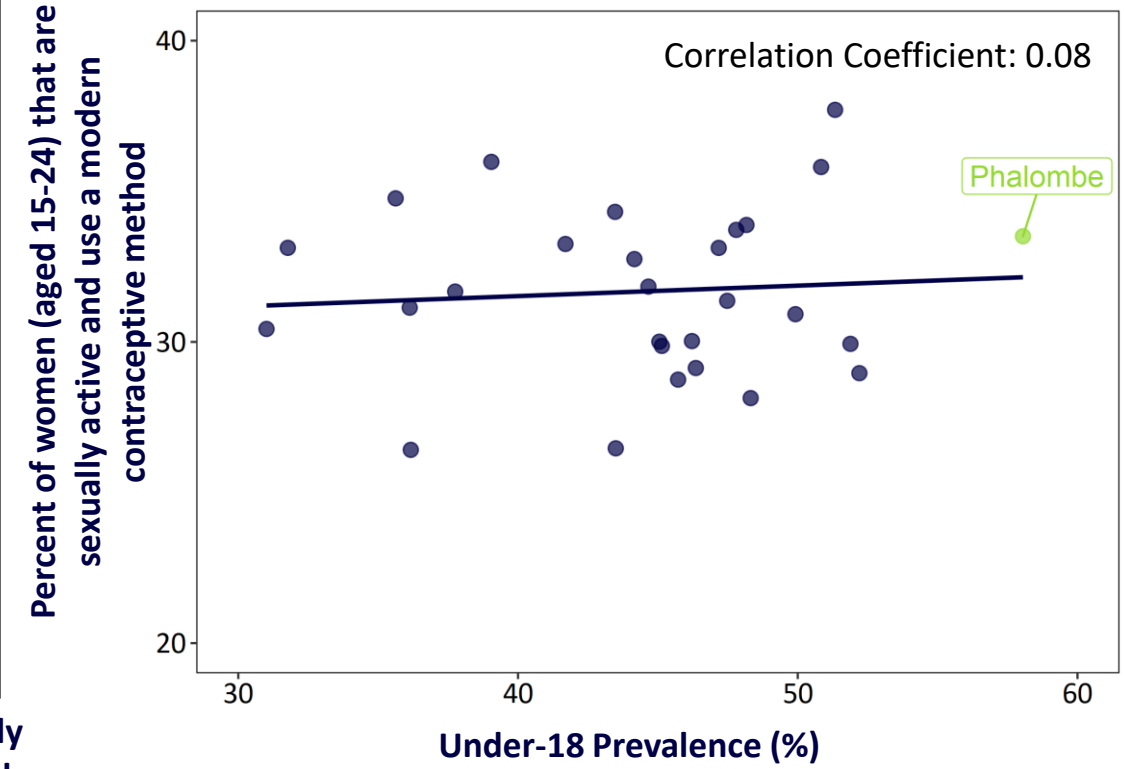
Under 18 Prevalence

City Large cities

Areas with total population less than 10 people per sq km

Modern Contraceptive Use and Child Marriage Prevalence

Each point represents a district.

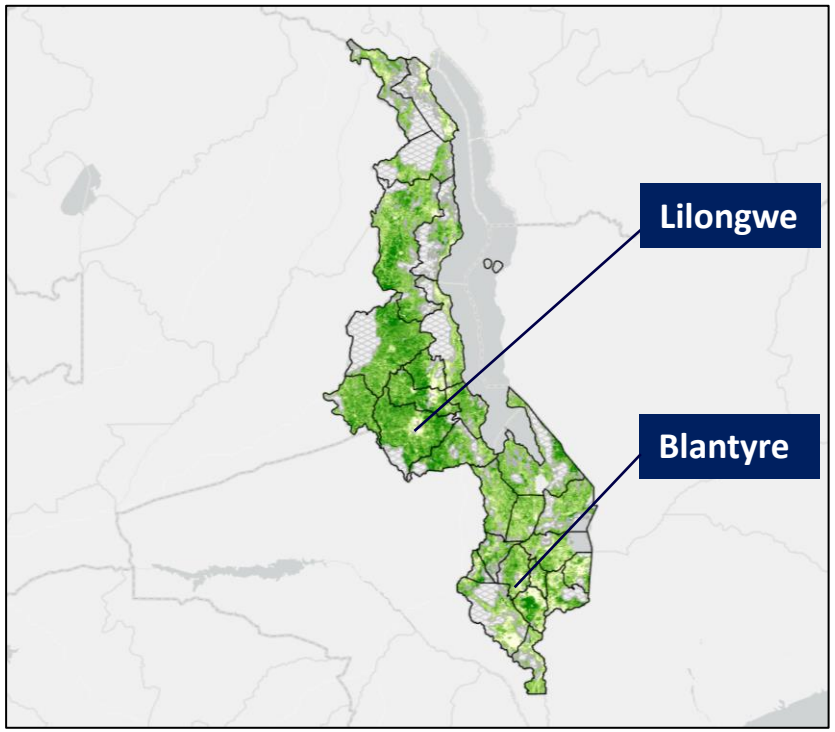


The y-axis intervals vary across indicators depending on the range of the values.

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, Malawi DHS 2016

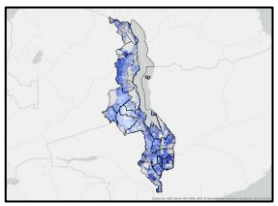
Child stunting and child marriage rates in Malawi have a weak positive relationship.

Child Stunting at the Community Level



Percent of children under five who are stunted

0% 70%+



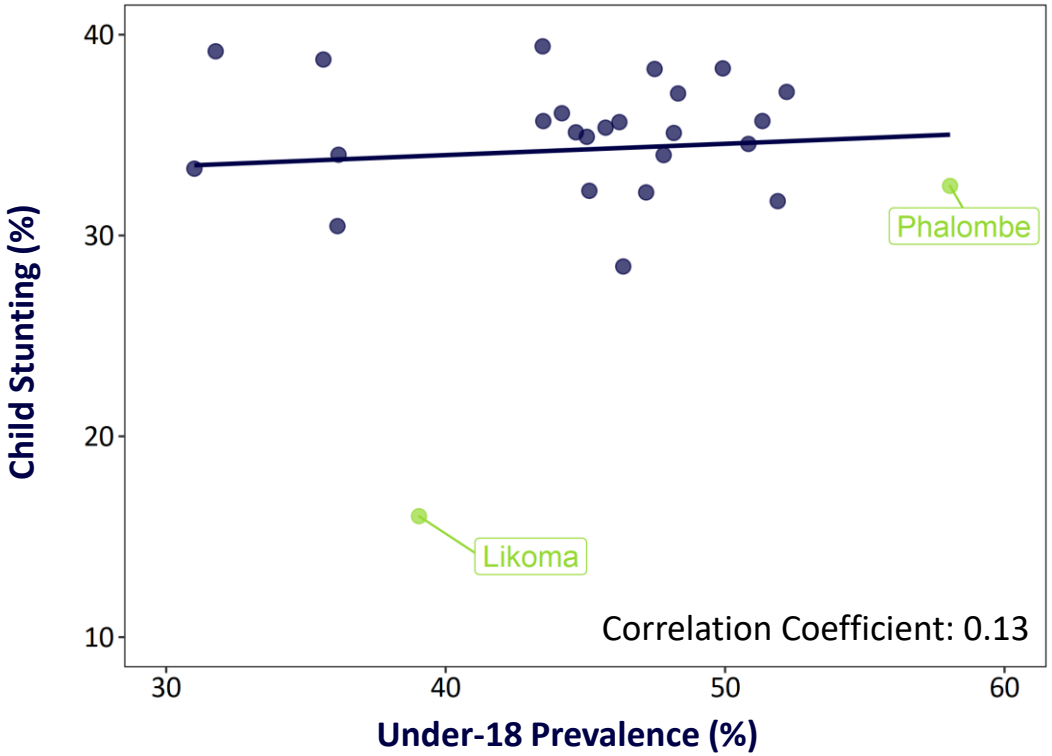
Under 18 Prevalence

City Large cities

Areas with total population less than 10 people per sq km

Child Stunting and Child Marriage Prevalence

Each point represents a district.

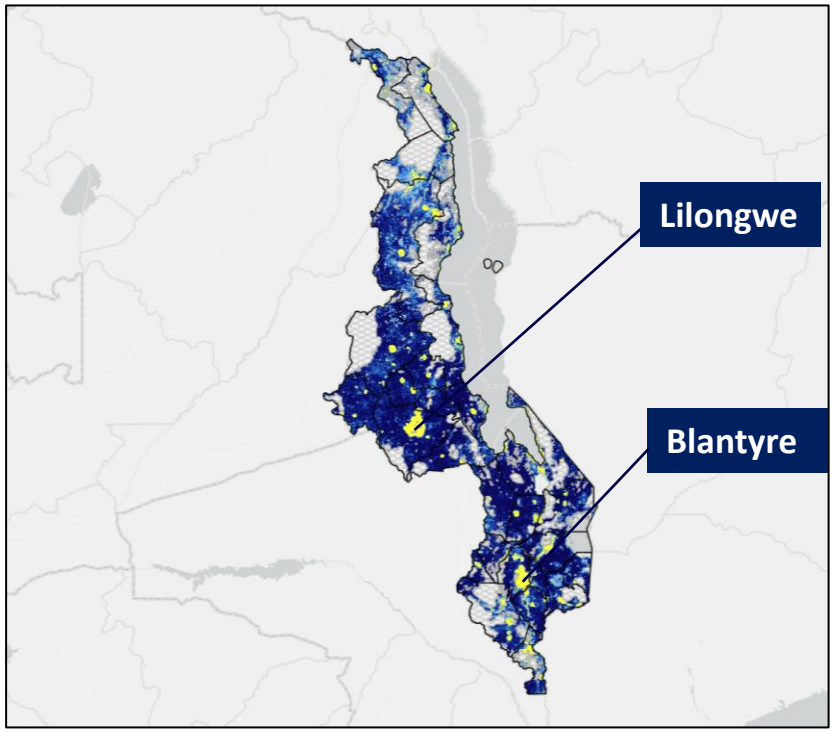


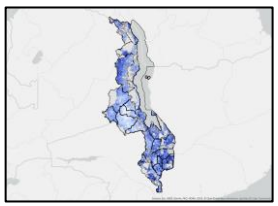
The y-axis intervals vary across indicators depending on the range of the values.

fraym **Source:** Fraym, Malawi DHS 2016

Districts with high child marriage rates have lower rates of household access to electricity.

Access to Electricity at the Community Level





Percent of individuals that live in households with access to electricity

0% — 90%+

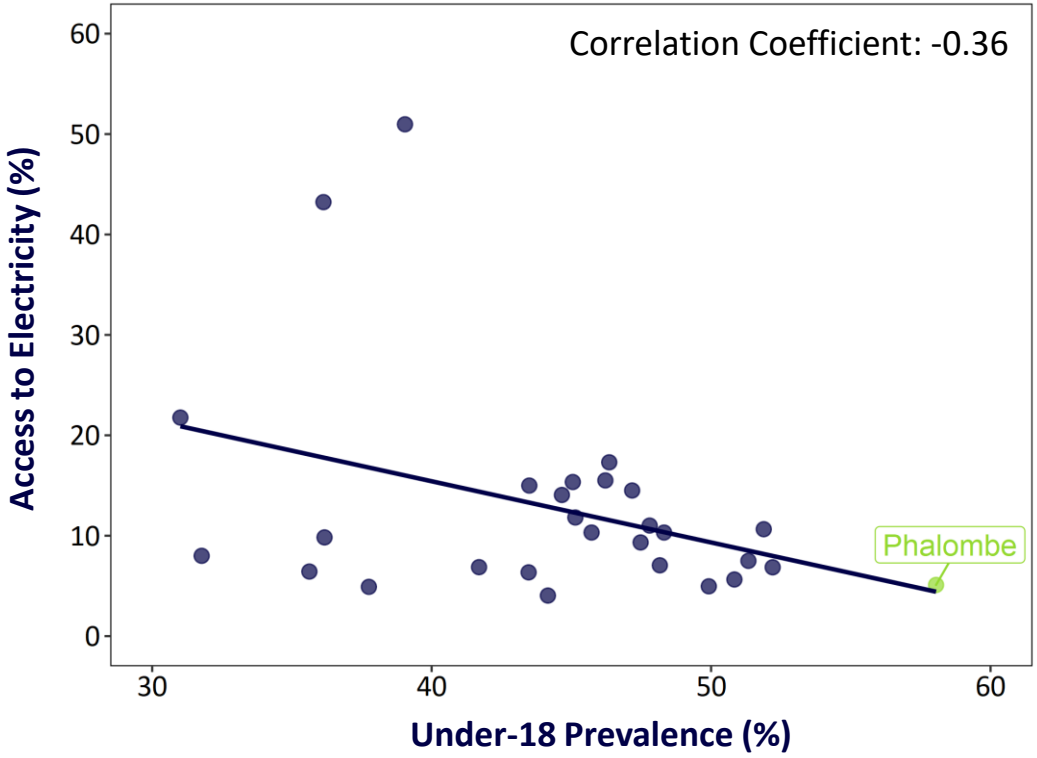
Under 18 Prevalence

City Large cities

Areas with total population less than 10 people per sq km

Access to Electricity and Child Marriage Prevalence

Each dot represents a district.



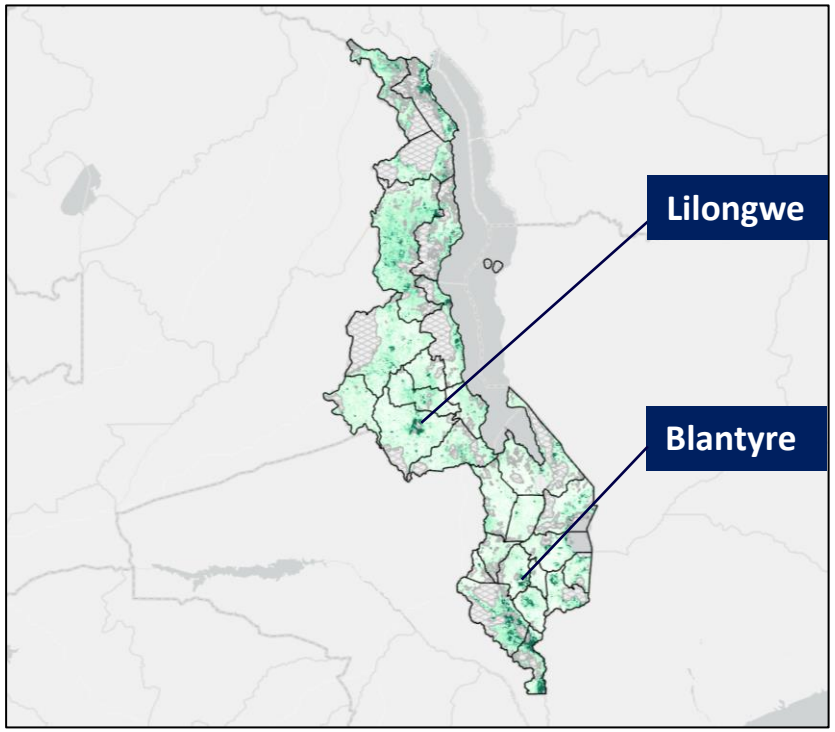
The y-axis intervals vary across indicators depending on the range of the values.

fraym

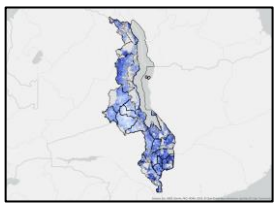
Source: Fraym, Malawi DHS 2016

Most districts in Malawi have very limited access to improved sanitation, and there is a negative relationship with child marriage rates.

Flush Toilet Access at the Community Level



Percent of individuals that live in households with a flush toilet



0% 65%+

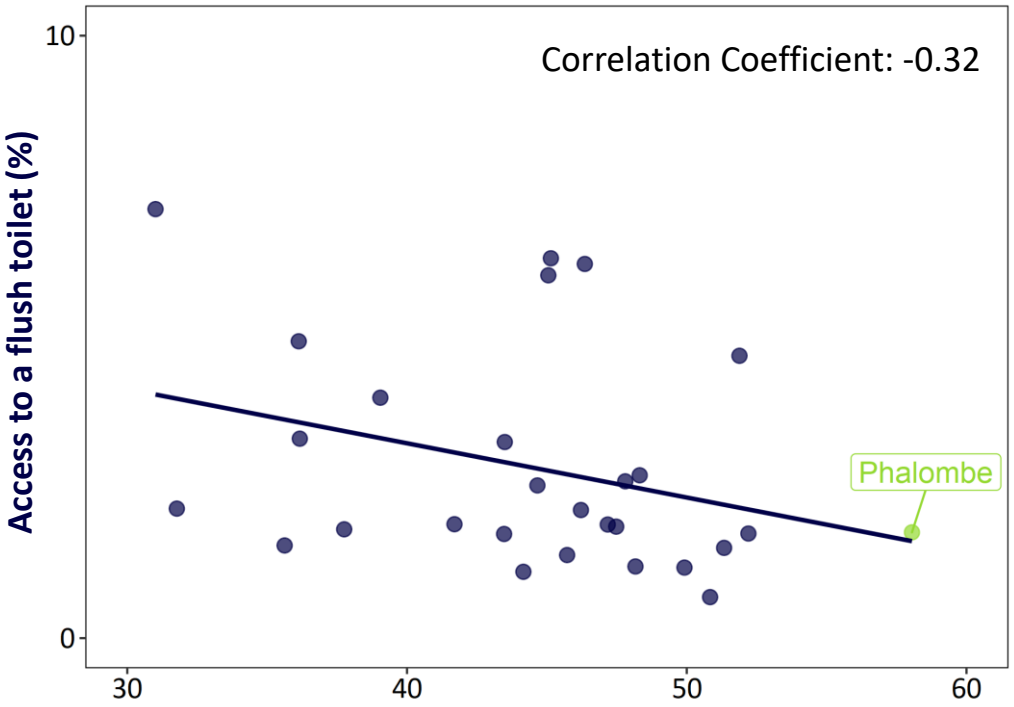
Under 18 Prevalence

City Large cities

Areas with total population less than 10 people per sq km

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.

fraym

Source: Fraym, Malawi DHS 2016

COMMUNITY CHARACTERISTICS || KEY TAKEAWAYS

The magnitude of the correlation coefficients between several community indicators and child marriage is weak, indicating there is no clear relationship.

1. Female educational attainment is the indicator **most strongly associated with child marriage.**

2. Adult employment, female employment, modern contraceptive use, and child stunting have **little to no relationships with child marriage**. The correlations between adult employment and child stunting with child marriage also run counter to expectation.

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

Correlation Coefficient with Child Marriage Prevalence at the District Level	
Socioeconomic Characteristics	
Adult Employment	0.10
Female Employment	-0.04
Female Educational Attainment	-0.43
Male Educational Attainment	-0.25
Health	
Modern Contraceptive Use	0.08
Child Stunting	0.13
Infrastructure	
Access to Electricity	-0.36
Access to Improved Sanitation	-0.32

Source: Fraym, Malawi DHS 2016

At-Risk Population

AT-RISK POPULATION || SECTION OVERVIEW

Fraym segmented the population 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 presence of three potential risk factors** for child marriage in Malawi.

2. Fraym then **estimated the potential risk factors at the community level (1 km^2) 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 three risk profiles and calculating the total number of girls aged 10 to 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 Malawi is relatively high – 50 percent of women aged 15 to 24 have given birth, regardless of marital status.

2. In Malawi, 10 percent of never-married women aged 15 to 24 have given birth. This low proportion suggestions 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	79%	22%	50%
Ever-married women[2]	91%	65%	85%
Never-married women	26%	7%	10%

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.
Source: Fraym, Malawi DHS 2016

Among women who were married as children, 19 percent gave birth either before or within six months of marriage.

1 Nearly a quarter of ever-married women aged 15-24 have become pregnant outside of marriage. This suggests that pregnancy outside of marriage is common.

2 Additionally, 19 percent of women aged 20-24 who were married before age 18 gave birth before or within six months of marriage, which suggests pregnancy outside of marriage is a strong risk factor for child marriage in Malawi.

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]	20%	6%	13%
Ever-married women[3]	24%	21%	23%
Women who were married before age 18	19%	—	—

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, Malawi DHS 2016

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

Fraym's 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 km^2) 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").

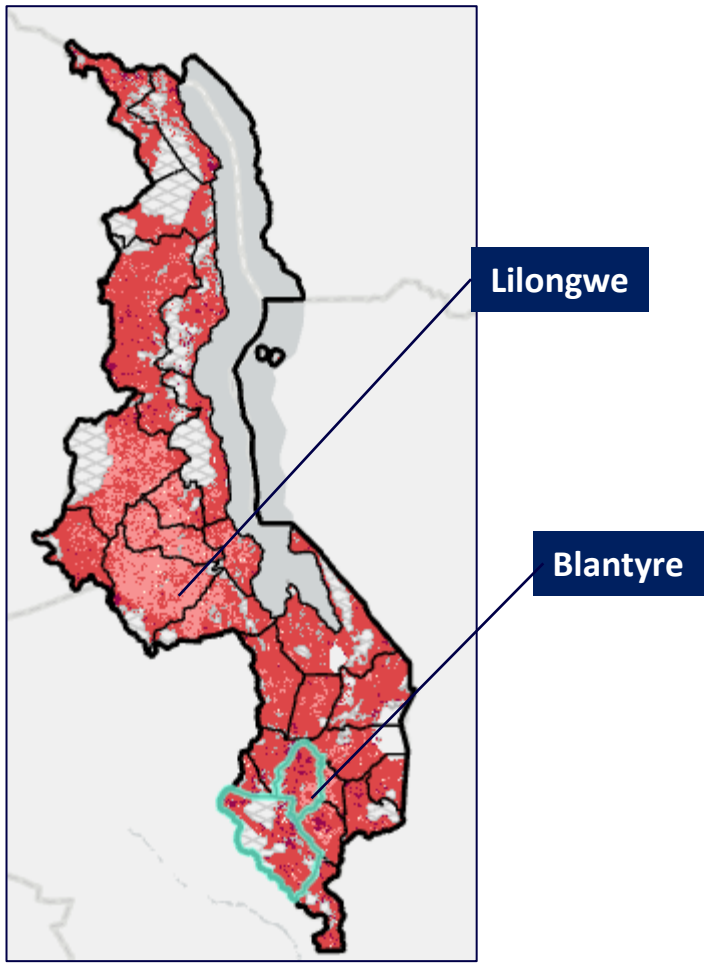
4. Finally, Fraym **estimated the number of at-risk girls** by calculating the total number of girls aged 10 to 14 who live in the communities where pregnancy outside of marriage represents the highest risk for child marriage (categorized as a 4).

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.
Source: Fraym

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

There are an estimated 44,500 girls aged 10-14 who live in communities where pregnancy outside of marriage represents a high-risk. Roughly a quarter live in Blantyre and Chikwawa districts.

Pregnancy Outside of Marriage Risk Category[1]



- Low Risk
- Medium-Low Risk
- Medium-High Risk
- High Risk
- Areas with total population less than 10 people per sq km
- City — Large cities

Population of at-risk girls due to pregnancy outside of marriage, highlighted districts[2]

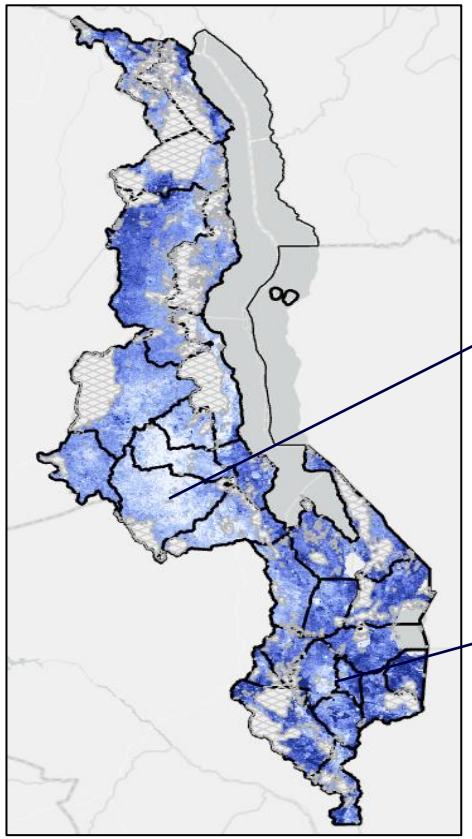
District	Population of at-risk girls (aged 10-14)
Blantyre	7,400
Chikwawa	4,000

Note 1: The map shows the classification of pregnancy outside of marriage for each 1km^2 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 40 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 pregnancy outside of marriage risk category equal to 4 (highest risk).
Source: Fraym, Malawi DHS 2016, WorldPop 2020

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

There are a few high-risk communities due to pregnancy outside of marriage in the South, whereas child marriage prevalence is more prominent.

Child Marriage Prevalence



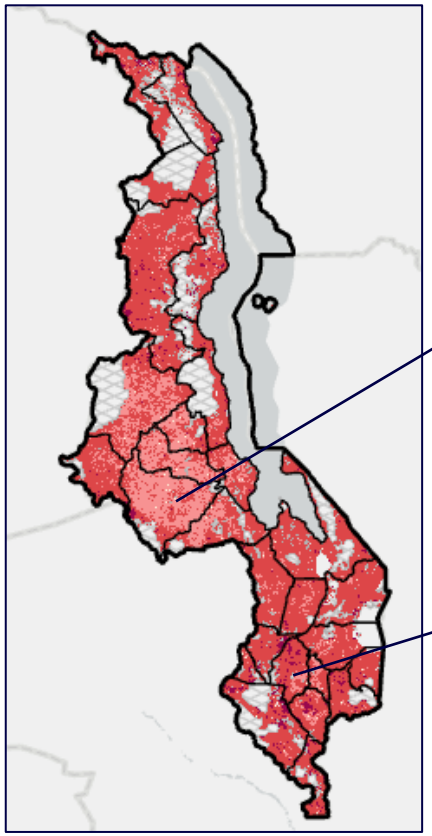
Percent of women (aged 20-24) who were married before 18

0% **70%+**

Areas with total population less than 10 people per sq km

City Large cities

Pregnancy Outside of Marriage Risk Category[1]



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

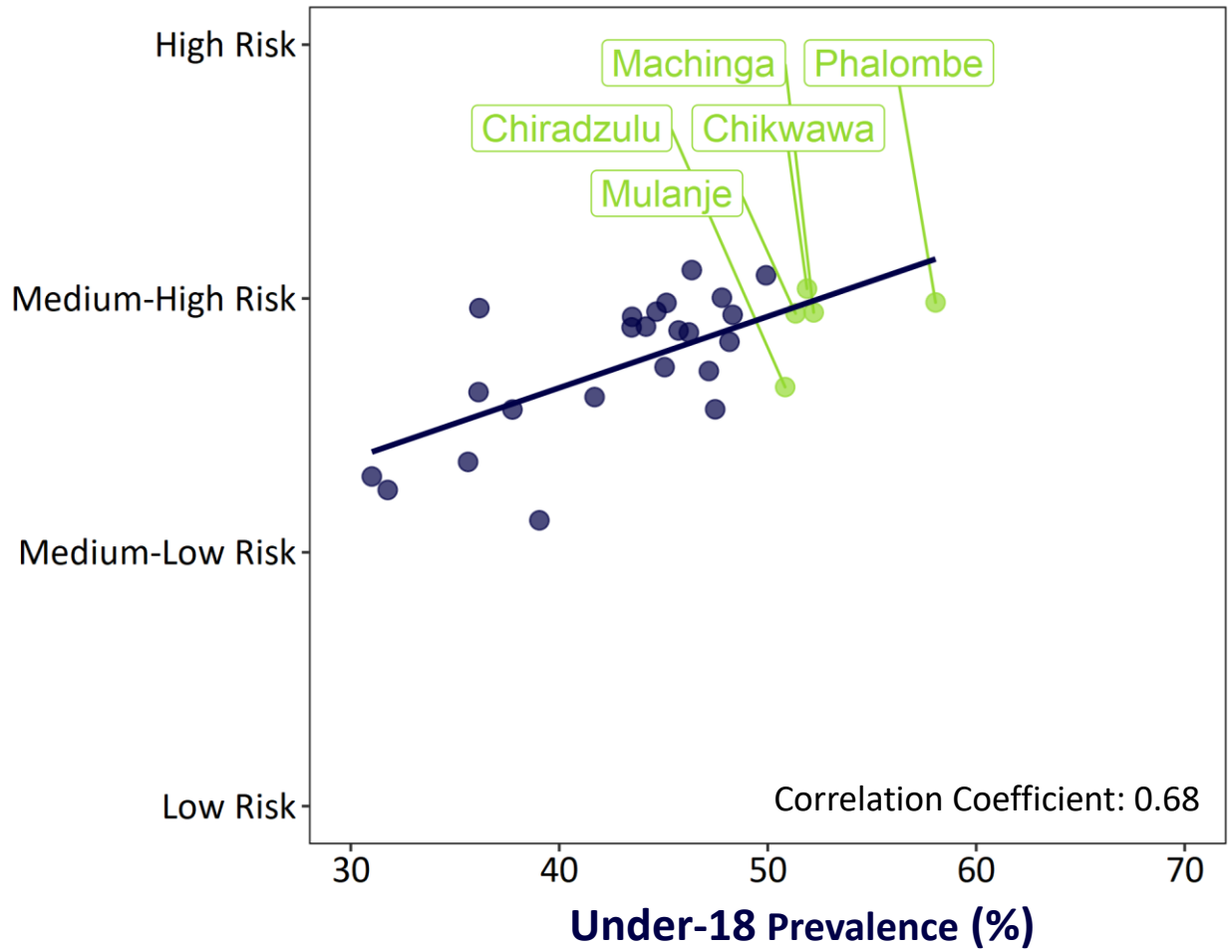
Note 1: The map shows the classification of pregnancy outside of marriage for each 1km^2 cell into quartiles. The pregnancy outside of marriage risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. See slide 40 or the appendix for more details.

Source: Fraym, Malawi DHS 2016, WorldPop 2020

Districts with high under-18 prevalence tend to be districts where pregnancy outside of marriage represents a higher risk for child marriage. However, there is not much variation in risk, as most districts are between medium-low and medium-high.

Average Pregnancy Outside of Marriage Risk Category and Child Marriage Prevalence

Each dot represents a district.



Source: Fraym, WorldPop 2020

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

Literature suggests a strong relationship between poverty and child marriage. Based on expert consultation, Fraym measured poverty through education, employment, and overall wealth.[1]

1 **Education:** 64 percent of household heads with daughters have primary schooling or less.

2 **Employment:** Most household heads with daughters are employed, and nearly three out of four of those employed work in unskilled manual labor or are self-employed in agriculture.[2] Among women aged 15-24, about 50 percent are employed, and of those employed, more than four out of five work in work in unskilled manual labor or are self-employed in agriculture.

Poverty-related Indicators	
Education	
Household heads with daughters, and who have primary schooling or less	64%
Employment	
Household heads with daughters, and who are currently employed	89%
Employed household heads with daughters, and who are working in unskilled manual labor or self-employed in agriculture	71%
Women (aged 15-24) who are employed	50%
Employed women (aged 15-24) working in unskilled manual labor or self-employed in agriculture	84%

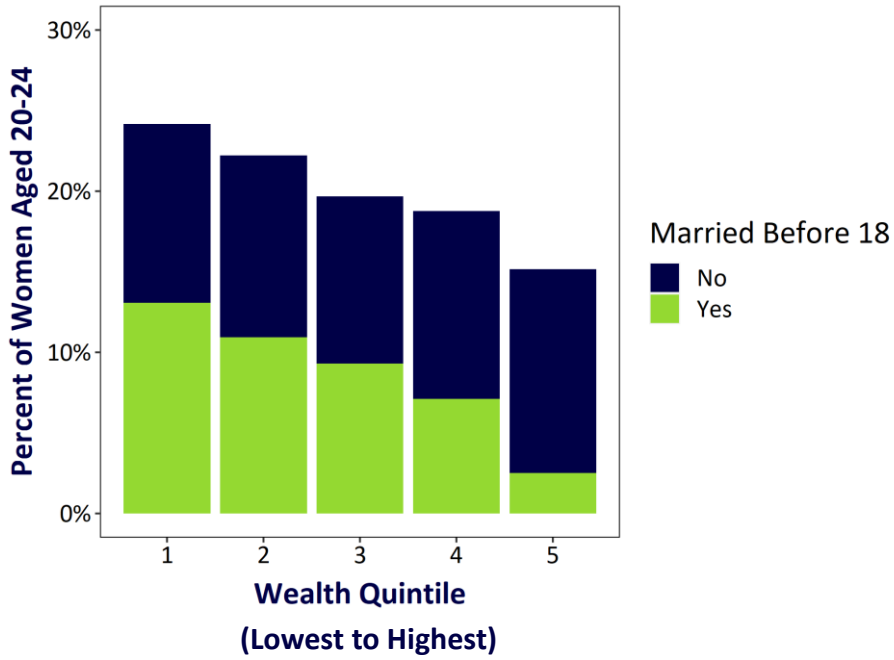
Note 1: Risk profile indicators, particularly wealth, are explained in more detail in the appendix.
Note 2: Based on expert consultations, Fraym identified employment in agriculture or unskilled manual labor as low opportunity jobs, or jobs that are likely to have low pay and/or poor working conditions.
Source: Fraym, Malawi DHS 2016

In Malawi, employed women aged 20-24 who married before 18 were more likely to work in unskilled manual labor or self-employment in agriculture compared to all employed women in the same age range. Additionally, women married as children tend to be less wealthy.

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	60%	63%
Employed women working in unskilled manual labor or self-employed in agriculture[2]	80%	87%

Distribution of women aged 20-24 by wealth quintile and under-18 prevalence[1]



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 agriculture or unskilled manual labor as low opportunity jobs, or jobs that are likely to have low pay and/or poor working conditions.

Source: Fraym, Malawi 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. Based on feedback and analysis, Fraym **selected four indicators to capture poverty**: (i) wealth; (ii) employment in unskilled manual labor or self-employment in agriculture for women aged 15 to 24; (iii) educational attainment of the household head; and (iv) employment of the household head in unskilled manual labor or self-employment in agriculture for the household head.

2. 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).

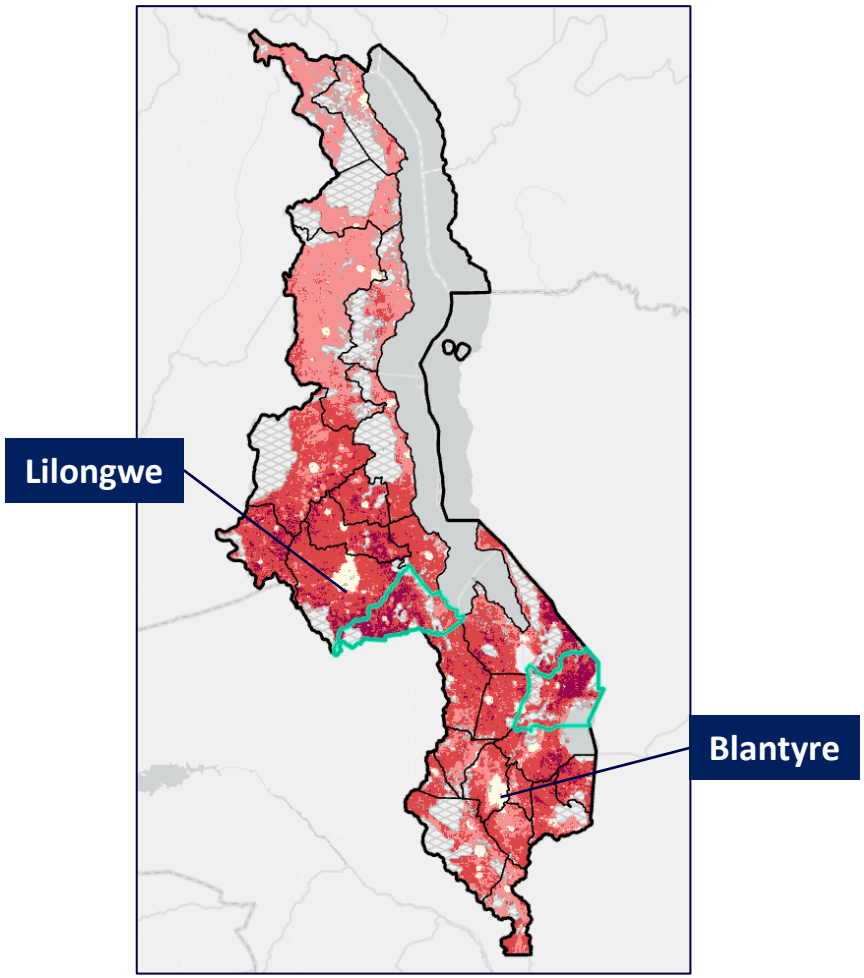
3. Fraym then **classified communities into quartiles with risk categories ranging from 1 to 4.** Communities with higher index values, or more impoverished as defined by the index, are categorized as a 4 ("high risk").

4. 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)

There are an estimated 104,000 girls aged 10 to 14 who live in communities where poverty represents a high risk.

Poverty Index Risk Category[1]



- Low Risk
- Medium-Low Risk
- Medium-High Risk
- High Risk
- Areas with total population less than 10 people per sq km
- City — Large cities

Population of at-risk girls due to poverty, highlighted districts[2]

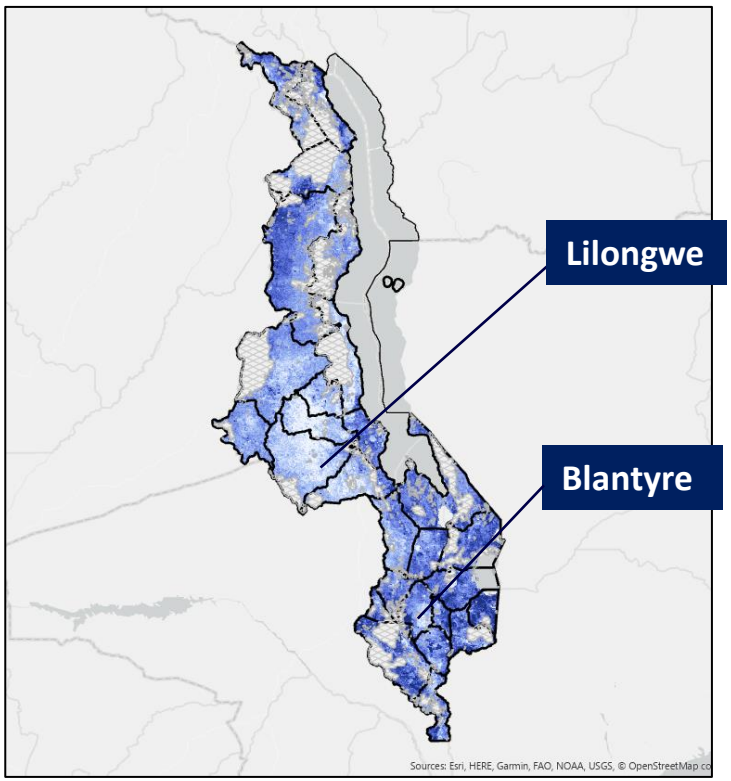
District	Population of at-risk girls (aged 10-14)
Dedza	22,800
Machinga	18,400

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 46 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, Malawi DHS 2016, WorldPop 2020

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

Communities with high under-18 child marriage prevalence are concentrated in the southeast and northwest, whereas communities where poverty represents a high-risk factor for child marriage are concentrated in the South.

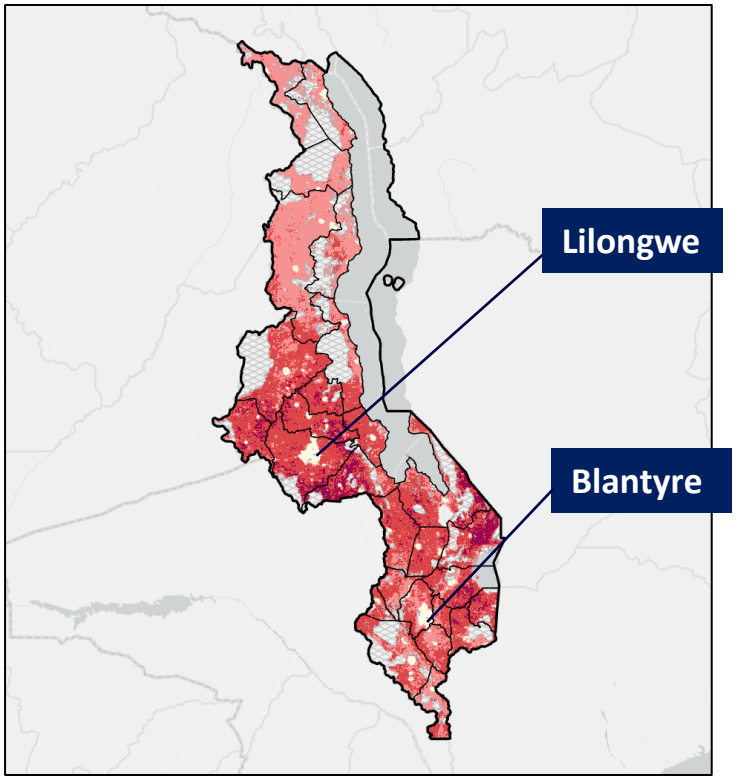
Child Marriage Prevalence



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

0% **70%+**

Poverty Index Risk Category[1]



Areas with total population less than 10 people per sq km

City Large cities

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

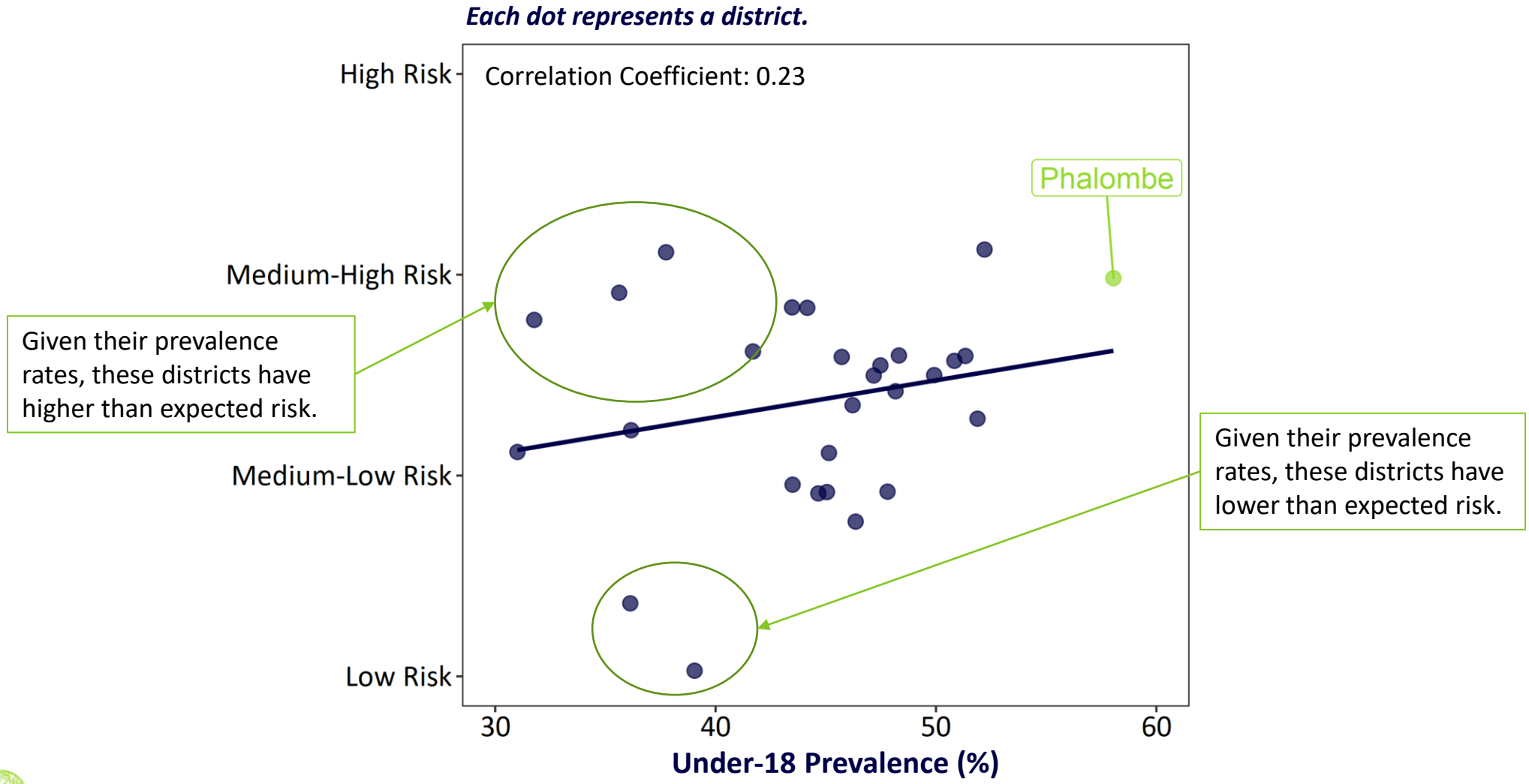
Note 1: The map shows the classification of the poverty index for each 1km^2 cell into quartiles. The poverty index risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. See slide 46 or the appendix for more details..

Source: Fraym, Malawi DHS 2016

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

Some high prevalence districts, like Phalombe, are higher risk for child marriage due to poverty. Yet this pattern does not hold across all districts.

Average Poverty Index Risk Category and Child Marriage Prevalence



Source: Fraym

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. Attitudes towards domestic violence may be related to child marriage. Roughly one out of every six women (aged 15-49) and one out of every eight men (aged 15-49) believe that there are situations wherein 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 Malawi, a little more than half of currently married women (aged 15-49) do not participate in any household decisions.

Attitudes and Behaviors, by Sex		
	Men	**Women**
Attitudes towards Domestic Violence		
Believe that there is at least one reason that justifies wife beating	12%	16%
Women's Participation in Decision Making[1]		
Respondent's healthcare		67%
Large household purchases		55%
Visits to family		78%
All three decisions		47%
No decisions		53%

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, Malawi DHS 2016

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

Communities in Malawi where individuals agree that wife-beating is justified are less likely to have high child marriage prevalence rates.

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

2. Fraym then estimates the selected indicator at the community level (1 km^2) and classified communities into quartiles with risk categories ranging from 1 to 4. 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).

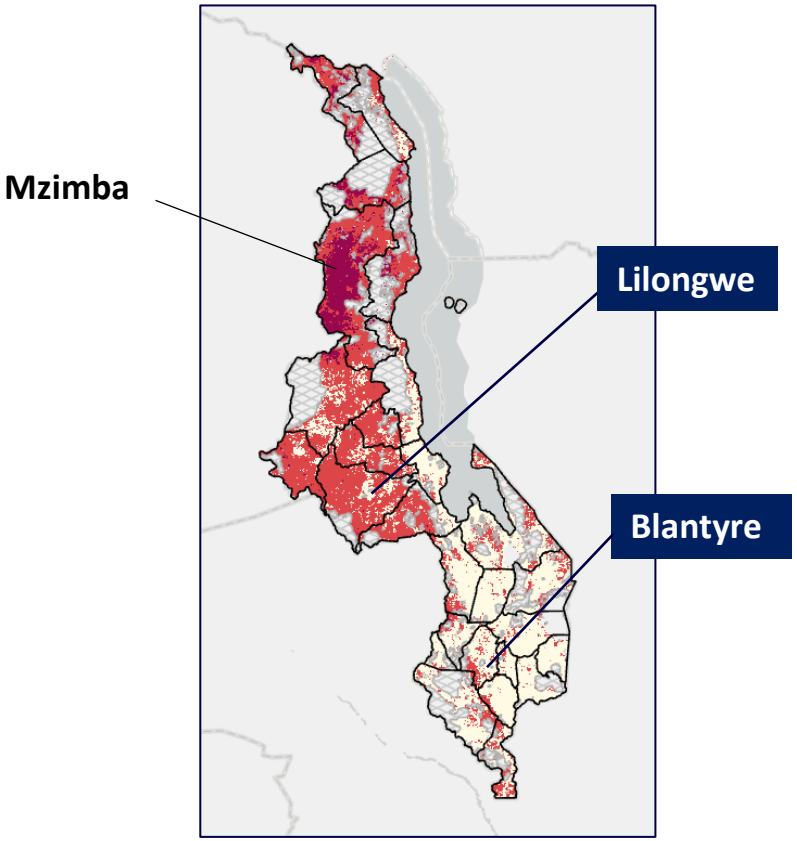
Indicator	Description	Correlation Coefficient with under-18 child marriage prevalence[1]
Attitudes towards Domestic Violence		
Believe that there is at least one reason that justifies wife beating[2]	Proportion of adults (aged 15-49) who agree with at least one reason that a husband is justified in hitting or beating his wife	-0.34

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, Malawi DHS 2016

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

There are an estimated 5,000 girls aged 10 to 14 who live in communities where attitudes towards wife beating represent a high-risk to child marriage; almost all are located in Mzimba district.

Adults' Attitudes towards Wife Beating Risk Category[1]



- Low Risk
- Medium-Low Risk
- Medium-High Risk
- High Risk
- Areas with total population less than 10 people per sq km
- City — Large cities

Population of at-risk girls due to attitudes towards wife beating, highlighted district[2]

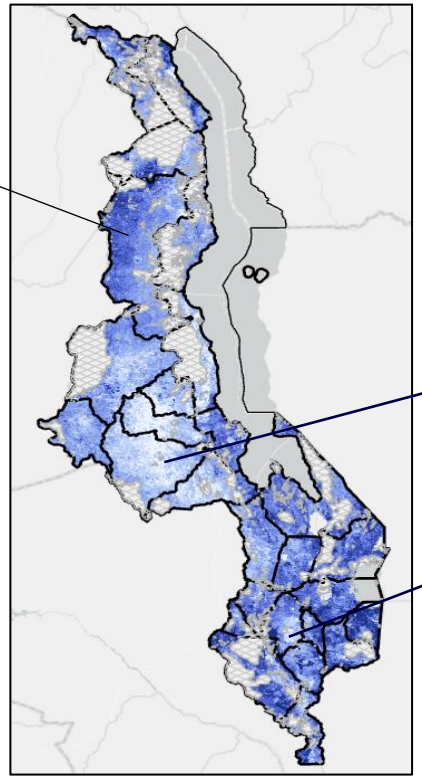
District	Population of at-risk girls (aged 10-14)
Mzimba	4,500

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 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 51 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 an attitudes towards wife beating risk category equal to 4 (highest risk).
Source: Fraym, Malawi DHS 2016, WorldPop 2020

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

While communities in the South have high child marriage prevalence, most are low risk for child marriage due to gender inequitable attitudes, indicating that it is an unlikely risk factor.

Child Marriage Prevalence



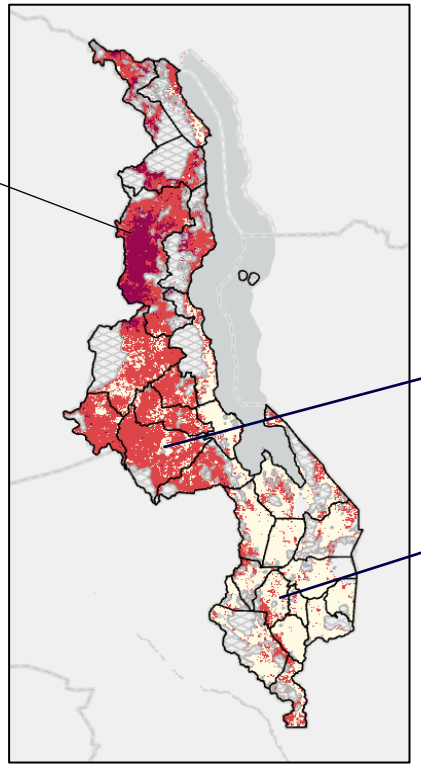
Percent of women (aged 20-24) who were married before 18

0% **70%+**

Areas with total population less than 10 people per sq km

City Large cities

Adults' Attitudes towards Wife Beating Risk Category[1]



- 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 51 or the appendix for more details.

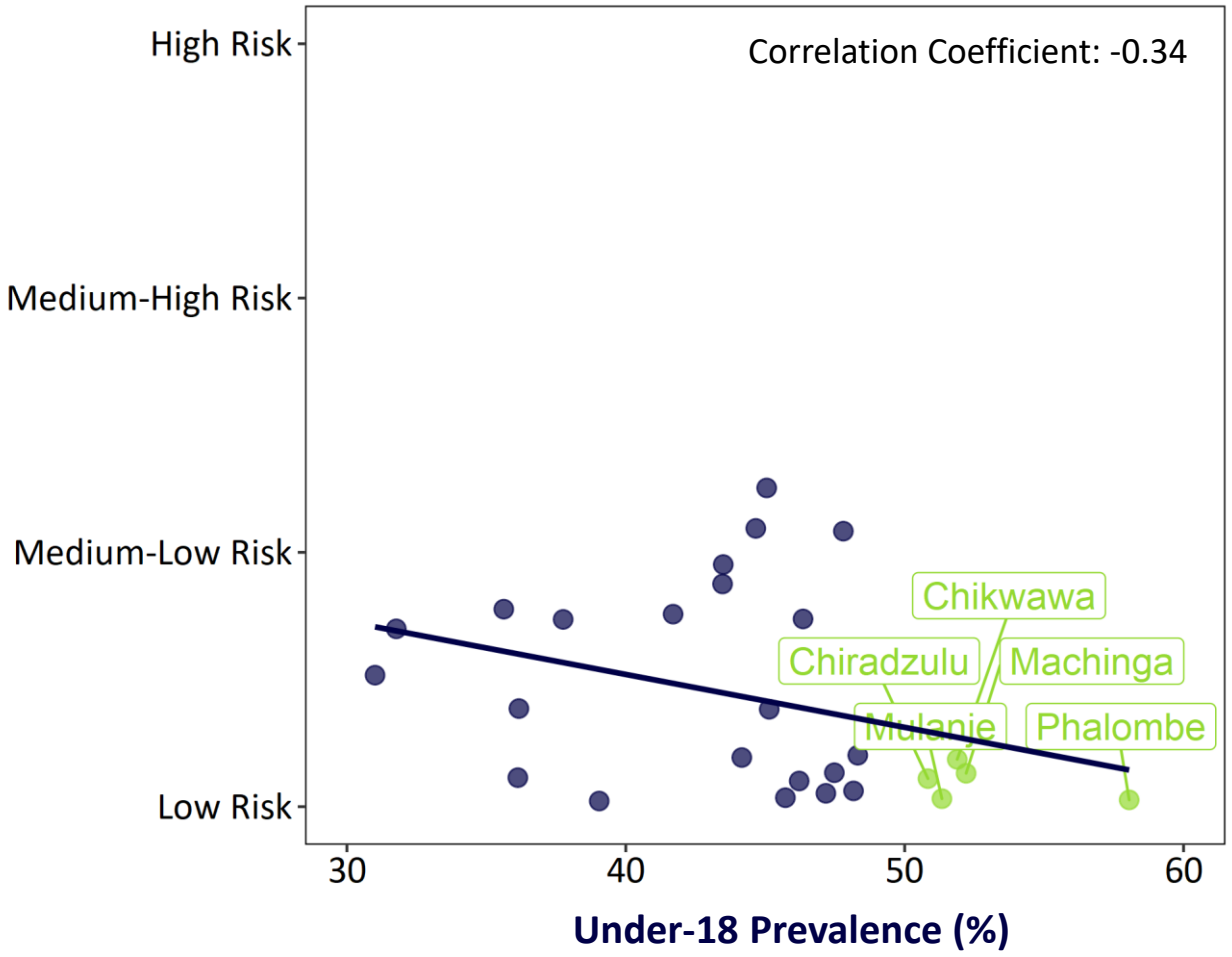
Source: Fraym, Malawi DHS 2016, WorldPop 2020

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

Districts with high child marriage prevalence tend to be classified as lower risk for child marriage due to inequitable attitudes towards wife beating. This is unsurprising, given communities with gender inequitable attitudes are primarily concentrated in Mzimba.

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

Each dot represents a district.



Source: Fraym, Malawi DHS 2016

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

Communities where women are more likely to participate 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 relationship between prevalence and decisions on large household purchases is strongest.

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	-0.39
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, Malawi DHS 2016

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

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

1. Fraym used **five 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; (iv) what food should be cooked each day; (v) husband's earnings.

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

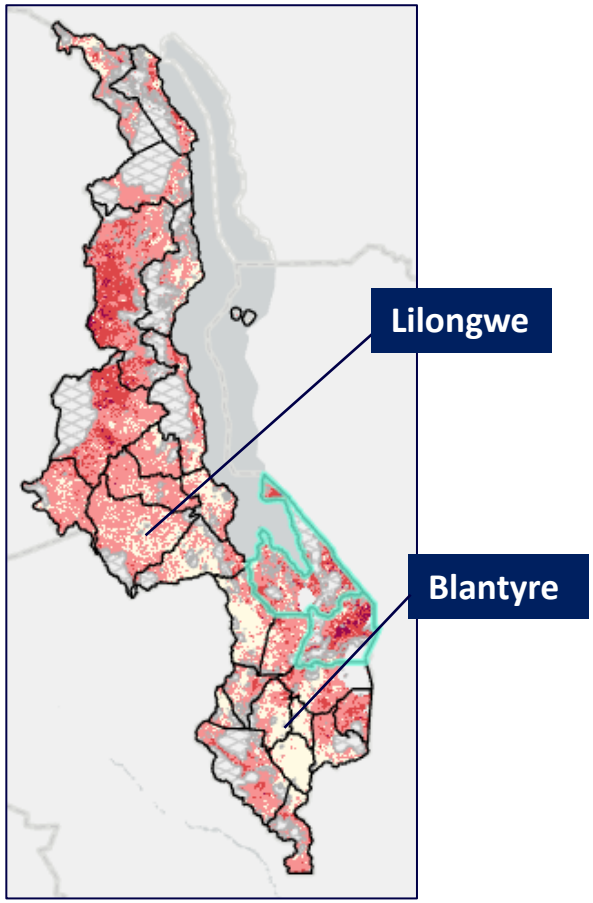
3. Fraym then **classified communities into quartiles with risk categories ranging from 1 to 4**. Communities with lower index values, or lower participation in decision-making, are categorized as a 4 ("high risk").

4. 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 behavior, as measured by women's participation in decision-making, represents the highest risk for child marriage.

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

There are an estimated 16,400 girls aged 10 to 14 who live communities where women's limited participation in decision-making is a risk factor for child marriage. More than half live in Machinga and Mangochi.

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



- Low Risk
- Medium-Low Risk
- Medium-High Risk
- High Risk
- Areas with total population less than 10 people per sq km
- City — Large cities

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

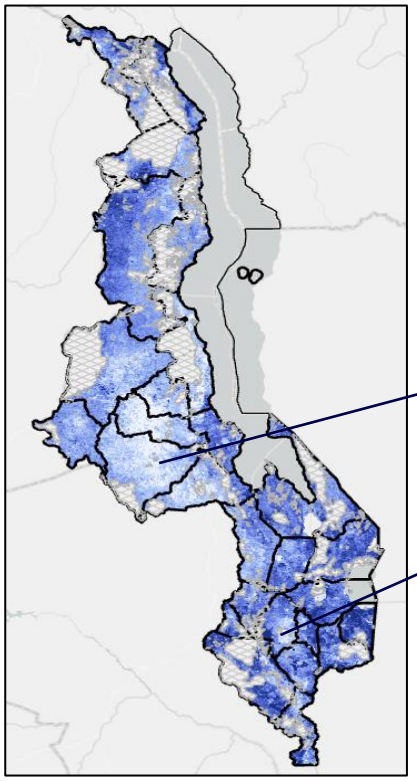
District	Population of at-risk girls (aged 10-14)
Machinga	6,400
Mangochi	3,000

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 56 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 index risk category equal to 4 (highest risk).
Source: Fraym, Malawi DHS 2016, WorldPop 2020

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

Few communities are classified as high risk for child marriage due to women's limited participation in decision-making, whereas prevalence is scattered in the South.

Child Marriage Prevalence



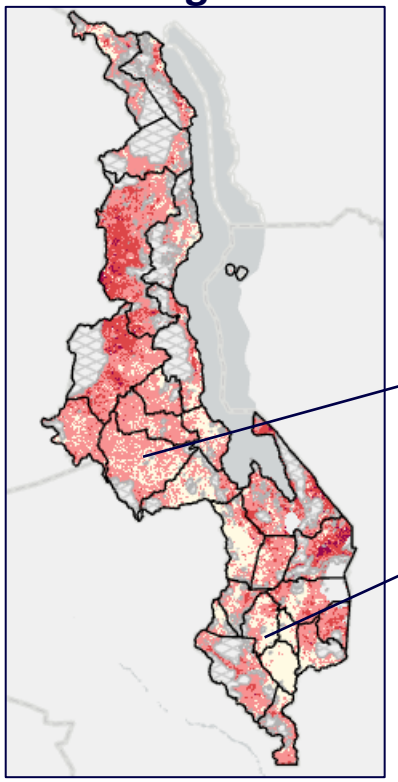
Percent of women (aged 20-24) who were married before 18

0% **70%+**

Areas with total population less than 10 people per sq km

City Large cities

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



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

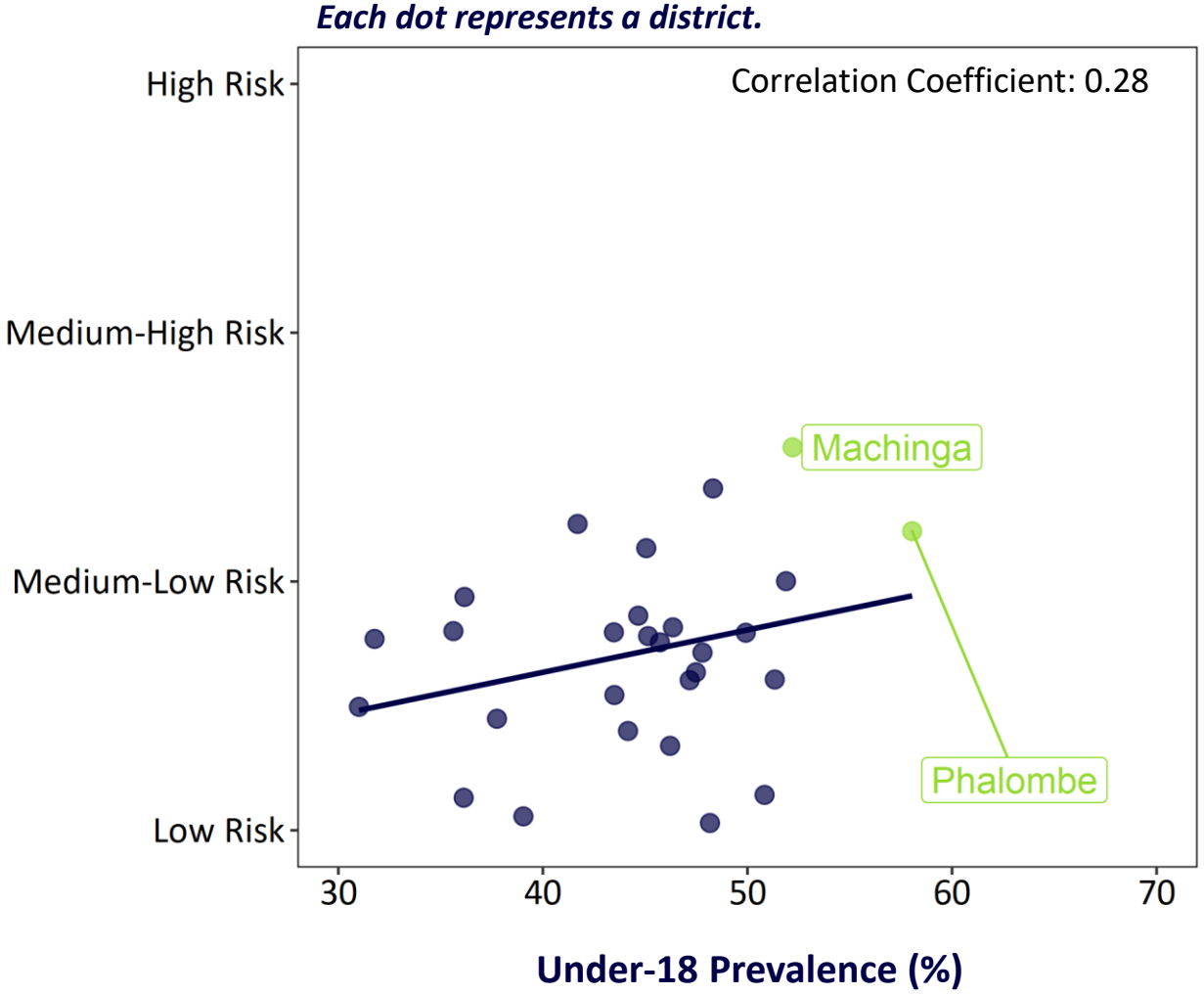
Note 1: The map shows the classification of classification of women's participation in decision-making index for each 1km^2 cell into quartiles. The risk categories range on a 1 to 4 scale, with 4 indicating the highest level of risk. Please see slide 56 or the appendix for more details.

Source: Fraym, Malawi DHS 2016, WorldPop 2020

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

Districts with higher child marriage prevalence tend to be categorized as higher risk for child marriage due to women's participation in decision making. However, the relationship is relatively weak.

Average Women's Limited Participation in Decision-Making Index Risk Category and Child Marriage Prevalence



Source: Fraym, WorldPop 2020

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 inequitable attitudes and behaviors. Each profile is equally weighted.

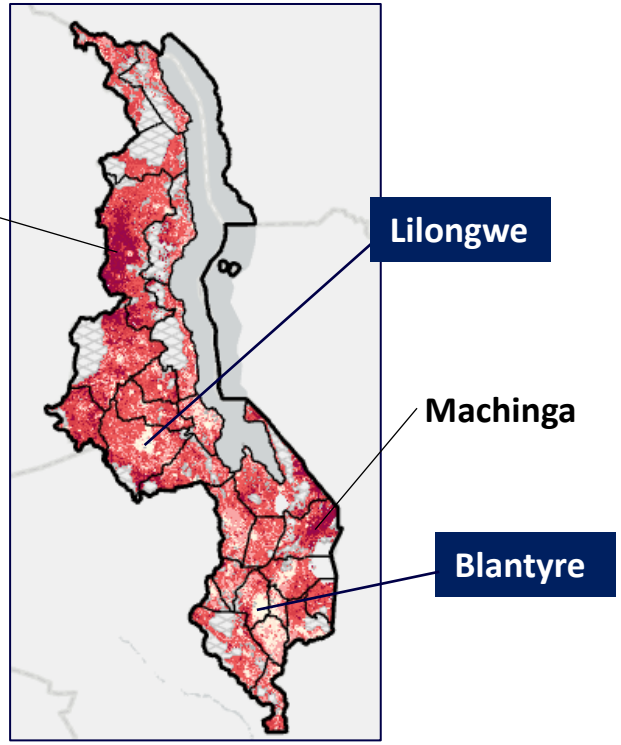
2. The total risk categories range on a 4 to 16 scale, with 16 indicating the highest level of risk. Communities with a score of 16 are classified as high risk on all profiles.

3. There are about 10,000 girls aged 10 to 14 who live in communities classified as high risk on all profiles.

AT-RISK POPULATION || TOTAL RISK ACROSS ALL PROFILES

Mzimba and Machinga are the districts with the most communities as high risk for child marriage across all profiles.

Total Risk



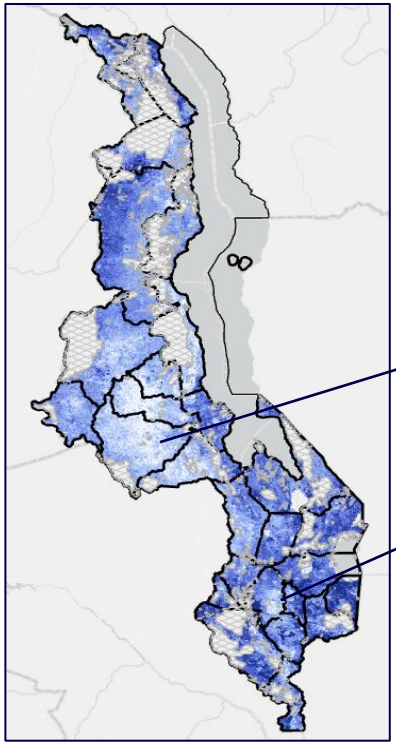
Total Risk

Low Risk — High Risk

Areas with total population less than 10 people per sq km

City Large cities

Child Marriage Prevalence



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

0% — 65%+

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, Malawi DHS 2016, WorldPop 2020

AT-RISK POPULATION || KEY TAKEAWAYS

Poverty and gender inequitable attitudes and behaviors as risk factors are most strongly associated with child marriage, whereas pregnancy is less critical.

1. While there is a strong relationship between pregnancy outside of marriage risk category and child marriage at the district level, **there are few communities classified as high risk for child marriage due to pregnancy, resulting in 44,500 at-risk girls aged 10-14.**

2. **There are an estimated 104,000 girls aged 10 to 14 who live in communities where poverty represents a high risk for child marriage**, most of which are in the South. This risk factor puts the most girls at risk.

3. **Communities with gender inequitable attitudes, measured as attitudes towards wife beating, are primarily concentrated in Mzimba, whereas communities where decision-making behavior represents a high risk are in Machinga**. There are an estimated 5,000 girls aged 10 to 14 in communities where attitudes represents a high risk and 16,400 girls in communities where decision-making represents a high risk.

4. **Mzimba and Machinga districts have higher total risk.** Machinga has the second highest under-18 prevalence rate (52 percent), whereas child marriage prevalence in Mzimba is the median (45 percent).

Hotspot Analysis

Bringing together the previous sections, Fraym identified three hotspots for child marriage: Phalombe, Chitipa, and Salima districts.

1. Fraym defined hotspots as **districts with particularly high child marriage prevalence and/or burden**, and high concentrations of risk factors for child marriage. Using this definition, Fraym identified three hotspots for each of the three regions.

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. **Phalombe district had the highest child marriage prevalence and burden in the southern region and in the country overall in 2016.** Interestingly, the district has the third highest rate of adult female employment in the country in addition to the second lowest female educational attainment.

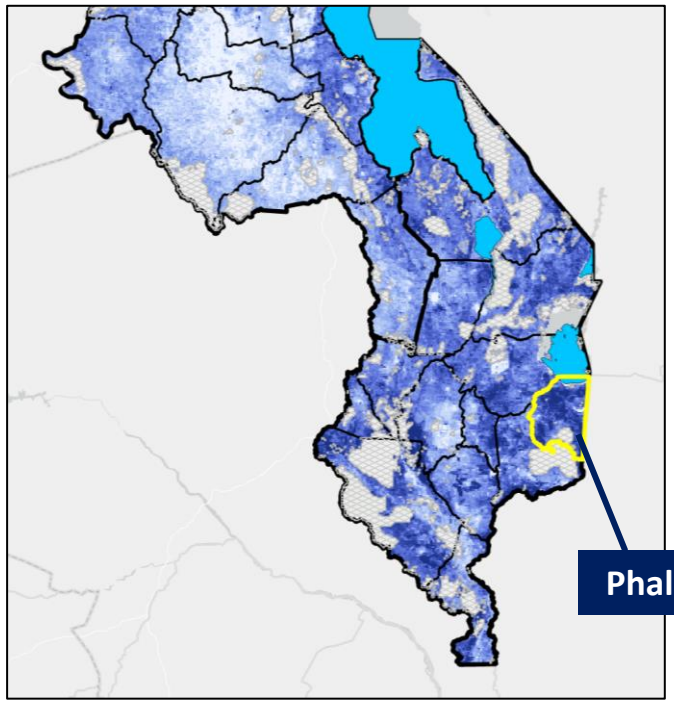
4. **Chitipa had the highest child marriage prevalence in the northern region in 2016**. The district showed the third highest rate of female educational attainment in the country overall as well as an adult female employment rate above the national average.

5. **Salima had the highest child marriage prevalence in the central region in 2016** and similarly poor female educational attainment. It is the only hotspot with access to major highways.

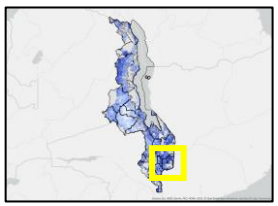
HOTSPOT ANALYSIS || PHALOMBE DISTRICT (OVERVIEW)

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

Phalombe has the highest prevalence of under-18 child marriage – 58%



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



0% **70%+**

Under 18 Prevalence

City District capital

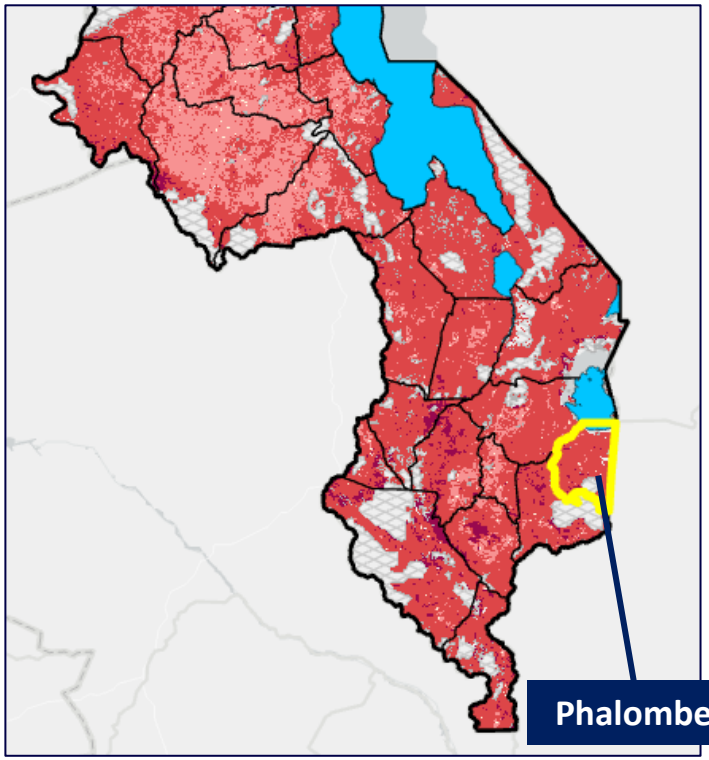
Key Indicators	
Under-18 Prevalence	58%
Under-18 Burden	10,800
Percent of adults (aged 15-49) who are employed	79%
Percent of women (aged 15-49) who are employed	72%
Percent of women (aged 18-49) who completed primary education or higher	22%
Percent of women (aged 15-24) who are sexually active and use a modern contraceptive method	34%
Percent of individuals in households with access to electricity	5%
Percent of individuals in households with a flush toilet	2%

Source: Fraym, Malawi DHS 2016

HOTSPOT ANALYSIS || PHALOMBE DISTRICT (RISK PROFILE MAPPING)

In Phalombe, several communities are categorized as very poor or within the high-risk category, whereas pregnancy outside of marriage is a lower risk factor.

Pregnancy Outside of Marriage Risk Category[1]

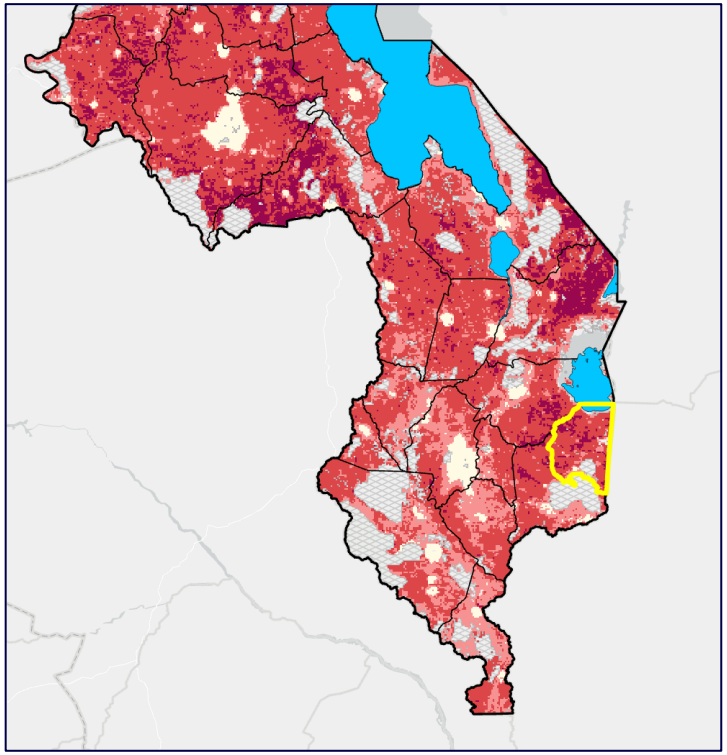


Low Risk
Medium-Low Risk
Medium-High Risk
High Risk

City District capital

Areas with total population less than 10 people per sq km

Poverty Index Risk Category[2]



Population of at-risk girls (aged 10-14) due to pregnancy as a factor[3]	1,200

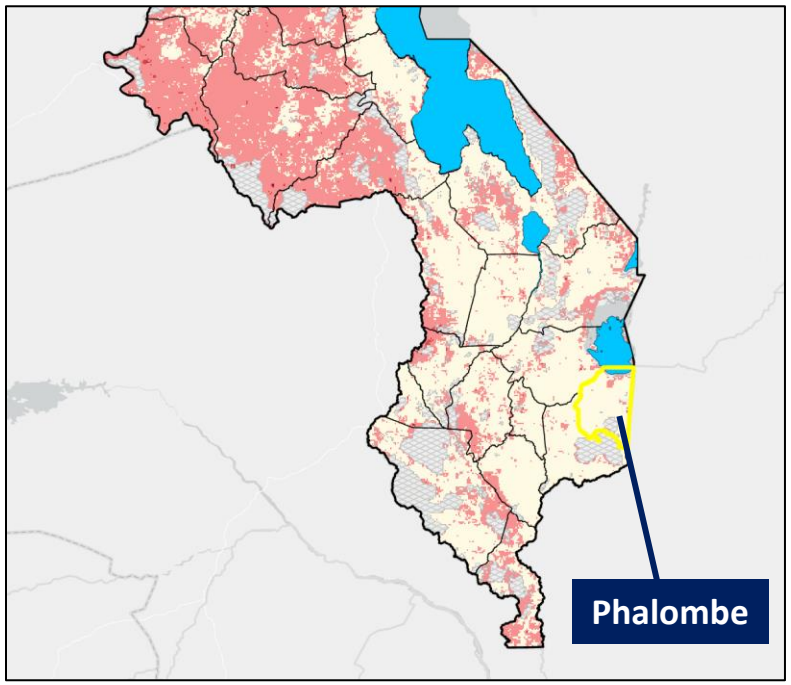
Population of at-risk girls (aged 10-14) due to poverty as a factor[3]	4,700

Note 1: The map shows the classification of pregnancy outside of marriage for each 1km^2 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 40 or the appendix for more details.
Note 2: 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 46 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, Malawi DHS 2016, WorldPop 2020

HOTSPOT ANALYSIS || PHALOMBE DISTRICT (RISK PROFILE MAPPING)

Few communities in Phalombe are categorized as high risk for gender inequitable attitudes or for decision-making.

Attitudes Towards Wife Beating Risk Category[1]

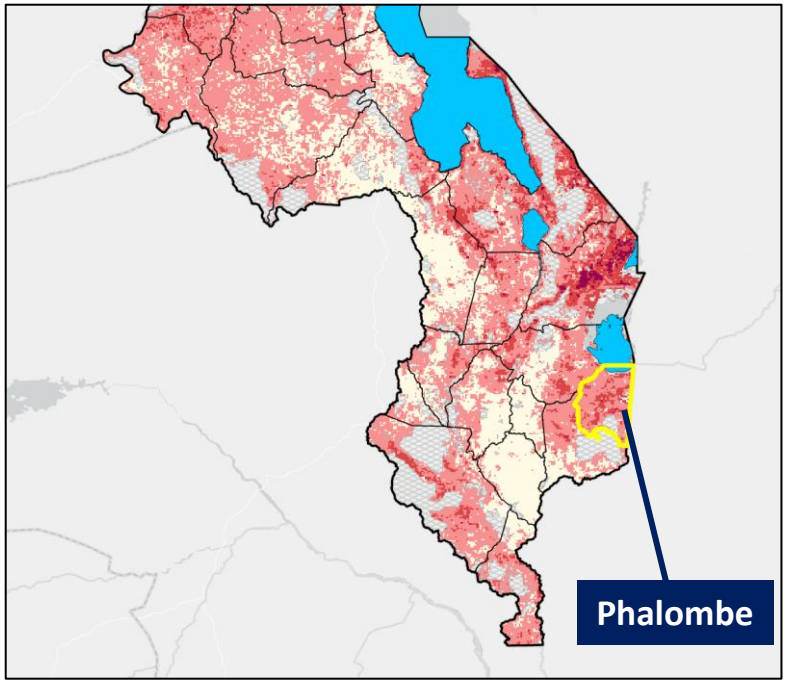


Low Risk
Medium-Low Risk
Medium-High Risk
High Risk

City District capital

Areas with total population less than 10 people per sq km

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



Population of at-risk girls (aged 10-14) due to attitudes as a factor[3]	0

Population of at-risk girls (aged 10-14) due to decision-making as a factor[3]	130

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 51 or the appendix for more details.
Note 2: 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 slides 56 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 decision-making index risk category equal to 4 (highest risk).
Source: Fraym, Malawi DHS 2016, WorldPop 2020

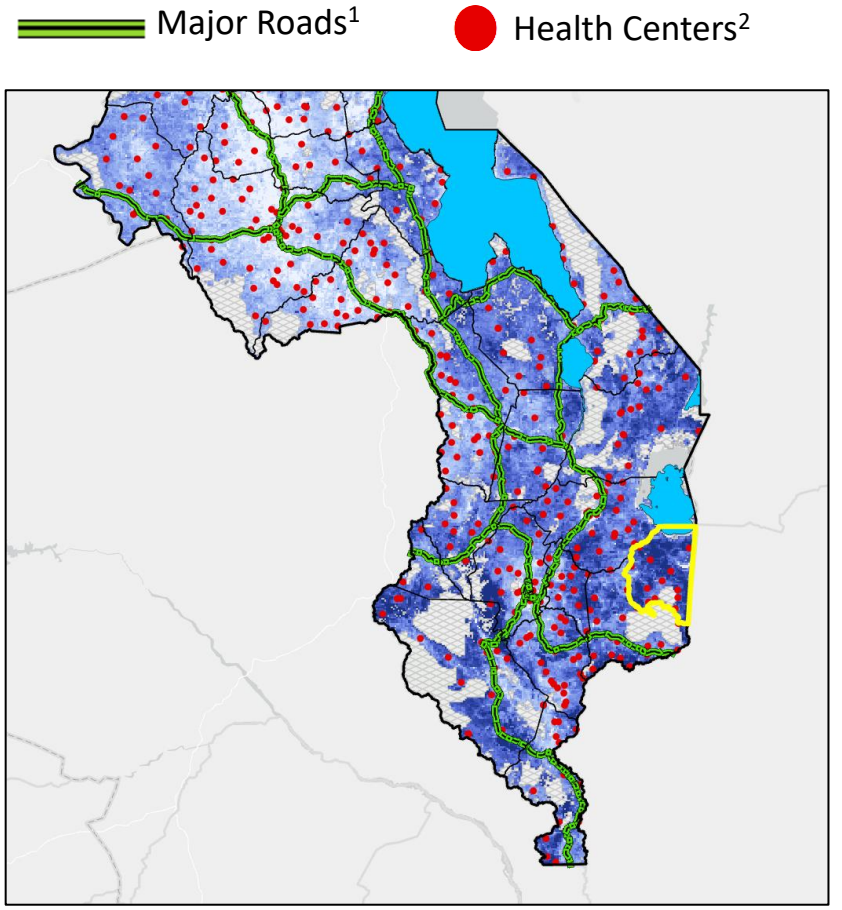
HOTSPOT ANALYSIS || PHALOMBE DISTRICT (INFRASTRUCTURE AND SERVICES)

Although communities in Phalombe lack connections to major roads, the distribution of health centers is on par with the national average, which suggests good access to health services possibly related to child marriage.

1. No major roads pass through Phalombe indicating that communities, including those with high prevalence, are disconnected.

2. There are roughly 3.4 public health centers per 100,000 people, which is on par with the national average. Health centers are evenly distributed throughout the region

Infrastructure in Phalombe

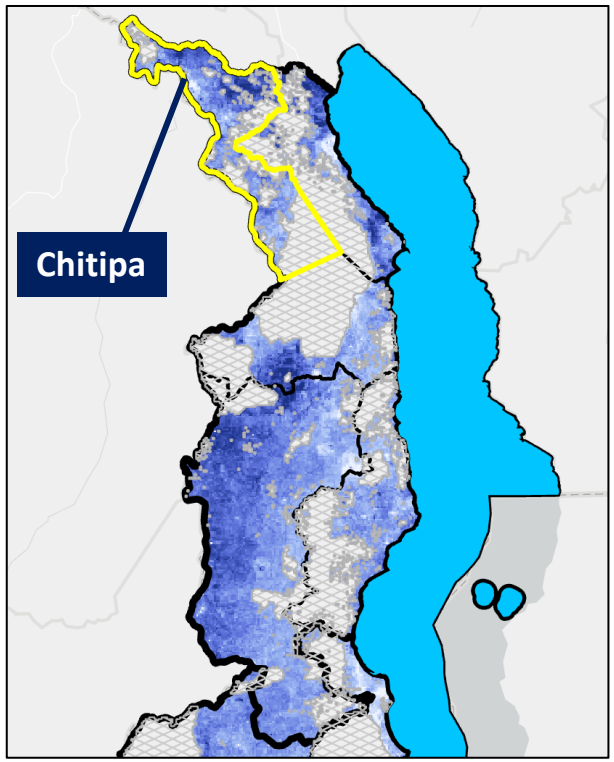


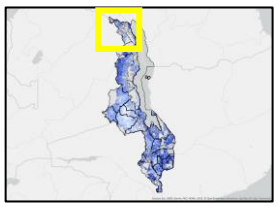
Note 1: Major roads include motorways, trunk roads, and primary roads, which are the most important roads in a country's road network.
Note 2: Public health centers come from the World Health Organization.
Source: Fraym, Malawi DHS 2016, OpenStreetMaps, WHO

HOTSPOT ANALYSIS || CHITIPA DISTRICT (OVERVIEW)

Chitipa has the highest child marriage prevalence in the Northern region.

Chitipa has the highest prevalence of under-18 child marriage – 48%





Under 18 Prevalence

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

0% **70%+**

City District capital

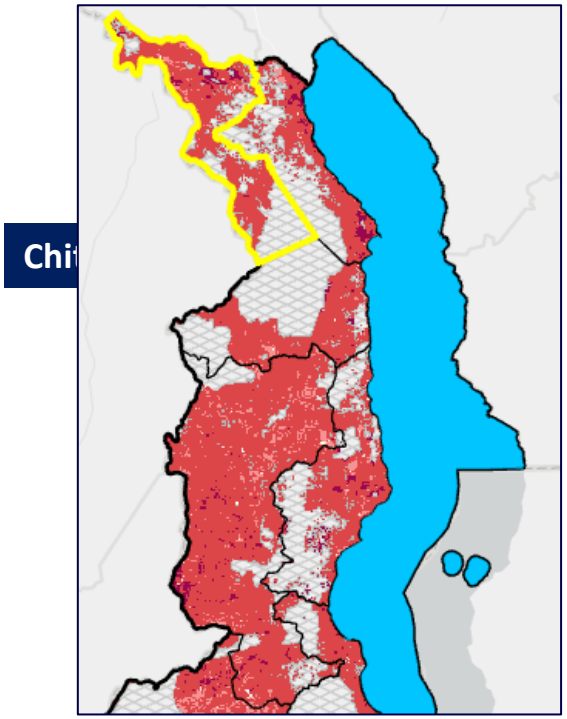
Key Indicators	
Under-18 Prevalence	48%
Under-18 Burden	4,750
Percent of adults (aged 15-49) who are employed	75%
Percent of women (aged 15-49) who are employed	67%
Percent of women (aged 18-49) who completed primary education or higher	50%
Percent of women (aged 15-24) who are sexually active and use a modern contraceptive method	34%
Percent of individuals in households with access to electricity	11%
Percent of individuals in households with a flush toilet	3%

Source: Fraym, Malawi DHS 2016

HOTSPOT ANALYSIS || CHITIPA DISTRICT (RISK PROFILE MAPPING)

In Chitipa, very few communities are categorized as very poor or within the high-risk category. There are a handful more communities where pregnancy represents a risk factor for child marriage.

Pregnancy Outside of Marriage Risk Category[1]

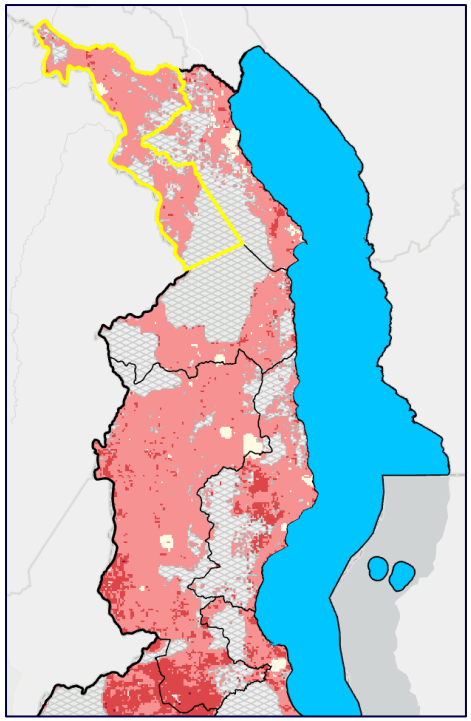


Low Risk
Medium-Low Risk
Medium-High Risk
High Risk

City District capital

Areas with total population less than 10 people per sq km

Poverty Index Risk Category[2]



Population of at-risk girls (aged 10-14) due to pregnancy as a factor[3]	1,400

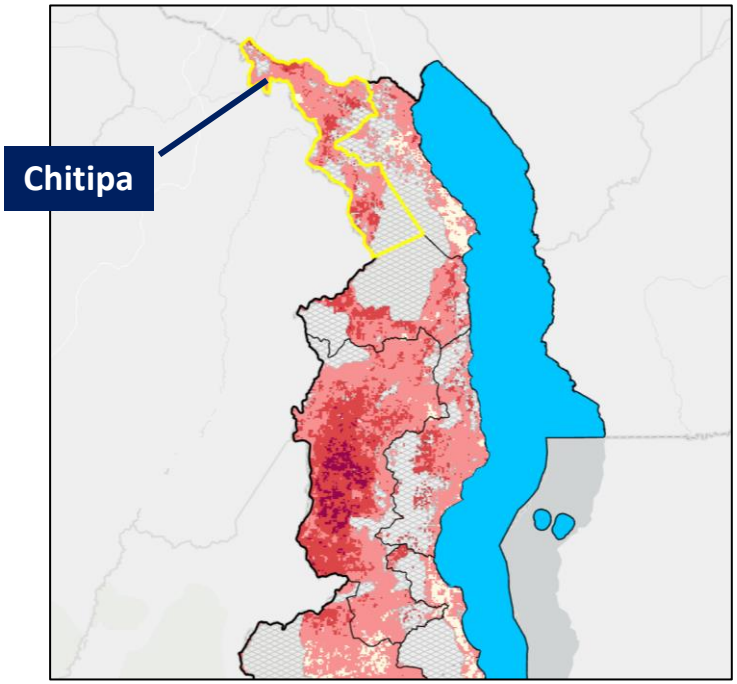
Population of at-risk girls (aged 10-14) due to poverty as a factor[3]	<10

Note 1: The map shows the classification of pregnancy outside of marriage for each 1km^2 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 40 or the appendix for more details.
Note 2: 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 46 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, Malawi DHS 2016, WorldPop 2020

HOTSPOT ANALYSIS || CHITIPA DISTRICT (RISK PROFILE MAPPING)

Few communities in Chitipa are categorized as high risk for child marriage due to gender inequitable attitudes or decision-making.

Attitudes Towards Wife Beating Risk Category[1]



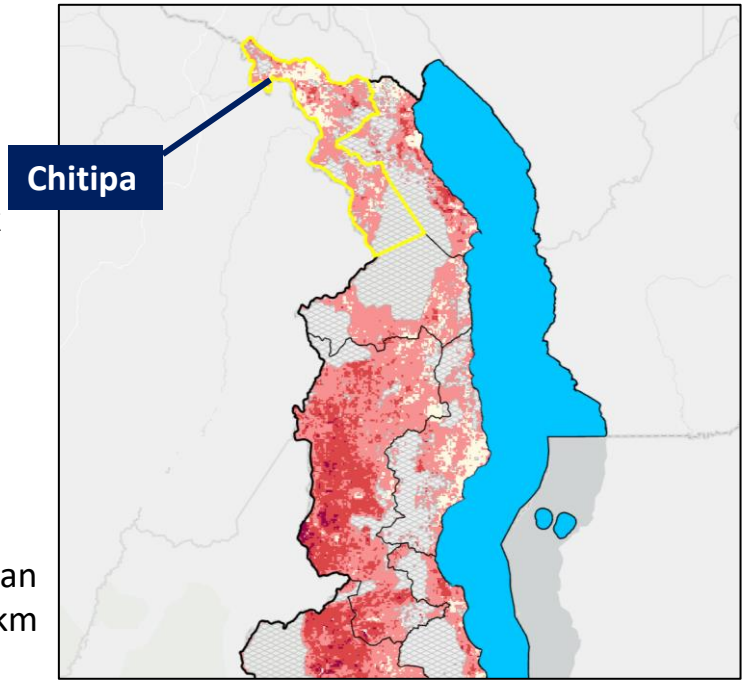
Low Risk
Medium-Low Risk
Medium-High Risk
High Risk

City District capital

Areas with total population less than 10 people per sq km

Population of at-risk girls (aged 10-14) due to attitudes as a factor[3]	30

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



Population of at-risk girls (aged 10-14) due to decision-making as a factor[3]	20

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 51 or the appendix for more details.

Note 2: 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 slides 56 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 decision-making index risk category equal to 4 (highest risk).

Source: Fraym, Malawi DHS 2016, WorldPop 2020

HOTSPOT ANALYSIS || CHITIPA DISTRICT (INFRASTRUCTURE AND SERVICES)

Communities in Chitipa also lack connections to major roads with an even distribution of health centers, indicating a similar situation to Phalombe.

1 No major roads pass through Chitipa, including the district capital indicating that communities may have limited access to services.

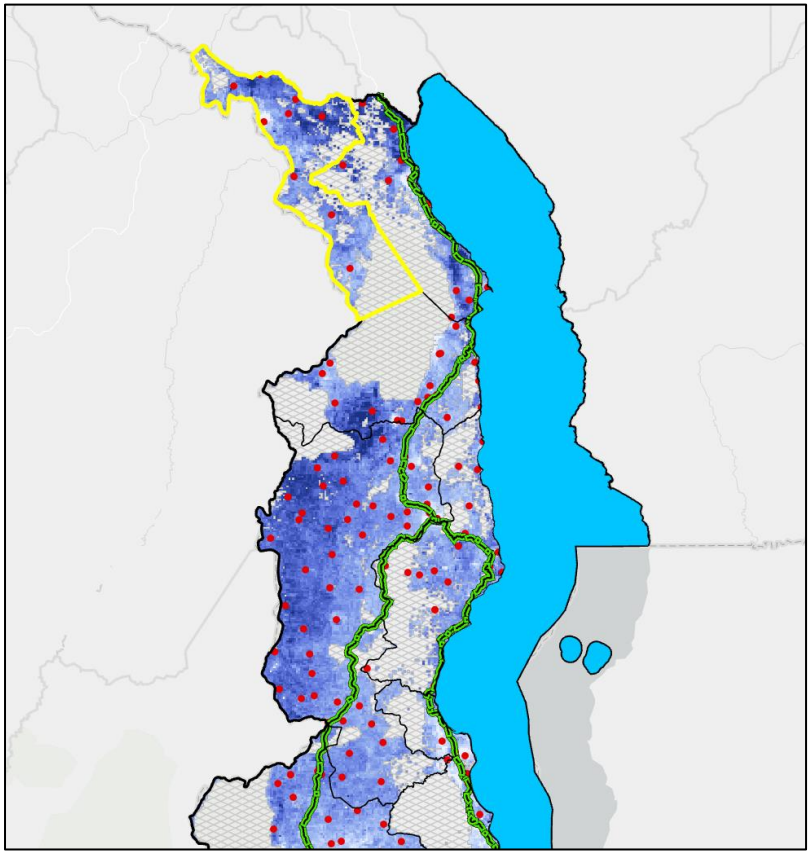
2 There are roughly 3.7 public health centers per 100,000 people, which is slightly higher than the national average. Health centers are evenly distributed throughout the region

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

0% **65%+**

Infrastructure in Chitipa

Major Roads[1] Health Centers[2]

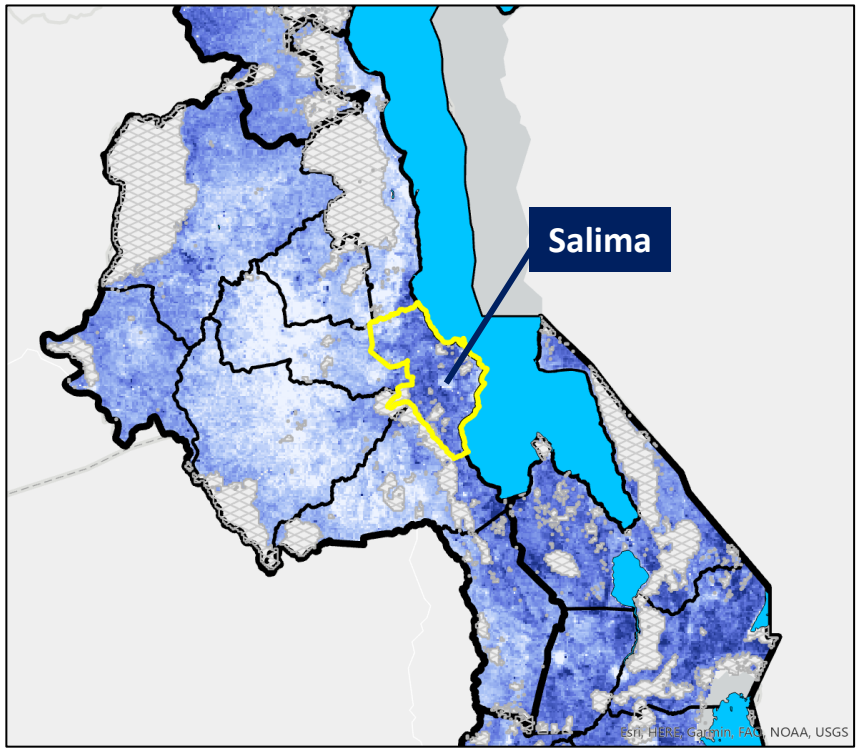


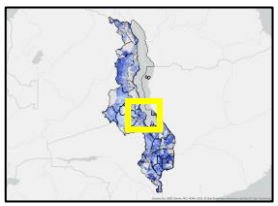
Note 1: Major roads include motorways, trunk roads, and primary roads, which are the most important roads in a country's road network.
Note 2: Public health centers come from the World Health Organization.
Source: Fraym, Malawi DHS 2016, OpenStreetMaps, WHO

HOTSPOT ANALYSIS || SALIMA DISTRICT (OVERVIEW)

Salima has the highest child marriage prevalence in the Central region.

Salima has the highest prevalence of under-18 child marriage – 47%





Under 18 Prevalence

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

0% **70%+**

City District capital

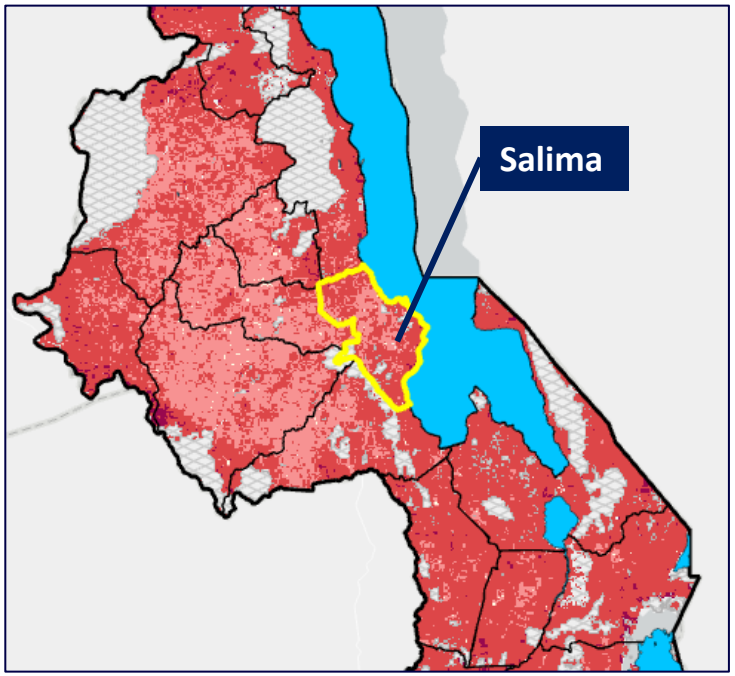
Key Indicators	
Under-18 Prevalence	47%
Under-18 Burden	9,720
Percent of adults (aged 15-49) who are employed	72%
Percent of women (aged 15-49) who are employed	60%
Percent of women (aged 18-49) who completed primary education or higher	23%
Percent of women (aged 15-24) who are sexually active and use a modern contraceptive method	31%
Percent of individuals in households with access to electricity	9%
Percent of individuals in households with a flush toilet	2%

fraym **Source:** Fraym, Malawi DHS 2016

HOTSPOT ANALYSIS || SALIMA DISTRICT (RISK PROFILE MAPPING)

In Salima, few communities are categorized as very poor or within the high-risk category. Salima city shows low risk.

Pregnancy Outside of Marriage Risk Category[1]

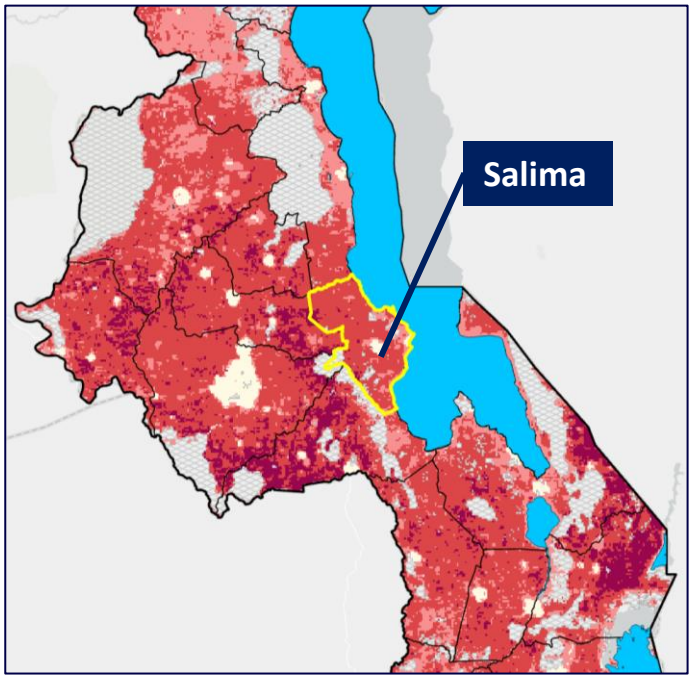


Low Risk
Medium-Low Risk
Medium-High Risk
High Risk

City District capital

Areas with total population less than 10 people per sq km

Poverty Index Risk Category[2]



Population of at-risk girls (aged 10-14) due to pregnancy as a factor[3]	160

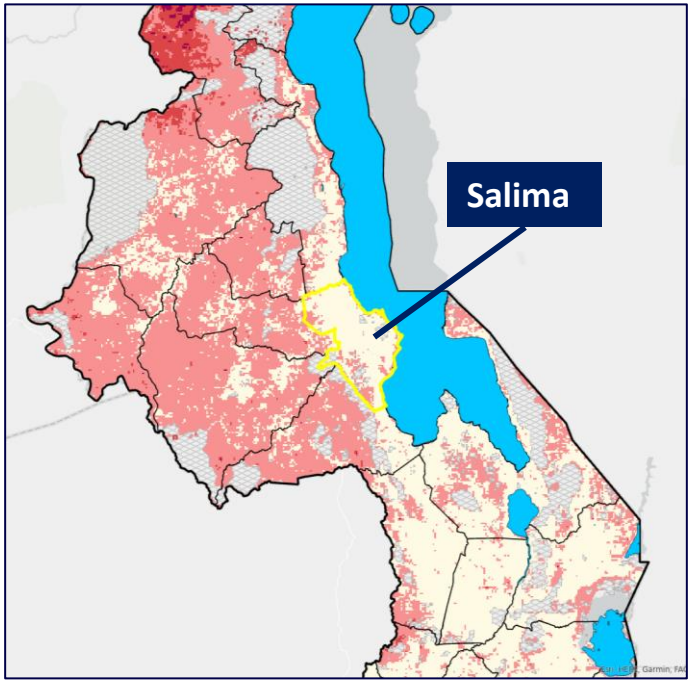
Population of at-risk girls (aged 10-14) due to poverty as a factor[3]	1,000

Note 1: The map shows the classification of pregnancy outside of marriage for each 1km^2 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 40 or the appendix for more details.
Note 2: 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 46 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, Malawi DHS 2016, WorldPop 2020

HOTSPOT ANALYSIS || SALIMA DISTRICT (RISK PROFILE MAPPING)

Very few communities in Salima are categorized as high risk for child marriage due to gender inequitable attitudes or decision-making.

Attitudes Towards Wife Beating Risk Category[1]



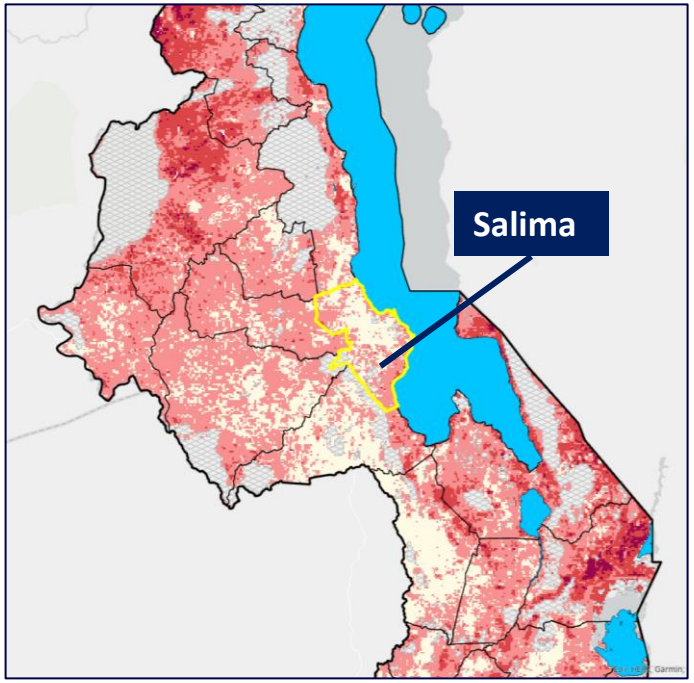
Population of at-risk girls (aged 10-14) due to attitudes as a factor[3]	0

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

City District capital

Areas with total population less than 10 people per sq km

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



Population of at-risk girls (aged 10-14) due to decision-making as a factor[3]	330

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 51 or the appendix for more details.

Note 2: 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 slides 56 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 decision-making index risk category equal to 4 (highest risk).

Source: Fraym, Malawi DHS 2016, WorldPop 2020

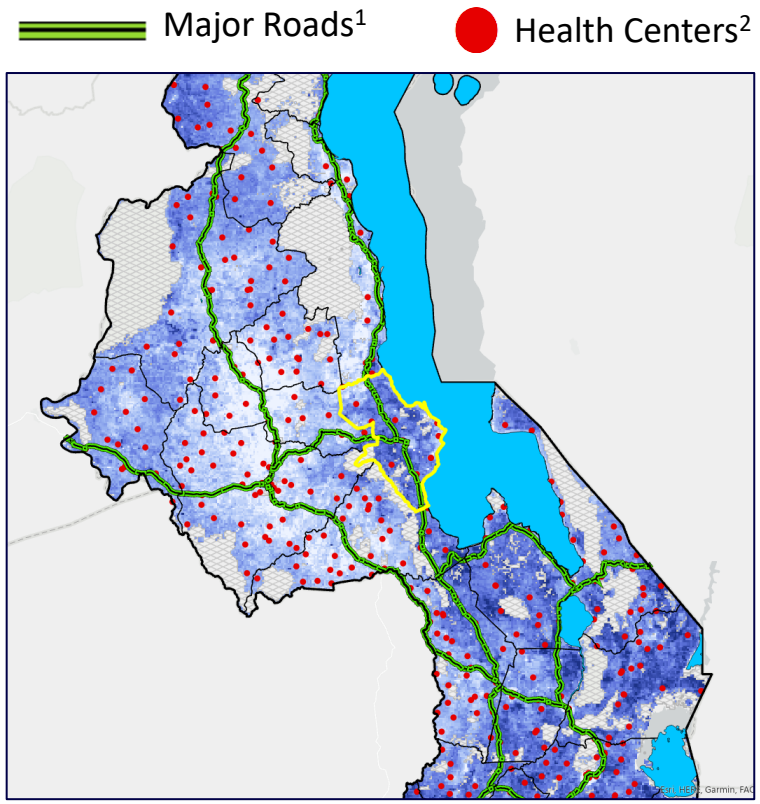
HOTSPOT ANALYSIS || SALIMA DISTRICT (INFRASTRUCTURE AND SERVICES)

While two major highways intersect in Salima, high prevalence communities along Lake Malawi are still disconnected. Health center access is limited.

1 Two major roads pass through Chitipa, the M5 and the M14. While the district is relatively small, communities along Lake Malawi have limited access to major transportation.

2 There are roughly 3.2 public health centers per 100,000 people, which is slightly lower than the national average.

Infrastructure in Salima



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 centers come from the World Health Organization.
Source: Fraym, Malawi DHS 2016, OpenStreetMaps, WHO

HOTSPOT ANALYSIS || DISTRICT-LEVEL DATA

Phalombe has the highest under-18 prevalence rate and the highest population of girls living in very poor communities.

Indicator	Phalombe	Chitipa	Salima
Child Marriage			
Under-18 Prevalence	58%	48%	47%
Population of At-Risk Girls (aged 10-14), by Profile			
Pregnancy	1,200	1,400	160
Poverty	4,700	<10	1,000
Gender Inequitable Attitudes	-	30	-
Limited Decision-Making	130	16	330
Community Characteristics			
Total Population	412,000	245,000	471,000
Number of Health Centers Per 100,000 People	3.4	3.7	3.2
Percent of women (aged 15-49) who are employed	72%	67%	60%
Percent of women (aged 18-49) who completed primary education or higher	22%	50%	23%

Source: Fraym

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.

Note: All indicators are from the 2016 Malawi DHS. Child marriage prevalence is also calculated using the 2010 Malawi DHS and 2004 Malawi DHS.

APPENDIX | | DEFINITIONS

Indicator	Description
Community Context	
Adult Employment	Percent of adults (aged 15-49) who are employed. An adult is employed if he or she reports working in the last 7 days.
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 women (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.

Note: All indicators are from the 2016 Malawi DHS. Child marriage prevalence is also calculated using the 2010 Malawi DHS and 2004 Malawi DHS.

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. 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 four indicators to capture poverty: (i) wealth; (ii) employment in unskilled manual labor or self-employment in agriculture for women aged 15 to 24; (iii) educational attainment of the household head; and (iv) employment in unskilled manual labor or self-employment in agriculture for the household head. 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 adults 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. 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	Fraym selected five 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; (iv) what food should be cooked each day; (v) husband's earnings. Fraym then combined these indicators using a principal components analysis (PCA) to produce 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 Malawi DHS. Child marriage prevalence is also calculated using the 2010 Malawi DHS and 2004 Malawi 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 2016 Malawi Demographic and Health Survey (DHS), 2010 DHS, and 2004 DHS.

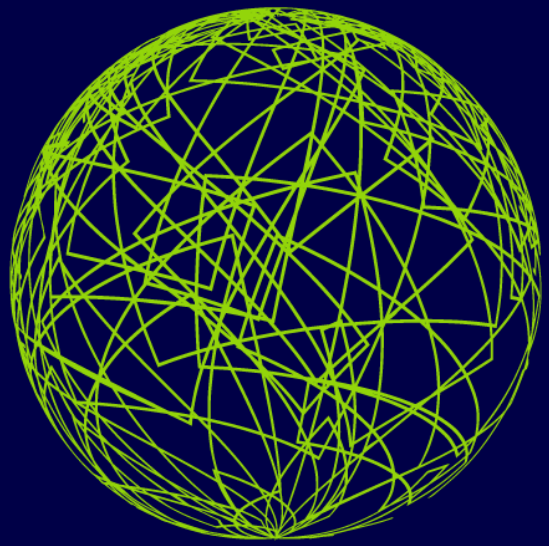
Additionally, granular population distribution data comes from WorldPop, a publicly available and detailed population distribution and composition data source that leverages existing census data to produce 100m x 100m resolution estimates of population density. In order to build its datasets, WorldPop 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 (2016, 2010, and 2004).

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 Malawi, the surveys were implemented by the National Statistics Office with financial, technical, and managerial support by large **internationally respected organizations**, including the World Bank, USAID, and Millennium Challenge Corporation. 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