# Contraceptive Use and Needs among Adolescent Women Aged 15-19: Regional and Global Estimates and Projections from 1990 to 2030 from a Bayesian Hierarchical Modeling Study

## S1 APPENDIX

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†The views and opinions expressed in this paper are those of the authors and do not necessarily represent those of the United Nations. This paper has not been formally edited and cleared by the United Nations.

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This appendix contains details on data and methods, and additional results, that supplement those given in the main manuscript.

# 1 Data and Country Classifications

The term "country" as used in this study also refers, as appropriate, to territories or areas.

## 1.1 Data on Contraceptive Prevalence and Unmet Need for Family Planning

Data availability by region, time-period, and marital status is summarized in Figure A.

## 1.2 Classification of Countries Based on Sexual Activity

There are large differences across countries in the prevalence of sex among unmarried and not in-union women of reproductive age (UWRA) (Ueffing et al., 2019). We accounted for this by incorporating a country classification based on sexual activity in the hierarchical structure of our model for unmarried and not in-union women (see Section 2.1). The classification consisted of two groups defined as follows:

**Sexual Activity Group 0 (SA0)** Countries with very low levels of sexual activity, i.e., recent sexual activity (sexual intercourse in past four weeks) among UWRA was less than 2 percent;

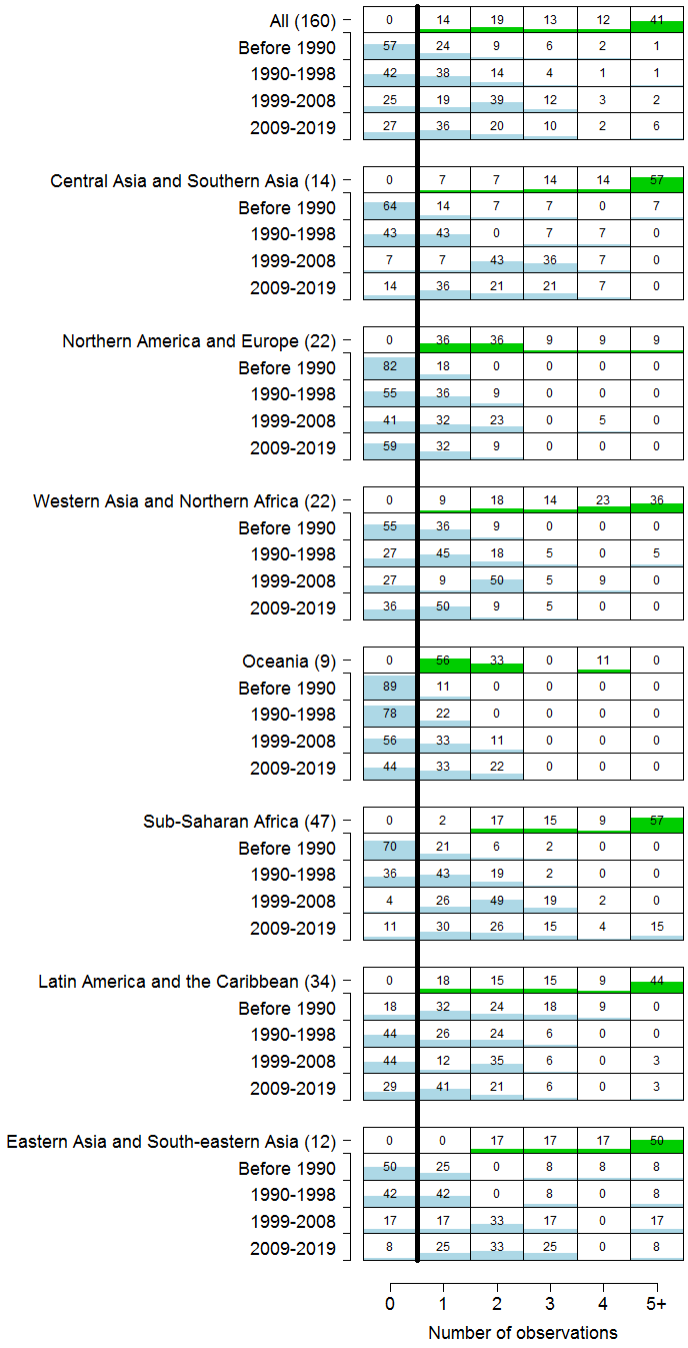
**Sexual Activity Group 1 (SA1)** All other countries.

Countries were assigned to the same sexual activity group for the entire time period of estimation and projection.

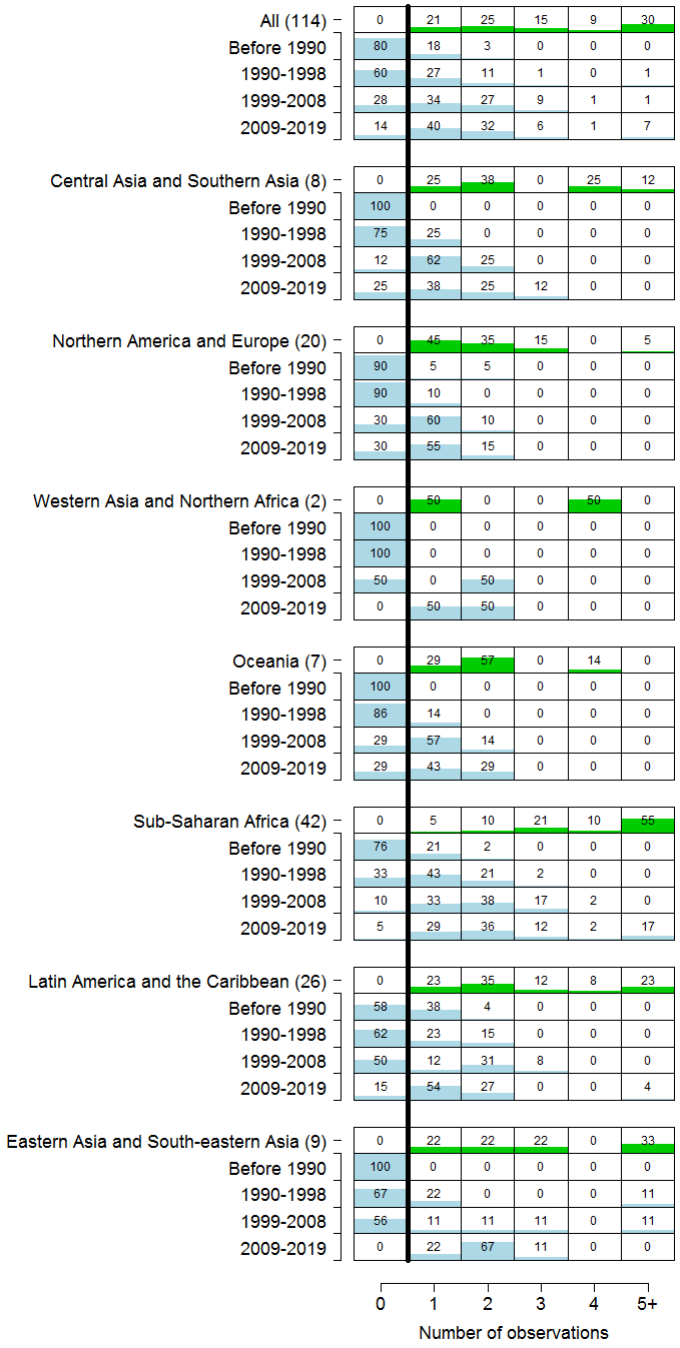
Data on sexual activity among UWRA were available in 81 Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS). Countries with less than 2 percent sexually active (defined as having sexual intercourse in past 28 days) among UWRA were assigned to Group 0, the rest to Group 1. Other data were used as proxies for countries with neither a DHS nor a MICS. For 43 countries, we used information on the acceptance of sex between unmarried adults from Pew Research Center (2014) (29 countries) and Inglehart et al. (2013) (14 countries). We used the most recently available data for each county. The remaining 71 countries, all in Asia and Northern Africa, were assigned on the basis of the proportion religious in the population using information from Pew Research Center (2012).

In total, 45 countries (23 percent) were classified as having low sexual activity among unmarried women. All of these countries were in either Africa or Asia, predominantly in the following subregions: Northern Africa, Western Asia, South-Central Asia and South-Eastern Asia (Figure B). A list of all countries by sexual activity group is in Table C. A complete discussion of the classification scheme, and the data sources used, can be found in Kantorová et al. (2020, S1 Appendix, Subsection 2.4).

This classification was done using information about sexual activity among UWRA, that is aged 15–49 years. We compared it to a classification based on sexual activity among women aged 15–19 years for the 81 countries with data from DHS or MICS. A small number of countries switched groups but these were countries with enough data on the family planning indicators such that their sexual activity grouping would have minimal impact on the posterior estimates. Given this finding, and the fact that we did not have information for the remaining 114 countries, we retained the classification based on sexual activity among UWRA.




**(i)** Married women




**(ii)** Unmarried women

**Figure A.** Data availability by region, time-period and marital status. Proportion of countries by number of observations of contraceptive prevalence (any method) by region and time period for (i) married and (ii) unmarried women aged 15–19. The cells give the percentage of all countries for the given region and time period with the number of observations according to column. The cells sum to 100 (within rounding) across each row. The numbers in parentheses next to the region names are the number of countries in that region with at least one observation.

**Figure B.** Classification of countries by sexual activity among unmarried women. Sexual Activity Group 0, countries with low levels of sexual activity among unmarried women; Sexual Activity Group 1, countries with higher levels of sexual activity among unmarried women. Classification was based on the information about the level of, acceptance of, or justification for sexual activity among unmarried women from a variety of data sources, including DHS and MICS. The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

# 2 Statistical Methods

## 2.1 Hierarchical Model Structures

We used the same hierarchical structures as (Kantorová et al., 2020). Different structures were used to model married and unmarried women, and each marital group's structure had two variants, giving a total of four structures. The married women model used a geographic structure for the majority of model parameters and a combination of development status and geography for the remainder. The unmarried women model used a combination of the sexual activity classification (Section 1.2) and geography for both variants.

Each marital group's main variant had four levels, with the highest, Level 4, being "World", the cluster to which all countries belonged. The secondary variant in both models had no Level 4; this variant allowed a greater degree of divergence between country parameter estimates depending on the grouping at lower levels. The structure used in the unmarried women model was motivated by the *a priori* expectation that variation in contraceptive use among unmarried women would be related to variation in sexual activity. In the married women model, being married was taken as a reasonable proxy for being sexually active.

The four hierarchical structures thus defined are summarized in Table A and Figure C. For extended discussions of the structures and model parameters of the married women model see Alkema et al. (2013, Supplementary appendix, Subsections 2.1–2.2) and Cahill et al. (2017, Supplementary appendix, Subsections 2.1–2.3); for the unmarried women model see Kantorová et al. (2020, S1 Appendix, Subsection 3.4). For a list of countries by region, subregion, and sexual activity group, see Table C.

While it might be possible to explore different hierarchical structures, out-of-sample validation exercises (see Sections 2.2 and 3.1) indicated that the structure defined here performed well in terms of predictive accuracy. Therefore, we would expect any improvements under other structures to be limited.

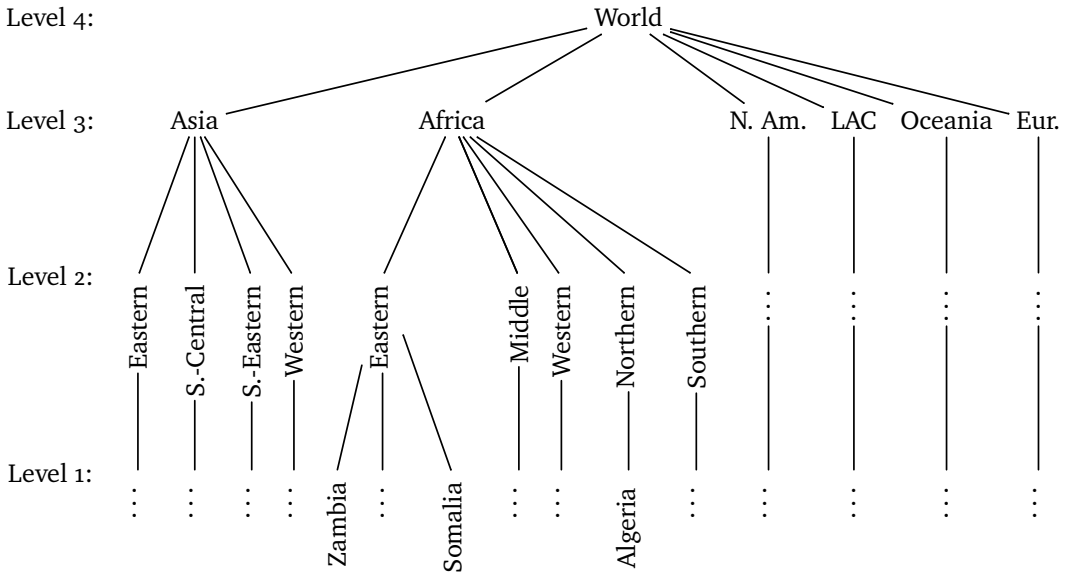
**Table A.** Comparison of the hierarchical structures used in the married (i & ii) and unmarried (iii & iv) models for estimating contraceptive prevalence among women aged 15–19. The term "country" as used in this study also refers, as appropriate, to territories or areas. The terms "developed" and "less developed" are used for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. See also Figure C.

| | Classification Scheme | | | |
|---|---|---|---|---|
| | (i) Geographic | (ii) Development / Geographic | (iii) Sexual Activity / Geographic | (iv) Sexual Activity / Geographic |
| Level 1 | Country | Country | Country | Country |
| Level 2 | Subregion | Region / —* | Region + India / Subregion† | Region‡ |
| Level 3 | Region | Development status | Sexual activity group | Sexual activity group |
| Level 4 | World | — | World | — |

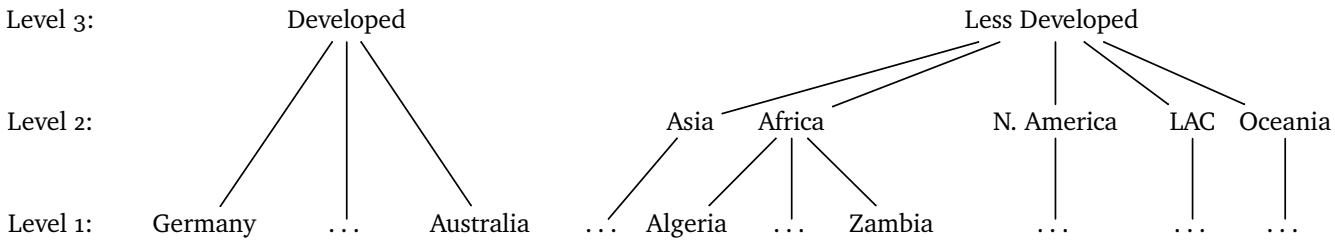
* Only for Less Developed Countries; no Level 2 for Developed Countries.
† Region + India for Sexual Activity Group 0; Subregion for Sexual Activity Group 1.
‡ No Level 2 for Sexual Activity Group 0; Region for Sexual Activity Group 1.

## 2.2 Model Validation

Model performance was assessed using cross-validation exercises like those employed by Kantorová et al. (2020, S1 Appendix, Sect. 4.3) and Alkema et al. (2013, Supplementary Appendix, Sect. 2.6). In each exercise the input data set was partitioned into a *training set* and a *test set*. The model was then re-run on the training set and the results evaluated against the test set. The exercises used were:

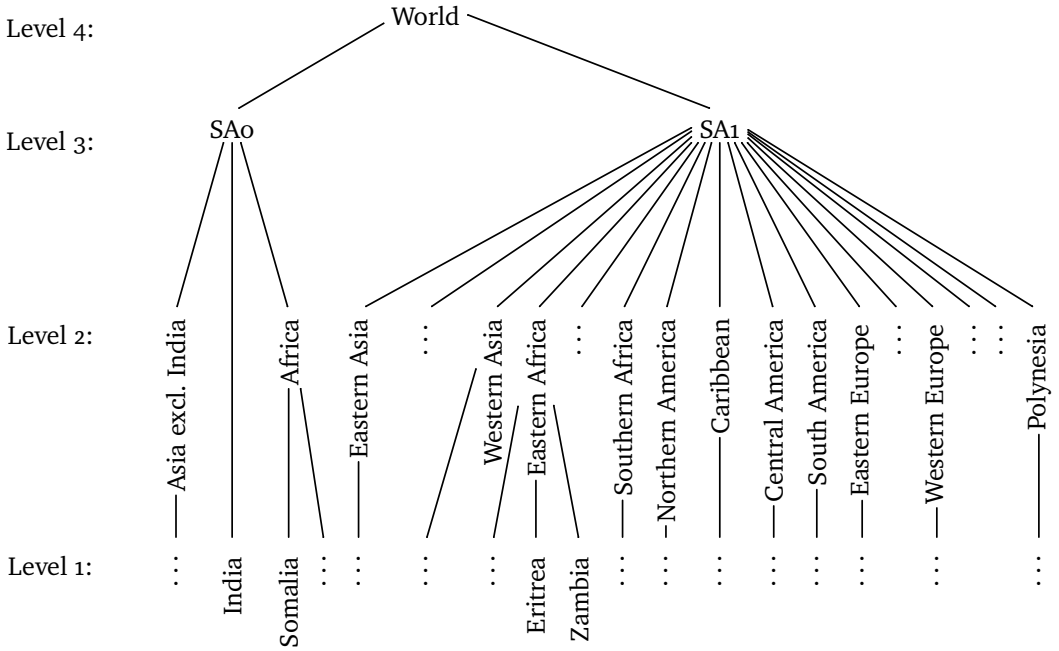



**(i)** Geographic model used for the majority of parameters in the married women model. All clusters at Levels 3 and 4 are shown but, for clarity, only a subset of clusters at Level 2 (sub-regions) and Level 1 (countries) are.

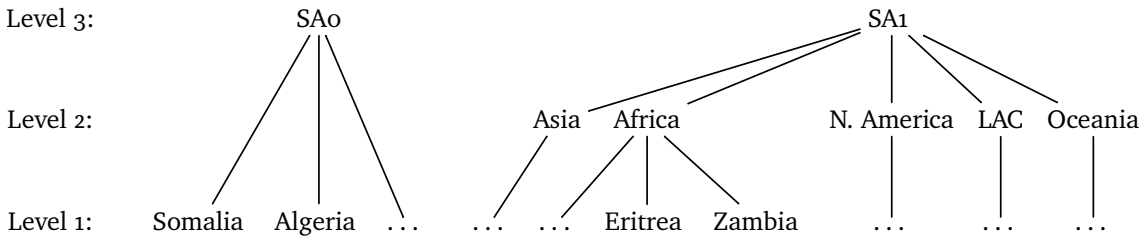



**(ii)** Development / Geographic model used for the remainder of parameters in the married women model. All clusters at Levels 2–4 are shown but, for clarity, only a few example Level 1 clusters (countries) are. The terms "developed" and "less developed" are used for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. The developed countries group comprises all regions of Europe plus Northern America, Australia/New Zealand and Japan. The developing countries group comprises all regions of Africa, Asia (excluding Japan) and Latin America and the Caribbean, as well as Melanesia, Micronesia and Polynesia (Alkema et al., 2013, Supplementary appendix, Subsection 1.1).

**Figure C.** Hierarchical structures used in the married and unmarried women models (see also Table A).




**(iii)** Hierarchical structure used for the majority of parameters in the unmarried women model. Level 1 consists of individual countries which, save the examples, are omitted due to lack of space. "SAo" and "SA1" are Sexual Activity Groups 0 and 1, respectively.




**(iv)** Hierarchical structure used for the remainder of parameters in the unmarried women model. Level 1 consists of individual countries which, save the examples, are omitted due to lack of space. "SAo" and "SA1" are Sexual Activity Groups 0 and 1, respectively.

**Figure C.** (cont'd)

**Exercise 1** Leave out 20 percent of the observations within each country at random.

**Exercise 2** Leave out approximately the most recent 20 percent of observations. For married women, this meant leaving out all observations after 2012 (22 percent) and, for unmarried women, all observations after 2014 (23 percent).

**Exercise 3** Leave out all unmet need observations from 20 percent of countries, randomly chosen from the set of all countries with at least one such observation.

Exercise 1 assesses general out-of-sample performance across the time period of estimation and indicator components. Exercise 3 does the same but is based only on observations of unmet need. Exercise 2 assesses forecast performance within the period of data availability by leaving out all observations after a given year. We used the mid-year of each observation's reference period for this purpose. We wanted to keep the training and test set proportions as similar as possible across married and unmarried models. Differences in data availability meant that this required choosing slightly different cut-off years.

Random cross-validation exercises such as these are subject to noise, and this can be significant in reasonably small datasets such as ours. We attempted to ameliorate this by repeating Exercises 1 and 3 five times, each time with a different randomly chosen test set, and averaging over the results. Exercise 2 could not be replicated as the test set is chosen deterministically.

The following measures were used to summarize the results:

1. Median prediction error (MPE) and median absolute prediction error (MAPE).
   For example, the error in predicting test-set observation $y_i$ was computed as

   $$e_i = y_i - \hat{y}_i,$$

   where $\hat{y}_i$ is the predictive posterior median of $y_i$ from the model fitted to the training set. The MPE was computed as the median of the $e_i$, the MAPE the median of the $|e_i|$, both taken over the observations in the test set.

2. Proportion of the left out observations less than their posterior predictive median. If the model is well calibrated, we expect this to be around 50 percent.

3. Coverage of 95 percent prediction intervals with respect to the left out observations.
   This was defined as the proportion of the left out observations that fell inside the respective posterior predictive intervals. If the model is well calibrated, and if the left out observations are independent from one another, we expect this to be the nominal level (e.g,. for 95 percent intervals, this should be close to 0.95).

Only one left out observation per country was used to calculate the above measures so as to reduce bias due to dependence among observations within country.

# 3 Results

## 3.1 Model Validation

Validation results are shown in Table B for (i) the married women model and (ii) the unmarried women model. They show that the uncertainty intervals have good coverage over the different indicator components for both married and unmarried women when observations are excluded at random (Exercise 1). This is the most general of the Exercises performed.

Exercise 2 was designed to assess the coverage of forecasts of future values. Only one replicate per marital status model was possible due to the deterministic definition of the test set, so results are noisier than for the

other two exercises which were able to be replicated. Nevertheless, the coverages of the 95 percent posterior uncertainty intervals are good and the proportions below the median for the different components are close to the nominal value of 50 percent in most cases. The values for the married women model are higher for the "Total" and "Traditional" components (65% and 64% resp.), however, the prediction errors are, again, quite small. In this work, though, we are primarily interested in the use of modern contraceptive methods and the proportion below the median was very good for this component (55% ).

In both models, the numbers of observations upon which the Exercise 3 replicates were based were very small (20 and 15 for the married and unmarried models, resp.). Nevertheless, the coverages of the uncertainty intervals were close to the nominal value of 95 percent. For the married women model, the proportion below the median was acceptable at 45 percent. The MAPE was 6.1 percent but the MPE was 1.9, suggesting the prediction errors were dispersed but centered only a couple of percentage points above zero. The proportion below the median was further from the nominal value for the unmarried women model but both the MPE and MAPE were small.

**Table B.** Summary of model validation results based on out-of-sample validation experiments; see Section 2.2 for a description of the exercises. For each exercise and component, the values are the proportion of left out observations that fall outside, or inside, the respective 95% prediction intervals, and below their posterior predictive median estimate, and their median error (ME) and median absolute error (MAE). The '# Obs' column gives the number of observations in the test set in each replication of each exercise. Exercises 1 and 3 were repeated five times with different randomly chosen test sets of size '# Obs'.

**(i)** Married women model

| | | 95% prediction interval | | | Median | Prediction Errors (%) | |
|---|---|---|---|---|---|---|---|
| Component | # Obs | %Below | %Within | %Above | % Below | MPE | MAPE |
| Exercise 1 (leave out 20% of obs.) | | | | | | | |
| Total | 80 | 3.7 | 94.3 | 2.0 | 53.1 | -0.1 | 3.5 |
| Modern | 80 | 1.5 | 95.3 | 3.3 | 49.1 | -0.0 | 2.7 |
| Traditional | 80 | 4.4 | 92.8 | 2.8 | 49.1 | 0.1 | 1.4 |
| Unmet | 54 | 2.2 | 94.6 | 3.1 | 49.1 | 0.2 | 4.4 |
| Exercise 2 (leave out all obs. after 2012) | | | | | | | |
| Total | 84 | 4.8 | 95.2 | 0.0 | 65.5 | -2.0 | 4.7 |
| Modern | 84 | 1.2 | 98.8 | 0.0 | 54.8 | -1.0 | 3.4 |
| Traditional | 84 | 2.4 | 97.6 | 0.0 | 64.3 | -0.5 | 1.1 |
| Unmet | 67 | 1.5 | 94.0 | 4.5 | 43.3 | 1.2 | 5.2 |
| Exercise 3 (leave out all unmet need obs. from 20% of countries) | | | | | | | |
| Unmet | 20 | 3.0 | 96.0 | 1.0 | 45.0 | 1.9 | 6.1 |
| Values Expected | | | | | | | |
| | | 2.5 | 95.0 | 2.5 | 50.0 | | |

**Table B.** (cont'd).

**(ii)** Unmarried women model

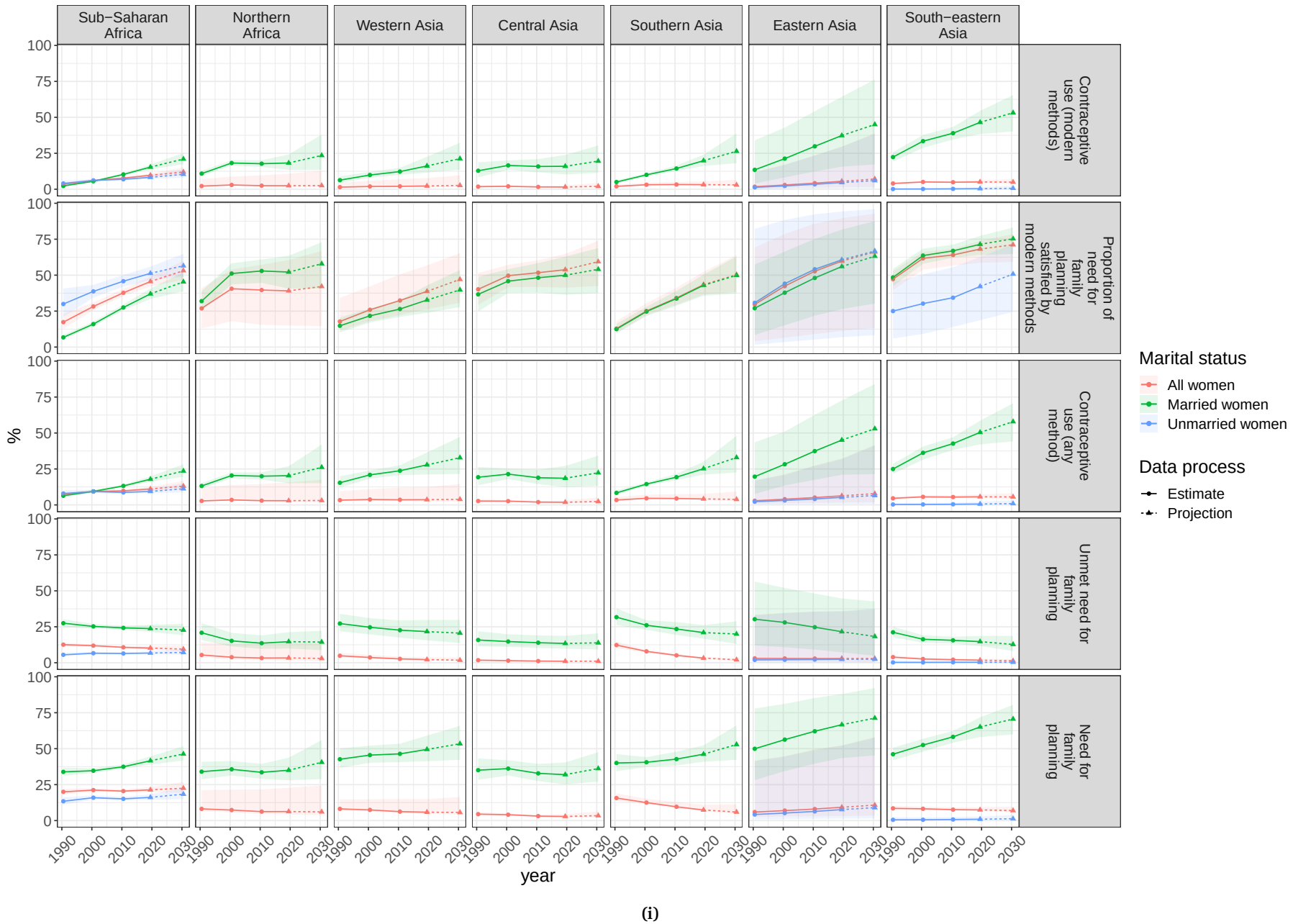
| Component | # Obs | 95% prediction interval %Below | %Within | %Above | Median % Below | Prediction Errors (%) MPE | MAPE |
|---|---|---|---|---|---|---|---|
| Exercise 1 (leave out 20% of obs.) | | | | | | | |
| Total | 53 | 3.4 | 94.7 | 1.9 | 56.3 | -0.1 | 1.1 |
| Modern | 53 | 3.4 | 94.3 | 2.3 | 54.8 | -0.0 | 1.1 |
| Traditional | 53 | 3.9 | 95.0 | 1.2 | 54.7 | -0.0 | 0.3 |
| Unmet | 35 | 2.3 | 96.0 | 1.7 | 41.2 | 0.3 | 0.9 |
| Exercise 2 (leave out all obs. after 2014) | | | | | | | |
| Total | 60 | 1.7 | 96.7 | 1.7 | 56.7 | -0.1 | 1.3 |
| Modern | 60 | 3.3 | 96.7 | 0.0 | 53.3 | -0.0 | 1.7 |
| Traditional | 60 | 0.0 | 98.3 | 1.7 | 51.7 | -0.0 | 0.2 |
| Unmet | 49 | 6.1 | 93.9 | 0.0 | 51.0 | -0.0 | 1.1 |
| Exercise 3 (leave out all unmet need obs. from 20% of countries) | | | | | | | |
| Unmet | 15 | 4.0 | 96.0 | 0.0 | 41.3 | 0.7 | 1.7 |
| Values Expected | | | | | | | |
| | | 2.5 | 95.0 | 2.5 | 50.0 | | |

## 3.2 Estimates and Projections for Level 2 Regions

Estimates and projections of the family planning indicators are plotted for Level 2 regions in Figure D. These results are supplementary to the results for Level 1 regions presented in the main manuscript.

## 3.3 Ternary Color Maps with Re-centered Color Scales

In most countries, the majority of adolescent women aged 15–19 who are unmarried and not in-union experienced no need for family planning in 2019. This makes is difficult to identify relative differences among countries from a plot using a ternary color scale centered at the point ($1/3$, $1/3$, $1/3$), as in Figures 8 and 9 in the main article. Relative differences can be highlighted by re-centering the color scale to the compositional mean (e.g., Pawlowsky-Glahn et al., 2015). We do this for unmarried and all women in Figures E and F. Maps with centered color schemes are useful for comparing countries in the same population (i.e., in the same map). They cannot be used for cross-population comparisons.




(i)

**Figure D.** Estimates and projections of the proportion of adolescent women (15-19 years) using contraception (any method and modern methods) and having unmet need for family planning, by marital status and regions, 1990–2030. Given are the posterior medians (solid lines) posterior 95% uncertainty intervals (ribbons).

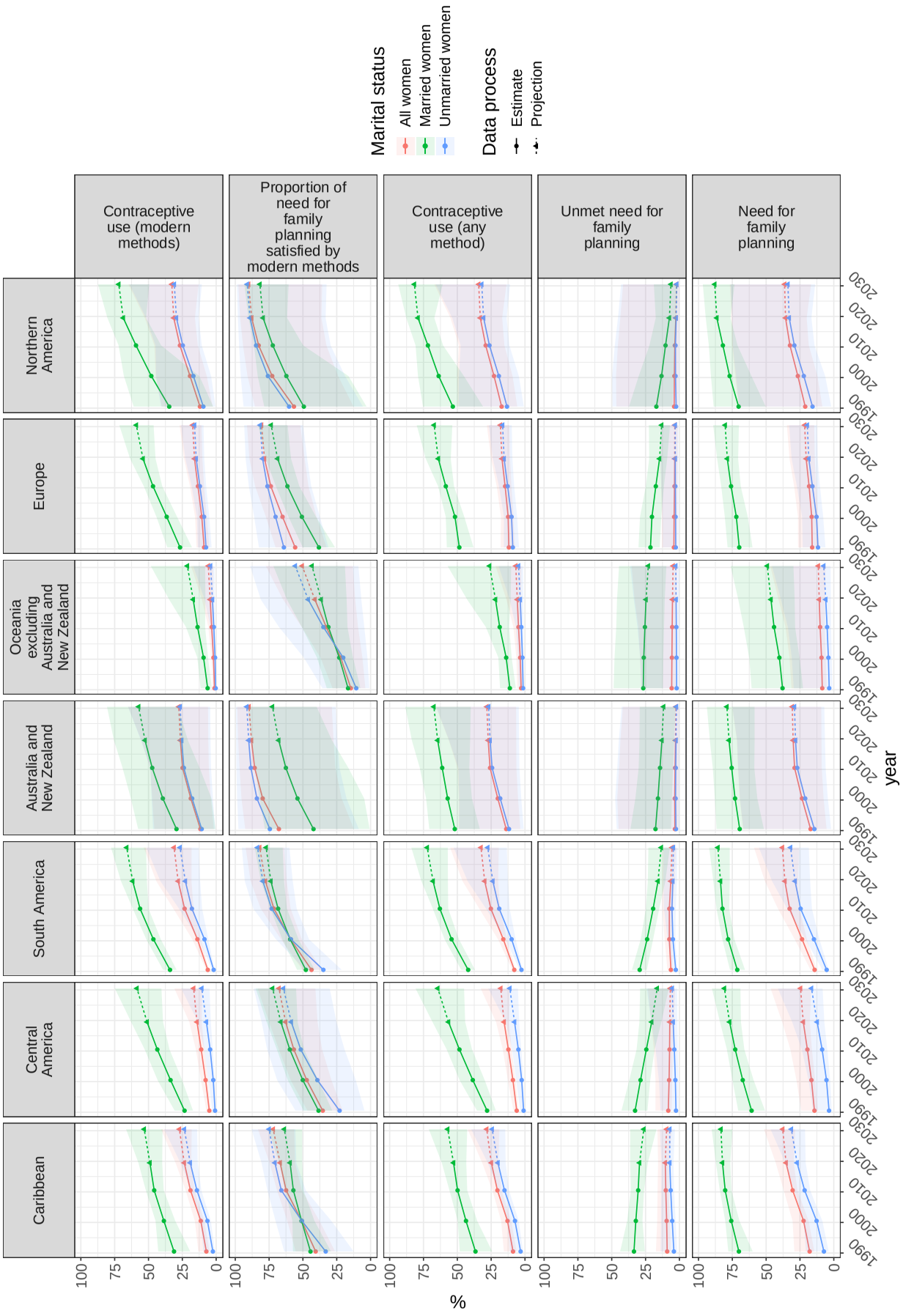



**Figure D.** (cont'd).

(ii)

Note: The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. Final boundary between the Republic of Sudan the Republic of South Sudan has not yet been determined. A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

**Figure E.** Ternary color scheme map with centered color scheme for unmarried adolescent women aged 15–19, 2019. The map shows posterior median estimates of contraceptive use (any method), unmet need for family planning, and no need for family planning. The color scheme is centered at the compositional mean so that relative differences among countries are highlighted. However, it also means that this map is not directly comparable with the other ternary color scheme maps. Note that the legend has been cropped.

Note: The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. Final boundary between the Republic of Sudan the Republic of South Sudan has not yet been determined. A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

**Figure F.** Ternary color scheme map with centered color scheme for all adolescent women aged 15–19, 2019. The map shows posterior median estimates of contraceptive use (any method), unmet need for family planning, and no need for family planning. The color scheme is centered at the compositional mean so that relative differences among countries are highlighted. However, it also means that this map is not directly comparable with the other ternary color scheme maps. Note that the legend has been cropped.

# Appendix

**Table C.** Country and region classifications used in the married and unmarried model hierarchies. Sub-Saharan Africa consists of all countries in Africa except those in Northern Africa. "Lat. Am. & Caribb." is Latin America and the Caribbean; "PEW GRL" = Pew Global Religious Landscape Survey (Pew Research Center, 2012); "PEW GAS" = Pew Global Attitudes Survey (Pew Research Center, 2014). The terms "developed" and "less developed" are used for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. The developed countries group comprises all regions of Europe plus Northern America, Australia/New Zealand and Japan. The developing countries group comprises all regions of Africa, Asia (excluding Japan) and Latin America and the Caribbean, as well as Melanesia, Micronesia and Polynesia. The term "country" as used in this study also refers, as appropriate, to territories or areas.

| Region | Subregion | Name | Development Group | Sexual Activity Group | Source data for Sexual Activity group |
|---|---|---|---|---|---|
| Africa | Eastern Africa | Djibouti | Less developed | 0 | PEW GRL |
| | | Somalia | Less developed | 0 | PEW GRL |
| | | South Sudan | Less developed | 0 | DHS/MICS |
| | | Burundi | Less developed | 1 | DHS/MICS |
| | | Comoros | Less developed | 1 | DHS/MICS |
| | | Eritrea | Less developed | 1 | DHS/MICS |
| | | Ethiopia | Less developed | 1 | DHS/MICS |
| | | Kenya | Less developed | 1 | DHS/MICS |
| | | Madagascar | Less developed | 1 | DHS/MICS |
| | | Malawi | Less developed | 1 | DHS/MICS |
| | | Mauritius | Less developed | 1 | PEW GRL |
| | | Mozambique | Less developed | 1 | DHS/MICS |
| | | Réunion | Less developed | 1 | PEW GRL |
| | | Rwanda | Less developed | 1 | DHS/MICS |
| | | Uganda | Less developed | 1 | DHS/MICS |
| | | United Rep. of Tanzania | Less developed | 1 | DHS/MICS |
| | | Zambia | Less developed | 1 | DHS/MICS |
| | | Zimbabwe | Less developed | 1 | DHS/MICS |
| | Middle Africa | Angola | Less developed | 1 | PEW GRL |
| | | Cameroon | Less developed | 1 | DHS/MICS |
| | | Central African Republic | Less developed | 1 | DHS/MICS |
| | | Chad | Less developed | 1 | DHS/MICS |
| | | Congo | Less developed | 1 | DHS/MICS |
| | | Democratic Rep. of the Congo | Less developed | 1 | DHS/MICS |
| | | Equatorial Guinea | Less developed | 1 | PEW GRL |
| | | Gabon | Less developed | 1 | DHS/MICS |

**Table C.** Country and region classifications (cont'd).

| Region | Subregion | Name | Development Group | Sexual Activity Group | Source data for Sexual Activity group |
|---|---|---|---|---|---|
| | | Sao Tome and Principe | Less developed | 1 | DHS/MICS |
| | Northern Africa | Algeria | Less developed | 0 | PEW GRL |
| | | Egypt | Less developed | 0 | PEW GAS |
| | | Libya | Less developed | 0 | World Values Survey |
| | | Morocco | Less developed | 0 | DHS/MICS |
| | | Sudan | Less developed | 0 | PEW GRL |
| | | Tunisia | Less developed | 0 | PEW GAS |
| | Southern Africa | Botswana | Less developed | 1 | DHS/MICS |
| | | Eswatini | Less developed | 1 | DHS/MICS |
| | | Lesotho | Less developed | 1 | DHS/MICS |
| | | Namibia | Less developed | 1 | DHS/MICS |
| | | South Africa | Less developed | 1 | DHS/MICS |
| | Western Africa | Mauritania | Less developed | 0 | DHS/MICS |
| | | Niger | Less developed | 0 | DHS/MICS |
| | | Benin | Less developed | 1 | DHS/MICS |
| | | Burkina Faso | Less developed | 1 | DHS/MICS |
| | | Cabo Verde | Less developed | 1 | PEW GRL |
| | | Côte d'Ivoire | Less developed | 1 | DHS/MICS |
| | | Gambia | Less developed | 1 | DHS/MICS |
| | | Ghana | Less developed | 1 | DHS/MICS |
| | | Guinea | Less developed | 1 | DHS/MICS |
| | | Guinea-Bissau | Less developed | 1 | DHS/MICS |
| | | Liberia | Less developed | 1 | DHS/MICS |
| | | Mali | Less developed | 1 | DHS/MICS |
| | | Nigeria | Less developed | 1 | DHS/MICS |
| | | Senegal | Less developed | 1 | DHS/MICS |
| | | Sierra Leone | Less developed | 1 | DHS/MICS |
| | | Togo | Less developed | 1 | DHS/MICS |
| Asia | Central Asia | Tajikistan | Less developed | 0 | DHS/MICS |
| | | Turkmenistan | Less developed | 0 | DHS/MICS |
| | | Uzbekistan | Less developed | 0 | DHS/MICS |
| | | Kazakhstan | Less developed | 1 | DHS/MICS |
| | | Kyrgyzstan | Less developed | 1 | DHS/MICS |
| | Eastern Asia | Japan | Developed | 1 | PEW GAS |

**Table C.** Country and region classifications (cont'd).

| Region | Subregion | Name | Development Group | Sexual Activity Group | Source data for Sexual Activity group |
|---|---|---|---|---|---|
| | | China | Less developed | 1 | PEW GAS |
| | | China, Hong Kong SAR | Less developed | 1 | World Values Survey |
| | | Democratic People's Rep. of Korea | Less developed | 1 | PEW GRL |
| | | Mongolia | Less developed | 1 | PEW GRL |
| | | Republic of Korea | Less developed | 1 | PEW GAS |
| | South-eastern Asia | Cambodia | Less developed | 0 | DHS/MICS |
| | | Indonesia | Less developed | 0 | DHS/MICS |
| | | Lao People's Dem. Republic | Less developed | 0 | DHS/MICS |
| | | Malaysia | Less developed | 0 | PEW GAS |
| | | Myanmar | Less developed | 0 | PEW GRL |
| | | Democratic Rep. of Timor-Leste | Less developed | 0 | DHS/MICS |
| | | Viet Nam | Less developed | 0 | DHS/MICS |
| | | Philippines | Less developed | 1 | DHS/MICS |
| | | Singapore | Less developed | 1 | World Values Survey |
| | | Thailand | Less developed | 1 | World Values Survey |
| | Southern Asia | Afghanistan | Less developed | 0 | PEW GRL |
| | | Bangladesh | Less developed | 0 | PEW GRL |
| | | Bhutan | Less developed | 0 | DHS/MICS |
| | | India | Less developed | 0 | DHS/MICS |
| | | Iran, Islamic Republic of | Less developed | 0 | PEW GRL |
| | | Maldives | Less developed | 0 | PEW GRL |
| | | Nepal | Less developed | 0 | DHS/MICS |
| | | Pakistan | Less developed | 0 | PEW GAS |
| | | Sri Lanka | Less developed | 0 | PEW GRL |
| | Western Asia | Israel | Developed | 1 | PEW GAS |
| | | Armenia | Less developed | 0 | DHS/MICS |
| | | Azerbaijan | Less developed | 0 | DHS/MICS |
| | | Bahrain | Less developed | 0 | PEW GRL |
| | | Iraq | Less developed | 0 | PEW GRL |
| | | Jordan | Less developed | 0 | PEW GAS |
| | | Kuwait | Less developed | 0 | PEW GRL |
| | | Lebanon | Less developed | 0 | PEW GAS |
| | | Oman | Less developed | 0 | PEW GRL |
| | | Qatar | Less developed | 0 | World Values Survey |
| | | Saudi Arabia | Less developed | 0 | PEW GRL |

**Table C.** Country and region classifications (cont'd).

| Region | Subregion | Name | Development Group | Sexual Activity Group | Source data for Sexual Activity group |
|---|---|---|---|---|---|
| | | State of Palestine | Less developed | 0 | PEW GAS |
| | | Syrian Arab Republic | Less developed | 0 | PEW GRL |
| | | Turkey | Less developed | 0 | PEW GAS |
| | | United Arab Emirates | Less developed | 0 | PEW GRL |
| | | Yemen | Less developed | 0 | PEW GRL |
| | | Georgia | Less developed | 1 | World Values Survey |
| Europe | Eastern Europe | Belarus | Developed | 1 | DHS/MICS |
| | | Bulgaria | Developed | 1 | PEW GRL |
| | | Czechia | Developed | 1 | PEW GAS |
| | | Hungary | Developed | 1 | PEW GRL |
| | | Poland | Developed | 1 | PEW GAS |
| | | Republic of Moldova | Developed | 1 | DHS/MICS |
| | | Romania | Developed | 1 | World Values Survey |
| | | Russian Federation | Developed | 1 | PEW GAS |
| | | Slovakia | Developed | 1 | PEW GRL |
| | | Ukraine | Developed | 1 | DHS/MICS |
| | Northern Europe | Denmark | Developed | 1 | PEW GRL |
| | | Estonia | Developed | 1 | World Values Survey |
| | | Finland | Developed | 1 | PEW GRL |
| | | Ireland | Developed | 1 | PEW GRL |
| | | Latvia | Developed | 1 | PEW GRL |
| | | Lithuania | Developed | 1 | PEW GRL |
| | | Norway | Developed | 1 | PEW GRL |
| | | Sweden | Developed | 1 | World Values Survey |
| | | United Kingdom | Developed | 1 | PEW GAS |
| | Southern Europe | Albania | Developed | 1 | DHS/MICS |
| | | Bosnia and Herzegovina | Developed | 1 | DHS/MICS |
| | | Croatia | Developed | 1 | PEW GRL |
| | | Greece | Developed | 1 | PEW GAS |
| | | Italy | Developed | 1 | PEW GAS |
| | | Malta | Developed | 1 | PEW GRL |
| | | Montenegro | Developed | 1 | DHS/MICS |
| | | Portugal | Developed | 1 | PEW GRL |
| | | Serbia | Developed | 1 | DHS/MICS |
| | | Slovenia | Developed | 1 | World Values Survey |

**Table C.** Country and region classifications (cont'd).

| Region | Subregion | Name | Development Group | Sexual Activity Group | Source data for Sexual Activity group |
|---|---|---|---|---|---|
| | | Spain | Developed | 1 | PEW GAS |
| | | TFYR Macedonia | Developed | 1 | DHS/MICS |
| | Western Europe | Austria | Developed | 1 | PEW GRL |
| | | Belgium | Developed | 1 | PEW GRL |
| | | France | Developed | 1 | PEW GAS |
| | | Germany | Developed | 1 | PEW GAS |
| | | Netherlands | Developed | 1 | World Values Survey |
| | | Switzerland | Developed | 1 | PEW GRL |
| Lat. Am. & Caribb. | Caribbean | Anguilla | Less developed | 1 | PEW GRL |
| | | Antigua and Barbuda | Less developed | 1 | PEW GRL |
| | | Bahamas | Less developed | 1 | PEW GRL |
| | | Barbados | Less developed | 1 | DHS/MICS |
| | | Cuba | Less developed | 1 | PEW GRL |
| | | Dominica | Less developed | 1 | PEW GRL |
| | | Dominican Republic | Less developed | 1 | DHS/MICS |
| | | Grenada | Less developed | 1 | PEW GRL |
| | | Guadeloupe | Less developed | 1 | PEW GRL |
| | | Haiti | Less developed | 1 | DHS/MICS |
| | | Jamaica | Less developed | 1 | PEW GRL |
| | | Martinique | Less developed | 1 | PEW GRL |
| | | Montserrat | Less developed | 1 | PEW GRL |
| | | Puerto Rico | Less developed | 1 | PEW GRL |
| | | Saint Kitts and Nevis | Less developed | 1 | PEW GRL |
| | | St. Lucia | Less developed | 1 | DHS/MICS |
| | | St. Vincent and the Grenadines | Less developed | 1 | PEW GRL |
| | | Trinidad and Tobago | Less developed | 1 | DHS/MICS |
| | | United States Virgin Islands | Less developed | 1 | PEW GRL |
| | Central America | Belize | Less developed | 1 | DHS/MICS |
| | | Costa Rica | Less developed | 1 | PEW GRL |
| | | El Salvador | Less developed | 1 | PEW GAS |
| | | Guatemala | Less developed | 1 | DHS/MICS |
| | | Honduras | Less developed | 1 | DHS/MICS |
| | | Mexico | Less developed | 1 | PEW GAS |
| | | Nicaragua | Less developed | 1 | PEW GRL |
| | | Panama | Less developed | 1 | PEW GRL |

**Table C.** Country and region classifications (cont'd).

| Region | Subregion | Name | Development Group | Sexual Activity Group | Source data for Sexual Activity group |
|---|---|---|---|---|---|
| | South America | Argentina | Less developed | 1 | PEW GAS |
| | | Bolivia, Plurinational State of | Less developed | 1 | DHS/MICS |
| | | Brazil | Less developed | 1 | DHS/MICS |
| | | Chile | Less developed | 1 | PEW GAS |
| | | Colombia | Less developed | 1 | DHS/MICS |
| | | Ecuador | Less developed | 1 | World Values Survey |
| | | Guyana | Less developed | 1 | DHS/MICS |
| | | Paraguay | Less developed | 1 | DHS/MICS |
| | | Peru | Less developed | 1 | DHS/MICS |
| | | Suriname | Less developed | 1 | DHS/MICS |
| | | Uruguay | Less developed | 1 | World Values Survey |
| | | Venezuela, Bolivarian Republic of | Less developed | 1 | PEW GAS |
| Northern America | Northern America | Canada | Developed | 1 | PEW GAS |
| | | United States of America | Developed | 1 | PEW GAS |
| Oceania | Australia and New Zealand | Australia | Developed | 1 | PEW GAS |
| | | New Zealand | Developed | 1 | World Values Survey |
| | Melanesia | Fiji | Less developed | 1 | PEW GRL |
| | | Papua New Guinea | Less developed | 1 | PEW GRL |
| | | Solomon Islands | Less developed | 1 | PEW GRL |
| | | Vanuatu | Less developed | 1 | PEW GRL |
| | Micronesia | Guam | Less developed | 1 | PEW GRL |
| | | Kiribati | Less developed | 1 | PEW GRL |
| | | Marshall Islands | Less developed | 1 | PEW GRL |
| | | Nauru | Less developed | 1 | PEW GRL |
| | | Palau | Less developed | 1 | PEW GRL |
| | Polynesia | Cook Islands | Less developed | 1 | PEW GRL |
| | | Samoa | Less developed | 1 | PEW GRL |
| | | Tonga | Less developed | 1 | PEW GRL |
| | | Tuvalu | Less developed | 1 | PEW GRL |

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