THE LANCET
Global Health

Supplementary appendix 3

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Contents

Methods S1. Search terms, translations.

S1.1. Search terms

The systematic review included an initial search in official websites of countries that publish information on cancer control plans, screening policies and coverage statistics (e.g., health departments and national epidemiological centres) followed by a global review using web search engines to look for additional web-based materials. Search terms included specific country names and the following keywords "HPV", "screening", "cervical cancer", "cytology", "pap smear", "papanicolau", "VIA", "VILI", "coverage", "uptake", including the abbreviated versions and its variations (e.g. "VIA", Visual Inspection with Acetic Acid, early detection of cancer…)

The algorithm also included a systematic search in PubMed using a combination of MESH terms and keywords relevant to "cervical cancer", "screening", and "coverage" for each specific country.

S1.2. Data extraction and translations

Six reviewers were involved in the search and data extraction. This process was done directly, without the help of translation, for publications in Romance languages or English. Eleven professional translators assisted investigators in the search of information and the interpretation of the data for 37 countries in which official languages are Arabic, Russian, Ukrainian, Armenian, Serbian, Croatian, Bosnian, Macedonian, Montenegrin, Slovenian, Polish, Romanian, Greek, Czech, Slovak, Hindi, Urdu, Persian, and Standard Chinese.

Methods S2. Data pre-processing.

Official cervical cancer screening recommendations and coverage data (for at least one of the five screening intervals: previous year, previous two years, previous three years, previous five years, ever in lifetime) were identified in 139 and 164 out of 202 WHO member states and associated countries and territories, respectively (Tables S1-S2).

A global database with 10 302 single ages from 20 to 70 years and 202 countries was constructed including the identified information on screening recommendations and coverages. Below we describe the process of data selection and transformation.

S2.1. Data cleaning

S2.1.1. Country-specific corrections and assumptions for coverage data

For five countries, the coverage of an interval different from those included in the analysis was assigned as the country coverage (Table MS2.1.1.1). For Sweden, Papua New Guinea, and Norway, we assigned the previous eight-, 10- and 25-year coverage, respectively, as the ever in lifetime coverage. For France and England-United Kingdom, we assigned the previous 3.5 years coverage as the previous three years coverage.

Table MS2.1.1.1. Summary of original and new assigned screening intervals among countries with screening intervals not included in the analysis.

Country	Age Range	Original screening interval		New screening interval
Sweden	23-60 y	Previous 8 years	→	Ever in lifetime
Papua New Guinea	20-59 y	Previous 10 years	→	Ever in lifetime
Norway	16+ y	Previous 25 years	→	Ever in lifetime
France	25-65 y	Previous 3.5 years	→	Previous 3 years
England (United Kingdom)	20+ y	Previous 3.5 years	→	Previous 3 years

y: years.

For United Kingdom we did not have a global national coverage, but four regional coverages (England, Scotland, Wales, Northern Ireland). We calculated the national coverage applying the proportion of population that each region contributes to the national coverage (82.3% England, 8.1% Scotland, 4.7% Wales, 2.8% Northern Ireland). For ages 20-24 years and 65-70 years, and for screening intervals of three- and five-years, we only had screening coverage from England, so we assumed this coverage as the national one.

For each singe-age and country, we verified that no original coverage exceeded that of its upper screening interval (coverage previous year < coverage previous two years < coverage previous three years < coverage previous five years < coverage ever in lifetime). This rule was not satisfied in seven countries (Table MS2.1.1.2). For Germany (cov 1-year> cov 3-year and ever, age group 20-24 years), Uruguay (cov 1-, 3-, 5-year > cov ever, age 20 years; cov 1-year > cov 3-year, age 70 years), Belgium (cov 2-year> cov ever, age group 20-24 years), Estonia (cov 3-, 5-year > cov ever, age group 20-24 years), and Czechia (cov 5-year > cov ever, age group 20-24 years) the aggregated coverage for the mentioned age groups (in brackets) systematically included ages outside 20 to 70 years and therefore we decided to not use this data when discrepancies appeared and treat this coverage as missing. For Iceland and Kenya, the rule was satisfied when the disaggregated ever in lifetime distribution was applied to disaggregate the 1-, 3-, and 5-year aggregated coverages (see section S2.2).

Table MS2.1.1.2. Summary of the original and corrected screening data when the coverage rule was not satisfied, by country.

Country	Original screening data (%)						Corrected screening data (%)				
	Age	1y	3y	5y	Ever		Age	1y	3y	5y	Ever
Germany	15-24 y	-	54.7	-	56.5	→	20-24 y	59.2	NA	-	NA
	20-24 y	59.2	-	-	-						
Uruguay	15-20 y	-	-	-	14.9	→	20 y	20.7	46.3	55.6	NA
	18-29 y	20.7	46.3	55.6	-						
Uruguay	70-79 y	3.2	2.1	3.4	-	→	70 y	3.2	NA	3.4	-
Belgium	15-24 y	-	-	-	33.7	→	20-24 y	See Sec.3	46.7	-	NA
	20-24 y	-	46.7	-	-						
	20-69 y	33.3	-	-	-						
Estonia	16-24 y	-	-	-	34.4	→	20-24 y	28.7	53.7	62.3	NA
	20-29 y	28.7	53.7	62.3	-						
Czechia	15-24 y	-	-	-	66.6	→	20-24 y	48.5	-	69.7	NA
	15-29 y	48.5	-	69.7	-						
Iceland	23-65 y	-	67.0	-	Data disag.	→	23-65 y	-	See Sec.2	-	Data disag.
Kenya	25-49 y	2.9	7.3	12.3	Data disag.	→	25-49 y	See Sec.2	See Sec.2	See Sec.3	Data disag.

y: year; NA: Not Available; Data disag: Data disaggregated, Sec: Section.

S2.1.2. Country-specific assumptions in programme data:

To perform the statistical analysis, we had to assign a missing screening interval for the recommendations in 10 countries. When the primary screening test was VIA (Guinea, Madagascar, Mozambique, and Timor-Leste) or cytology (Dominica, Cyprus, Vanuatu, Cook Islands, and Syria), we assumed a 5-year interval. Particularly for Sri Lanka, we assumed a 10-year interval because the screening recommendations indicate that cytology should be performed at ages 35 and 45 years.

For 11 countries (Belgium, Cyprus, Portugal, Romania, South Africa, Paraguay, Vanuatu, China, Syria, Timor-Leste, and Cook Islands) we assumed that there was no screening invitation as no data on screening invitation was identified in the original sources.

In eight countries, the antiquity of the screening programme (years since the introduction of the screening programme in the country) was missing (Cyprus, Guinea, Antigua & Barbuda, Grenada, St Lucia, Vanuatu, Timor-Leste, Cook Islands), and we assumed less than 10 years for all of them as a more conservative decision.

In eight countries (United Arab Emirates, Belgium, Canada, Italy, Portugal, Spain, and United Kingdom) more than one programme recommendation was registered (e.g., different regional recommendations, or recommendations only in some regions of the country). We selected the one considered more representative of the country population.

In 19 countries (American Samoa, Bermuda, Bolivia, Brunei, Chile, Colombia, Ecuador, El Salvador, Guatemala, Mexico, Myanmar, Malaysia, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, USA and, South Africa) more than one screening test was recommended for a specific age group (e.g., cytology or VIA for women aged 30-49 years). We selected the most used test or the one preferred in national recommendations.

S2.2. Data transformation

Screening coverages were reported aggregated by age groups of five years, ten years, or more. Coverages were transformed into single age datapoints by assigning the same coverage to all ages in the reported age group.

S2.2.1. Country-specific disaggregation of coverage data by age

For seven countries (Belgium, Iceland, Israel, Kenya, Peru, Slovenia, and Turkey) with reporting coverages for wide age range groups (e.g., 30-65 years), we modified the aggregated data using the age disaggregated distribution from other screening intervals within the same country (Table MS2.2.1.1). We disaggregated the data multiplying the original aggregated data by the disaggregated distribution of other screening interval, and then dividing by the mean of the disaggregated data of another screening interval. For example, for a specific country, we have aggregated data for the previous year coverage interval among women aged 20-70 years, and disaggregated data for the previous three years coverage interval in a five-year age group. To calculate the new disaggregated data for the coverage of the previous year interval, we applied the following formula for each disaggregated age group:

New disaggregated previous year coverage for 20-24 years = Original aggregated previous year coverage for 20-70 years * Original disaggregated previous three years coverage for 20-24 years / mean (Original disaggregated previous three years coverage for 20-70 years)

Table MS2.2.1.1. Summary of countries and screening intervals with aggregated data that could be disaggregated.

Country	Age Range	Screening intervals with aggregated data	Screening intervals with disaggregated data
Belgium	20-69 y	1-y, 2-y	3-y
Iceland	23-65 y	3-y	ever
Israel	35-54 y	3-y	2-y
Kenya	25-49 y	1-y, 3-y, 5-y	ever
Peru	30-49 y	1-y	3-y
Slovenia	30-49 y	1-y, 5-y, ever	3-y
Turkey	30-65 y	1-y, 3-y, 5-y	2-y

y: year.

Disaggregated data from other sources not included in the final database were also used to disaggregate data for the Republic of Moldova, Serbia, and Colombia (Table MS2.2.1.2).

Table MS2.2.1.2. Summary of countries and screening intervals with aggregated data that could be disaggregated using disaggregated data from other sources not included in the final analysis.

Country	Age Range	Screening intervals with aggregated data	Screening intervals with disaggregated data from sources not included in the final analysis
Republic of Moldova	25-61 y	1-y, 3-y	1-y, 3-y
Serbia	25-64 y	3-y, ever	3-y
Colombia	25-69 y	1-y	1-y

y: year.

For one country (Gabon), we modified the aggregated out of programme data coverage using a corrected factor based on disaggregated data from countries with same income and antiquity of screening programme.

For Gabon we had aggregated data for the previous year and previous three years coverage among women aged 20-70 years. The screening programme recommends to screen women between 25-65 years, so ages 20-24 years and 66-70 years are out of programme. We calculated a correction factor including the mean disaggregated data of the previous year and previous three years intervals from those countries with the same income and antiquity of screening programme (Georgia, Jamaica, Romania). In summary, to calculate the new disaggregated out of programme data for the previous year and previous three years coverage intervals, we applied the following formula:

New disaggregated previous year and previous three years coverage for 20-24 years = Original aggregated previous year and previous three years coverage for 20-24 years * mean (previous year and previous three years disaggregated coverage for 20-24 years from Georgia, Jamaica, Romania) / mean

(Original previous year and previous three years aggregated coverage for 20-70 years). We also recalculated the data for those ages included in the screening programme (25-65 years) to obtain the same mean aggregated data for 20-70 years.

Methods S3. Statistical procedures.

To produce global estimates of screening coverage we developed a multi-step algorithm to impute missing datapoints based on the closest available data (Table S4). This algorithm included the following statistical procedures:

S3.1. Linear interpolation

Linear interpolation is a mathematical method to estimate new datapoints within the range of a set of known datapoints using linear polynomials[1]. Linear interpolation between two known points is the straight line between these points. We can interpolate as many points as needed between the two known points.

Application

In our stepwise algorithm, imputation by linear interpolation between screening intervals within the same country was applied first (Table S4: Step 2). We selected ages with at least two coverage datapoints in different screening intervals, and then imputed missing values between them by linear interpolation. This is a conservative strategy that imputes plausible data assuming linear functions between the known coverage datapoints of the different screening intervals.

S3.2. Predictive Mean Matching using Multiple Imputation

Predictive Mean Matching (PMM) is a semi-parametric statistical imputation method for missing values[2-4]. Imputation by PMM uses an observed value from one value with a similar predictive mean. Compared with standard methods based on linear regression and normal distribution, PMM produces imputed values that are much more like real values sampled from the data. The aim of this process is to reduce the bias introduced in a dataset through imputation. Compared to other imputation methods, it usually imputes less implausible values (e.g., negative incomes) and takes heteroscedastic data into account more appropriately.

The PMM algorithm builds a small subset of observations where the outcome variable matches the outcome of the observations with missing values. Multiple imputation is recommended, repeating the process iteratively at least five times, although it is advantageous to set higher iterations, ranging from 20 to 100[5-6]. It creates several different plausible imputed datasets and combines the results obtained from each of them.

Application

In our stepwise algorithm, the PMM was applied second when linear interpolation was not possible (Table S4: Step 3a). PMM includes as many relevant covariates in the model as possible to obtain better estimates of missing data. Overfitting (e.g., making it more dependent on your data) is not real a problem and any available associations, small or large, are used.

We included the following covariates:

- *Country characteristics:* Country, Income level (four and three categories), Human Development Index (HDI; four categories and quantitative), Fragile and Conflict affected Situations (FCS, dichotomous yes/no), Small State or territory (SST, dichotomous yes/no), Continent (five categories), Sustainable Development Goals (SDG) regions (eight categories), United Nations (UN) subregions (22 categories), Country (202 categories).

- *Coverage characteristics*: single age (20 to 70 years), range in years of the coverage figure (i.e., if coverage was reported for the age group of 25-29 years old, this corresponds to a range of five years), estimation year (year of estimation of the original coverage).

- *Programme characteristics*: existence of screening recommendations (dichotomous yes/no), use of personal invitation to screening (dichotomous yes/no), whether age was included in the recommended screening ages (dichotomous yes/no), whether the year of original reported coverage corresponds to the date of the current screening recommendations (dichotomous yes/no), antiquity of the programme (dichotomous ≤10 years/>10 years).

We built several models including a combination of the covariates. The final PMM model included the following covariates: single age (20 to 70 years), range in years of the age group in which the coverage was reported, existence of screening recommendations (dichotomous yes/no), whether the age was included in the recommended screening ages (dichotomous yes/no), individual invitation to screening (dichotomous yes/no), whether the year of the reported coverage corresponds to the date of the current recommendations (dichotomous yes/no), HDI (as quantitative), UN geographical subregion (22 categories), whether the country was under FCS (dichotomous yes/no), whether the country is an SST (dichotomous yes/no). Some covariates, such as country, could not be included in the model because the PMM model detected multi-collinearity and results could be instable.

Multiple imputation was applied, creating 40 imputed datasets from the interim dataset obtained after steps 3b and 3c (Table S4) in which all countries with at least one observed coverage datapoint had all datapoints filled. Resulting databases without missing data included the 202 (countries) * 51 (single ages from 20 to 70) records, resulting on 10 302 records in each dataset (a total of 412 080 records).

S3.3. Last observation carried forward / Next observation carried backward

Single imputation methods replace a missing datapoint by a single value, and analyses are conducted as if all the data were observed. In Last Observation Carried Forward (LOCF) and Next Observation Carried Backward (NOCB) single imputation methods, the single value used to fill in the missing datapoint comes from the observed values in the same subject[7-8]. LOCF imputes the last measured value before the missing value and carries it forward. NOCB is a similar approach to LOCF but works in the opposite direction, by imputing the first observation after the missing value and carrying it backward. These techniques are common statistical approaches to the analysis of longitudinal repeated measures where some follow-up observations may be missing.

Application

In our stepwise algorithm, LOCF or NOCB were applied third, if linear interpolation was no applicable and PMM was not used because we do not have any coverage for those ages (Table S4: Step 3b). Within countries with single ages with missing data, we carried forward or backward the mean of the last/first five observations as long as the ages had the same screening recommendations. Its use was restricted to a maximum carrying of 5 datapoints to avoid overrepresentation of one specific imputed datapoint.

S3.4. Bootstrapping to calculate confidence intervals (CIs)

It is important to consider inference of the estimates after multiple imputation. When estimates are calculated using non-parametric models (e.g., PMM method), it is unclear how to obtain valid inference, meaning obtain standard errors, and therefore confidence intervals). Bootstrap estimation may be an option[9].

In general, we can distinguish between two approaches for bootstrap inference when using multiple imputation: M imputed datasets are created and bootstrap estimation is applied to each of them, or B bootstrap samples of the original dataset (including missing values) are drawn and in each of these samples, the data is imputed. Taking this into account, there are four different approaches to combine results and calculate confidence intervals using bootstrap:
-    Multiple Imputation Boot (pooled sample): Multiple imputation is utilized for the dataset D. For each of the M imputed dataset, B bootstrap samples are drawn. In each of these datasets, the point estimates are calculated. The pooled sample of ordered estimates is used to construct the confidence interval.
-    Multiple Imputation Boot: Multiple imputation is utilized for the dataset D. For each of the M imputed dataset, B bootstrap samples are drawn. The bootstrap samples are used to estimate the standard error in each imputed dataset, resulting in M point estimates and M standard errors. Confidence interval is constructed using, possibly, t distribution.
-    Boot Multiple Imputation (pooled sample): B bootstrap samples, including missing data, are drawn and multiple imputation is utilized in each bootstrap sample. There are B x M imputed datasets which can be used to obtain the corresponding point estimates, and then the set of pooled ordered estimates can be used to construct the confidence interval.

- Boot Multiple Imputation: B bootstrap samples, including missing data, are drawn and each of them is imputed M times. There are M imputed datasets associated with each bootstrap sample. They can be used to obtain the corresponding point estimates, and the set of ordered estimates can be used to construct the confidence interval.

Application

In our stepwise algorithm, we used the first approach of Multiple Imputation Boot (using pooled sample) to calculate the confidence intervals of our estimates. We had to decide in advance the ages and regions for which we wanted to produce the screening coverage estimates (i.e., worldwide among women aged 30-49 years, by income among women aged 25-65 years).

Therefore, from the complete database that included the 40 imputations (412 080 records), we calculated, for a previously defined age group and region, the number of women screened for each of the 40 imputed datasets. Then, we computed, for the 40 estimated numbers, 3 000 bootstrap estimations, we combined these 3 000 estimated numbers of screened women from the 40 imputations, and we computed the confidence interval using the 2.5% and 97.5% quantiles. The same process was done for each screening interval, and for each selected age group and region.

Methods S4. Treatment of missing coverage data.

As previously mentioned, coverage data was available for at least one of the five screening intervals for 164 out of 202 WHO member states and associated countries and territories, covering a combination of 7 324 single age datapoints: 3 239 point estimates were available for the previous year, 1 110 for the previous two years, 3 451 for the previous three years, 1 580 for the previous five years, and 5 472 for the ever in lifetime.

From a total of 51 510 point estimates (202 countries x 51 single ages from 20 to 70 years x 5 screening intervals), we had available information for 14 852 (28.8%) point estimates. Coverage data was unavailable for 38 countries, corresponding to 1938 single age datapoints and 9960 point estimates (Table MS4).

Table MS4. List of countries without information on screening coverage

CONTINENT	COUNTRIES (N=38)
Europe (3)	North Macedonia, Monaco, San Marino
Africa (20)	Angola*, Burundi*, Central African Republic*, DR Congo*, Djibouti*, Equatorial Guinea*, Eritrea*, Gambia*, Guinea, Guinea Bissau*, Liberia*, Libya*, Niger*, Nigeria*, Rwanda, Seychelles*, Sierra Leone*, South Sudan*, Tanzania*, Togo*
America (4)	Antigua & Barbuda, Panama, Suriname*, Venezuela
Asia (6)	Afghanistan*, Bahrain, Cambodia, DPR Korea, Palestine*, Yemen*
Oceania (5)	American Samoa, Cook Islands, Niue*, Samoa, Vanuatu

* Countries with no official recommendations for cervical cancer screening identified.

S4.1. Stepwise algorithm to impute missing specific single age data coverage.

A multi-step algorithm was developed to impute missing datapoints based on the closest available data.

The imputation algorithm was different in countries with at least one coverage datapoint and in countries without any coverage datapoints.

S4.1.1. Algorithm in countries with at least one coverage datapoint

Imputation by linear interpolation between screening intervals was firstly applied (Table S4: Step 2). 3 606 single ages had at least two coverage datapoints reported with 6 976 missing coverage datapoints. 4 669 missing datapoints could be imputed by linear interpolation because coverage data was available in upper and lower screening intervals. 2 307 datapoints remained as missing because they could not be imputed by linear imputation (i.e., missing on coverage in the previous year).

For single ages with at least one coverage datapoint and when linear interpolation was not possible, we imputed missing data using the PMM method using the covariates explained in Methods S3 (Table S4: Step 3a). Using the PMM model, 40 imputed databases were created derived from the multiple imputation process. In total, 17 099 coverage datapoints without data from each imputed database were calculated, obtaining complete single ages for the five screening intervals for the 164 countries with at least one coverage datapoint. For each singe-age specific imputation, it was verified that no coverage exceeded that of its upper screening interval (coverage 1-year <coverage 2-year <coverage 3-year <coverage 5-year <coverage ever). When this rule was not met, coverage was recalculated as follows: original data was preserved, imputed coverage datapoints were reordered assigning the minimum imputed value to the lowest screening interval and the maximum imputed value to the greatest screening interval, intermediate coverage datapoints without original data were assigned as missing (Table S4: Step 5). When the minimum or maximum imputed value assigned to a coverage datapoint was greater or lower respectively than the original coverage datapoint, the original coverage datapoint was assigned to the missing values. Finally, the remaining missing datapoints were imputed by linear interpolation between screening intervals. With this strategy 116 154 single ages were corrected among the 40 imputed datasets.

For single ages without coverage datapoints, last observation carried forward or next observation carried backward techniques were applied within the last five observations before or after the missing data (Table S4: Step 3b). This approach was only applied when programme characteristics were the same between single ages. To avoid overrepresentation of one specific imputed datapoint, we carried forward or backward the mean of the last/first five observations. With this strategy, 58 400 coverage datapoints were imputed among the 40 imputed datasets (1 460 datapoints in each imputation).

For the rest of single ages without coverage datapoints, a ponderation rate was applied. This ponderation rate was calculated using the imputed coverage database for each country and five-year age group (20-24, 25-29, …, 60-64, 65-70) from countries with same income and same single ages included in the screening recommendations (Table S4: Step 3c). With this strategy, 149 600 coverage datapoints were imputed among the 40 imputed datasets (3 740 datapoints in each imputation).

Again, for each singe-age specific imputation, it was verified that no coverage exceeded that of its upper screening interval. When the rule was not met, coverage data was reordered, and linear interpolation was applied as previously explained (Table S4: Step 5). A total of 3 544 single ages had to be changed among the 40 imputed datasets.

S4.1.2. Algorithm in countries without coverage datapoints

Missing screening coverage datapoints for the 38 countries without any original coverage data were imputed by the PMM method, directly applied to the original coverage dataset (Table S4: Step 4). This model included the same covariates used for countries with at least one coverage datapoint available. Using the PMM method, 40 imputed databases were created derived from the multiple imputation process. A total of 9 690 datapoints (38 countries x 51 single ages from 20 to 70 years x 5 screening intervals) from each database were imputed, obtaining complete single ages for the five screening intervals for the 38 countries without any original coverage data.

Again, for each singe-age specific imputation, it was verified that no coverage exceeded that of its upper screening interval. When the rule was not met, coverage data was reordered, and linear interpolation was applied as previously explained (Table S4: Step 5). A total of 61 814 single ages were rectified among the 40 imputed databases.

Figure S3 shows the final coverage dataset by country and imputation method.

S4.2. Validation of the algorithm

Missing data imputation has many assumptions and may produce bias in the screening coverage estimates. Several sensitivity analyses and validations were performed to address and validate our methodological approach to treat missing data.

S4.2.1. Simulations

a) Comparison between original and imputed data selected randomly

Fifty simulations were performed taking a random sample of 200 original coverage data for each simulation. These 200 original coverages included different age groups and age ranges (e.g., original coverage data for the previous year was taken for one country for the age group 25-29 years, but for another country the original coverage data for the previous year was taken for the broader age group 25-64 years). After this, the stepwise algorithm to impute missing data was run again treating this data as missing. The 50 simulations performed resulted in 66 672 single age coverages to be imputed. When comparing the imputed data with the original coverage data not used, the correlation coefficient was 0.89 including all simulations combined (Figure S4). In 6 917 out of 66 672 (10.4%) imputed data, the difference with the original data was equal or greater than 15%. Among the rest of imputed data, 10.1% showed a difference between 10-15%, 23.6% a difference between 5-10%, and around 55.9% showed a difference lower than 5%.

b) Comparison between original and imputed data, excluding one by one each country

All the original coverages from the 164 countries with at least one datapoint were removed and treated as missing data, country by country. Missing data was imputed using the multi-step algorithm, including the imputation of the original removed data for each country. Screening coverages were then estimated worldwide, by income level and by region, obtaining almost identical estimation rates (Figure S5). Differences ranged from 0% to 1% in almost all countries. Despite this, differences between 5-10% depending on the screening interval were observed when data from countries with largest populations were put as missing and imputed (e.g., China, India).

S4.2.2. Sensitivity analyses for the imputation algorithm

Additionally, sensitivity analyses of the most uncertain assumptions of the stepwise algorithm were performed (Table S4).

a) Restriction of coverage data by age and region

First, we calculated the coverage estimates for the age group 30-49 years using three different age-scenarios. Scenario one used the complete database with individual coverages for single ages from 20 to 70 years, while scenario two and three restricted the database to individual coverages for the age group from 25 to 65 years and from 30 to 49 years, respectively. Estimations of screening coverage were very similar to the final estimates of our study, worldwide and by income and region (Table S6).

Second, we calculated the coverage estimates for the age group 30-49 years using two region-scenarios. Scenario one included the complete database with coverage data from all regions, while scenario two only included data for countries corresponding to each income level or SGD region. Coverage estimates were very similar compared to the final estimates of our study (Table S7). By income level, imputations including only upper middle-income countries showed differences in the coverage estimates in the previous year close to 7% (from 11% to 18%) compared to imputations including all countries. Differences close to 3% were also observed in all screening intervals when low-income countries were validated. By SGD regions, differences ranged from 2% to 5% in the estimation coverages for some screening intervals in Sub-Saharan Africa, Central & Southern Asia, Eastern & South-Eastern Asia, Latin America & Caribbean, Oceania, and Australia & New Zealand.

b) Sensitivity analyses for steps 1 to 4 of the imputation algorithm

We carried out a sensitivity analysis of each step of the imputation algorithm, including modification of aggregated and out-of-programme coverage, linear interpolation, LOCF and NOCB techniques, and application of a ponderation rate. Global estimates derived from the non-application of these four steps of the algorithm (Table S4) were consistent compared to the reference ones, with differences close to 1-2% compared to our reference estimates (Table S8). The main differences in the screening coverages were observed when linear interpolation was not used (scenario 3) and PMM was applied instead, where disparities of up to 10% were observed. Specifically, by income, the non-application of linear interpolation resulted in differences in screening coverages ranging from 2 to 4% in low-income countries, although results were similar for the other income regions. By region, the greatest differences were observed in Western Africa (close to 10%) and ranging from 4 and 5% in Western Asia and Australia & New Zealand.

We also did a sensitivity analysis considering a group of scenarios where all coverages from countries without data were set to 0%, 25%, 50%, and 75-100%. We applied these values to each screening interval. In the most extreme scenarios, global estimates were 1% lower when missing data was set to 0 (scenario 2) and 6% higher when missing data was set to 75-100% (scenario 5) (Table S9). The impact of these assumptions was more prominent in low-income countries, with estimates between 2 to 6% lower (scenario 2) or between 33 to 39% higher (scenario 5). This impact was almost negligible in high- and upper-middle-income countries. Differences by income could be explained by a higher number of missing data in lower-middle- and low-income countries compared to high- and upper-middle-income countries. By region, we observed similar patterns, with estimates 56 to 60% higher (scenario 5) in Sub-Saharan Africa (excluding Southern Africa), 19 to 23% higher (scenario 5) in Polynesia and 8 to 9% higher (scenario 5) in Western Asia.

S4.2.3. Impact of imputations in the results

The impact of the imputation algorithm in the global estimates varied substantially depending on the population of the country for each single age between 20 and 70 years old (Table S5). We could obtain coverage data from original sources for 7 324 single ages, corresponding to 14 852 datapoints considering all the screening intervals (29%) (Table S3). When population weights are considered, the 14 852 datapoints represented 59% of the targeted women instead of 29%, meaning that more than half of coverage data used to estimate the number of screened women came from the original sources.

Regarding the imputed datapoints (71%), 9% were derived from linear interpolation, representing 13% of targeted population (Step 2). 33% of datapoints were imputed by the PMM method, corresponding to 36% of targeted population (Step 3a). Around 10% of datapoints were imputed using the approach of LOCF and NOCB, or a ponderation rate based on other country coverage datapoints with similar characteristics, representing less than 0.1% (Steps 3b and 3c) of targeted population. Step 4, that included PMM imputation for countries without data, was the one with more associated uncertainty because imputation of coverages came from the rest of countries. About 19% of datapoints were imputed through this methodology, representing 3% of targeted population.

Methods S5. WHO official country consultation.

Following WHO's quality standards for data publication an official consultation round with WHO member states and associated countries was conducted from November 27th, 2020, to February 12th, 2021, to review, comment and provide insight on the estimates. Countries were presented with draft estimates and sources of data. The country consultation was responded by 83 countries, resulting in an update of screening policies and coverages in 33 and 42 countries, respectively.

Table MS5.1. List of countries that responded to the WHO country consultation

Continent	Countries (N=83)
Europe (27)	Austria, Belarus, Belgium, Bulgaria, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Latvia, Lithuania, Luxembourg, Netherlands, North Macedonia, Norway, Poland, Portugal, Russian Federation, Slovakia, Slovenia, Spain, United Kingdom (England - Scotland - Northern Ireland - Wales)
Africa (13)	Burkina Fasso, Côte d'Ivoire, Egypt, Ethiopia, Gabon, Kenya, Madagascar, Mali, Mauritius, Morocco, Niger, Tchad, Uganda
America (16)	Bahamas, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Ecuador, Guyana, Haiti, Jamaica, Panama, Peru, Trinidad & Tobago, Uruguay, United States of America
Asia (23)	Afghanistan, Brunei, Cambodia, China, Hong Kong SAR, India, Iran, Israel, Japan, Jordan, Republic of Korea, Lebanon, Malaysia, Myanmar, Nepal, Oman, Philippines, Qatar, Singapore, Syria, Thailand, Turkey, Viet Nam
Oceania (4)	Australia, French Polynesia, Niue, Solomon Islands

Table MS5.2. List of countries providing additional information on screening recommendations

Continent	Countries (N=33)
Europe (14)	Belarus, Bulgaria, Croatia, Denmark, Finland, France, Germany, Greece, Hungary, Poland, Portugal, Russian Federation, Slovakia, Spain
Africa (4)	Gabon, Kenya, Mauritius, Uganda
America (6)	Bahamas, Canada, Colombia, Guyana, Peru, Trinidad & Tobago
Asia (9)	Brunei, Hong Kong SAR, Japan, Republic of Korea, Malaysia, Myanmar, Qatar, Singapore, Thailand
Oceania (0)	-

Table MS5.3. List of countries providing additional information on screening coverages

Data	Countries (N=42)
New data (4)	Gabon, Madagascar, French Polynesia, Syria
Updated data (38)*	Austria, Czechia, Denmark, Estonia, Finland, France, Greece, Hungary, Latvia, Luxembourg, Republic of Moldova, Netherlands, Norway, Slovenia, United Kingdom, Ethiopia, Kenya, Morocco, Bahamas, Brazil, Canada, Colombia, Jamaica, Peru, Uruguay, United States of America, Australia

*38 countries with previous data (updated or more disaggregated data)

Figures S1.1, S1.2 and S1.3. Distribution of original coverage data by age and screening interval.

To assess whether the pooled coverage data for one screening interval could be disaggregated using the distribution from other screening intervals with more disaggregated data within the same country, we compared the distribution of the original data among screening intervals in the 63 countries with original disaggregated data for more than one screening interval. We specifically assessed whether the ever in lifetime distribution was comparable to the other screening intervals distribution.

Visually, we identified 40 countries with the ever in lifetime distribution comparable to other screening intervals distributions (Armenia, Bangladesh, Barbados, Belgium, Benin, Bermuda, Bulgaria, Cabo Verde, Cameroon, Canada, China, Costa Rica, Germany, Denmark, Dominica, Dominican Republic, Grenada, Haiti, Hong Kong, Israel, Korea, Latvia, Lesotho, Marshall Islands, Nepal, Nicaragua, Palau, Paraguay, Portugal, Romania, Russian Federation, Sweden, Trinidad and Tobago, Tunisia, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, South Africa, Switzerland, Zimbabwe) (Figure S1.1). In 22 countries different distributions were observed, mainly among older ages (from 50-60 years) (Austria, Brunei Darussalam, Croatia, Cyprus, Czechia, El Salvador, Estonia, France, Greece, Honduras, Hungary, Jamaica, Lithuania, Luxembourg, Malta, Norway, Poland, Singapore, Slovakia, Spain, Uruguay, United States) (Figure S1.2), and only one country had different distribution for all age groups (The Netherlands) (Figure S1.3). Considering this, we assumed that age-distribution was similar among screening intervals. Statistical tests could not be performed to verify this assumption because coverage data was not independent among screening intervals and the number of datapoints was too small.

Figures S1.1, S1.2 and S1.3 show the distribution of ever in lifetime coverage (y-axis) compared with other screening intervals, by single age (x-axis) and screening interval (lines).

Figure S1.1. Distribution of original coverage data by single age and screening interval among countries with similar pattern.
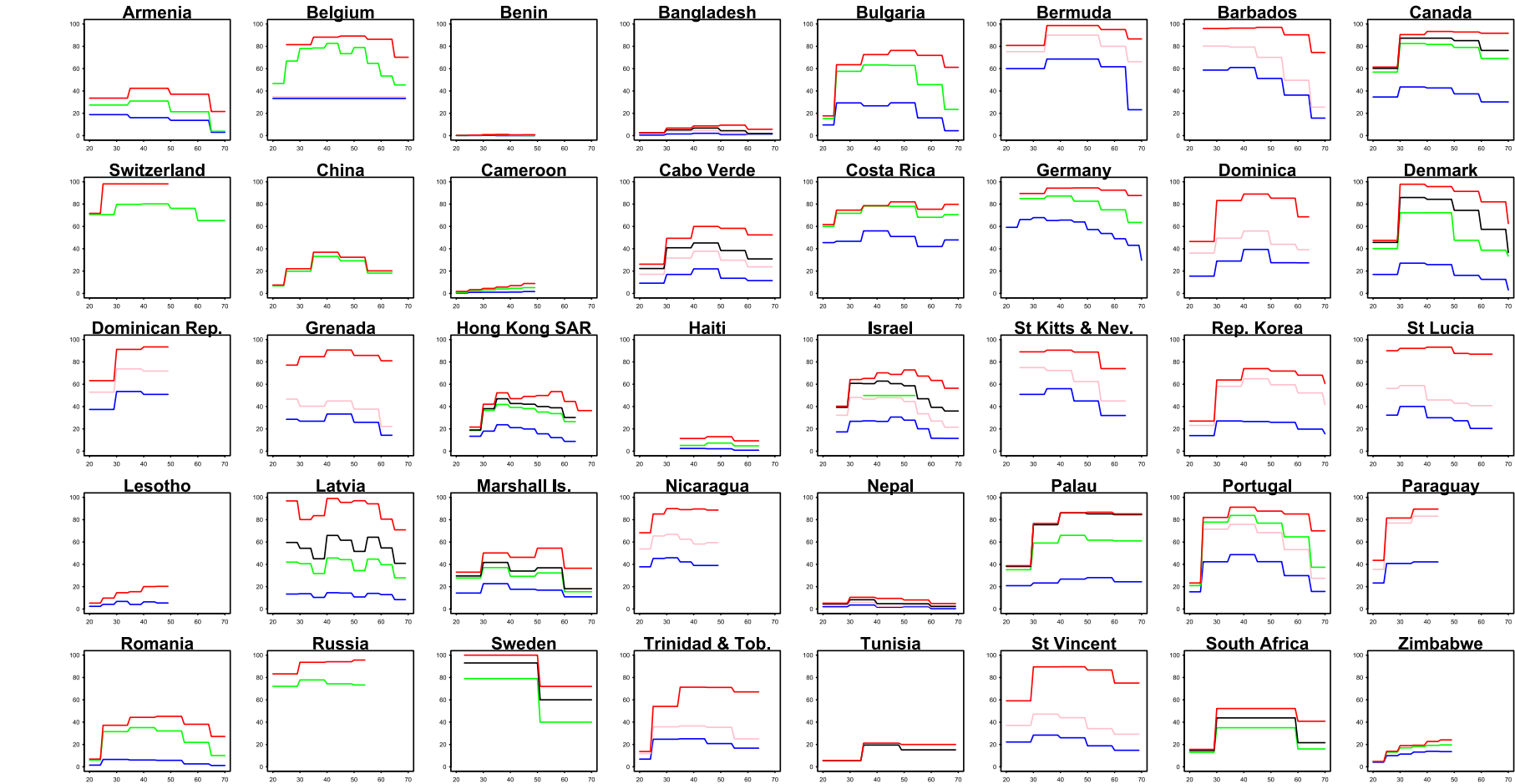
Blue line: previous year; Pink line: previous two years; Green line: previous three years; Black line: previous five years; Red line: ever in lifetime.

Figure S1.2. Distribution of original coverage data by single age and screening interval among countries with different pattern in older ages for the ever in lifetime coverage compared to other screening intervals.
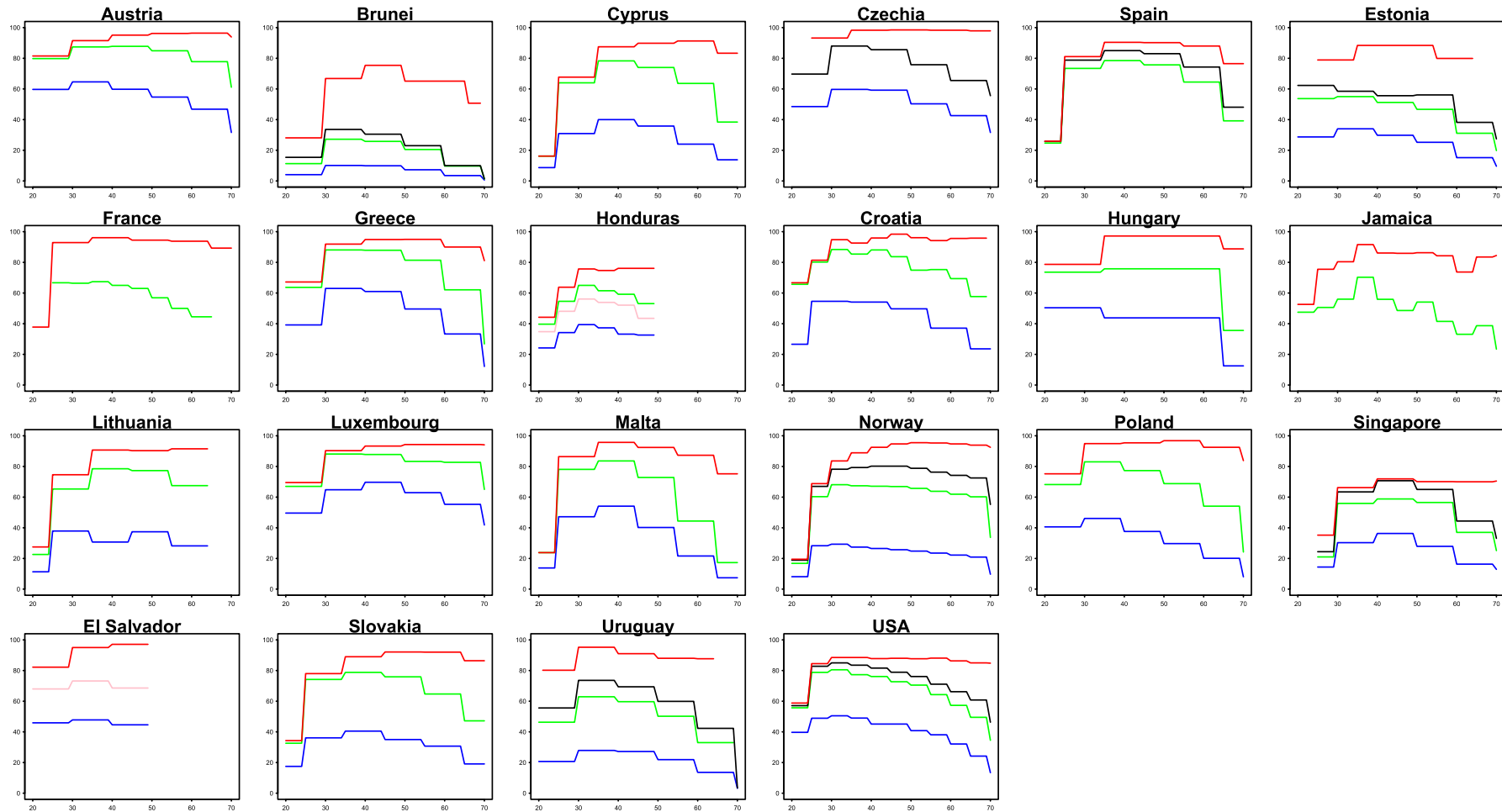
Blue line: previous year; Pink line: previous two years; Green line: previous three years; Black line: previous five years; Red line: ever in lifetime.

Figure S1.3. Distribution of original coverage data by single age and screening interval among countries with different pattern for the ever in lifetime coverage compared to other screening intervals.
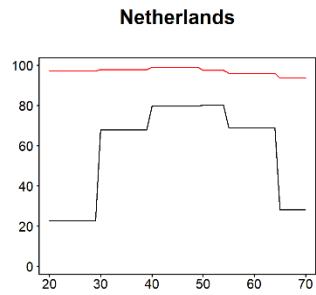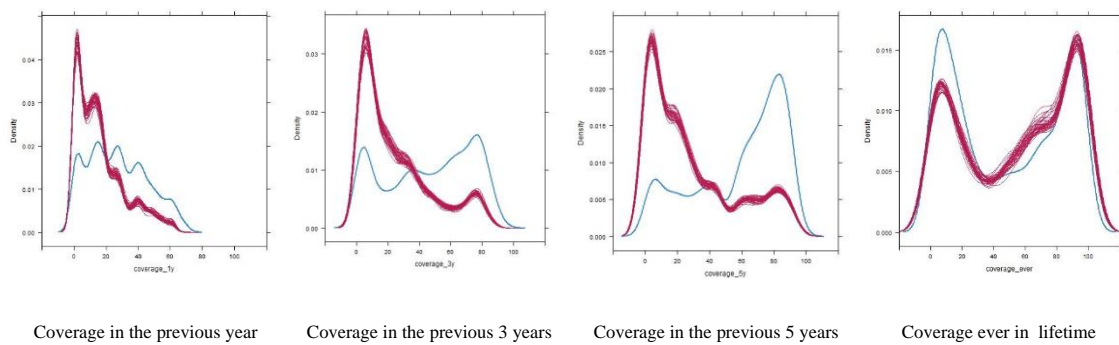

Netherlands

Black line: previous five years; Red line: ever in lifetime.

Figures S2.1 and S2.2. Density plots of missing data using Predictive Mean Matching.

We plotted below the density plots of original and imputed data using the Predictive Mean Matching method for each screening period (Figures S2.1 and S2.2). In blue we drew the original data and in red we drew the 40 imputed data. As displayed in the plots, PMM imputes lower coverages to the original data for all screening intervals except for the ever in lifetime coverage, suggesting that screening data was missing in countries with small coverages.

Figure S2.1. Density plots of original and imputed data including in the model the 164 countries with at least one datapoint (Step 3a of the imputation algorithm).

| Coverage in the previous year | Coverage in the previous 3 years | Coverage in the previous 5 years | Coverage ever in lifetime |

Blue line: original data; Red line: imputed data.

Figure S2.2. Density plots of original and imputed data including in the model all countries (Step 4 of the imputation algorithm).

| Coverage in the previous year | Coverage in the previous 3 years | Coverage in the previous 5 years | Coverage ever in lifetime |
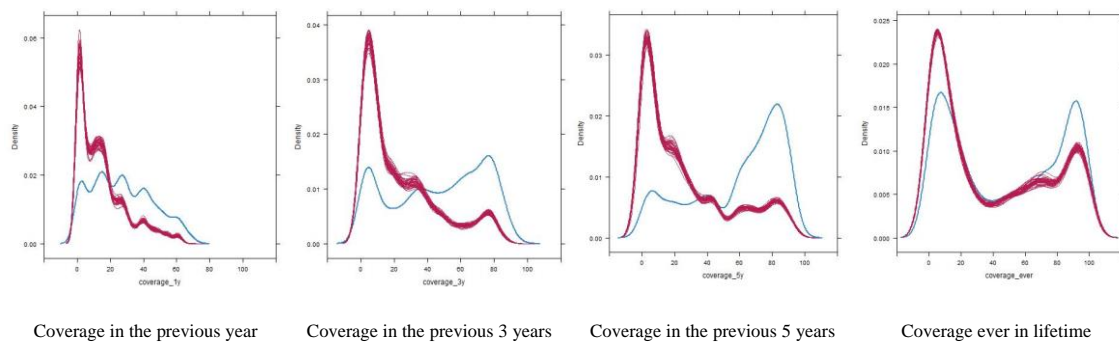
Blue line: original data; Red line: imputed data.

Figure S3. Imputation method used to estimate missing data by age and country

The figure below presents the imputation method used to estimate missing data for the previous year, previous three years, previous five years and ever in lifetime among women aged 20-70 years by country. Green squares represent the original coverage data (Step 0), and the rest of estimations are coming from the multi-step imputation algorithm (Steps 1 to 4) (Table S4).

Legend:

Step 0		Original data coverage
Countries with at least one coverage datapoint		
Step 1		Modification of aggregated/out of recommendations data
Step 2		Linear interpolation
Step 3a		Predictive Mean Matching method to records with at least one datapoint
Step 3b		Last observation carried forward / next observation carried backward technique
Step 3c		Ponderation rate
Countries without coverage datapoints		
Step 4		Predictive Mean Matching method to all records of the database

Country	Previous year	Previous three years	Previous five years	Ever in lifetime
Eastern Europe				
Belarus				
Bulgaria				
Czechia				
Hungary				
Poland				
Moldova				
Romania				
Russia				
Slovakia				
Ukraine				
Northern Europe				
Denmark				
Estonia				
Finland				
Iceland				
Ireland				
Latvia				
Lithuania				
Norway				
Sweden				
UK				
Southern Europe				
Albania				
Andorra				
Bosnia & H.				
Croatia				
Cyprus				
Greece				
Italy				
Malta				
Montenegro				
Portugal				
San Marino				
Serbia				
Slovenia				
Spain				
North Macedonia				
Western Europe				
Austria				
Belgium				
France				
Germany				
Luxembourg				
Monaco				
Netherlands				
Switzerland				

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	Previous year	Previous three years	Previous five years	Ever in lifetime
Age	20 25 30 35 40 45 50 55 60 65 70	20 25 30 35 40 45 50 55 60 65 70	20 25 30 35 40 45 50 55 60 65 70	20 25 30 35 40 45 50 55 60 65 70

Country
Gambia
Ghana
Guinea
Guinea-Bissau
Liberia
Mali
Mauritania
Niger
Nigeria
Senegal
Sierra Leone
Togo

Caribbean
Antigua & Bar.
Bahamas
Barbados
Cuba
Dominica
Dominican Rep.
Grenada
Haiti
Jamaica
Puerto Rico
St Kitts & Nev.
St Lucia
St Vincent
Trinidad & Tob.

Central America
Belize
Costa Rica
El Salvador
Guatemala
Honduras
Mexico
Nicaragua
Panama

South America
Argentina
Bolivia
Brazil
Chile
Colombia
Ecuador
Guyana
Paraguay
Peru
Suriname

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	Previous year	Previous three years	Previous five years	Ever in lifetime
Age	20 25 30 35 40 45 50 55 60 65 70	20 25 30 35 40 45 50 55 60 65 70	20 25 30 35 40 45 50 55 60 65 70	20 25 30 35 40 45 50 55 60 65 70

Country
Uruguay
Venezuela

Northern America
Bermuda
Canada
Greenland
USA

Australia & New Zealand
Australia
New Zealand

Melanesia
Fiji
Papua N. Guinea
Solomon Is.
Vanuatu

Micronesia
Kiribati
Marshall Is.
FS Micronesia
Nauru
Palau

Polynesia
American Samoa
Cook Is.
French Polynes.
Niue
Samoa
Tokelau
Tonga
Tuvalu

Central Asia
Kazakhstan
Kyrgyzstan
Tajikistan
Turkmenistan
Uzbekistan

Eastern Asia
China
Hong Kong SAR
DPR Korea
Rep. Korea
Japan
Mongolia

Southern Asia
Afghanistan
Bangladesh
Bhutan

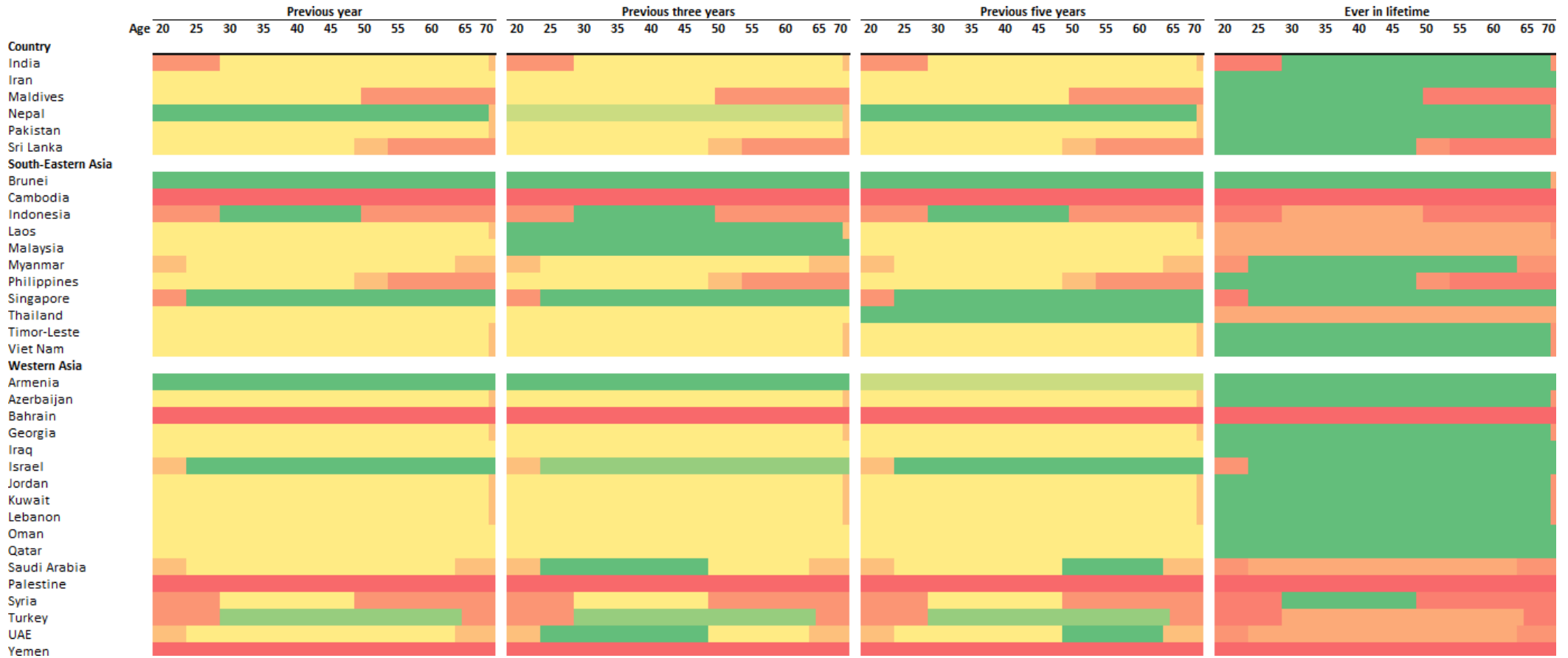| Country	Previous year	Previous three years	Previous five years	Ever in lifetime
Country				
India				
Iran				
Maldives				
Nepal				
Pakistan				
Sri Lanka				
South-Eastern Asia				
Brunei				
Cambodia				
Indonesia				
Laos				
Malaysia				
Myanmar				
Philippines				
Singapore				
Thailand				
Timor-Leste				
Viet Nam				
Western Asia				
Armenia				
Azerbaijan				
Bahrain				
Georgia				
Iraq				
Israel				
Jordan				
Kuwait				
Lebanon				
Oman				
Qatar				
Saudi Arabia				
Palestine				
Syria				
Turkey				
UAE				
Yemen				

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Figure S4. Correlation between imputed data and original data for 50 simulations.

One of the strategies to validate the imputation algorithm was to run 50 simulations in which in each simulation we selected a random sample of 200 age groups with original coverage data to be treated as missing, and we imputed the data following the stepwise algorithm (Table S4). The resulting plot of all simulations combined shows a correlation coefficient of 88.8%. 6 917 out of 66 672 single age datapoints imputed (10.4%) had distances equal or greater than 15% (coloured in red in the plot).
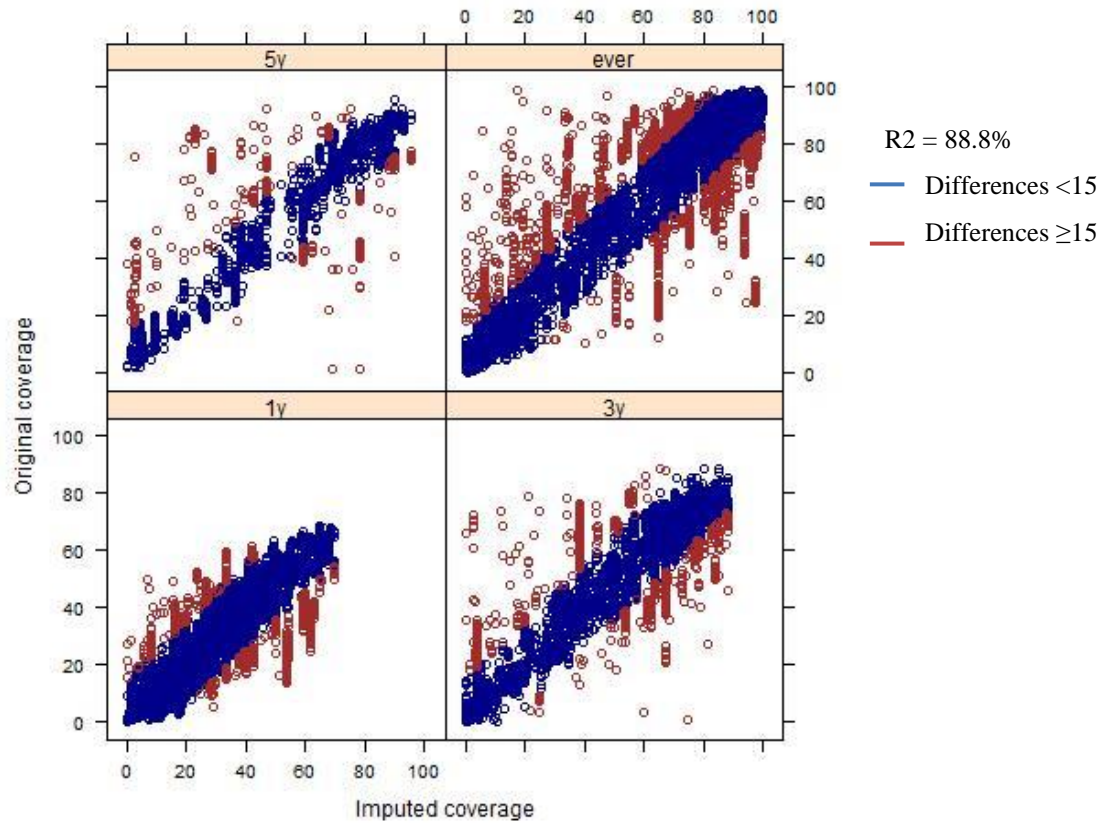
Figure S5. Differences between imputed data and original data, excluding one by one each country.

Another strategy to validate the imputation algorithm was to select one by one each country with original coverage data (164 countries), treat the country as missing and impute the data following the stepwise algorithm. The boxplot shows screening estimates worldwide and by income level, for each screening interval. Global estimates worldwide show differences between 1-4% and of maximum 11% by income level and region. The higher differences came from countries with larger populations, such as China, India, Brazil, or USA.
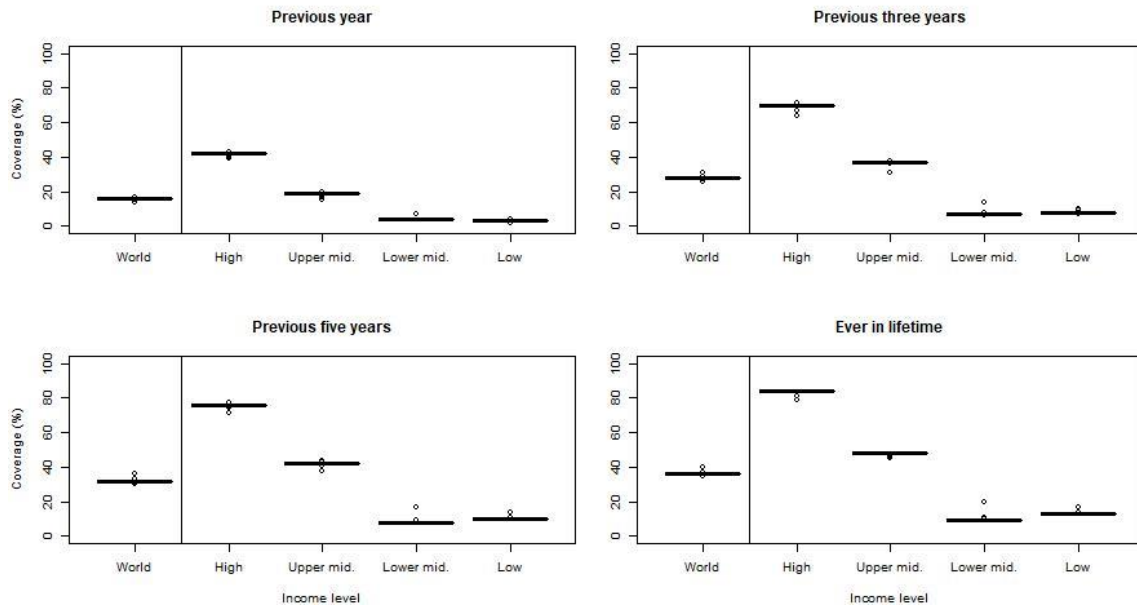
Table S1. Data sources for screening coverage, by country.

Area	Coverage	Setting	Year	Source type	Source name	Reference
EUROPE						
Albania	National	All	2019	Admin	Albania National Cervical Cancer Program Evaluation Report 2019	Personal communication (*)
Andorra	National	All	2011	Survey	National Health Survey (NHS) - Andorra	Social Observatory Andorra (https://observatorisocial.ad)
Austria	National	All	2019	Survey	Austrian Health Interview Survey (ATHIS)	Statistic Austria (http://www.statistik.at/web_de/statistiken/index.html)
Belarus	National	All	2016-2017	Survey	STEPS survey - Belarus	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Belgium	National	All	2018	Survey	Health Interview Survey - Belgium	Health Interview Survey (https://his.wiv-isp.be/SitePages/Home.aspx)
Belgium	National	All	2013	Survey	European Health Interview Survey (EHIS) - Belgium	Eurostat (https://ec.europa.eu/eurostat/web/main/home)
Bosnia & Herzegovina	Subnat - Tuzla Kanton	All	2019	Admin	Tuzla Kanton registry	Personal communication (*)
Bulgaria	National	All	2014	Survey	European Health Interview Survey (EHIS) - Bulgaria	Eurostat (https://ec.europa.eu/eurostat/web/main/home)
Croatia	National	All	2019	Survey	European Health Interview Survey (EHIS) - Croatia	Eurostat (https://ec.europa.eu/eurostat/web/main/home)
Cyprus	National	All	2014	Survey	European Health Interview Survey (EHIS) - Cyprus	Eurostat (https://ec.europa.eu/eurostat/web/main/home)
Czechia	National	All	2019	Admin	National Registry of Reimbursed Health Services (NRRHS) - Czech Republic	WHO country consultation (*)
Czechia	National	All	2014	Survey	European Health Interview Survey (EHIS) - Czech Republic	Eurostat (https://ec.europa.eu/eurostat/web/main/home)
Denmark	National	All	2019	Admin	Danish Quality Assurance database for cervical cancer screening	Danish Quality Assurance database for cervical cancer screening - DKLS (https://www.sundhed.dk/)
Estonia	National	All	2019	Admin	Health Insurance Fund - Estonia	WHO country consultation (*)
Estonia	National	All	2016	Survey	Health Behavior among Estonian Adult Population	National Institute fo Health Development (https://www.tai.ee/et/)
Finland	National	All	2018	Admin	Finish Cancer Registry	Finish Cancer Registry (https://cancerregistry.fi/) Pankakoski M (2020) Preventive Medicine
France	National	All	2018	Admin	GEO Donnees en Santé Publique (GEODES) -France	GEO Donnees en Santé Publique (https://geodes.santepubliquefrance.fr/#c=home)
France	National	All	2014	Survey	European Health Interview Survey (EHIS) - France	Eurostat (https://ec.europa.eu/eurostat/web/main/home)
Germany	National	All	2014-2015	Survey	Germany Health Update (GEDA/EHIS)	Eurostat (https://ec.europa.eu/eurostat/web/main/home) Starker A, et al. (2018) Bundesgesundheitsblatt

						Gesundheitsforschung Gesundheitsschutz
Greece	National	All	2019	Survey	National Health Interview Survey (EHIS) - Greece	WHO country consultation (*)
Hungary	National	All	2019	Survey	European Health Interview Survey (EHIS) - Hungary	Hungarian Central Statistical Office (https://www.ksh.hu/)
Ireland	National	All	2017	Admin	CervicalCheck - Ireland	National Screening Service (https://www.screeningservice.ie/)
Iceland	National	All	2019	Admin	Cancer Detection Clinic of the Icelandic Cancer Society	Eurostat (https://ec.europa.eu/eurostat/web/main/home)
Iceland	National	All	2014	Survey	European Health Interview Survey (EHIS) - Iceland	Eurostat (https://ec.europa.eu/eurostat/web/main/home)
Italy	National	All	2019	Survey	National telephone-interview surveillance system - PASSI - Italy	Epicentro (https://www.epicentro.iss.it/passi/dati/ScreeningCervicale)
Latvia	National	All	2019	Admin	National Health Service - Republic of Latvia	WHO country consultation (*)
Lithuania	National	All	2014	Survey	Health Behaviour among Lithuanian Adult Population	Institute of Hygiene (https://hi.lt/)
Luxembourg	National	All	2019	Survey	European Health Interview Survey (EHIS) - Luxembourg	WHO country consultation (*)
North Macedonia	Not available					
Malta	National	All	2014-2015	Survey	European Health Interview Survey (EHIS) - Malta	Ministry for Health (https://deputyprimeminister.gov.mt/en/Pages/Contact-Us.aspx)
Monaco	Not available					
Montenegro	National	All	2019	Admin	Official administrative data	Personal communication (*)
Netherlands	National	All	2019	Survey	National Health survey (NHS) - Netherlands	Statline (https://opendata.cbs.nl/statline/#/CBS/nl/)
Norway	National	All	2019	Admin	Cervical Screening Program registry - Norway	Cancer Registry of Norway (https://www.kreftregisteret.no/)
Poland	National	All	2014	Survey	The state of health of the Polish population	Statistics Poland (https://stat.gov.pl/)
Portugal	National	All	2014	survey	National Heath Survey (EHIS) - Portugal	National Institute of Statistics (https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_main)
Republic of Moldova	National	All	2019	Admin	Official administrative data	WHO country consultation (*)
Romania	National	All	2014	Survey	European Health Interview Survey (EHIS) - Romania	Eurostat (https://ec.europa.eu/eurostat/web/main/home)
Russian Federation	National	All	2012	Survey	Russia Longitudinal Monitoring Survey	Reynolds Z, et al. (2014) Chapel Hill, NC: MEASURE Evaluation
San Marino	Not available					
Serbia	National	All	2019	Survey	European Health Interview Survey (EHIS) - Serbia	Statistical Office of the Republic of Serbia (https://www.stat.gov.rs/)
Serbia	National	All	2016	Admin	Official administrative data	Personal communication (*)
Slovakia	National	All	2014	Survey	European Health Interview Survey (EHIS) - Slovakia	Eurostat (https://ec.europa.eu/eurostat/web/main/home)
Slovenia	National	All	2019	Admin	ZORA program - Slovenia	Cervical Cancer Screening Program and Registry ZORA (https://zora.onko-i.si/)

Spain	National	All	2017	Survey	National Health Survey (NHS) - Spain	Ministry of Health (https://www.mscbs.gob.es/home.htm)
Sweden	National	All	2018	Admin	National Quality Register for Cervical Cancer Prevention (NKCx) - Sweden	Swedish National Cervical Screening Registry (https://nkcx.se/index.htm)
Switzerland	National	All	2014	Survey	National cross-sectional questionnaire survey - Switzerland	Wymann MN, et al. (2018) Int J Public Health
Switzerland	National	All	2012	Survey	Swiss Health Interview Survey (SHIS)	Burton-Jeangros C, et al. (2017) Eur J Public Health
Ukraine	Subnat - Lviv region	All	2019	Admin	Official administrative data	Personal communication (*)
United Kingdom	Subnat - Wales	All	2018-2019	Admin	Public Health Wales	Public Health Wales (https://phw.nhs.wales/)
United Kingdom	Subnat - England	All	2019	Admin	NHS Digital - England	NHS Digital (https://digital.nhs.uk/)
United Kingdom	Subnat - Scotland	All	2019	Admin	NHS National Services Scotland	NHS National Services Scotland (https://nhsnss.org/)
United Kingdom	Subnat - Northern Ireland	All	2019	Admin	NSC Public Health Agency - Northern Ireland	NSC Public Health Agency (https://www.publichealth.hscni.net/)
AFRICA						
Algeria	National	All	2016-2017	Survey	STEPS survey - Algeria	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Angola	Not available					
Benin	National	All	2017-2018	Survey	Demographic and Health Survey (DHS) - Benin	DHS Program (https://dhsprogram.com/)
Botswana	National	All	2014	Survey	STEPS survey - Botswana	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Burkina Faso	National	All	2013	Survey	STEPS survey - Burkina Fasso	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Burundi	Not available					
Cameroon	National	All	2018	Survey	Demographic Health Survey (DHS) - Cameroon	DHS Program (https://dhsprogram.com/)
Cape Verde	National	All	2019	Survey	STEPS survey - Cape Verde	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Central African Republic	Not available					
Chad	National	All	2003	Survey	World Health Survey (WHS) - Chad	WHO World Health Survey (https://www.who.int/healthinfo/survey/en/)
Comoros	National	All	2003	Survey	World Health Survey (WHS) - Comoros	WHO World Health Survey (https://www.who.int/healthinfo/survey/en/)
Congo	National	All	2003	Survey	World Health Survey (WHS) - Congo	WHO World Health Survey (https://www.who.int/healthinfo/survey/en/)
Cote d'Ivoire	National	All	2011-2012	Survey	Demographic Health Survey & Multiple Indicator Cluster (DHS-MIC) - Cote d'Ivoire	DHS Program (https://dhsprogram.com/)
Djibouti	Not available					
DR Congo	Not available					

Egypt	National	All	2017	Survey	STEPS survey - Egypt	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Equatorial Guinea	Not available					
Eritrea	Not available					
Eswatini	National	All	2014	Survey	STEPS survey - Swaziland	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Ethiopia	National	All	2019	Admin	Ethiopia District Health information System	WHO country consultation (*)
Gabon	National	All	2019	Admin	Official administrative data	WHO country consultation (*)
Gambia	Not available					
Ghana	National	All	2014-2015	Survey	WHO study on global AGEing and adult health (SAGE) - Ghana	Calys-Tagoe BNL, et al. (2020) BMC Womens Health
Guinea	Not available					
Guinea-Bissau	Not available					
Kenya	National	All	2019	Admin	Kenya Health Information System data	WHO country consultation (*)
Kenya	National	All	2015	Survey	STEPS survey - Kenya	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Lesotho	National	All	2014	Survey	Demographic Health Survey (DHS) - Lesotho	DHS Program (https://dhsprogram.com/)
Liberia	Not available					
Libya	Not available					
Madagascar	National	All	2019	Admin	Madasgascar Health Information System data	WHO country consultation (*)
Malawi	National	All	2017	Survey	STEPS survey - Malawi	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Mali	National	All	2003	Survey	World Health Survey (WHS) - Mali	WHO World Health Survey (https://www.who.int/healthinfo/survey/en/)
Mauritania	National	All	2003	Survey	World Health Survey (WHS) - Mauritania	WHO World Health Survey (https://www.who.int/healthinfo/survey/en/)
Mauritius	National	All	2003	Survey	World Health Survey (WHS) - Mauritius	WHO World Health Survey (https://www.who.int/healthinfo/survey/en/)
Morocco	National	All	2019	Admin	Screening registry Morocco	WHO country consultation (*)
Mozambique	National	All	2014-2015	Survey	STEPS survey - Mozambique	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Namibia	National	All	2013	Survey	Demographic and Health Survey (DHS) - Namibia	DHS Program (https://dhsprogram.com/)
Niger	Not available					
Nigeria	Not available					
Rwanda	Not available					
Sao Tome & Principe	National	All	2019	Survey	STEPS survey - Sao Tome & Principe	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Senegal	National	All	2015	Survey	STEPS survey - Senegal	WHO NCD Microdata repository

Seychelles	Not available					
Sierra Leone	Not available					
Somalia	Subnat - Somaliland	All	2018-2019	Survey	STEPS survey - Somalia	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
South Africa	National	All	2016	Survey	Demographic and Health Survey (DHS) - South Africa	DHS Program (https://dhsprogram.com/)
South Sudan	Not available					
Sudan	Not available					
Tanzania	Not available					
Togo	Not available					
Tunisia	National	All	2016	Survey	Tunisian Health Examination Survey	Health Ministry (http://www.santetunisie.rns.tn/fr/)
Uganda	National	All	2014	Survey	STEPS survey - Uganda	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Zambia	National	All	2017	Survey	STEPS survey - Zambia	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Zimbabwe	National	All	2015	Survey	Demographic and Health Survey (DHS) - Zimbawe	DHS Program (https://dhsprogram.com/)
AMERICA						
Antigua & Barbuda	Not available					
Argentina	National	Urban	2018	Survey	National Survey on Risk Factors (ENFR)- Argentina	Health Ministry (https://www.argentina.gob.ar/salud)
Bahamas	National	All	2019	Survey	STEPS survey - Bahamas	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Barbados	National	All	2007	Survey	STEPS survey - Barbados	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Belize	National	All	2005-2006	Survey	Central America Diabetes Initiative (CAMDI) - Belize	Lemp JM, et al. (2020) JAMA
Bermuda	National	All	2011	Survey	Health Survey of Adults (STEPS) - Bermuda	Government of Bermuda (https://www.gov.bm/)
Bolivia	National	All	2008	Survey	Demographic Health Survey (ENDSA) - Bolivia	DHS Program (https://dhsprogram.com/)
Brazil	National	All	2019	Admin	Cancer Information System (SISCAN)	Health Ministry (https://datasus.saude.gov.br/)
Canada	National	All	2017	Survey	Canadian Community Health Survey (CCHS)	Statistics Canada (https://www.statcan.gc.ca/eng/start)
Chile	National	All	2017	Survey	National Socioeconomic Characterization Survey (CASEN) - Chile	Social Observatory (http://observatorio.ministeriodesarrollosocial.gob.cl/)

Colombia	National	All	2019	Admin	Registry of specific protection and early detection activities (PEDT) - Colombia	Minsalud (https://www.sispro.gov.co/Pages/Home.aspx)
Costa Rica	National	All	2006	Survey	National Health Survey (ENSA) - Costa Rica	BINASSS (https://www.binasss.sa.cr/)
Cuba	National	All	2010-2011	Survey	National Survey of Risk Factors and Preventive Activities for Non-Communicable Diseases- Cuba	Editorial Medical Sciences (http://www.ecimed.sld.cu/)
Dominica	National	All	2008	Survey	STEPS survey - Dominica	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Dominican Republic	National	All	2013	Survey	Demographic Health Survey (DHS) - Dominican Republic	DHS Program (https://dhsprogram.com/)
Ecuador	National	All	2018	Survey	STEPS survey - Ecuador	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
El Salvador	National	All	2008	Survey	National Family Health Survey (FESAL) - El Salvador	Central America Integration System - SICA (https://www.sica.int/)
Greenland	National	All	2011	Admin	Cancer registry - Greenland	Holst S, et al. (2016) Gynecol Oncol
Grenada	National	All	2010	Survey	STEPS survey - Grenada	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Guatemala	National	All	2015	Survey	Demographic Health Survey - Guatemala	DHS Program (https://dhsprogram.com/)
Guyana	National	All	2016	Survey	STEPS survey - Guyana	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Haiti	National	All	2016-2017	Survey	Mortality, Morbidity and Use of Services Survey (EMMUS) - Haiti	DHS Program (https://dhsprogram.com/)
Honduras	National	All	2011-2012	Survey	Demographic Health Survey (ENDESA) - Honduras	DHS Program (https://dhsprogram.com/)
Jamaica	National	All	2016-2017	Survey	Jamaica Health and Lifestile Survey	Ministry of Health and Wellness (https://www.moh.gov.jm/)
Mexico	National	All	2018	Survey	National Health and Nutrition Survey (ENSANUT) - Mexico	National Health and Nutrition Survey (https://ensanut.insp.mx/)
Nicaragua	National	All	2012	Survey	Demographic Health Survey (ENDESA) - Nicaragua	National Institute of Development (https://www.inide.gob.ni/)
Panama	Not available					
Paraguay	National	All	2008	Survey	Demographic and Reproductive Health Survey (ENDSSR) - Paraguay	USAID (https://www.usaid.gov/)
Peru	National	All	2019	Survey	Demographic and Family Health Survey (DHS) - Peru	DHS Program (https://dhsprogram.com/)
Puerto Rico	National	All	2018	Survey	CDC. Behavioral Risk Factor Surveillance System (BRFSS) - Puerto Rico	Centers for Disease Control and Prevention - CDC (https://www.cdc.gov/)
St Kitts & Nevis	National	All	2008	Survey	STEPS survey - St Kidds & Nevis	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
St Lucia	National	All	2012	Survey	STEPS survey - St Lucia	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
St Vincent & The Grenadines	National	All	2013-2014	Survey	STEPS survey - St Vincent & The Grenadines	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)

Suriname	Not available					
Trinidad & Tobago	National	All	2011	Survey	STEPS survey - Trinidad & Tobago	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
United States of America	National	All	2019	Survey	National Health Interview Survey in Adult US population (NHIS) - United States of America	Centers for Disease Control and Prevention - CDC (https://www.cdc.gov/)
Uruguay	National	All	2019	Admin	Information systems of the Cervical Cancer Prevention Program (PPCCU) & Honorary Commission for the Fight Against Cancer (CHLCC)	WHO country consultation (*)
Uruguay	National	Urban	2013	Survey	STEPS survey - Uruguay	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Venezuela	Not available					
OCEANIA						
American Samoa	Not available					
Australia	National	All	2019	Admin	National Cervical Screening Programme - Australia	Australian Institute of Health and Welfare (https://www.aihw.gov.au/)
Cook Islands	Not available					
Fiji	National	All	2006	Admin	Data from Hospital Registries	Law I, et al. (2013) Sex Health.
French Polynesia	National	All	2019	Admin	Data from screening program - French Polynesia	WHO country consultation (*)
FS Micronesia	Subnat - Chuuk State	All	2016	Survey	STEPS survey - Micronesia	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Kiribati	National	All	2015-2016	Survey	STEPS survey - Kiribati	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Marshall Islands	National	All	2017	Survey	STEPS survey - Marshall Islands	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Nauru	National	All	2015	Survey	STEPS survey - Nauru	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
New Zealand	National	All	2019	Admin	National Cervical Screening Programme (NCSP) - New Zealand	National Screening Unit (https://minhealthnz.shinyapps.io/nsu-ncsp-coverage/)
Niue	Not available					
Palau	National	All	2016	Survey	STEPS survey - Palau	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Papua New Guinea	Subnat - Mount Hagen, Goroka	Urban	2011	Admin	Data from Goroka General Hospital and Mt Hagen General Hospital	Toliman PJ, et al. (2018) Papillomavirus Res.
Samoa	Not available					
Solomon Islands	National	All	2015	Survey	STEPS survey - Solomon Islands	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Tokelau	National	All	2014	Survey	STEPS survey - Tokelau	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)

Tonga	National	All	2017	Survey	STEPS survey - Tonga	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Tuvalu	National	All	2015	Survey	STEPS survey - Tuvalu	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Vanuatu	Not available					
ASIA						
Afghanistan	Not available					
Armenia	National	All	2015-2016	Survey	Health System Performance Assessment (STEPS) - Armenia	National Institute of Health Avdalbekyan (https://nih.am/am)
Azerbaijan	National	All	2017	Survey	STEPS survey - Azerbaijan	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Bahrain	Not available					
Bangladesh	National	All	2018	Survey	STEPS survey - Bangladesh	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Bhutan	National	All	2014	Survey	STEPS survey - Buthan	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Brunei	National	All	2015-2016	Survey	STEPS survey - Brunei	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Brunei	National	All	2019	Admin	National registry - Brunei	WHO country consultation (*)
Cambodia	Not available					
China	National	All	2015	Survey	National Survey - Chinese Chronic Disease and Risk Factor Surveillance (CCDRFS)	Zhang, M, et al. (2020) China CDC Weekly.
DPR Korea	Not available					
Georgia	National	All	2016	Survey	STEPS survey - Georgia	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Hong Kong SAR	National	All	2018-2019	Survey	Health Behaviour Survey (HBS) - Hong Kong	Centre for Health protection (https://www.chp.gov.hk/en/index.html)
India	National	All	2017-2018	Survey	National NCD Monitoring Survey (NNMS) - India	National Centre for Disease Informatics and Research - NCDIR (https://www.ncdirindia.org/NCD.aspx)
Indonesia	National	All	2019	Admin	Ministry of Health - Indonesia	Ministry of Health Republic of Indonesia (https://www.kemkes.go.id/)
Iran	National	All	2016	Survey	STEPS survey - Iran	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Iraq	National	All	2015	Survey	STEPS survey - Iraq	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Israel	National	All	2017	Admin	Israel Social Survey	Israel Central Bureau of Statistics (https://www.cbs.gov.il/he/pages/default.aspx)
Japan	National	All	2015	Survey	Comprehensive Survey of Living Conditions - Japan	ministry of health Lavour and Wellfare (https://www.mhlw.go.jp/index.html)
Jordan	National	All	2019	Survey	STEPS Survey - Jordan	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Kazakhstan	National	All	2017	Admin	Official reports	Personal communication (*)

Kwait	National	All	2014	Survey	STEPS survey - Kuwait	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Kyrgyzstan	National	All	2013	Survey	STEPS survey - Kyrgyzstan	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Laos	National	All	2003	Survey	World Health Survey (WHS) - Laos	WHO World Health Survey (https://www.who.int/healthinfo/survey/en/)
Lebanon	National	All	2016-2017	Survey	STEPS survey - Lebanon	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Malaysia	National	All	2019	Survey	National Health and Morbidity Survey (NHMS) - Malaysia	Institute for Public Health (http://iku.moh.gov.my/)
Maldives	National	All	2012-2013	Survey	Health survey - Maldives	Basu P, et al. (2014) Asian Pac J Cancer Prev.
Mongolia	National	All	2018	Survey	Social Indicator Sample Survey (SISS) - Mongolia	National Statistics Office Mongolia (https://www.en.nso.mn/)
Myanmar	National	All	2014	Survey	National Survey on Diabetes Mellitus and Risk Factors for Non Communicable Diseases - Myanmar	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Nepal	National	All	2019	Survey	STEPS survey - Nepal	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Oman	National	All	2017	Survey	STEPS survey - Oman	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Pakistan	National	All	2013-2014	Survey	STEPS survey - Pakistan	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Palestine	Not available					
Philippines	National	All	2017	Survey	Demographic and Health Survey (DHS) - Philippines	DHS Program (https://dhsprogram.com/)
Qatar	National	All	2006	Survey	World Health Survey (WHS) - Qatar	WHO World Health Survey (https://www.who.int/healthinfo/survey/en/)
Republic of Korea	National	All	2019	Survey	Korean National Cancer Screening Survey (KNCSS)	WHO country consultation (*)
Saudi Arabia	National	All	2008	Survey	World Health Survey (WHS) - Saudi Arabia	WHO World Health Survey (https://www.who.int/healthinfo/survey/en/)
Singapore	National	All	2019	Survey	National Health Survey (NHS) - Singapore	Personal communication WHO country consultation
Sri Lanka	National	All	2016	Survey	Demographic and Health Survey (DHS) - Sri Lanka	DHS Program (https://dhsprogram.com/)
Syria	National	All	2018	Survey	Multipurpose Demographic Survey - Syria	WHO country consultation (*)
Tajikistan	National	All	2016	Survey	STEPS survey - Tajikistan	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Thailand	National	All	2010	Survey	Thai Behavioral Risk Factor Surveillance System (BRFSS) survey	Chongthawonsatid S. (2017) PLoS One.
Timor-Leste	National	All	2014	Survey	STEPS survey - Timor Leste	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Turkey	National	All	2019	Admin	Data from the national registry - Turkey	WHO country consultation (*)

Turkmenistan	National	All	2013	Survey	STEPS survey - Turkmenistan	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
United Arab Emirates	National	All	2008	Survey	World Health Survey (WHS) - United Arab Emirates	WHO World Health Survey (https://www.who.int/healthinfo/survey/en/)
Uzbekistan	National	All	2014	Survey	STEPS survey - Uzbekistan	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Viet Nam	National	All	2015	Survey	STEPS survey - Viet Nam	WHO NCD Microdata repository (https://extranet.who.int/ncdsmicrodata/index.php/home)
Yemen	Not available					

(*) Contact: https://hpvcentre.net/contactus.php

Table S2. Data sources for cervical cancer screening recommendations by country.

Area	Screening policy	Reference
EUROPE		
Albania	Yes	Ministry of Health Albania. 2019. New cervical cancer programme in Albania [Manastirliu: Program i ri për kancerin e qafës së mitrës, rritëm financimin publik për shëndetësinë] (https://shendetesia.gov.al/) Public Health Institute Albania. Cervical cancer screening programme. (http://www.ishp.gov.al)
Andorra	No	
Austria	Yes	Public Health Service Austria. Annual preventive medical check-up [Vorsorgeuntersuchung (Gesundenuntersuchung) (https://www.gesundheit.gv.at/)
Belarus	Yes	Personal communication WHO country consultation (*)
Belgium	Yes	Flemish Cervical cancer screening programme [Bevolkings onderzoek baarmoeder halskanker] (https://baarmoederhalskanker.bevolkingsonderzoek.be) Centre Communautere de Reference pour le dépistage des cancers (https://www.ccref.org)
Bosnia & Herzegovina	Yes	Personal communication (*)
Bulgaria	Yes	Personal communication WHO country consultation (*)
Croatia	Yes	Croatian Institute for Public Health. National Programme for Early detection of cervical cancer(https://javno-zdravlje.hr/)
Cyprus	Yes	WHO Country Capacity Survey 2019. WHO Global Health Observatory (https://www.who.int/data/gho)
Czechia	Yes	Czech National Cervical Screening Programme (https://www.cervix.cz/index-en.php)
Denmark	Yes	The Danish Health Authority. Cervical cancer screening [Screening for livmoderhalskræft] (https://www.sst.dk/da)
Estonia	Yes	Nordscreen. Cancer screening Estonia (https://nordscreen.org/)
Finland	Yes	Current Care Guidelines. Cervical cancer screening guidelines (https://www.kaypahoito.fi/en/)
France	Yes	Haute Autorité de Santé. Dépistage et Prévention Du Cancer Du Col de l'utérus. Actualisation Du Référentiel de Pratiques de l'examen Périodique de Santé (EPS).; 2013. (https://www.has-sante.fr/jcms/pprd_2986129/en/home)
Germany	Yes	Federal joint Committee [Gemeinsamer bundesausschuss. Pressemitteilung | Methodenbewertung]. Future Organized cervical Cancer Screening Programme [Früherkennung von Gebärmutterhalskrebs künftig als organisiertes Programm] (https://www.g-ba.de/)
Greece	Yes	Government of the Hellenic Republic. Joint Ministerial Decision n. ΕΑΛΕ/Γ.Π. 80157 published in the Government Gazette n. 4898/B/2018
Hungary	Yes	Boncz I, et al. Organized, nationwide cervical cancer screening programme in Hungary. Gynecol Oncol. 2007 Jul;106(1):272-3. Kívés Z, et al. Cancer screening policy in Hungary. Int J Cancer. 2018 Aug 15;143(4):1003-1004.
Iceland	Yes	Icelandic Cancer Society (https://www.krabb.is/)
Ireland	Yes	Health Service, Ireland. Cervical screening - CervicalCheck (https://www.hse.ie/eng/)

Italy	Yes	Regione Piemonte. Bollettino Ufficiale. N.20 del 16.Mag.2013. Deliberazione della Giunta Regionale 23 Aprile 2013, n.21-5705. Approvazione della modifica del programma regionale di screening oncologico, "prevenzione serena" per i tumori della cervice uterina. Aggiornamento dell'allegato A della D.G.R. n.111-3632 del 02.08.2006.
		Regione Trento. Azienda Provinciale per i Servizi Sanitari Trento – via Degasperi 79. Verbale di deliberazione del Direttore Generale Reg. delib. n. 88|2017. Nuovo programma di screening di diagnosi precoce del carcinoma del collo dell'utero con test HPV.
		Regione Veneto. Bur n.59 del 13.06.2014 (Codice interno: 275291) Deliberazione della Giunta Regionale n.772 del 27.mag.2014. Modifica del programma regionale di screening oncologico per i tumori della cervice uterina con utilizzo del test HPV-DNA come test primario a parziale sostituzione del Pap Test.
		Regione Liguria. Secretaria Generale Gabinetto del Presidente della Giunta Regionale. N.3182 del 31.05.2013. Valutazione dell'uso del test HPV DNA come test primario per l'individuazione del carcinoma del collo dell'utero nella fascia d'eta 30/35-64 anni. Provvedimenti.
		Regione Emilia Romagna. Assessorato politiche per la salute. Circolaire N.8; PG. 2015. 0509168. del 17.07.2015. Indicazioni per la riconversione del programma di screening per la prevenzione e diagnosi precoce dei tumori del collo dell'utero con HPV DNA test: criteri di ammissibilita e modalita di erogazione del test.
		Regione Toscana. Giunta regionale estratto dal verbale della seduta del 26.11.2012 (punto N.33) Delibera N 1049 del 26.11.2012. Programma di screening regionale per il tumore della cervice uterina con HPV primario in sostituzione del Pap-Test. Progettazione e modalità attuative.
		Regione Umbria. Supplemento ordinario n. 2 al «Bollettino Ufficiale» - serie generale - n. 33 del 24.Lug.2013. Direzione Redazione e Amministrazione presso presidenza della giunta regionale Perugia. Deliberazione della Giunta Regionale 28.Mag.2013, n.506. Approvazione Piano Regionale di Prevenzione per l'anno 2013.
		Regione Lazio. 13/07/2017 - Bolletino Ufficiale della regione Lazio N.56 - Supplemento n.1. Decreto del Commissario ad Acta 28 giugno 2017, n. U00240. Programma Operativo 2016-2018 (DCA 52/2017). Approvazione documento di indirizzo per il programma di screening del cervicocarcinoma della Regione Lazio. Modello organizzativo e protocollo diagnosticoterapeutico.
		Segnan N, et al. Cervical cancer screening in Italy. Eur J Cancer. 2000;36(17):2233-2234.
		Ronco G, et al. Extension of organized cervical cancer screening programmes in Italy and their process indicators, 2011-2012 activity Estensione dei programmi organizzati di screening cervicale in Italia e loro indicatori di processo Marco Zappa 2 and the Italian cervica. Epidemiol PrevEpidemiol Prev. 2015;39(1):1-125.
		Regione Puglia. Bollettino Ufficiale della Regione Puglia - n.30 del 27-2-2018. Deliberazione della Giunta Regionale 06.feb.2018, n.129. Programma Operativo 2016-2018. Piano delle azioni avviate nel biennio 2016-2017 e delle misure da attuare nel 2018.
		Regione Basilicata. Dipartimento Salute, sicurezza e solidarieta sociale , servici alla persona e alla comunita. Deliberazione N. 668 del 29. Mag. 2012. Approvacione Piano Regionale Screening Oncologici.
		Regione Calabria. Programma Operativo 2013-2015. Programma 11 - Sanità pubblica. Azioni 11.2.3, 11.2.4 ed 11.2.5 "Screening per il cancro della cervice" ~ integrazioni e modifiche DCA n. 50/2015. DCA N. 126 del 24. Nov. 2015
		Regione Siciliana. Dipartimento Attivita Sanitare Osservatorio Epidemiologico. Passagio del Pap test all'HPV DNA come test primario per lo screening del cervicocarcinoma. D.A.n.08 del 03.Gen.2017.
		Regione Sardegna. Assessorato dell'igiene e sanita e dell'assistenza sociale. Allegato alla Delib.G.R. n. 56/17 del 20.12.2017. Piano Regionale di Prevenzione (PRP) 2014-2018. Programma P-1.4 Identificazione precoce dei tumori oggetto di screening e presa in carico sistemica Azione P–1.4.3. Riorganizzazione del percorso dello screening del cervicocarcinoma con l'introduzione test HPV-DNA come test primario.
Latvia	Yes	Vīberga I, et al. Cervical cancer screening in Latvia: a brief history and recent improvements (2009-2011). Acta Dermatovenerol Alp Pannonica Adriat. 2013;22(1):27-30.
		Latvia, National Health Service (http://www.vm.gov.lv)
Lithuania	Yes	Kurtinaitienė R, et al. Increasing attendance in a cervical cancer screening programme by personal invitation: experience of a Lithuanian primary health care centre. Acta Med Litu. 2016;23(3):180-184.
Luxembourg	No	
Malta	Yes	Ministry for Health, Malta. Cervix Screening Programme (https://deputyprimeminister.gov.mt/en/Pages/health.aspx)
Monaco	Yes	Public services of the Princely Government of Monaco. Screening for cervical cancer. Available at: http://en.service-public-particuliers.gouv.mc/ Social-health-and-families/Public-health/Prevention-and-screening/Screening-for-cervical-cancer
Montenegro	Yes	Public Health Institute, Montenegro. Screening department [Odjeljenje za skringe] (https://www.ijzcg.me/)
Netherlands	Yes	National Institute for Public Health and the Environment, The Netherlands. Cervical Cancer Screening Programme (https://www.rivm.nl)
North Macedonia,	Yes	Institute of Public Health of Republic of Nord Macedonia, Effects of the screening programme for early detection of cervical cancer in the Republic of Macedonia on the occasion of "Week for prevention of cervical cancer", 2015. (https://www.iph.mk/)
		Government of the Republic of Macedonia. Official Gazette of the Republic of Macedonia, no. 196 of 12.26.2014.
Norway	Yes	Cancer Registry of Norway. CervicalScreen Norway (https://www.kreftregisteret.no/)
Poland	Yes	Ministry of Health Poland. Cervical cancer screening programme [Program profilaktyki raka szyjki macicy (cytologia)] (https://www.gov.pl/)

Portugal	Yes	Personal communication WHO country consultation (*) National Health Service, Portugal. Regional Health Administration of Lisbon and Valley de Tejo. Cervical cancer screening (https://www.arslvt.min-saude.pt/pages/1) National Health Service (SNS), Portugal. National Programme for oncological diseases. Report 2014. Evaluation and Monitoring of Population-Based Organized Cancer Screenings in Mainland Portugal (https://www.sns.gov.pt/?cpp=1) Regional Health Secretariat. Autonomous Region of the Azores. Regional Health Plan 2014-2016 - Extension 2020. 2015: 1-292.
Republic of Moldova	Yes	UNFPA-Moldova. Cervical Cancer Prevention in the Republic of Moldova [Proiectul "Prevenirea Cancerului de Col Uterin în Republica Moldova"] (https://moldova.unfpa.org/ro)
Romania	Yes	National Istitute of Public Health. Cervical cancer screening [programul de screening pentru cancerul de col uterin]] (https://insp.gov.ro/) Institutul Oncologic Prof. Dr.I. Chiricuta. Cluj-Napoca. Romania. National Cervical Cancer Screening Programme (http://www.iocn.ro/)
Russian Federation	Yes	Order of the Ministry of Health of the Russian Federation of 13 March 2019 N9 124n <<06 approval of the procedure for conducting preventive medical examination and the clinical examination of certain groups of the adult population>>
San Marino	Yes	Istituto per la Sicurezza Sociale. Screening prevenzione (http://www.iss.sm)
Serbia	Yes	Serbian Public Health Institute. Cervical cancer programme (http://www.skriningsrbija.rs/)
Slovakia	Yes	Ministry of Health of the Slovak Republic. Press December 13th, 2018: Screenings will start in January (https://www.health.gov.sk/Titulka)
Slovenia	Yes	Institute of Oncology Ljubljana. Slovenia Cervical Cancer Screening Programme ZORA (https://zora.onko-i.si/)
Spain	Yes	Servicio Andaluz de Salud. Proceso asistencial integrado cáncer de cérvix. (https://www.sspa.juntadeandalucia.es) Gobierno de Aragón. Recomendaciones para el desarrollo del programa de cribado de cáncer de cérvix en Aragón. (https://www.aragon.es/) AsturSalud. Programa de Salud del Principado de Asturias. (https://www.astursalud.es/astursalud) Ib-salut Servei de Salud de les Illes Balears. Programa de prevención del cancer de cervix. (https://www.ibsalut.es/) Servicio canario de la salud. Cribado oportunista del cáncer de cérvix. Recomendaciones clínico asistenciales. 2013. (https://www3.gobiernodecanarias.org/) Gobierno de Cantabria. Protocolo de detección precoz de cáncer de cérvix. 2015. (https://saludcantabria.es)Sanidad Castilla la Mancha. Sescam. Programa de Detección Precoz de Cáncer de Cérvix (https://sanidad.castillalamancha.es) Junta de Castilla y León. Programa de prevención y detección precoz de cáncer de cuello de útero en Castilla y León. (https://www.saludcastillayleon.es/) Generalitat de catalunya. Programa de detecció precoç de càncer de coll d'úter. (https://canalsalut.gencat.cat/ca/inici) Generalitat Valenciana. Estrategia contra el cáncer de la Comunidad Valenciana 2019-2022 (http://www2.san.gva.es/) Generalitat Valenciana. Informes de Salud. Detección precoz de cáncer de cervix Nº93. 2006 (http://www2.san.gva.es/) Generalitat Valenciana. Sanidad elabora un nuevo protocolo de detección precoz de cáncer de útero que amplía la población diana a las mujeres de 20 a 65 años. Valencia (21-3-04). (http://www2.san.gva.es/) Junta de Extremadura. Plan Integral contra el cáncer en Extremadura 2017-2021 (https://saludextremadura.ses.es/) Servizo Galego de Saúde. Guía Técnica do proceso de detección precoz de cancro de cervix. Versión 2 Xullo 2013. (https://www.sergas.es/) Gobierno de La Rioja. Nuevo programa de detección precoz de cáncer de cérvix. (http://www.riojasalud.es/) Presupuestos Generales de la Comunidad de Madrid 2019. (http://www.madrid.org/) Region de Murcia. Consegería de Sanidad y política social. Programa Integral de Atención a la Mujer (PIAM) Región de Murcia. 2012. (https://www.murciasalud.es/principal.php) Gobierno de Navarra. Prevención del Cancer de Cuello de Utero. (https://www.navarra.es) Gobierno Vasco. Programa de cribado de cáncer de cérvix. (https://www.osakidetza.euskadi.eus/) Guidelines for cervical cancer screening in Spain, 2014 (http://www.aepcc.org/) Personal communication WHO country consultation (*)
Sweden	Yes	Regionala Cancercentrum i Samverkan. Nationellt vårdprogram för livmoderhalscancerprevention [National Cervical Cancer Prevention Programme] (https://cancercentrum.se/samverkan/)
Switzerland	Yes	Societé Suisse de Gyanecologie et Obstetrique. Recommandations pour la prévention du cancer du col de l'utérus. (https://www.sggg.ch/)
Ukraine	Yes	Order of the Ministry of Health of Ukraine of April 2nd, 2014 No. 236. On the approval of the introduction of medical-technological documents on the standardization of medical procedures related to dysplasia and cervical cancer [Про затвердження та впровадження медико-технологічних документів зі стандартизації медичної допомоги при дисплазії та раку шийки матки].

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AFRICA		
Algeria	Yes	Yazghich I, et al. Cervical cancer in the Maghreb country (Morocco - Algeria - Tunisia) : epidemiological, clinical profile and control policy. Tunis Med. 2018 Oct-Nov;96(10-11):647-657.
Angola	No	
Benin	No	
Botswana	No	
Burkina Faso	Yes	WHO Country Capacity Survey 2019. WHO Global Health Observatory (https://www.who.int/data/gho)
Burundi	No	
Cameroon	No	
Cape Verde	No	
Central African Republic	No	
Chad	No	
Comoros	No	
Congo	No	
Côte d'Ivoire	Yes	Boni S, et al. Assessment of the scale-up of cervical cancer screening in Abidjan stratified by HIV status. Int J Gynaecol Obstet. 2019;147(2):246-251.
Djibouti	No	
DR Congo		
Egypt	No	
Equatorial Guinea	No	
Eritrea	No	
Eswatini	No	
Ethiopia	Yes	Guideline for Cervical Cancer Prevention and Control in Ethiopia (https://www.iccp-portal.org/)
Gabon	Yes	Ministère de la Santé & Fondation Sylvia Bongo Ondimba. Guide de bonnes pratiques: Detection precoce des cancers du sein et du col uterin. (http://www.sylviabongoondimba.org)
Gambia	No	
Ghana	No	
Guinea	Yes	WHO Country Capacity Survey 2019. WHO Global Health Observatory (https://www.who.int/data/gho)
Guinea-Bissau	No	
Kenya	Yes	Ministry of Health, Kenya. Kenya National Cancer Screening Guidelines Nairobi, November 2018 (https://www.health.go.ke/)
Lesotho	No	
Liberia	No	
Libya	No	
Madagascar	Yes	WHO Country Capacity Survey 2019. WHO Global Health Observatory (https://www.who.int/data/gho)
Malawi	Yes	Ministry of Health. The government of Malawi. National Reproductive Health service delivery Guidelines 2014-2019
Mali	No	

Mauritania	No	
Mauritius	Yes	Personal communication WHO country consultation (*)
Morocco	Yes	Association Lalla Salma de lutte contre le Cancer. Guide de détection précoce des cancers du sein et du col de l'utérus (https://www.contrelecancer.ma/fr/)
Mozambique	Yes	Brandão M, et al. Cervical cancer screening uptake in women aged between 15 and 64 years in Mozambique. Eur J Cancer Prev. 2019 Jul;28(4):338-343.
Namibia	No	
Niger	No	
Nigeria	No	
Rwanda	Yes	Binagwaho A, et al. Integration of comprehensive women's health programmes into health systems: cervical cancer prevention, care and control in Rwanda. Bull World Health Organ. 2013 Sep 1; 91(9): 697–703.
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Seychelles	No	
Sierra Leone	No	
Somalia	No	
South Africa	Yes	Botha MH, et al. Guidelines for cervical cancer screening in South Africa.Southern African Journal of Gynaecological Oncology 2017; 9(1):8-12
South Sudan	No	
Sudan	No	
Tanzania	No	
Togo	No	
Tunisia	Yes	Ministere de la Sante. Republique Tunisiene. (2015) Plan pour le lutte contre le cancer en Tunisie 2015-2019. (https://www.iccp-portal.org/) Hsairi M, et al. Health screening strategies in Maghreb countries: Situation Analysis and perspectives. Tunis Med. 2018 Oct-Nov;96(10-11):688-695.
Uganda	Yes	Personal communication WHO country consultation (*)
Zambia	Yes	Ministry of health. Republic of Zambia. National Cancer Control Strategic Plan 2016-2021(https://www.iccp-portal.org/) Ministry of Health. Center for Disease Control. Center for Infectious Disease Research in Zambia (CIDRZ). Cervical Cancer (http://www.cidrz.org/) Nyambe A, et al. Knowledge, attitudes and practices of cervical cancer prevention among Zambian women and men. BMC Public Health. 2019 May 4;19(1):508.
Zimbabwe	No	
AMERICA		
Antigua & Barbuda	Yes	Pan American Health Organization. Situational Analysis of Cervical Cancer Prevention and Control in the Caribbean. 2013 dic. (https://www.paho.org/)
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Bahamas	Yes	National Health Insurance Authority. Bahamas Primary Care Benefits Package (https://www.nhibahamas.gov.bs/) Bahamas Ministry of Health. Gynaecology Services (http://www.bahamas.gov.bs)
Barbados	No	Luciani S, et al. Cancer Prevention and Control in the Caribbean. Cancer Control. 2017;53–61.
Belize	Yes	Ministry of Health. Cervical Cancer Clinical Guidelines Belize; 2016 (https://www.iccp-portal.org/)
Bermuda	Yes	Bermuda Cancer and Health Centre. Bermuda's Cancer Screening Guidelines (https://www.cancer.bm)
Bolivia	Yes	Dirección General de Salud, Unidad de Servicios de Salud y Calidad. Norma Nacional, Reglas, Protocolos y Procedimientos para la Detección y Control de Cáncer de Cuello Uterino. Cuarta edición actualizada (https://www.minsalud.gob.bo)

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Canada	Yes	Cervical Cancer Screening in Canada: Environmental Scan. 2018. (https://www.partnershipagainstcancer.ca/) Alberta Health Services. Alberta Cervical Cancer Screening Programme (https://www.albertahealthservices.ca) Screening for Life.ca (http://screeningforlife.ca/) Provincial Health Service Authority, British Columbia. BC Cancer Screening (http://www.bccancer.bc.ca/screening/) CancerCare Manitoba. CervixCheck (https://www.cancercare.mb.ca/home/) New Brunswick Department of Health, Cancer Network. New Brunswick Cervical Cancer Prevention and Screening Programme (https://www2.gnb.ca/content/gnb/en.html) Cancer Care Programme, Easthern Health. Cervical Screening Initiatives Programme (http://cancercare.easternhealth.ca/) Cancer Care Nova Scotia, Nova Scotia Health Authority Programme of Care for Cancer. Cervical Cancer Prevention Programme. Cancer screening programmes (https://cancercare.easternhealth.ca/) Government of Northwest Territories. Lest's Talk about Cancer. Cervical Cancer Screening (https://www.cancernwt.ca/) Cancer Care Ontario. Ontario Cervical Screening Programme (https://www.cancercareontario.ca/) Health Prince Edward Island. Cervical Cancer Screening Service (https://www.princeedwardisland.ca/en) Institut National de Santé Publique du Quebec. Guidelines on Cervical Cancer Screening in Québec. 2011 (https://www.inspq.qc.ca/) Saskatchewan Cancer Agency. Screening Programme for Cervical Cancer (http://www.saskcancer.ca/) Canadian Task Force on Preventive Health Care. Cervical Cancer Screening Guidelines 2013 (https://canadiantaskforce.ca/)
Chile	Yes	Ministerio de Salud, Gobierno de Chile. Guías Clínicas AUGE, Cáncer Cérvico Uterino, 2015 (https://www.minsal.cl/)
Colombia	Yes	República de Colombia, Ministerio de Salud y Protección Social. Resolución 3280 de 2018 (https://www.minsalud.gov.co) República de Colombia, Ministerio de Salud y Protección Social. Resolución 276 de 2019 (https://www.minsalud.gov.co)
Costa Rica	Yes	Presidencia de la República. Ministerio de Salud. DECRETOS No 33119-S : Normas y Procedimientos de Atención Integral a la Mujer para la Prevención y Manejo del Cáncer de Cuello de Útero, para el I y II Nivel de Atención y Normas de Laboratorios de Citología. La Gaceta 131; 2006: 1–24 (https://www.imprentanacional.go.cr) Presidencia de la República, Ministerio de Salud. DECRETO No 33650-S: Manual de Normas y rocedimientos de Atención Integral a la Mujer para la Prevención y Manejo del Cáncer de Cuello de Útero, para el I y II Nivel de Atención y Normas de Laboratorios de Citología. Costa Rica, 2007 La Gaceta 171 (https://extranet.who.int/ncdccs/Data/CRI_B5_COR_Poli%cc%81tica_CA_cuellouterino.pdf)
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Dominica	Yes	Pan American Health Organization. Situational Analysis of Cervical Cancer Prevention and Control in the Caribbean. 2013 dic. (https://www.paho.org/) Luciani S, et al. Cancer Prevention and Control in the Caribbean. Cancer Control. 2017;53–61.
Dominican Republic	Yes	Secretaría de Estado de Salud Pública y Asistencia Social. Guías Para el Manejo de las Neoplasias de Cérvix. [Internet]. Santo Domingo, República Dominicana; 2010 (https://extranet.who.int/ncdccs/Data/DOM_D1_Gu%C3%ADa%20Manejo%20%20de%20la%20Neoplasias.pdf)
Ecuador		Ministerio de Salud Pública. Estrategia Nacional para la Atención Integral del Cáncer en el Ecuador, 2017 (https://www.salud.gob.ec/)
El Salvador	Yes	Gobierno de El Salvador., Ministerio de Salud. Lineamientos técnicos para la prevención y control del cáncer cérvico uterino y de mama 2015 (http://www.salud.gob.sv/)
Greenland	Yes	Holst S, et al. Cervical cancer screening in Greenland, 1997-2011: Screening coverage and trends in the incidence of high-grade cervical lesions. Gynecol Oncol. 2016 Nov;143(2):307-312.
Grenada	Yes	Pan American Health Organization. Situational Analysis of Cervical Cancer Prevention and Control in the Caribbean 2013 dic (https://www.paho.org/) Luciani S,et al. Cancer Prevention and Control in the Caribbean. Cancer Control. 2017;53–61.
Guatemala	Yes	Ministerio de Salud Pública y Asistencia Social. Gobierno de Guatemala. Guia de atención Integral para la prevención, detección y tratamiento de lesiones precursoras del Cáncer Cervico Uterino. Guatemala 2020. (https://www.isdmguatemala.org/)
Guyana	Yes	Ministry of Health. Guyana Strategic Plan for the Integrated Prevention and Control of Chronic Non-communicable diseases and their risk factors 2013-2020 (https://www.paho.org/) Biblioteca Médica Nacional. Guyana Cervical Cancer prevention (https://www.mchip.net/)
Haiti	Yes	WHO Country Capacity Survey 2019. WHO Global Health Observatory (https://www.who.int/data/gho)
Honduras	Yes	Gobierno de la República de Honduras, Secretaría de Salud. Protocolo para el tamizaje y tratamiento de lesiones premalignas para la prevención del cáncer cervicouterino, 2015 (https://www.iccp-portal.org/)
Jamaica	Yes	Ministry of Health. National Guidelines for Cervical Cancer Prevention and Control Jamaica; 2011 (https://extranet.who.int/ncdccs/Data/JAM_D1_JAM-Cervical-Cancer-guidelines.pdf)

Mexico	Yes	Gobierno de México. Programa prevención y control del cáncer de la mujer, 2015. (https://www.gob.mx/salud)
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Nicaragua	Yes	Ministerio de Salud. Protocolo de prevención del cáncer cérvico uterino a través del tamizaje con inspección visual con ácido acético (IVVA) y tratamiento con crioterapia-Normativa – 037. Nicaragua, 2010 (http://www.minsa.gob.ni)
		Pan American Health Organization. Cervical Cancer Prevention and Control Programmes: A rapid assesment in 12 countries of Latin America, 2010 (https://www.paho.org/)
Panama	Yes	República de Panamá, Ministerio de Salud, Coordinación Nacional de Salud Sexual y Reproductiva. Normas de prevención, detección y seguimiento de las lesiones preinvasoras del cuello uterino y guías de manejo. Panamá, 2017 (http://www.minsa.gob.pa)
Paraguay	Yes	República del Paraguay. Manual Nacional de Normas y Procedimientos para la prevención y el control del cáncer del tracto genital inferior femenino, 2015 (http://portal.mspbs.gov.py/https://www.mspbs.gov.py/index.php)
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Peru	Yes	Resolución Ministerial N° 576-2019/MINSA para aprobar la Directiva Sanitaria Nº 085-MINSA/2019/DGIESP "Directiva Sanitaria para la prevención del cáncer de cuello uterino mediante la detección temprana y tratamiento de lesiones pre malignas incluyendo carcinoma in situ (https://www.gob.pe)
		National guideline based on the ministerial resolution N° 1013-2016/MINSA
		Dirección General de Intervenciones Estratégicas en Salud Pública, Ministerio de Salud, Perú. Guía de Práctica Clínica para la Prevención y Manejo del Cáncer de Cuello Uterino, 2017 (http://bibliotecavirtual.insnsb.gob.pe/)
Puerto Rico	Yes	Programa de Prevención y Detección Temprana de Cáncer de Mama y Cuello Uterino de Puerto Rico (PRBCCEDP)
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St Kitts & Nevis	Yes	Luciani S,et al. Cancer Prevention and Control in the Caribbean. Cancer Control. 2017;53–61.
St. Lucia	Yes	Luciani S,et al. Cancer Prevention and Control in the Caribbean. Cancer Control. 2017;53–61.
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Suriname	No	
Trinidad & Tobago	Yes	Ministry of Health. Trinidad & Tobago. Women Health (https://sites.google.com/health.gov.tt/womenshealth)
United States of America	Yes	US Preventive Services Task Force, Curry SJ,et al. Screening for Cervical Cancer: US Preventive Services Task Force Recommendation Statement. JAMA. 2018 Aug 21;320(7):674-686.
Urugay	Yes	Ministerio de Salud Pública. Guía de Práctica Clínica de Tamizaje de Cáncer de Cuello de Útero. Uruguay, 2014 (https://www.gub.uy/)
Venezuela	Yes	Murillo R, et al. Cervical cancer in Central and South America: Burden of disease and status of disease control. Cancer Epidemiol 2016;44 (1): S121–30.
OCEANIA		
American Samoa	Yes	Senkomago V, et al. Cancer Epidemiol. 2017 October ; 50(Pt B): 260–267.
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Cook Islands	Yes	Cook Islands. National health Information Bulletin (https://www.health.gov.ck/)
Fiji	Yes	Fiji develops comprehensive screening policy to fight cancer. Xinhua, May 8, 2015 (http://www.china.org.cn)
French Polynesia	Yes	Journal Officiel de la Polynesie Française. 3310 NS. 13 Juin 2019. Loi du Pays nº 2019-17 APF du 13 de Juin 2019 portant modification de la délibération nº 2003-173 APF du 6 novembre 2003 instituant un dépistage gratuit des cancers gynécologiques.
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Kiribati	Yes	WHO Country Capacity Survey 2019. WHO Global Health Observatory (https://www.who.int/data/gho)
Marshall Islands	Yes	Townsend JS, et al. Current cervical cancer screening knowledge, awareness, and practices among U.S. affiliated pacific island providers: opportunities and challenges. Oncologist. 2014 Apr;19(4):383-93. Ministry of Health & Human Services. Republic of Marshall Islands. National Comprehensive Cancer Control Plan 2017-2022 (https://ftp.cdc.gov/pub/Publications/Cancer/ccc/marshall_islands_ccc_plan-508.pdf)
Nauru	No	
New Zealand	Yes	National Cervical Screening Programme (NCSP), National Screening Unit, Ministry of Health, New Zealand (https://www.nsu.govt.nz)
Niue	No	
Palau	Yes	Tutii IM, et al. Breast and Cervical Cancer Screening in Palau: Have We Improved Early Detection and Survival? Hawaii J Med Public Health. 2017 Dec; 76(12): 337–343. CDC. National Breast and Cervical Cancer Early Detection Programme (NBCCEDP) (http://www.cdc.gov)
Papua New Guinea	No	
Samoa	No	
Solomon Islands	No	
Tokelau	No	
Tonga	No	
Tuvalu	No	
Vanuatu	Yes	WHO Country Capacity Survey 2019. WHO Global Health Observatory (https://www.who.int/data/gho)
ASIA		
Afghanistan	No	
Armenia	Yes	World Health Organization. The European Magazine for Sexual and Reproductive Health, 2007: 64. Avagyan G, Abrahamyan R. Implementation of the national programme on diagnoses, treatment and prevention of cervical cancer in Armenia, 2006-2015. Non Communicable Disease Strategy and Action Plan 2016-2020, Goverment of the Republic of Armenia. Article 81 of Appendix 1 to the Decision N 111-N of January 15, 2015 World Health Organization (WHO). Health System Performance Assessment, Armenia, 2007
Azerbaijan	No	
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Brunei	Yes	Ministry of Health Brunei Darussalam. National Health Screening Guideline on Noncommunicable Diseases (NCDs). November 2019 Edition (http://www.moh.gov.bn/)
Cambodia	Yes	WHO Country Capacity Survey 2019. WHO Global Health Observatory (https://www.who.int/data/gho)
China	Yes	Personal communication (*)
Georgia	Yes	Levan J. Cervical Cancer Screening in Georgia. Eurasian Cancer Screening Conference. Minsk, Belarus. May 2018. [Oral Presentation-personal communication]. UNFPA Standard Progress Report 2014. GEO2U202 Support to Breast and Cervical Cancer Prevention
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Hong Kong SAR	Yes	Personal communication WHO country consultation (*)

India	Yes	Ministry of Health and Welfare, India. Training Module for Medical Officers for Prevention, Control and Population Level Screening of Hypertension, Diabetes and Common Cancer (Oral, Breast & Cervical) (2017) (http://nhsrcindia.org/) Baggchi S. India Launches Plan for Cervical Cancer Screening. BMJ 2016;355:i5574
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Iraq	No	
Israel	Yes	Israel cancer association. Early detection: Cervical cancer (http://en.cancer.org.il)
Japan	Yes	Hamashima C, et al. The Japanese guideline for cervical cancer screening. Jpn J Clin Oncol. 2010 Jun;40(6):485-502. Sauvaget C, et al. Challenges in breast and cervical cancer control in Japan. Lancet Oncol. 2016 Jul;17(7):e305-e312. National Cancer Center, Tokio. Cervical Cancer Screening (https://ganjoho.jp)
Jordan	No	
Kazakhstan	Yes	Kaidarova D. Cervical Cancer Screening in Kazakhstan. Eurasian Cancer Screening Conference. Minsk, Belarus. May 2018. [Oral Presentation-personal communication]. Order of the Minister of Health of the Republic of Kazakhstan of December 25th, 2017 No. 995. Amendments to the Order of the Minister of Health of the Republic Kazakhstan of November 10th, 2009 No 685 "On approval of the Rules for preventive medical examinations of target populations" ["Об утверждении Правил проведения профилактических медицинских осмотров целевых групп населения"] (http://adilet.zan.kz)
Kuwait	No	
Kyrgyzstan	No	
Laos	No	
Lebanon	No	
Malaysia	Yes	Personal communication WHO country consultation (*)
Maldives	Yes	Practical and Cost-effective Screening for Cervical Cancer using VIA Launched in Maldives 23 January 2014 (https://maldives.unfpa.org) National cervical cancer screening plan 2016 (http://www.health.gov.mv)
Mongolia	Yes	World Health Organization (WHO). Saving women's lives in Mongolia through cancer screening (2014) (https://www.who.int)
Myanmar	Yes	Personal communication WHO country consultation
Nepal	Yes	National Guideline for Cervical Cancer Screening and Prevention in Nepal. Department of Health Services, Kathmandu: Government of Nepal; 2010 Public Health Perspective, Nepal. Annual Report of the Department of Health Services 2073/74 (2016/2017) (https://phpnepal.org.np/)
Oman	No	
Pakistan	No	
Palestine	No	
Philippines	Yes	Republic of Philippines. Department of Health. Office of the secretaty (2015). DM2015-0120 Guidelines on free cervical cancer screening in DOH Hospitals (https://www.doh.gov.ph)
Qatar	Yes	Personal communication WHO country consultation (*)
Republic of Korea	Yes	National Cancer Center 2018. Goyang-si Gyeonggi-do, Republic of Korea. Cancer Screening Programme (https://www.ncc.re.kr)
Saudi Arabia	No	
Singapore	Yes	CervicalScreen Singapore. Management Guidelines for Cervical Screening & Preinvasive Disease of the Cervix. February 2019 (https://www.sccps.org)

Sri Lanka	Yes	Family Health Bureau. Ministry of Health Nutrition and Indigenous Medicine. Annual Reports (https://fhb.health.gov.lk) Family Health Bureau. Ministry of Health Nutrition and Indigenous Medicine. Revised Guidelines for the Implementation of Well Women Services - for women of Reproductive and Pot reproductive Age (7th february 2018). Annual Reports (https://fhb.health.gov.lk) Family Health Bureau. Ministry of Health Nutrition and Indigenous Medicine. National Strategic Plan 2019-2023. Well Woman Programme (https://fhb.health.gov.lk)
Syria	Yes	WHO Country Capacity Survey 2019. WHO Global Health Observatory (https://www.who.int/data/gho)
Tajikistan	No	
Thailand	Yes	Personal communication WHO country consultation (*)
Timor-Leste	Yes	WHO Country Capacity Survey 2019. WHO Global Health Observatory (https://www.who.int/data/gho)
Turkey	Yes	Gultekin M, et al. Initial results of population based cervical cancer screening programme using HPV testing in one million Turkish women. Int J Cancer. 2018 May 1;142(9):1952-1958. National Standards for Cervical Cancer Screening Programme, turkey (https://hsgm.saglik.gov.tr)
Turkmenistan	Yes	Order of the Minister of Health and Medical Industry of Turkmenistan, 2018. Procedures for conducting clinical examination (dispensary) of citizens ["Порядок проведения диспансерного наблюдения (диспансеризации) граждан"] (http://www.saglykhm.gov.tm)
United Arab Emirates	Yes	Department of Health- Abu Dhabi, UAE. Cancer in Abu Dhabi-Cancer Programmes-Cervical Cancer Prevention and Screening Programmes. Live Healthy and Simply Check(https://www.doh.gov.ae/) Standard for the Cervical Cancer Screening Programme. Department of Health-Abu Dhabi, UAE; 2018 (https://www.doh.gov.ae/)
Uzbekistan	No	
Viet Nam	Yes	Ministry of Health. Socialist Republic of Vietnam. Technical Guidelines on Screening and Treatment of Precancerous Lesions for Cervical Cancer Secondary Prevention (Promulgated by Ministerial Decision Nr.: 1476 /QD-BYT on May 16th, 2011). Vietnam Ministry of Health. Joint annual HealtH review 2014 - Strengthening prevention and control of non-communicable disease. Hanoi, March 2015
Yemen	No	

(*) Contact: https://hpvcentre.net/contactus.php

Tables S3.1 and S3.2. Coverage datapoints available by age and screening interval.

Of the 164 countries for which coverage data was available, most had data for the previous year, the previous three years, and/or ever in lifetime (46%, 48%, and 74% respectively). Coverage was available for at least one of the five screening intervals for a combination of 7 324 / 10 302 (71%) single age datapoints (Table S3.1). For the 30–49 age group, data completeness was higher with 3 260 / 4 040 (81%) datapoints available (Table S3.2).

Table S3.1. Number and percentage of single ages with coverage datapoints, and number of countries with and without coverage data by screening interval, among women aged 20 to 70 years.

	Screening interval					Total combined *
	Previous year	Previous two years	Previous three years	Previous five years	Ever in lifetime	
N of single ages with coverage datapoint	3 239	1 110	3 451	1 580	5 472	**7 324**
% of single ages with coverage datapoint	31%	11%	33%	15%	53%	**71%**
N of countries with at least one datapoint	76	26	79	37	122	**164**
N of countries without data	126	176	123	165	80	**38**

* Combination of at least one datapoint for any of the screening intervals.

Table S3.2. Number and percentage of single ages with coverage datapoints, and number of countries with and without coverage data by screening interval, among women aged 30 to 49 years.

	Screening interval					Total combined *
	Previous year	Previous two years	Previous three years	Previous five years	Ever in lifetime	
N of single ages with coverage datapoint	1 500	515	1 570	700	2 430	**3 260**
% of single ages with coverage datapoint	37%	13%	39%	17%	60%	**81%**
N of countries with at least one datapoint	76	26	79	35	122	**164**
N of countries without data	126	176	123	167	80	**38**

* Combination of at least one datapoint for any of the screening intervals.

Table S4. Stepwise algorithm to impute missing coverage data for each single age.

Order	Criteria	Example	N single ages [1]	N data points [2]	N countries
Step 0	Original coverage data	-	7324	14 852	164

Countries with at least one coverage datapoint

Order	Criteria	N single ages [1]	N data points [2]	N countries
Step 1	Modification of aggregated and out-of-recommendations coverage	336	625	10

ISO	Age	1y	2y	3y	5y	ever
BEL	39	46.4	54.4	80.0	-	7.9
BEL	40	44.1	51.7	76.0	-	93.0

Order	Criteria	N single ages [1]	N data points [2]	N countries
Step 2	Linear interpolation among screening intervals	3606	4669	84

ISO	Age	1y	2y	3y	5y	ever
BGR	34	29.3	43.5	57.6	60.5	63.5
BGR	35	26.7	45.0	63.3	67.9	72.6

Order	Criteria	N single ages [1]	N data points [2]	N countries
Step 3a	Predictive Mean Matching Method	7324	17 099	164

ISO	Age	1y	2y	3y	5y	ever
ECU	39	16.7	27.1	34.1	41.7	68.0
ECU	40	20.7	37.1	49.7	59.0	72.7

Order	Criteria	N single ages [1]	N data points [2]	N countries
Step 5	Verification of coverage's rule and if not followed, reorder of coverage data and linear interpolation among screening intervals	116 154 (include 40 imp.)	-	88

ISO	Age	1y	2y	3y	5y	ever
AND	30	61.4	80.0	79.0	84.3	80.5
AND	30	61.4	→[original data]			
AND	30	61.4	[maximum] →			84.3
AND	30	61.4	67.1	72.9	78.6	84.3

Order	Criteria	N single ages [1]	N data points [2]	N countries
Step 3b	Last observation carried forward / Next observation carried backward	11 680 (include 40 imp.)	58 400 (include 40 imp.)	85

ISO	Age	1y	2y	3y	5y	ever
SLV	49	44.6	68.6	78.1	87.6	97.1
SLV	50	44.6	68.6	78.1	87.6	97.1

Order	Criteria	N single ages [1]	N data points [2]	N countries
Step 3c	Calculation of a ponderation rate from countries with same income and ages included in the screening recommendations	29 920 (include 40 imp.)	149 600 (include 40 imp.)	56

ISO	Age	1y	2y	3y	5y	ever
CUB	64	48.1	67.1	75.6	82.3	87.1
CUB	65	32.9	45.3	50.0	60.5	70.5

Order	Criteria	N single ages [1]	N data points [2]	N countries
Step 5	Verification of coverage's rule and if not followed, reorder of coverage data and	3544 (include 40 imp.)	-	28

ISO	Age	1y	2y	3y	5y	ever

		ISO	Age	Coverage 1y	2y	3y	5y	ever			
linear interpolation among screening intervals		LSO	65	10.1	7.7	10.5	14.0	18.0			
		LSO	65	7.7	→ [minimum]						
		LSO	65	7.7		[maximum] →		18.0			
		LSO	65	7.7	10.3	12.9	15.5	13.8			

Countries without coverage datapoints

Step		ISO	Age	Coverage 1y	2y	3y	5y	ever			
Step 4	Predictive Mean Matching Method	GMB	45	6.4	8.8	5.8	0.5	15.2	1938	9690	38
		GMB	46	7.4	14.9	5.0	0.5	6.0			
Step 5	Verification of coverage's rule and if not followed, reorder of coverage data and linear interpolation among screening intervals	RWA	20	0.4	1.8	0.2	2.3	2.6	61 814 (include 40 imp.)	-	34
		RWA	20	0.2	→ [minimum]						
		RWA	20	0.2		[maximum] →		2.6			
		RWA	20	0.2	0.8	1.4	2.0	2.6			

Estimates with white background in the table are original data. Coloured estimates in blue, red, pink, orange and purple are imputed. Coloured estimates in grey are modified because coverage's rule was not followed. [1] N single ages included single ages with at least one coverage datapoint; [2] N data points included the single ages for the five screening intervals (previous year, previous two years, previous three years, previous five years, ever in lifetime); imp: imputations.

Table S5. Impact of the imputation algorithm in the estimations.

We evaluated the impact of the algorithm in the coverage estimates. In the table below we presented the number of targeted and screened women (in the previous year, three years, five years, ever in lifetime), and the percentage of datapoints obtained originally and imputed in each step, worldwide and by income level.

| | Number (in Millions) | % of Original data | Imputation algorithm | | | | Countries without coverage datapoints |
| | | | Countries with at least one coverage datapoint | | | | |
			Lineal interpolation (S1)	Predictive Mean Matching (S3a)	LOCF/ NOCB (S3b)	Ponderation rate (S3c)	Predictive Mean Matching (S4)
World							
Targeted women (30-49y)	1 032 M						
Screened women in the previous year (30-49y)	160 M	**47%**	0%	**51%**	0%	0%	2%
Screened women in the previous three years (30-49y)	292 M	**70%**	4%	**23%**	0%	0%	3%
Screened women in the previous five years (30-49y)	330 M	28%	**39%**	**30%**	0%	0%	3%
Screened women ever in lifetime (30-49y)	370 M	**63%**	0%	**34%**	0%	0%	3%
High-income							
Targeted women (30-49y)	158 M						
Screened women in the previous year (30-49y)	67 M	**73%**	0%	**27%**	0%	0%	0%
Screened women in the previous 3 years (30-49y)	111 M	**81%**	6%	**13%**	0%	0%	0%
Screened women in the previous 5 years (30-49y)	121 M	**51%**	29%	20%	0%	0%	0%
Screened women ever in lifetime (30-49y)	133 M	**72%**	0%	**28%**	0%	0%	0%
Upper middle-income							
Targeted women (30-49y)	404 M						
Screened women in the previous year (30-49y)	76 M	26%	0%	**72%**	0%	0%	2%
Screened women in the previous 3 years (30-49y)	152 M	**72%**	1%	**26%**	0%	0%	1%
Screened women in the previous 5 years (30-49y)	173 M	13%	**52%**	**34%**	0%	0%	1%
Screened women ever in lifetime (30-49y)	194 M	**59%**	0%	**39%**	0%	0%	2%
Lower middle-income							
Targeted women (30-49y)	397 M						
Screened women in the previous year (30-49y)	15 M	**44%**	0%	**52%**	0%	0%	4%

Screened women in the previous 3 years (30-49y)	25 M	**26%**	10%	**54%**	0%	0%	10%
Screened women in the previous 5 years (30-49y)	30 M	**21%**	10%	**58%**	0%	0%	11%
Screened women ever in lifetime (30-49y)	34 M	**54%**	0%	**34%**	0%	0%	12%
Low-income							
Targeted women (30-49y)	74 M						
Screened women in the previous year (30-49y)	1,9 M	13%	0%	**23%**	0%	1%	**63%**
Screened women in the previous 3 years (30-49y)	4,9 M	12%	5%	**16%**	0%	0%	**67%**
Screened women in the previous 5 years (30-49y)	6,5 M	13%	1%	**20%**	0%	0%	**66%**
Screened women ever in lifetime (30-49y)	8,2 M	**26%**	0%	9%	0%	0%	**65%**

M: Million. LOCF/NOCB: Last observation carried forward / next observation carried backward.

Table S6. Sensitivity analysis of screening coverage estimates for women aged 30-49 years under different scenarios of age.

	In the previous year Coverage (%)			In the previous three years Coverage (%)			In the previous five years Coverage (%)			Ever in lifetime Coverage (%)		
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3
World	**15%**	**15%**	**15%**	**28%**	**28%**	**28%**	**31%**	**32%**	**32%**	**35%**	**35%**	**36%**
Income												
High-Income	42%	42%	41%	70%	70%	70%	76%	76%	77%	83%	84%	84%
Low And Middle-Income	10%	10%	10%	20%	20%	20%	23%	23%	23%	27%	27%	27%
Upper Middle-Income	18%	18%	18%	37%	37%	37%	42%	42%	42%	48%	48%	48%
Lower Middle-Income	3%	3%	3%	6%	6%	6%	7%	7%	7%	8%	8%	8%
Low-Income	2%	2%	3%	6%	6%	7%	8%	9%	9%	11%	11%	12%
SDG Regions and Subregions												
Sub-Saharan Africa	**3%**	**4%**	**4%**	**8%**	**8%**	**9%**	**11%**	**11%**	**11%**	**14%**	**14%**	**14%**
Eastern Africa	2%	2%	3%	6%	6%	6%	8%	8%	9%	10%	11%	11%
Middle Africa	2%	2%	2%	7%	7%	7%	9%	9%	9%	12%	12%	11%
Southern Africa	21%	24%	23%	33%	33%	33%	42%	42%	42%	50%	50%	50%
Western Africa	2%	2%	2%	6%	6%	6%	8%	9%	8%	11%	11%	10%
Northern Africa & Western Asia	**8%**	**8%**	**7%**	**17%**	**17%**	**16%**	**24%**	**24%**	**23%**	**28%**	**28%**	**28%**
Northern Africa	4%	4%	4%	7%	7%	7%	8%	8%	8%	8%	8%	8%
Western Asia	11%	11%	10%	25%	25%	24%	38%	38%	37%	44%	45%	45%
Central & Southern Asia	**3%**	**3%**	**3%**	**5%**	**5%**	**5%**	**6%**	**6%**	**6%**	**7%**	**7%**	**7%**
Central Asia	7%	8%	8%	18%	19%	18%	29%	29%	29%	33%	33%	34%
Southern Asia	3%	3%	3%	4%	4%	4%	5%	5%	5%	6%	6%	5%
Eastern & South-Eastern Asia	**12%**	**12%**	**12%**	**26%**	**26%**	**27%**	**29%**	**29%**	**29%**	**32%**	**32%**	**32%**
Eastern Asia	15%	15%	14%	31%	31%	31%	33%	33%	33%	35%	35%	36%
South-Eastern Asia	6%	6%	7%	14%	14%	14%	19%	19%	19%	22%	22%	23%
Latin America & Caribbean	**29%**	**29%**	**29%**	**54%**	**54%**	**55%**	**61%**	**61%**	**62%**	**73%**	**74%**	**75%**
Caribbean	35%	35%	35%	58%	58%	58%	64%	64%	64%	69%	69%	69%
Central America	38%	38%	38%	66%	67%	70%	75%	77%	79%	85%	87%	88%
South America	25%	25%	24%	48%	49%	49%	55%	55%	56%	68%	70%	70%
Oceania (Excl. AUS/NZL)	**2%**	**1%**	**1%**	**6%**	**5%**	**5%**	**8%**	**7%**	**8%**	**10%**	**10%**	**12%**
Melanesia	1%	0%	0%	3%	3%	3%	5%	5%	5%	7%	7%	9%
Micronesia	12%	12%	11%	21%	21%	20%	24%	24%	24%	29%	29%	29%
Polynesia	13%	13%	12%	34%	34%	35%	43%	42%	42%	51%	50%	51%
Australia & New Zealand	**26%**	**26%**	**26%**	**71%**	**71%**	**71%**	**84%**	**85%**	**86%**	**95%**	**96%**	**96%**
Europe & Northern America	**43%**	**43%**	**43%**	**73%**	**73%**	**73%**	**81%**	**81%**	**81%**	**88%**	**88%**	**88%**
Eastern Europe	39%	39%	39%	69%	69%	69%	77%	77%	77%	85%	84%	85%
Northern Europe	34%	34%	36%	69%	69%	69%	80%	80%	80%	91%	91%	88%
Southern Europe	43%	44%	42%	75%	75%	75%	82%	82%	82%	89%	88%	88%
Western Europe	51%	51%	50%	76%	76%	76%	84%	84%	84%	94%	94%	94%
Northern America	47%	47%	47%	77%	77%	77%	82%	82%	82%	88%	88%	88%

S: Scenario; SDG: Sustainable Development Goals. Scenario 1 includes data between ages 20 to 70 years. Scenario 2 includes data between ages 25 to 65 years. Scenario 3 includes data between ages 30 to 49 years.

Figure S6.1. Screening coverage estimates for women aged 30-49 years under different scenarios of age, worldwide and by income level.
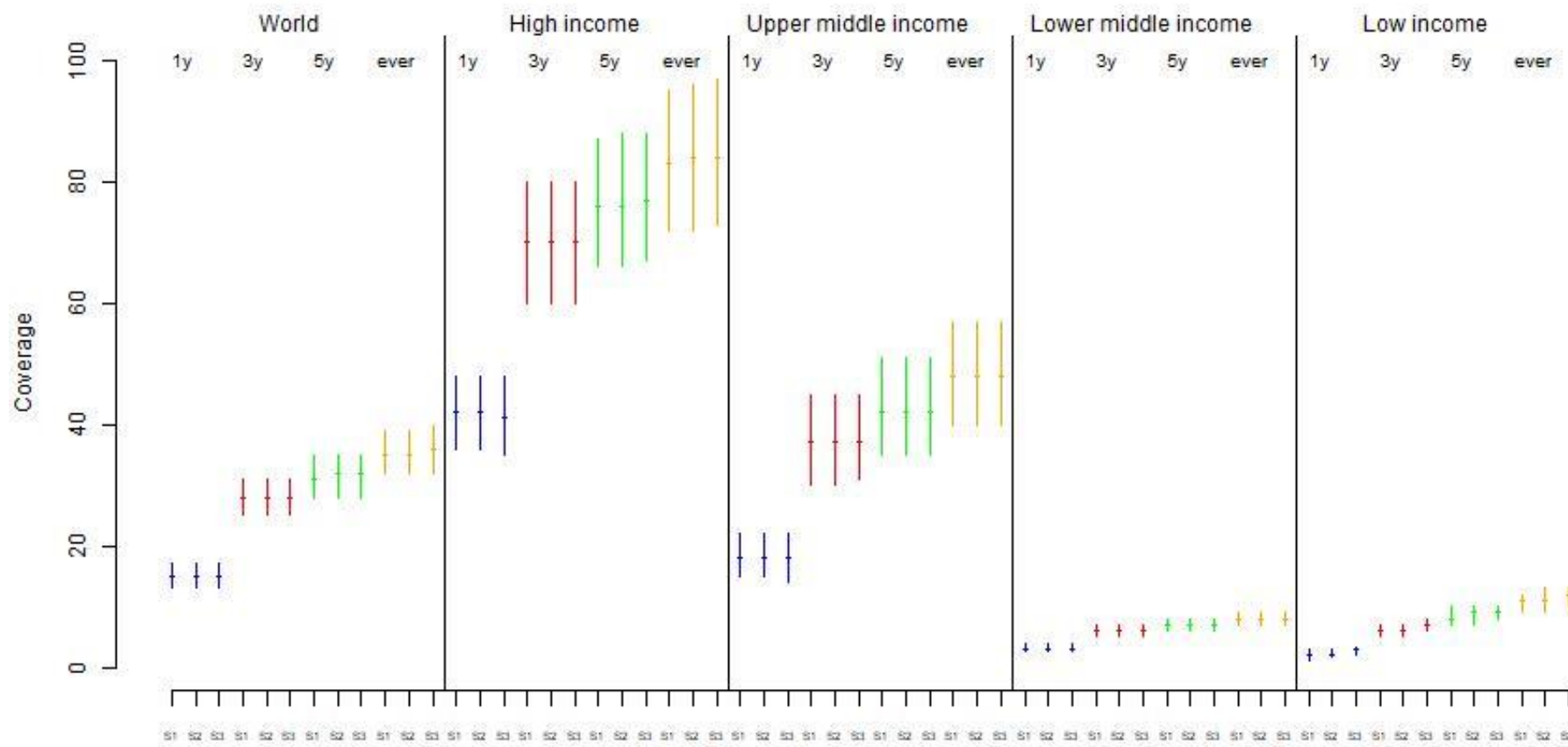
S1: Scenario 1; S2: Scenario 2; S3: Scenario 3.

Table S7. Sensitivity analysis of the screening coverage estimates for women aged 30-49 years under different scenarios of income and region.

	In the previous year Coverage (%)		In the previous three years Coverage (%)		In the previous five years Coverage (%)		Ever in lifetime Coverage (%)	
	S1	**S2**	**S1**	**S2**	**S1**	**S2**	**S1**	**S2**
Income								
High-Income	42%	42%	70%	70%	76%	76%	83%	83%
Low And Middle-Income	10%	9%	20%	20%	23%	23%	27%	26%
Upper Middle-Income	18%	11%	37%	37%	42%	42%	48%	47%
Lower Middle-Income	3%	3%	6%	6%	7%	8%	8%	10%
Low Income	2%	0%	6%	3%	8%	5%	11%	8%
SDG Regions								
Sub-Saharan Africa	3%	1%	8%	10%	11%	13%	14%	17%
Northern Africa & Western Asia	8%	7%	17%	18%	24%	25%	28%	27%
Central & Southern Asia £	3%	1%	5%	4%	6%	5%	7%	6%
Eastern & South-Eastern Asia	12%	17%	26%	27%	29%	29%	32%	31%
Latin America & Caribbean	29%	29%	54%	52%	61%	59%	73%	72%
Oceania (Excl. AUS/NZL)	2%	5%	6%	7%	8%	9%	10%	11%
Australia & New Zealand €	26%	27%	71%	68%	84%	82%	95%	95%
Europe & Northern America ¥	43%	43%	73%	74%	81%	81%	88%	89%

S: Scenario; SDG: Sustainable Development Goals.

Scenario 1 includes data among all regions. Scenario 2 includes, for each row in the table, data for countries corresponding to each income level or SGD region.

£ Imputations for screening coverage intervals in the previous 3 and 5 years in Steps 3a and 4 (PMM Method) could not be estimated because of collinearity. Linear interpolation was used. € Imputations for screening coverage interval at once in lifetime could not be estimated in Steps 3a and 4 (PMM Method) because only 2 countries are included. Imputations of the final analysis were used. ¥ Imputations for Albania (ages 20-39 years) could not be estimated in Step 3c because no countries with similar characteristics were included. Imputations of the final analysis were used.

Figure S7.1. Screening coverage estimates for women aged 30-49 years under different scenarios of income level.

S1: Scenario 1; S2: Scenario 2.

Figure S7.2. Screening coverage estimates for women aged 30-49 years under different scenarios of SDG regions.
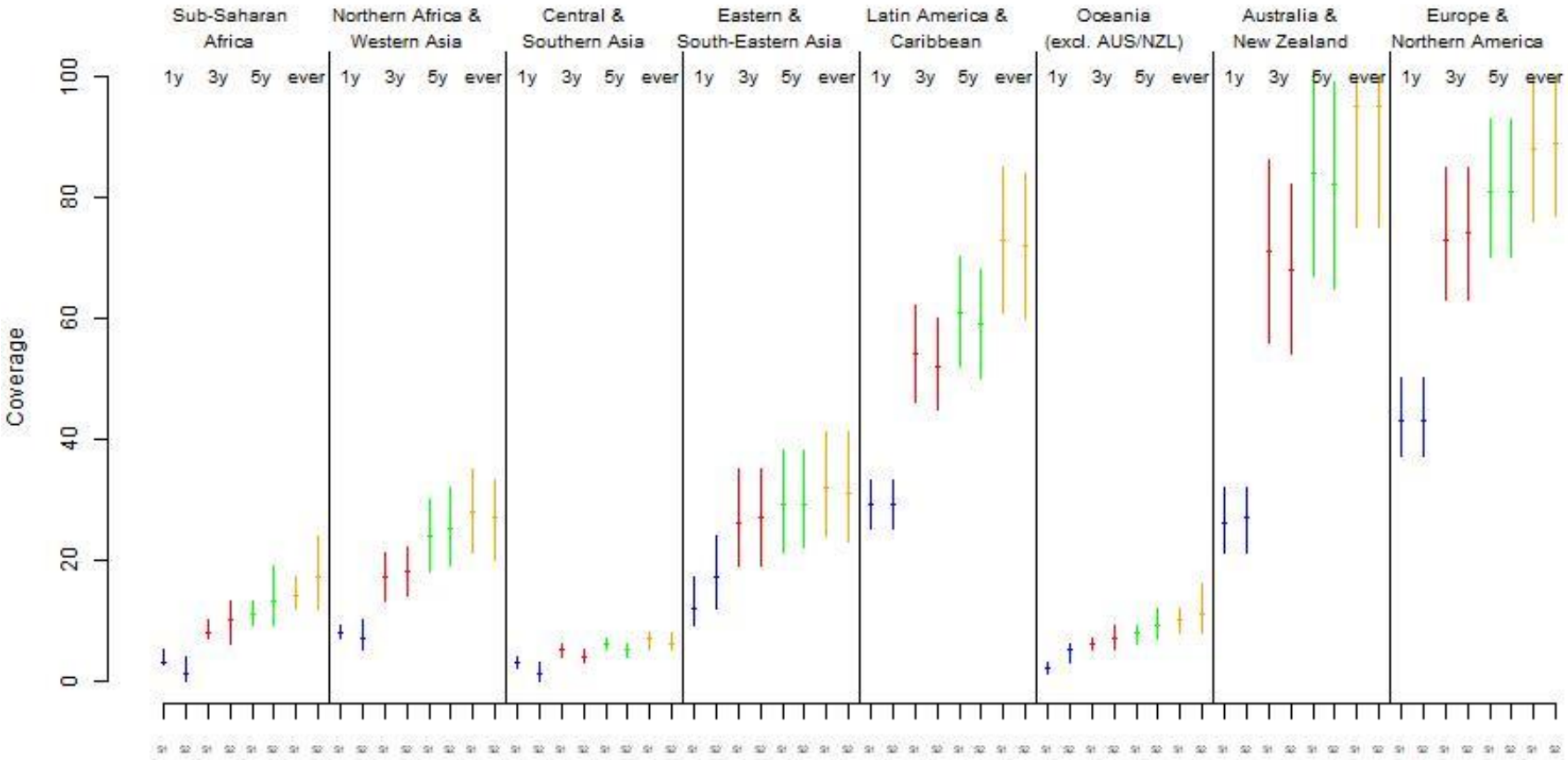
S1: Scenario 1; S2: Scenario 2.

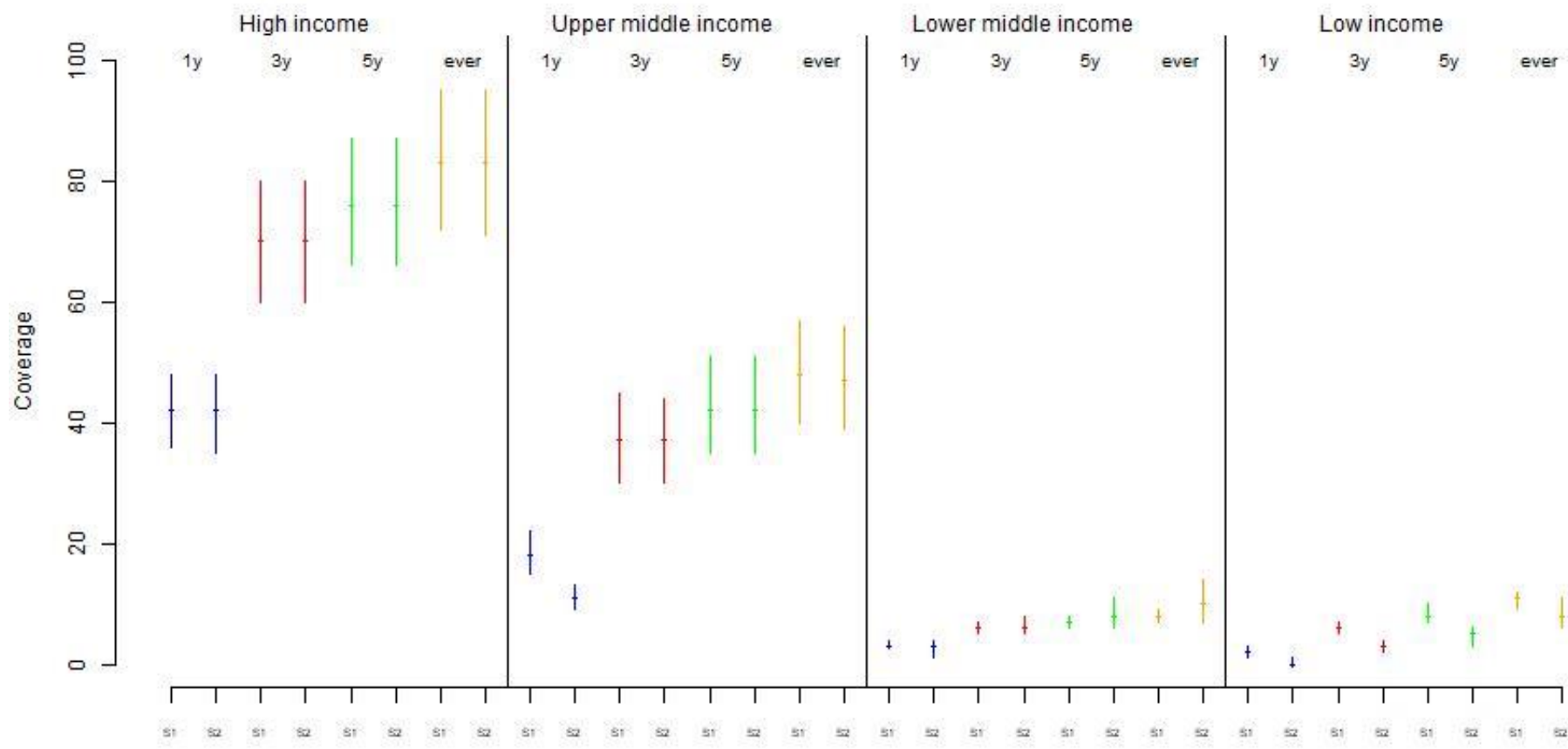**Table S8. Sensitivity analysis of screening coverage estimates for women aged 30-49 years under different missing imputation algorithms.**

Legend of scenarios under different missing imputation algorithms:

Steps	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Countries with data					
Step 1: Modification of aggregated data	X	Aggregated data	X	X	X
Step 2: Linear interpolation	X	X	PMM (with step 3a)	X	X
Step 3a: PMM	X	X	X	X	X
Step 3b: Assignation	X	X	X	PMM (with step 3a)	X
Step 3c: Ponderation	X	X	X	X	New PMM (after step 3b)
Countries without data					
Step 4: PMM	X	X	X	X	X

PMM: Predictive Mean Matching.

	In the previous year Coverage (%)					In the previous three years Coverage (%)					In the previous five years Coverage (%)					Ever in lifetime Coverage (%)				
	S1	S2	S3	S4	S5	S1	S2	S3	S4	S5	S1	S2	S3	S4	S5	S1	S2	S3	S4	S5
World	**15%**	15%	15%	15%	15%	**28%**	28%	28%	28%	28%	**31%**	31%	32%	31%	31%	**35%**	35%	36%	35%	35%
Income																				
High-Income	42%	42%	42%	42%	42%	70%	70%	70%	70%	70%	76%	76%	77%	76%	76%	83%	83%	84%	83%	83%
Low And Middle-Income	10%	10%	10%	10%	10%	20%	20%	21%	20%	20%	23%	23%	24%	23%	23%	27%	27%	27%	27%	27%
Upper Middle-Income	18%	19%	18%	18%	18%	37%	37%	37%	37%	37%	42%	42%	43%	42%	42%	48%	47%	47%	48%	48%
Lower Middle-Income	3%	3%	3%	3%	3%	6%	6%	6%	6%	6%	7%	7%	8%	7%	7%	8%	8%	9%	8%	8%
Low-Income	2%	2%	2%	2%	2%	6%	6%	8%	6%	6%	8%	8%	11%	8%	9%	11%	11%	15%	11%	11%
SDG Regions and Subregions																				
Sub-Saharan Africa	**3%**	**4%**	**3%**	**4%**	**3%**	**8%**	**8%**	**11**%	**8%**	**8%**	**11%**	**11%**	**15%**	**11%**	**11%**	**14%**	**14%**	**19**%	**14%**	**14%**
Eastern Africa	2%	2%	1%	2%	2%	6%	5%	6%	6%	6%	8%	8%	9%	8%	8%	10%	10%	12%	10%	10%
Middle Africa	2%	2%	1%	2%	2%	7%	7%	7%	7%	7%	9%	10%	10%	9%	9%	12%	13%	12%	12%	12%
Southern Africa	21%	25%	21%	22%	21%	33%	33%	33%	33%	33%	42%	42%	42%	42%	42%	50%	50%	50%	50%	50%
Western Africa	2%	2%	2%	2%	2%	6%	6%	12%	6%	6%	8%	8%	17%	8%	8%	11%	11%	23%	11%	11%
Northern Africa & Western Asia	**8%**	**8%**	**7%**	**8%**	**8%**	**17%**	**16%**	**16%**	**17%**	**17%**	**24%**	**23%**	**24%**	**24%**	**24%**	**28%**	**27%**	**25%**	**28%**	**28%**
Northern Africa	4%	4%	4%	4%	4%	7%	7%	7%	7%	7%	8%	8%	8%	8%	8%	8%	8%	9%	8%	8%
Western Asia	11%	10%	10%	11%	11%	25%	24%	24%	25%	25%	38%	36%	37%	38%	38%	44%	43%	40%	44%	44%
Central & Southern Asia	**3%**	**3%**	**3%**	**3%**	**3%**	**5%**	**5%**	**5%**	**5%**	**5%**	**6%**	**6%**	**6%**	**6%**	**6%**	**7%**	**7%**	**7%**	**7%**	**7%**
Central Asia	7%	7%	5%	8%	7%	18%	18%	17%	18%	18%	29%	28%	28%	29%	29%	33%	33%	33%	33%	33%
Southern Asia	3%	3%	3%	3%	3%	4%	4%	4%	4%	4%	5%	5%	5%	5%	5%	6%	5%	6%	6%	6%
Eastern & South-Eastern Asia	**12%**	**13%**	**12%**	**12%**	**12%**	**26%**	**26%**	**27**%	**26%**	**26%**	**29%**	**29%**	**29%**	**29%**	**29%**	**32%**	**31%**	**32%**	**32%**	**32%**
Eastern Asia	15%	16%	15%	15%	15%	31%	31%	31%	31%	31%	33%	33%	33%	33%	33%	35%	35%	36%	35%	35%
South-Eastern Asia	6%	6%	5%	6%	6%	14%	14%	14%	14%	14%	19%	19%	19%	19%	19%	22%	22%	21%	22%	22%
Latin America & Caribbean	**29%**	**29%**	**28%**	**29%**	**29%**	**54%**	**54%**	**54%**	**54%**	**54%**	**61%**	**61%**	**63%**	**60%**	**61%**	**73%**	**73%**	**74**%	**73%**	**73%**

Caribbean	35%	35%	35%	35%	36%	58%	58%	58%	58%	60%	64%	64%	63%	64%	66%	69%	69%	69%	69%	72%
Central America	38%	38%	38%	38%	38%	66%	67%	65%	66%	66%	75%	76%	74%	74%	75%	85%	85%	86%	85%	85%
South America	25%	24%	24%	25%	25%	48%	48%	49%	48%	48%	55%	54%	58%	55%	55%	68%	68%	69%	68%	68%
Oceania (Excl. AUS/NZL)	**2%**	**3%**	**2%**	**2%**	**2%**	**6%**	**6%**	**6%**	**6%**	**6%**	**8%**	**8%**	**7%**	**8%**	**8%**	**10%**	**10%**	**9%**	**10%**	**10%**
Melanesia	1%	2%	1%	1%	1%	3%	4%	4%	3%	3%	5%	5%	5%	5%	5%	7%	7%	6%	7%	7%
Micronesia	12%	12%	9%	12%	12%	21%	21%	19%	21%	21%	24%	24%	23%	25%	24%	29%	29%	29%	29%	29%
Polynesia	13%	13%	10%	13%	13%	34%	34%	31%	34%	34%	43%	42%	38%	43%	43%	51%	50%	44%	51%	51%
Australia & New Zealand	**26%**	**27%**	**26%**	**26%**	**26%**	**71%**	**70%**	**68**%	**71%**	**71%**	**84%**	**84%**	**81%**	**84%**	**84%**	**95%**	**95%**	**90%**	**95%**	**95%**
Europe & Northern America	**43%**	**43%**	**43%**	**43%**	**43%**	**73%**	**74%**	**74**%	**73%**	**73%**	**81%**	**81%**	**81%**	**81%**	**81%**	**88%**	**89%**	**89**%	**88%**	**88%**
Eastern Europe	39%	38%	37%	39%	39%	69%	70%	72%	69%	69%	77%	79%	79%	77%	77%	85%	87%	88%	85%	85%
Northern Europe	34%	34%	33%	33%	34%	69%	69%	69%	69%	69%	80%	80%	80%	80%	80%	91%	91%	92%	91%	91%
Southern Europe	43%	44%	42%	44%	43%	75%	75%	75%	75%	75%	82%	82%	82%	82%	82%	89%	88%	88%	89%	89%
Western Europe	51%	51%	53%	51%	51%	76%	76%	76%	76%	76%	84%	84%	83%	84%	84%	94%	94%	94%	94%	94%
Northern America	47%	47%	47%	47%	47%	77%	77%	77%	77%	77%	82%	82%	82%	82%	82%	88%	88%	88%	88%	88%

S: Scenario; SDG: Sustainable Development Goals.

Figure S8.1. Screening coverage estimates for women aged 30-49 years under different missing imputation algorithms, worldwide and by income level.
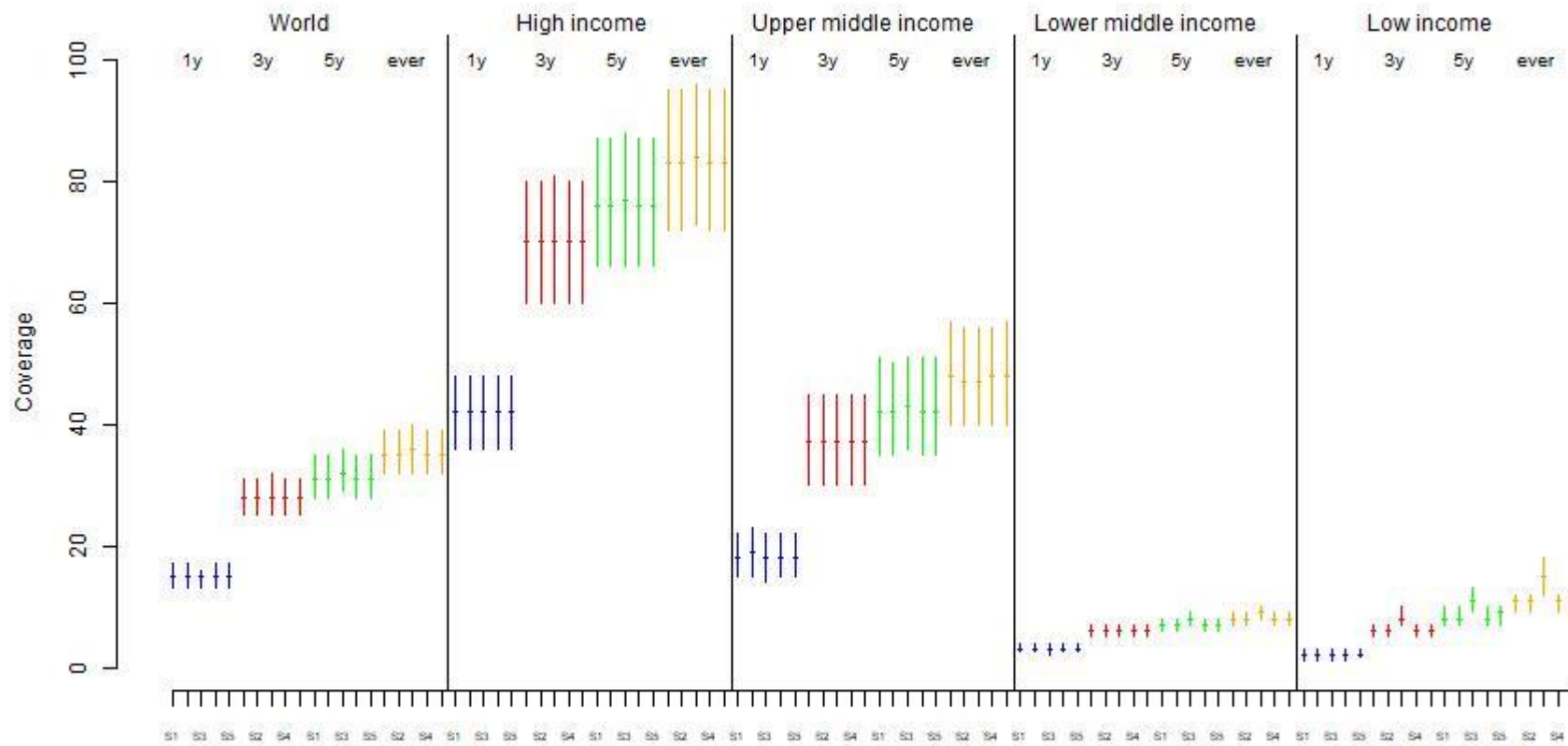
S1: Scenario 1; S2: Scenario 2; S3: Scenario 3; S4: Scenario 4; S5: Scenario 5.

Table S9. Sensitivity analysis of screening coverage estimates for women aged 30-49 years under different assumptions of screening coverages (from 0% to 100%) for missing values.

Legend of scenarios under assumptions of screening coverages (from 0% to 100%) for missing values:

Screening interval	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Previous year	Algorithm	0%	25%	50%	75%
Previous three years	Algorithm	0%	25%	50%	100%
Previous five years	Algorithm	0%	25%	50%	100%
Ever in lifetime	Algorithm	0%	25%	50%	100%

** Only among countries without data (38 countries)

	In the previous year Coverage (%)					In the previous three years Coverage (%)					In the previous five years Coverage (%)					Ever in lifetime Coverage (%)				
	S1	S2	S3	S4	S5	S1	S2	S3	S4	S5	S1	S2	S3	S4	S5	S1	S2	S3	S4	S5
World	**15%**	**15%**	**16%**	**18%**	**19%**	**28%**	**27%**	**29%**	**30%**	**33%**	**31%**	**30%**	**32%**	**34%**	**37%**	**35%**	**34%**	**36%**	**37%**	**41%**
Income																				
High-Income	42%	42%	42%	42%	42%	70%	69%	69%	70%	70%	76%	76%	76%	76%	76%	83%	83%	83%	83%	83%
Low And Middle-Income	10%	10%	12%	14%	15%	20%	19%	21%	23%	27%	23%	22%	24%	26%	30%	27%	25%	27%	29%	33%
Upper Middle-Income	18%	18%	18%	19%	19%	37%	37%	37%	37%	38%	42%	42%	42%	42%	43%	48%	47%	47%	48%	48%
Lower Middle-Income	3%	3%	5%	6%	8%	6%	5%	7%	8%	12%	7%	6%	8%	9%	13%	8%	7%	9%	10%	14%
Low-Income	2%	0%	12%	24%	35%	6%	2%	13%	25%	48%	8%	2%	14%	26%	49%	11%	3%	15%	27%	50%
SDG Regions and Subregions																				
Sub-Saharan Africa	**3%**	**3%**	**13%**	**24%**	**35%**	**8%**	**5%**	**16%**	**27%**	**48%**	**11%**	**7%**	**17%**	**28%**	**50%**	**14%**	**8%**	**19%**	**30%**	**52%**
Eastern Africa	2%	2%	7%	13%	19%	6%	4%	10%	15%	27%	8%	6%	11%	17%	29%	10%	8%	13%	19%	30%
Middle Africa	2%	0%	18%	35%	53%	7%	1%	19%	36%	71%	9%	2%	19%	37%	72%	12%	2%	19%	37%	72%
Southern Africa	21%	21%	21%	21%	21%	33%	33%	33%	33%	33%	42%	42%	42%	42%	42%	50%	50%	50%	50%	50%
Western Africa	2%	0%	17%	33%	50%	6%	1%	17%	34%	67%	8%	1%	18%	34%	67%	11%	1%	18%	34%	67%
Northern Africa & Western Asia	**8%**	**8%**	**9%**	**11%**	**13%**	**17%**	**16%**	**18%**	**20%**	**23%**	**24%**	**23%**	**25%**	**27%**	**30%**	**28%**	**27%**	**28%**	**30%**	**34%**
Northern Africa	4%	4%	5%	6%	7%	7%	7%	7%	8%	10%	8%	7%	8%	9%	10%	8%	7%	8%	9%	11%
Western Asia	11%	11%	13%	16%	19%	25%	24%	27%	29%	34%	38%	37%	39%	42%	47%	44%	43%	45%	48%	53%
Central & Southern Asia	**3%**	**3%**	**4%**	**4%**	**4%**	**5%**	**5%**	**5%**	**5%**	**6%**	**6%**	**6%**	**6%**	**6%**	**7%**	**7%**	**6%**	**7%**	**7%**	**8%**
Central Asia	7%	7%	7%	7%	7%	18%	18%	18%	18%	18%	29%	29%	29%	29%	29%	33%	33%	33%	33%	33%
Southern Asia	3%	3%	3%	4%	4%	4%	4%	5%	5%	6%	5%	5%	5%	5%	6%	6%	5%	6%	6%	7%
Eastern & South-Eastern Asia	**12%**	**12%**	**13%**	**13%**	**14%**	**26%**	**26%**	**26%**	**27%**	**28%**	**29%**	**28%**	**29%**	**29%**	**30%**	**32%**	**31%**	**31%**	**32%**	**33%**
Eastern Asia	15%	15%	15%	15%	16%	31%	30%	31%	31%	32%	33%	32%	33%	33%	34%	35%	34%	35%	35%	36%
South-Eastern Asia	6%	6%	6%	7%	8%	14%	14%	15%	15%	16%	19%	18%	19%	20%	21%	22%	22%	23%	23%	24%
Latin America & Caribbean	**29%**	**28%**	**29%**	**30%**	**31%**	**54%**	**52%**	**53%**	**54%**	**57%**	**61%**	**58%**	**60%**	**61%**	**63%**	**73%**	**70%**	**71%**	**73%**	**75%**
Caribbean	35%	35%	35%	35%	35%	58%	57%	58%	58%	58%	64%	63%	64%	64%	64%	69%	69%	69%	69%	69%
Central America	38%	37%	38%	39%	39%	66%	65%	65%	66%	67%	75%	73%	74%	75%	76%	85%	83%	84%	85%	86%
South America	25%	23%	25%	26%	28%	48%	46%	47%	49%	52%	55%	52%	53%	55%	58%	68%	65%	66%	68%	71%

Oceania (Excl. AUS/NZL)	**2%**	**2%**	**3%**	**4%**	**5%**	**6%**	**5%**	**6%**	**7%**	**9%**	**8%**	**7%**	**8%**	**9%**	**11%**	**10%**	**9%**	**10%**	**11%**	**13%**
Melanesia	1%	1%	1%	2%	3%	3%	3%	4%	4%	6%	5%	4%	5%	6%	7%	7%	7%	7%	8%	9%
Micronesia	12%	12%	12%	12%	12%	21%	21%	21%	21%	21%	24%	24%	24%	24%	24%	29%	29%	29%	29%	29%
Polynesia	13%	8%	16%	24%	33%	34%	25%	33%	41%	57%	43%	31%	39%	47%	64%	51%	37%	45%	53%	70%
Australia & New Zealand	**26%**	**26%**	**26%**	**26%**	**26%**	**71%**	**71%**	**71%**	**71%**	**71%**	**84%**	**84%**	**84%**	**84%**	**84%**	**95%**	**95%**	**95%**	**95%**	**95%**
Europe & Northern America	**43%**	**43%**	**43%**	**43%**	**44%**	**73%**	**73%**	**73%**	**73%**	**74%**	**81%**	**81%**	**81%**	**81%**	**81%**	**88%**	**88%**	**88%**	**88%**	**88%**
Eastern Europe	39%	39%	39%	39%	39%	69%	69%	69%	69%	69%	77%	77%	77%	77%	77%	85%	85%	85%	85%	85%
Northern Europe	34%	34%	34%	34%	34%	69%	69%	69%	69%	69%	80%	80%	80%	80%	80%	91%	91%	91%	91%	91%
Southern Europe	43%	43%	43%	44%	44%	75%	74%	74%	75%	76%	82%	81%	81%	82%	83%	89%	87%	88%	88%	89%
Western Europe	51%	51%	51%	51%	51%	76%	76%	76%	76%	76%	84%	84%	84%	84%	84%	94%	94%	94%	94%	94%
Northern America	47%	47%	47%	47%	47%	77%	77%	77%	77%	77%	82%	82%	82%	82%	82%	88%	88%	88%	88%	88%

S: Scenario; SDG: Sustainable Development Goals.

Figure S9.1. Screening coverage estimates for women aged 30-49 years under different assumptions of screening coverages (from 0% to 100%) for missing values, worldwide and by income level.
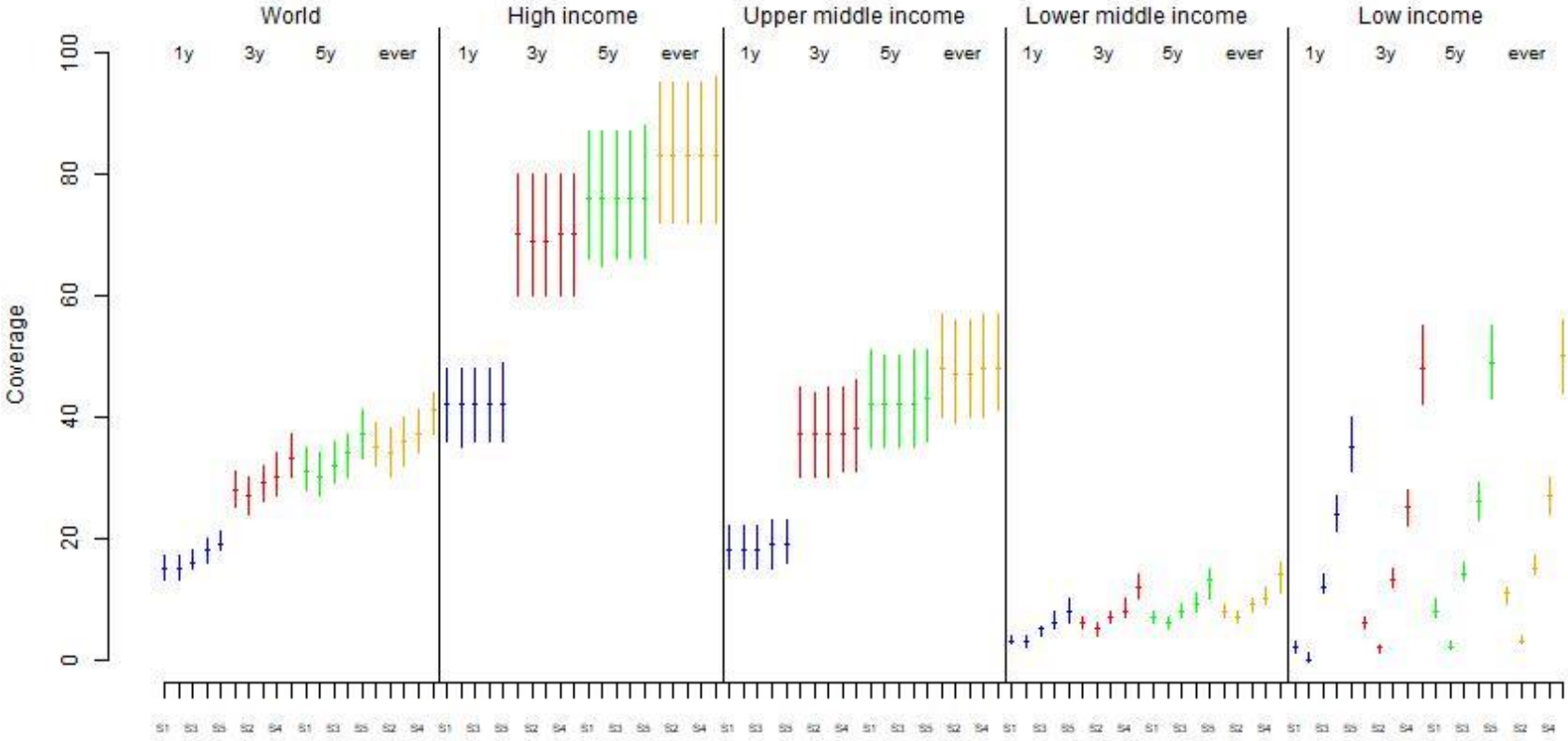
S1: Scenario 1; S2: Scenario 2; S3: Scenario 3; S4: Scenario 4; S5: Scenario 5.

Table S10. Estimates of cervical cancer screening coverage in women aged 25-65 years by 2019.

Area	In the previous year		In the previous three years		In the previous five years		Ever in lifetime	
	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
World	**14%**	**(13-15%)**	**27%**	**(25-29%)**	**31%**	**(28-33%)**	**35%**	**(32-38%)**
Income								
High income	38%	(34-42%)	66%	(59-72%)	73%	(66-80%)	83%	(75-91%)
Low and middle income	9%	(8-10%)	19%	(17-21%)	22%	(20-25%)	26%	(23-28%)
Upper middle income	16%	(14-19%)	34%	(30-39%)	39%	(34-44%)	45%	(39-50%)
Lower middle income	3%	(3-3%)	5%	(5-6%)	6%	(6-7%)	8%	(7-9%)
Low income	2%	(1-2%)	6%	(5-7%)	8%	(7-9%)	10%	(9-11%)
SGD regions and subregions								
Sub-Saharan Africa	**3%**	**(2-4%)**	**8%**	**(7-9%)**	**10%**	**(9-12%)**	**13%**	**(11-15%)**
Eastern Africa	2%	(1-2%)	5%	(4-6%)	7%	(6-8%)	9%	(8-11%)
Middle Africa	2%	(1-3%)	7%	(5-9%)	9%	(7-12%)	12%	(9-15%)
Southern Africa	18%	(13-26%)	28%	(20-37%)	35%	(25-46%)	43%	(31-56%)
Western Africa	1%	(1-2%)	6%	(4-8%)	8%	(6-11%)	10%	(8-14%)
Northern Africa & Western Asia	**7%**	**(6-8%)**	**16%**	**(13-18%)**	**23%**	**(18-27%)**	**27%**	**(22-32%)**
Northern Africa	4%	(3-5%)	7%	(6-7%)	7%	(6-8%)	8%	(7-9%)
Western Asia	10%	(8-12%)	23%	(19-29%)	36%	(28-45%)	43%	(34-54%)
Central & Southern Asia	**3%**	**(2-4%)**	**4%**	**(4-5%)**	**5%**	**(4-6%)**	**6%**	**(5-7%)**
Central Asia	7%	(5-9%)	17%	(15-20%)	28%	(24-32%)	32%	(28-37%)
Southern Asia	3%	(2-3%)	4%	(3-4%)	4%	(3-5%)	5%	(4-6%)
Eastern & South-Eastern Asia	**11%**	**(8-13%)**	**24%**	**(19-29%)**	**26%**	**(21-32%)**	**29%**	**(23-35%)**
Eastern Asia	13%	(9-16%)	28%	(21-34%)	29%	(23-36%)	32%	(25-39%)
South-Eastern Asia	5%	(4-6%)	13%	(11-15%)	17%	(15-20%)	21%	(18-24%)
Latin America & Caribbean	**28%**	**(25-31%)**	**52%**	**(47-58%)**	**59%**	**(53-66%)**	**72%**	**(64-81%)**
Caribbean	33%	(28-39%)	56%	(47-65%)	63%	(53-72%)	68%	(59-79%)
Central America	37%	(29-45%)	64%	(51-79%)	74%	(58-90%)	84%	(66-100%)
South America	24%	(21-27%)	47%	(42-53%)	53%	(47-60%)	68%	(59-78%)
Oceania (excl. AUS/NZL)	**2%**	**(1-3%)**	**5%**	**(5-6%)**	**7%**	**(6-8%)**	**10%**	**(9-11%)**
Melanesia	1%	(0.0-2%)	3%	(2-4%)	4%	(4-5%)	7%	(6-8%)
Micronesia	11%	(9-13%)	19%	(17-21%)	23%	(21-25%)	27%	(25-29%)
Polynesia	12%	(9-15%)	32%	(26-39%)	40%	(32-49%)	49%	(39-60%)
Australia & New Zealand	**27%**	**(23-31%)**	**71%**	**(61-82%)**	**84%**	**(72-97%)**	**95%**	**(81-100%)**
Europe & Northern America	**40%**	**(35-44%)**	**69%**	**(62-76%)**	**77%**	**(69-85%)**	**87%**	**(78-96%)**
Eastern Europe	36%	(30-42%)	66%	(56-76%)	75%	(63-87%)	84%	(71-97%)
Northern Europe	28%	(22-34%)	62%	(50-73%)	74%	(62-88%)	88%	(73-100%)
Southern Europe	40%	(34-47%)	71%	(60-82%)	79%	(68-91%)	87%	(75-100%)
Western Europe	46%	(39-54%)	71%	(61-81%)	81%	(70-93%)	93%	(81-100%)
Northern America	42%	(32-53%)	72%	(55-89%)	78%	(60-97%)	87%	(67-100%)
WHO region								
AFRO	3%	(3-4%)	8%	(7-9%)	11%	(9-12%)	13%	(12-15%)
EURO	33%	(30-36%)	61%	(56-66%)	72%	(66-78%)	82%	(76-89%)
EMRO	6%	(5-8%)	9%	(8-11%)	11%	(9-13%)	13%	(11-15%)
AMRO	33%	(29-38%)	59%	(52-67%)	66%	(58-75%)	78%	(68-88%)
SEARO	2%	(2-3%)	5%	(4-5%)	6%	(5-7%)	7%	(6-8%)
WPRO	12%	(9-15%)	26%	(21-33%)	28%	(22-35%)	31%	(25-38%)

CI: Confidence Interval, SDG: Sustainable Development Goals, AUS/NZL: Australia and New Zealand. The WHO regions include the African Region (AFRO), the European Region (EURO), the Eastern Mediterranean Region (EMRO), the Region of the Americas (AMRO), the South-East Asia Region (SEARO), and the Western Pacific Region (WPRO).

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