Sheffield Hallam University

Mapping routine measles vaccination in low- and middle-income countries

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Supplementary information

Mapping routine measles vaccination in low- and middle-income countries

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1.0 Supplementary Methods

1.1 GATHER compliance

Refer to Supplementary Table 1 for information on how this study meets GATHER compliance criteria[1].

1.2 Definitions

1.2.1 Routine first dose of measles-containing vaccine coverage

Routine coverage of the first dose of any measles-containing vaccine (MCV1), including measles-rubella and measles-mumps-rubella combination vaccines, was defined as the proportion of children born in a given year who received at least one dose of any measles-containing vaccine through routine immunisation services after reaching the target age for immunisation. In keeping with WHO/UNICEF Estimates of National Immunization Coverage (WUENIC) definitions of MCV1 coverage, our MCV1 coverage indicator reflects country-specific population schedules[2]. For countries recommending the first dose of a measles-containing-vaccine for children < 12 months old, the youngest (target age) cohort used to assess coverage in this analysis is 12–23 months old. If the first dose is not recommended until at least 12 months of age, the youngest (target age) cohort used to assess coverage is 24–35 months old. For a full list of schedules by country, please refer to Supplementary Table 2. We have included children among the target age cohort and the cohorts 1 and 2 years older than the target cohort at the time of survey. We excluded children that were 3 years older than the target cohort at the time of survey. We have tested this assumption in a sensitivity analysis that can be found in Supplementary Information section 2.2.

We assign coverage from each birth cohort of children surveyed to the year in which they were aged 0–12 months for modelling, in alignment with the methods used by WUNEIC and estimates from the Global Burden of Diseases, Injuries, and Risk Factors study (GBD). The WUENIC and GBD national-level coverage estimates both additionally incorporate administrative and/or official country-reported data on MCV1 coverage, which does not routinely collect nor report information on the precise birth cohort that accompanies the country-reported values of coverage. In order to maintain comparability with these national-level estimates, and because our estimates are calibrated to those produced by GBD, we adopt the same methodology for birth cohort assignment.

We considered children to have been vaccinated with MCV1 based on evidence from either home-based record (i.e., vaccination card) or parental recall. As with all survey-based measures of vaccination coverage, however, the use of data from parental recall could result in recall bias. Because recall bias of vaccination status varies in both direction and magnitude, we were unable to adjust for this bias[3], a limitation of this analysis.

In order to inform policy decisions regarding measles immunisation strategies, the ability to distinguish between the performance of routine immunisation services and supplemental immunisation activities is key. For instance, SIAs may reach unimmunised children across wealth quintiles more equitably than RI[4], but SIAs may be more vulnerable to disruption due to funding challenges, disasters, or political shifts. Currently, routine immunisation services are still recommended globally in the era of COVID-19[5]04/12/2020 14:14:00 and serve as the primary mechanism through which measles vaccination will be delivered in most settings during the pandemic, given COVID-19-related disruptions to planned SIAs. As the Global Measles and Rubella Strategic Plan suggests, RI services are meant to serve as the cornerstone of measles immunisation in all countries[6].

In this study, we therefore aim to model routine immunisation coverage, within the limits of the available data. To accomplish this aim, we included doses of MCV1 only from routine immunisation wherever possible when processing survey microdata, in order to minimise inclusion of doses administered in supplemental immunisation activities (SIA). See Supplementary Information section 1.3.4 for details on the removal of SIA doses during our data processing. This approach to estimating routine immunisation coverage is concordant with that used in other recent published studies[7] on routine MCV1 coverage. Due to inherent limitations in the underlying survey data, however, some SIA doses are still

likely to be misclassified as routine despite this process – particularly those from recall and from surveys where coding of SIA doses may have been inconsistent. While we aim to produce as representative an estimate of routine MCV1 coverage as possible, estimates presented in this manuscript should be interpreted in the context of this limitation.

1.3.2 Low- and middle-income countries

We defined low- and middle-income countries (LMICs) based on Socio-Demographic Index (SDI), as estimated in 2019 by the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD)[8]. This metric combines education, fertility and income to summarise development. A country was included in our analysis if was in the bottom three quintiles and therefore having a low (0–0.455), low-middle (0.455–0.606), or middle (0.606–0.688) classification. Additionally, we included countries if they were part of the 94 Decade of Vaccine priority countries regardless of their SDI classification[8,9,10]. For the full list of included countries (with the exception of Jordan, neither classified as low- or middle-income or a DoV priority country, which was added to increase geographic continuity), refer to Supplementary Table 3.

1.3 Data

1.3.2 Data seeking

An overview of the entire data preparation and geospatial modelling process can be found in Extended Data Fig. 1. We searched the Global Health Data Exchange[11] (GHDx) for sources with the key word "vaccine," "measles vaccines," "MMR vaccines," "mumps vaccines," "rubella vaccines," "vaccination cards," or "immunisation" for all LMICs . Sources included in models of coverage are listed in Supplementary Fig. 1 and Supplementary Table 4. We gathered a total of 354 surveys for use in final analysis.

1.3.2 Inclusion and exclusion criteria for data sources

Data sources considered for inclusion were those for all LMICs containing subnationally-resolved information on MCV1 coverage. Surveys were included if they contained information on children between 12 and 59 months old, precise GPS coordinates or areal geographic boundaries and survey design variables, such as strata and weight.

National-level time series of survey estimates were examined to assess systematic survey bias[2]. When the estimates of a particular source appeared implausible in the context of other data or external information on the reliability of that source, the survey methodology, case definitions, and data collection for that source were evaluated, along with the underlying spatial patterns of the original survey data. Sources assessed as implausible or with known methodological flaws were excluded from the modelling process and are listed in Supplementary Table 5.

1.3.3 Final list of countries included in analysis

For 13 countries (Bhutan, Brazil, China, Dominica, Georgia, Grenada, Libya, Oman, Palestine, Saint Lucia, Saint Vincent and the Grenadines, Seychelles, and Venezuela), no available subnational vaccine coverage data met the inclusion and exclusion criteria and therefore have been excluded from this analysis.

1.3.4 Data preparation

The following data were extracted from each survey source: vaccine card or home-based record (HBR) doses, parental recall vaccine doses, age (in months), survey weight and design variables, and GPS-cluster or areal location. Individuals with evidence of vaccination either from HBR or recall were considered to

have been vaccinated. Individuals were excluded from the analysis if they were missing age, spatial, or survey design information or were outside of the study age or year range. The study included all years between 2000 and 2019. A comprehensive overview of data from all study geographies included can be found in Supplementary Fig. 2.

Individual age, in months, at the time of survey collection was used to assign each child to a birth cohort (12–23 months, 24–35 months, 36–47 months, and 48–59 months). Data corresponding to each birth cohort were included in the modelling process in the year in which that birth cohort was aged 0–12 months old[12]. This method allows the inclusion of additional individuals, which increases overall geographical representation, but requires assumptions such as negligible catch-up vaccination and no differential mortality or migration. However, the influence of including older cohorts in our model on the key findings appeared to be minor (Supplementary Information section 2.2).

Wherever possible, we removed doses recorded on vaccination cards or from parental recall that were attributable to SIAs. First, we reviewed the underlying survey methodology to identify, where applicable, the coding used to identify doses delivered through SIAs rather than routine immunisation services. We confirmed the occurrence of each SIA by cross-referencing the summary documentation of historical SIAs compiled by WHO[13]. For children who participated in a SIA and had card or recall codes that indicating doses which were attributable to the campaign, we excluded those doses from our analysis of routine immunisation coverage. For surveys for which SIA doses were not identified through coding on vaccination cards or in specific recall survey variables, we were not able to make this distinction, reflecting an inherent limitation in data collection and recording from the underlying survey data.

1.3.5 Geographic positioning of GPS-located clusters and areal location data

Individuals were assigned to the most granular geographic location possible. Antigen-dose-specific coverage at each of these locations, either GPS-located cluster or an areal location, was calculated. The mean MCV1 coverage was calculated at the most precise geographic location possible. Survey weights were taken into account using the Kish adjustment when calculating averages for areally assigned data. Data without GPS information were matched to the most precise geographic location possible using a library of boundary definitions largely composed of shapefiles from individual surveys, the Global Administrative Unit Layers database, the Database of Global Administrative Areas, and other country-specific shapefiles. If the smallest geographic unit available was smaller than a 5 × 5-km pixel, the unit was assigned to a GPS-located cluster at the centroid of the pixel.

To be included in the model-based geostatistical framework, all data must be geo-located at the precision of a specific latitude and longitude coordinate pair. For areally located data that has been matched to an administrative unit but for which no GPS coordinates were available, we used a previously described method to generate a set of candidate cluster locations where survey sampling could plausibly have occurred, using population weights and k-means clustering[14] (Supplementary Fig. 3). In brief, 10,000 points were randomly sampled from the area within the administrative boundary that was matched to the areal data. Points were sampled proportionally to the total population within that space and time as estimated by the WorldPop population raster[15]. A set of integration points (1 per 1,000 5 × 5-km pixels) was generated via k-means clustering, representing candidate locations of survey sampling under the assumption that each survey sampled locations proportional to population. These integration points were used as input locations for the areal data in the geospatial model. Each integration point was assigned the mean MCV1 coverage value previously calculated for the entire areal location. A weight was also assigned to each integration point (i.e., candidate observation location) that is proportional to the number of randomly sampled points that were included in the k-means cluster, such that all weights sum to 1 for each areal data observation. The "survey" package in R[16] was used to determine a conservative sample size for the entire areal unit, and the sample size at each integration point was determined using this calculated total sample size and the weights of each integration point. Overall, this method produces a set of candidate observations of vaccine coverage spread over the area in question, with increased weight given to locations that are more densely populated.

1.3.6 Geospatial covariate selection

We used a variance inflation factor (VIF) algorithm for geospatial covariate selection before using the subsequent covariates in child models. We chose to use a covariate selection algorithm before fitting child models to remove collinear covariates to facilitate model convergence. For each coordinate point where data is located, geospatial covariate values were extracted. The VIF algorithm works by computing the variance of each covariate, which is conflated when multicollinearities exist in the covariate values[17]. The VIF was computed for each covariate, removing the largest incrementally, until the VIF for each remaining covariate was less than 3. This algorithm was run for all modelling regions (as discussed in Supplementary Information section 1.4.1).

1.4 Modelling methods

1.4.1 Geographic modelling regions

Coverage was modelled in 13 continuous geographic regions, and the outputs of these regional models were combined to create comprehensive maps of antigen-dose-specific coverage in LMICs. Countries were assigned to one of 13 regions. Regions were decided by adapting regions defined by GBD, which are constructed to group countries together by epidemiological similarity and geographical proximity (Extended Data Fig. 2). We modified these regions to ensure geographical contiguity. We included a one-degree buffer to each region when modelling to ensure minimal effects of regional edges in final results. Computationally, it is much more efficient to fit multiple regions in parallel that are smaller in area. Additionally, fitting models in separate regions allows for different regional relationships in coverage with geostatistical covariates.

1.4.2 Stacked generalisation child models

Stacked generalisation is an ensemble method for combining models and has shown to increase predictive accuracy in spatiotemporal disease modelling[18]. We use stacked generalisation in our modelling framework to combine predictions of our child models (lasso, GAM and boosted regression trees) for three main reasons. First, its use allows us to increase our predictive accuracy, although they reduce the causal interpretation of the subsequent results. Next, as not many geospatial covariates largely explain vaccination coverage, stacked generalisation maximise the predictive power of the covariates we do have. Third, staked generalisation allows us to account for the complex, non-linear relationships between covariates and outcomes in our model.

The choice of using stacked generalisation breaks the ability for our model to be used to describe any causal pathway. Ideally, models would be optimised for prediction and causal inference. However, as our objective is predictive accuracy rather than causal inference, we believe that the benefits of inclusion of a stacked generalisation step outweigh this limitation.

1.4.3 Geospatial model priors

The following priors were used for modelling MCV1 coverage:

$$\beta_0 \sim \mathrm{N}(\mu = 0, \sigma^2 = 3^2),$$

$$\beta_h \sim^{iid} \mathrm{N}(\mu = 0, \sigma^2 = 3^2),$$

$$\log\left(\frac{1+\rho}{1-\rho}\right) \sim \mathrm{N}(\mu = 0, \sigma^2 = 1/0.15),$$

$$\frac{1}{\sigma^2_{nugget}} \sim \mathrm{loggamma}(\alpha = 1, \gamma = 2),$$

$$\frac{1}{\sigma^2_{ctry(i)}} \sim \mathrm{loggamma}(\alpha = 1, \gamma = 2),$$

For the Matérn function, we used a penalised complexity prior for the range, δ, such that $P(\delta < \boldsymbol{\delta_0}) < 0.05$, and standard deviation, σ^2_{space}, such that $P(\sigma^2_{space} > 3) = 0.05$. $\boldsymbol{\delta_0}$ was chosen such that it was ~ 5% of the region size[19].

1.4.4 Spatial mesh construction

The SPDE approximation to the residuals of the Gaussian process requires the construction of a finite spatial elements mesh for each modelling region in order to fit the spatiotemporal correlated error term in the generalised linear modelling framework. A spherical finite mesh was constructed for each modelling region using edge-smoothed polygon boundaries; the inner mesh triangle edge length ranges from 25 to 500 km and the outer mesh edge length is 1000 km. For an example mesh, see Supplementary Fig. 5. With this type of spatial mesh, the spatial distance matrix as part of the Matérn covariate, was calculated using the greatest circle distance along the surface of the sphere (i.e. Earth).

We define the SPDE on $\mathbb{S}^2$, a spherical manifold, and use the great circle distance as described in the SPDE framework. Practically, this is implemented in our modelling pipeline by first converting data locations and geographic region boundaries to three-dimensional coordinates on the unit-sphere. Next, using the INLA "inla.mesh.create" function, we construct an $\mathbb{S}^2$, mesh using the three-dimensional data and boundaries.

1.4.5 Model fitting

Models were fit using R-INLA as described previously[14]. We have chosen to use R-INLA for model fitting and interpretation to leverage its computational tractability when running models across large spatial scales. This is possible through maximising computational efficiency via an inherent parallelising structure to exploit multi-core processing and also generalising across latent Gaussian models which allows for a significant amount of inference to be automated.

Cluster-level observations for which precise latitude and longitudinal coordinates are known were assigned a weight of 1. Areal data that was resampled as described above were given weight as a function of the K-means clustering process. These weights were used in the R-INLA fitting process to ensure both observation types were given equal contribution to the log-likelihood function of the model.

During model fitting, we apply a linear sum to 1 constraint on the child model β_c's using the "extraconstr" argument of R-INLA[20], such that:

$$A\boldsymbol{\beta}_{\mathbf{c}}^{\top} = \mathbf{e}^{\top}$$

where A is a matrix of dimensions (1,1, length of vector of the fixed effects (i.e. 3)) and e = 1.

Model fitting parameters can be found in Supplementary Table 8. The posterior is numerically approximated as part of the INLA approach and thus convergence cannot be assessed in a comparable way as with a full MCMC sampler. As an alternative, we used the R-INLA "inla_results$mode$mode.status" function to ensure that the INLA results have identified the posterior modes of the hyperparameters and the associated Hessian is positive definite. This check was passed for all modelled regions.

1.4.6 Additional modelling parameters and limitations

We modeled using AR(1) temporal structure; alternative approaches could provide more flexibility, but in practice we find that this works adequately given subsequent out-of-sample model performance. Selection of optimal spatiotemporal covariance structures for vaccine coverage modeling is an important area for further investigation in future work. Also, we used a model that is separable in space and time. While this assumes that the covariance between years and locations has the same functional form regardless of the locations. Fitting a non-separable model would be complex and computationally challenging and should also be considered in future work.

1.5 Post-estimation calibration and figure production

1.5.1 Production of GBD coverage estimates

Using the results of the geostatistical modelling process above, we calibrated our set of posterior draws to estimates of MCV1 coverage from GBD 2019[8]. The geostatistical model described above uses only subnationally-resolved survey data, while coverage estimates produced by GBD 2019 additionally leverage surveys for which only national-level data are available as well as bias-adjusted national-level administrative data. This calibration step allows our geospatial estimates to reflect national-level trends in coverage that are informed by national-level surveys and administrative data, while preserving the relative spatial patterns estimated by the geospatial model. GBD 2019 produced coverage estimates for 11 vaccine antigen-dose combinations in 204 national and 858 subnational locations from 21 countries from 1980 to 2019. Coverage indicators represent the same indicators as in the geospatial models, which is the proportion of children in the target age population receiving MCV1, as previously described.

Data from household surveys, administrative reports of coverage, and other survey reports and tabulations are used to produce GBD coverage estimates. The GHDx and targeted country searches were used to identify all nationally-representative sources containing information on vaccine coverage. Household survey series used include the Demographic Health Survey (DHS) series, Multiple Indicator Cluster Survey (MICS) series, Reproductive Health Survey (RHS) series, and Living Standards Measurement Study (LSMS) series. Appropriate survey weights were applied to generate weighted national estimates of coverage, and accompanying uncertainty was calculated from standard error and sample size.

Annual estimates of administrative immunisation coverage from the Joint Reporting Form (JRF) were collected. GBD applies a time-varying country- and vaccine-specific bias adjustment to account for changing degrees of bias in the JRF-reported administrative estimates over time[8]. The ratio of survey coverage to administrative estimates for paired points in the same year and location was modelled in a spatiotemporal Gaussian process regression (ST-GPR) using SDI as a predictive covariate. From this model, estimates of administrative bias were obtained for all locations and years, which were then used to adjust the administrative data prior to inclusion in the final vaccine coverage model.

GBD uses an ST-GPR model to estimate vaccination coverage by synthesising data from various sources while borrowing strength from data across time and space. This method produces a complete time series and accompanying uncertainty for each location and antigen-dose combination and has been widely used in many other GBD risk factors and causes. The ST-GPR model mean function can be summarised as:

$$m_c(t) = X\beta + h(r_{c,t}) \ ,$$

where $X\beta$ is a linear model and $h(r_{c,t})$ is a residual smoothing function, for each country c and each year t. In estimating vaccine coverage using ST-GPR, the following linear model was used:

$$logit(P_{c,t}) = \beta_0 + \beta_1 HAQI_{c,t} + \beta_2 war_{c,t} + \beta_3 stockout_{c,t} + \alpha_c + \gamma_{R[c]} + \omega_{SR[c]} + \varepsilon_{c,t} \ ,$$

where $P_{c,t}$ is vaccination coverage, $HAQI_{c,t}$ is health access and quality index[21], $war_{c,t}$ is mortality rate due to war and terror, and $stockout_{c,t}$ is a variable representing the magnitude of a stock-out as estimated by the logit-space difference between observed and expected administrative coverage for locations and years with a known antigen-specific vaccine stock-out, for each country c and each year t. α_c , $\gamma_{R[c]}$, and $\omega_{SR[c]}$ are country, GBD region, and GBD super-region random effects. Estimates were produced through ST-GPR regression steps with 1,000 random samples from the posterior distribution per country and year. Uncertainty intervals were taken from the 25th and 975th ordered posterior samples.

1.5.2 Figure production

All maps were generated using ArcMap 10.6 and Python 2.7[22,23]. Other figures were produced using R version 3.6.1[24].

2.0 Supplementary results and discussion

2.1 MCV1 coverage

We aggregated estimates to country and first and second administrative boundaries, and showed pixel-level maps for years 2000, 2005, 2010, 2015, and 2019 (Extended Data Figs 3-7). In 2019, pixel-level means and 95% uncertainty intervals for the full posterior distribution are shown in Supplementary Figs 14-16. These results for all years 2000 to 2019 are also available in the online visualisation tool, which can be found here: (https://vizhub.healthdata.org/lbd/mcv).

Additionally, to portray uncertainty, the Coffey-Feingold-Bromberg statistic[25] was used. This statistic provides a measure of the uncertainty in a set of draws of proportions that is comparable across different means and ranges from 0% indicating no uncertainty and 100% indicating highest possible uncertainty (Supplementary Fig. 17).

As the relationships between covariates and coverage are multi-dimensional, we used methods to account for these complex relationships. These methods are optimised for prediction, not inference, and this model therefore cannot be used to infer a causal relationship between any given covariate and vaccination coverage.

2.2 Age cohort selection sensitivity analysis

In this analysis, we include data from multiple age cohorts of surveyed children where available, including the target age cohort and older birth cohorts. Older children may be more likely to be vaccinated due to additional opportunities for vaccination, e.g. through catch-up routine immunisation services, inclusion in additional supplemental immunisation activities, or through a second opportunity for first-dose immunisation during the second year of life in countries that have introduced MCV2. Alternatively, older cohorts may have lower coverage in some cases than younger cohorts in a given survey, due to – for instance – rapidly increasing trends in immunisation coverage. The inclusion of older children in the model, therefore, has the potential to introduce bias. If this bias is negligible, however, exclusion of older children would remove potentially informative observations of coverage across space and time from the model. To determine which cohorts of children should be included in our model, we therefore conducted a series of regression and sensitivity analyses to assess for potential bias and evaluate the influence of these decisions on the key findings of this study.

First, we conducted an analysis of cohorts of children for which we have multiple observations of vaccine coverage from surveys conducted at different points in time. We chose this approach because simply looking at coverage by cohort within a given survey presents an age-period-cohort problem, where the effects of changing coverage by age and changing coverage within a country over time are difficult to disentangle. By analysing cohorts with multiple survey observations, we could compare survey estimates of coverage for the cohort obtained at the time in which they were the target age and in at least one other year, for instance when the children were one year older than the target age (t+1), two years older than the target age (t+2), or three years older than the target age (t+3). We evaluated the effect of the time lag between survey observations for a given birth cohort using the following regression analysis, which yielded the results shown in Supplementary Information Table 14:

$$\ln\left(\frac{coverage\ observed\ when\ cohort\ was\ older\ than\ target\ age}{coverage\ observed\ when\ cohort\ was\ of\ the\ target\ age}\right) = I_{t+1}\beta_1 + I_{t+2}\beta_2 + I_{t+3}\beta_3$$

There was a significant effect for the indicator variable for the largest (t+3) time lag between observations for a given cohort. Therefore, these oldest cohorts, i.e. those that were 3 years older than the target age group, were removed from our data set.

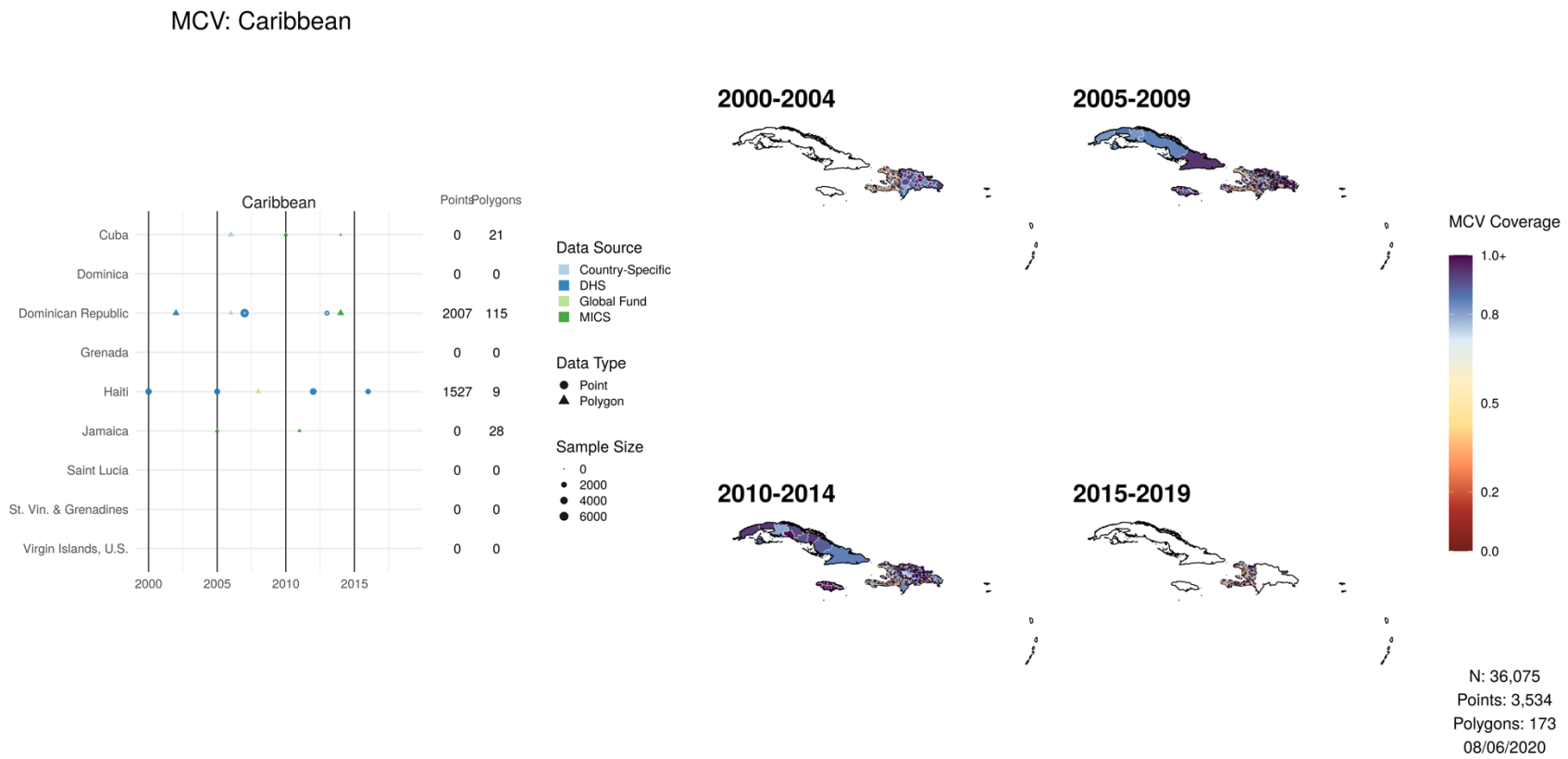
However, to ensure major themes of this work were not sensitive to choice in age cohort, we ran three additional versions of the models: a model including all cohorts from each survey, a model with the target age cohort along with t+1 and t+2 cohorts (the approach presented in the main text, figures, and tables), a model with only the target age cohort and the t+1 cohort, and a model with only the target age cohort. The results and major findings of this work did not sustainably change among the four cohort versions (Supplementary Table 15, Supplementary Figs. 18-20).

2.3 Changes in coverage sensitivity analysis

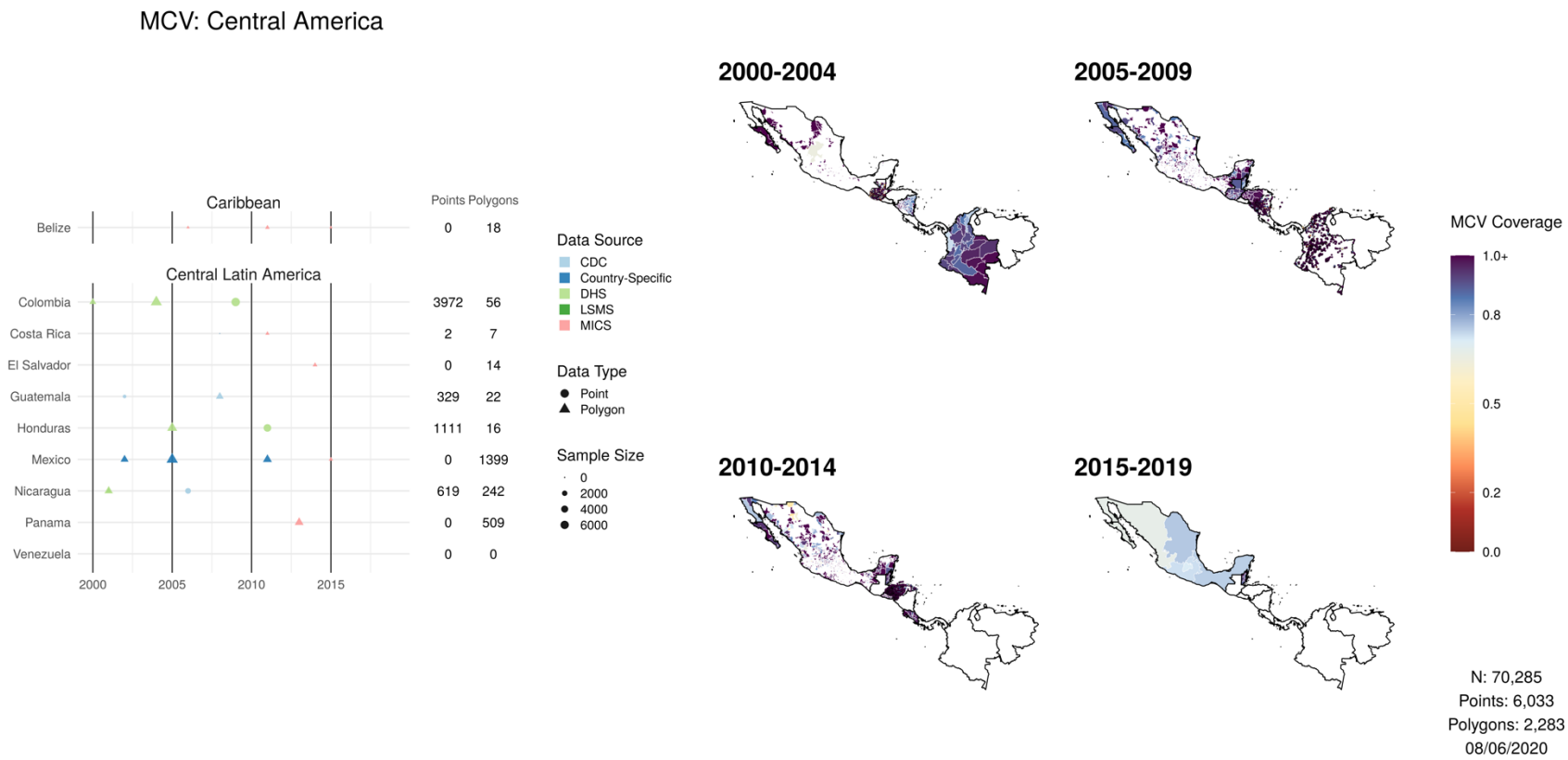
If a district has high starting coverage, there is less room for improvement in coverage and a higher likelihood of stagnant coverage values. Therefore, we performed a sensitivity analysis of changes in coverage between 2000 to 2010 and 2010 to 2019 to account for baseline starting value. Including only districts with coverage below 90% in 2000, 82.2% (95% Uncertainty Interval (UI): 77.6–86.1%) of districts had increasing coverage from 2000 to 2010. Including only districts with coverage below 90% in 2010, 44.6% (95% UI: 38.3–53.4%) of districts had increasing coverage from 2010 to 2019. Our original trend presented therefore holds true in this supplementary analysis – coverage improved in fewer districts between 2010–2019 when compared to the time period 2000–2010.

3.0 Supplementary Figures

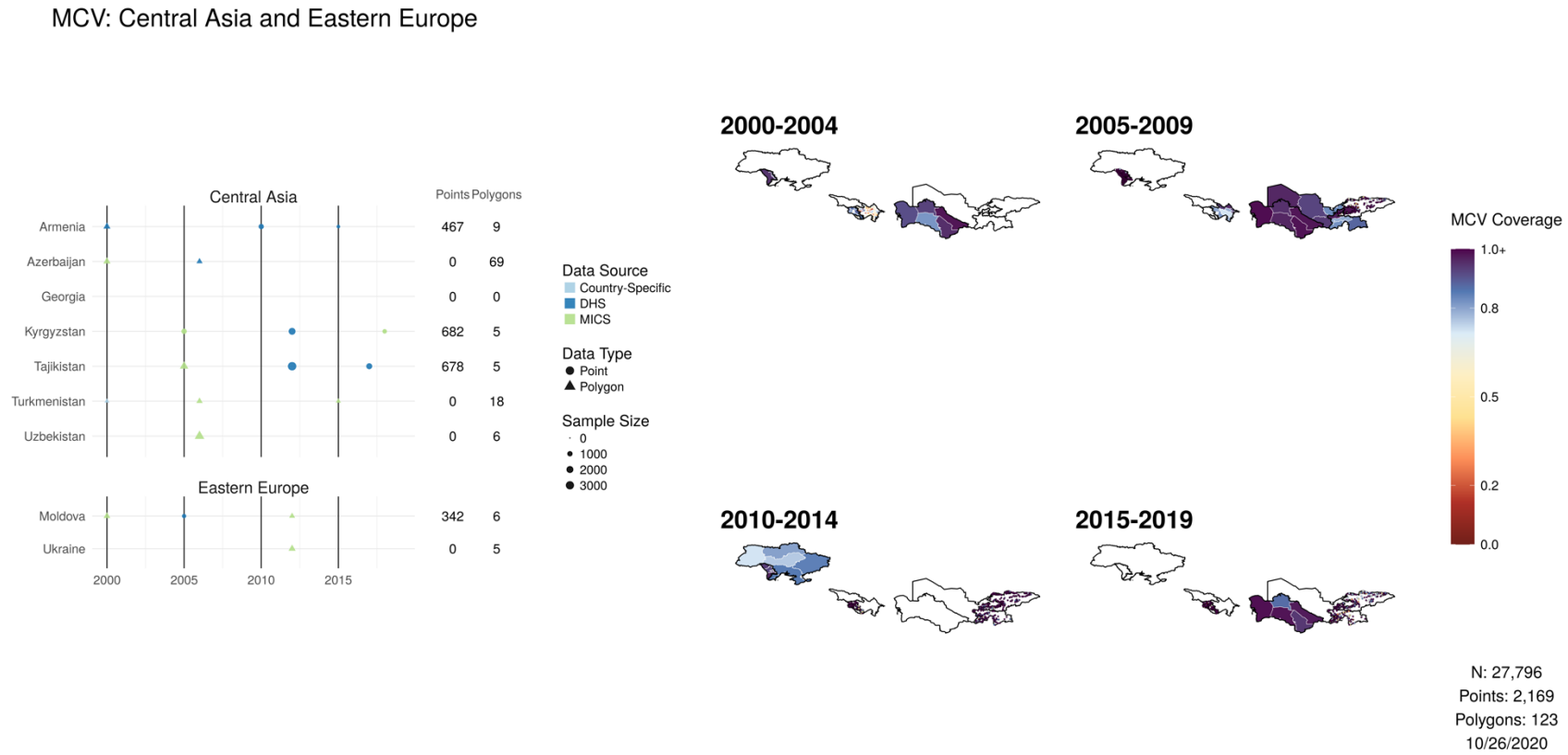
Supplementary Fig. 1: Household surveys included in modelling
All data are shown mapped to their corresponding geographic area. This is prior to candidate points being generated for areal data. The sample size represents the number of individual children included in the underlying microdata record for each survey. From 2000 to 2019, MCV1 data availability is shown for **a)** Caribbean, **b)** Central America, **c)** Central Asia and Eastern Europe, **d)** Central sub-Saharan Africa, **e)** East Asia, **f)** Eastern sub-Saharan Africa, **g)** North Africa and Middle East, **h)** Oceania, **i)** South America (Andean), **j)** South America (Tropical), **k)** South Asia, **l)** Southern sub-Saharan Africa, and **m)** Western sub-Saharan Africa. Countries excluded from this analysis due to lack of reliable survey data are shown in grey.



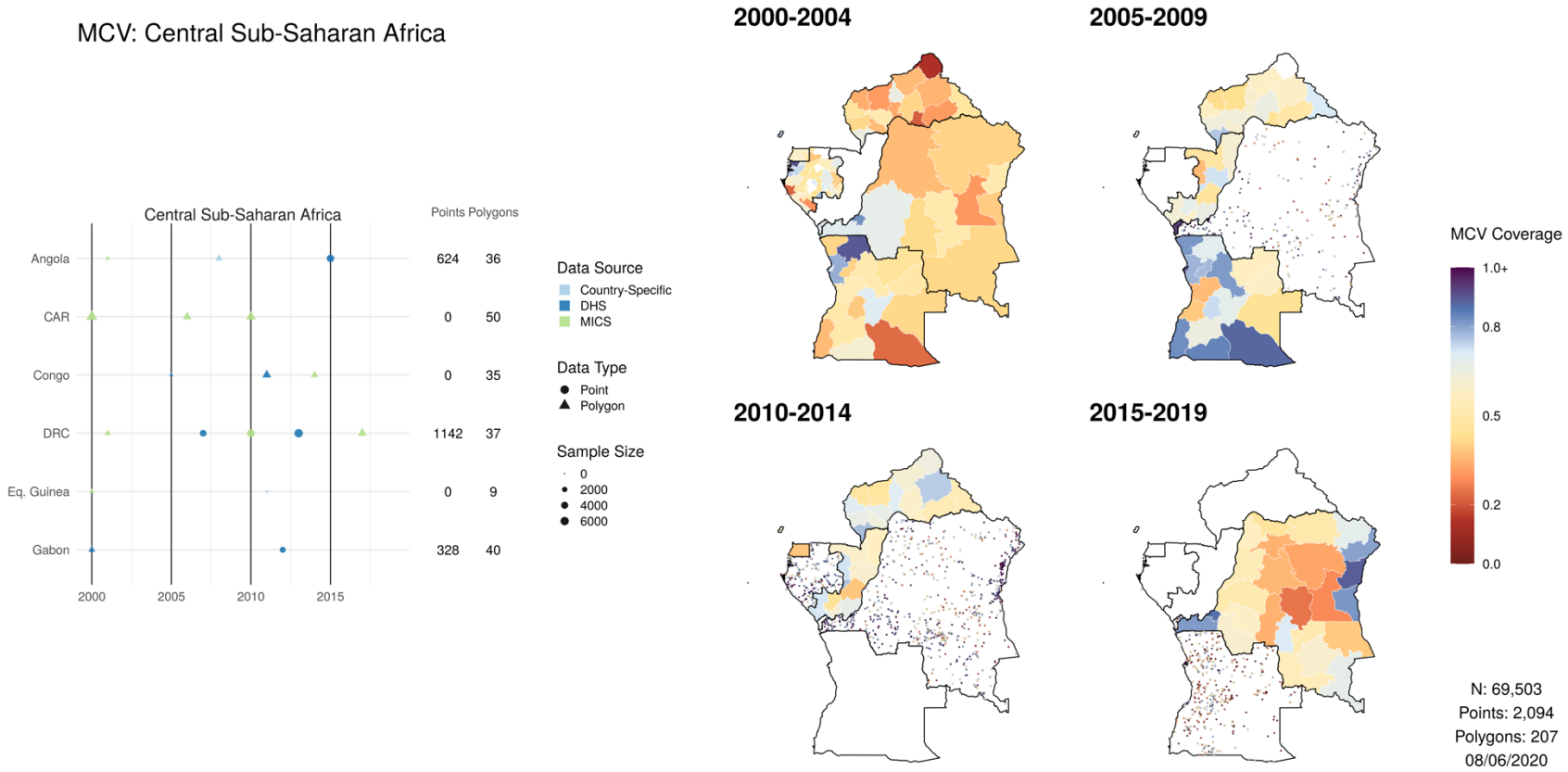
Supplementary Fig. 1a. Caribbean



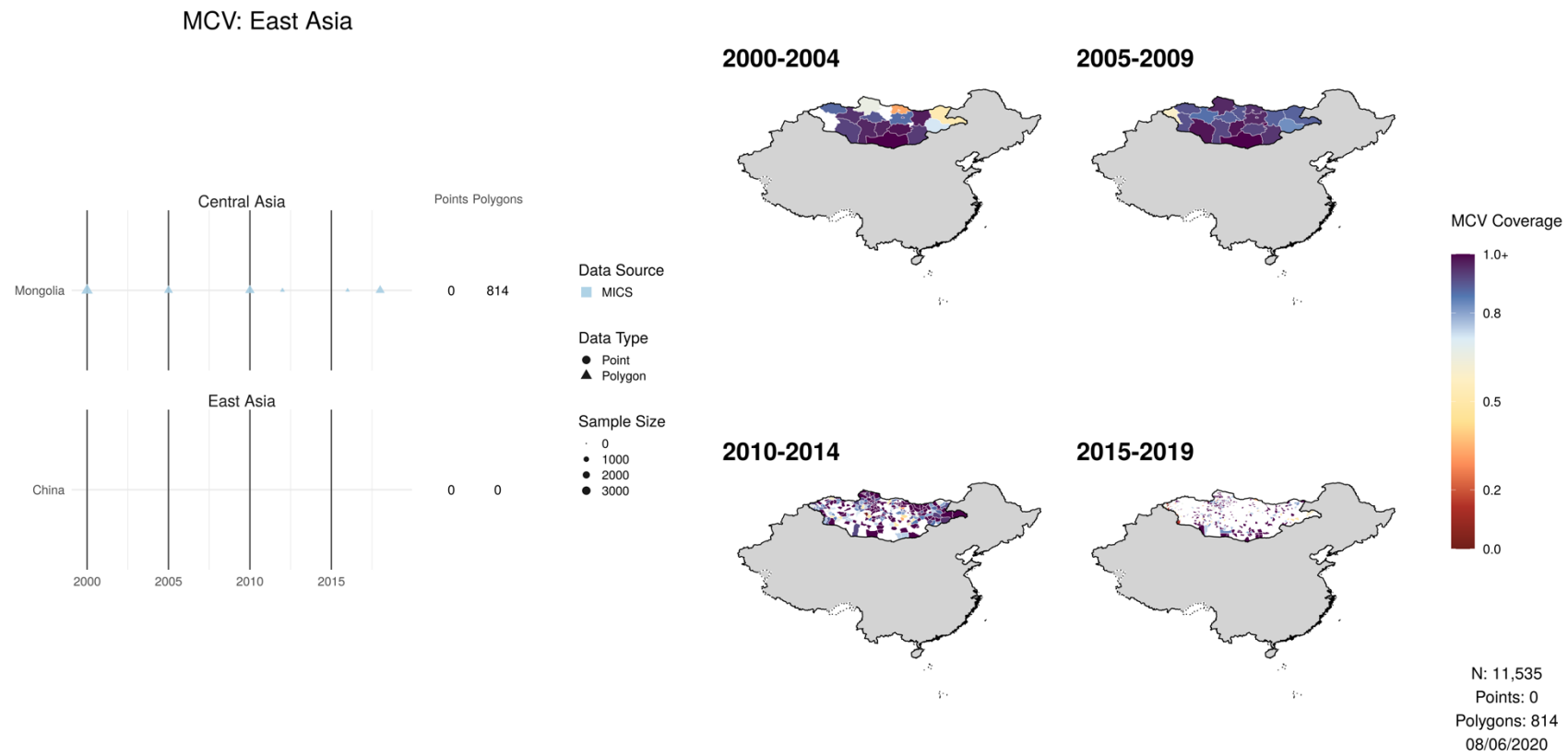
Supplementary Fig. 1b. Central America



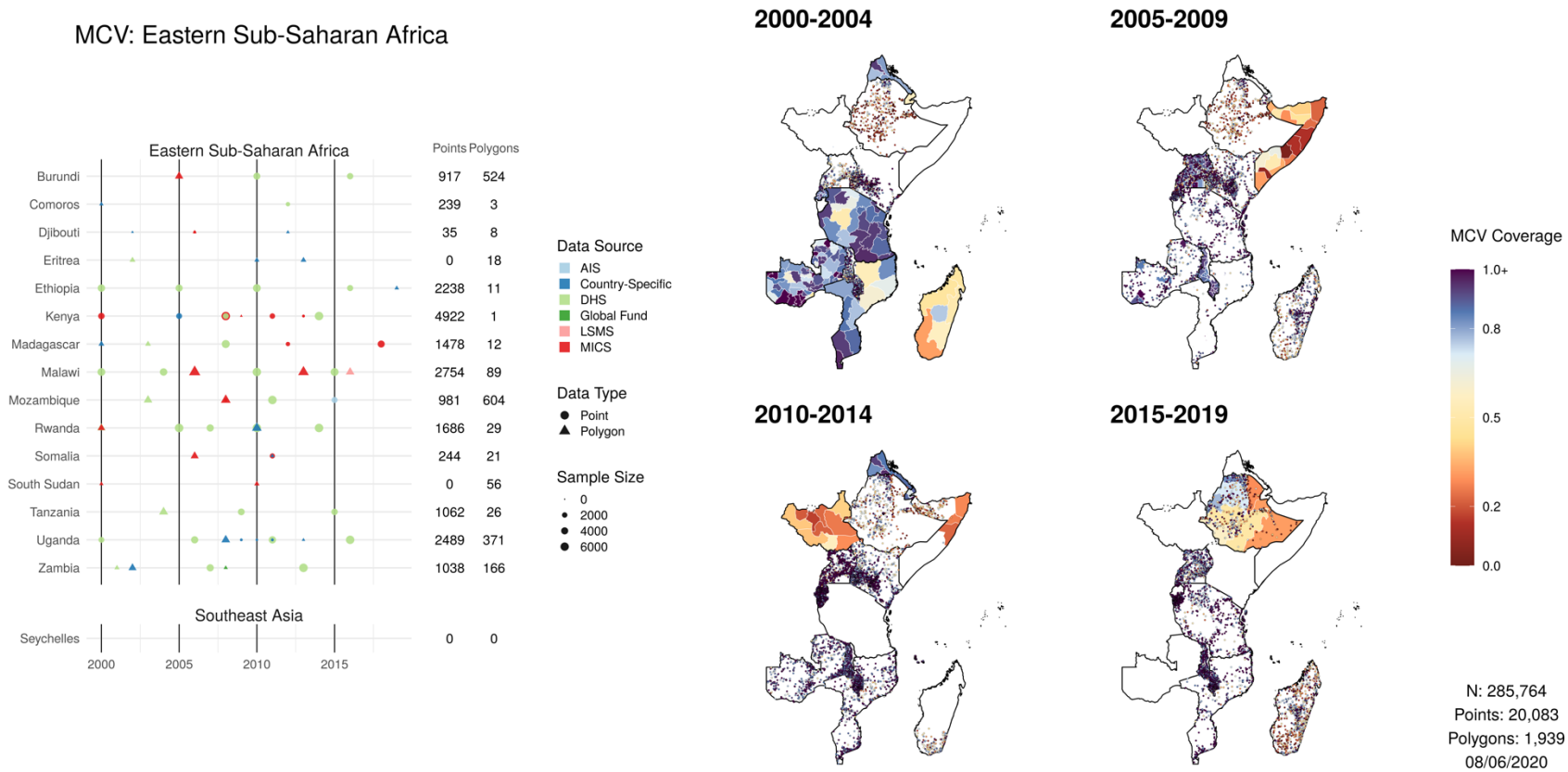
Supplementary Fig. 1c. Central Asia and Eastern Europe



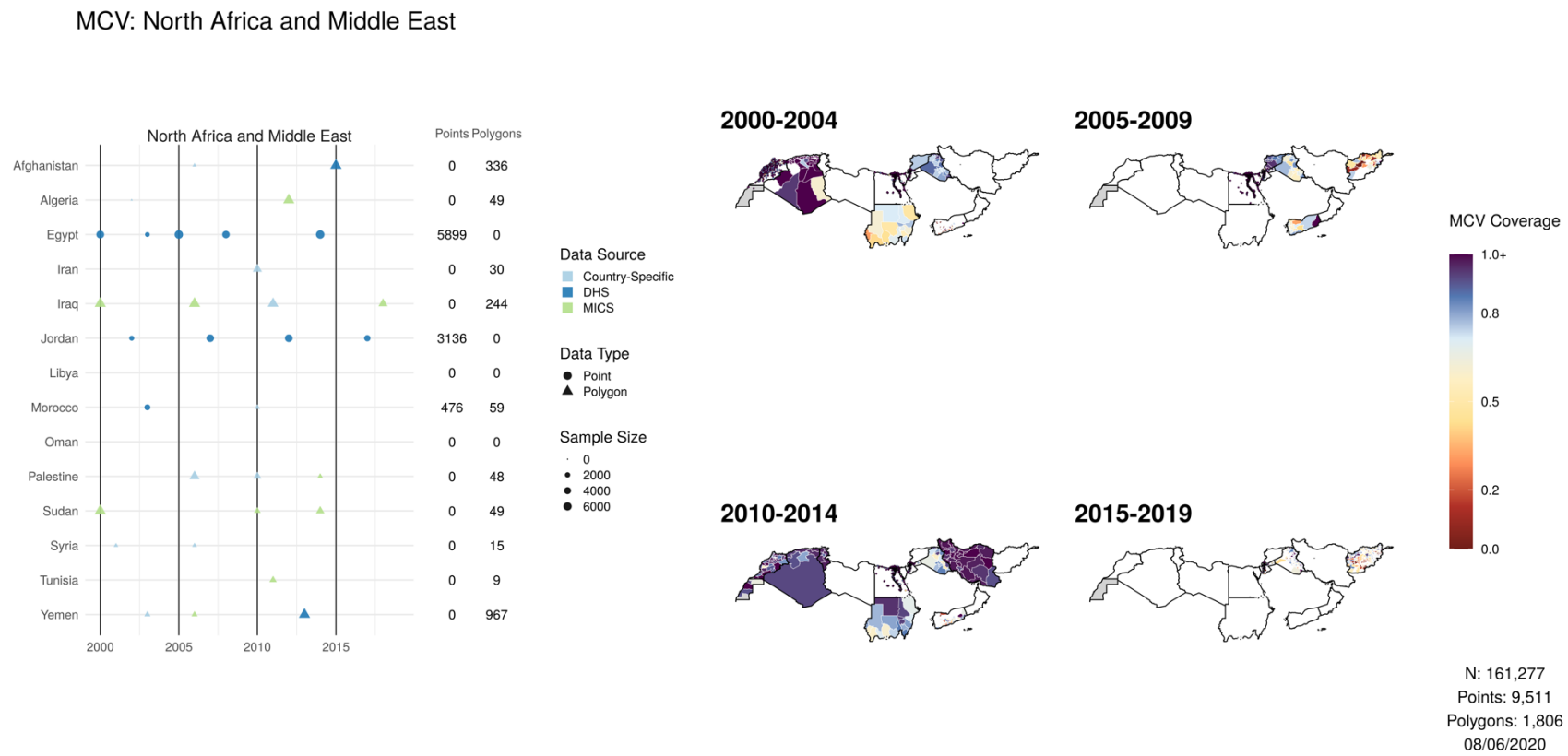
Supplementary Fig. 1d. Central Sub-Saharan Africa



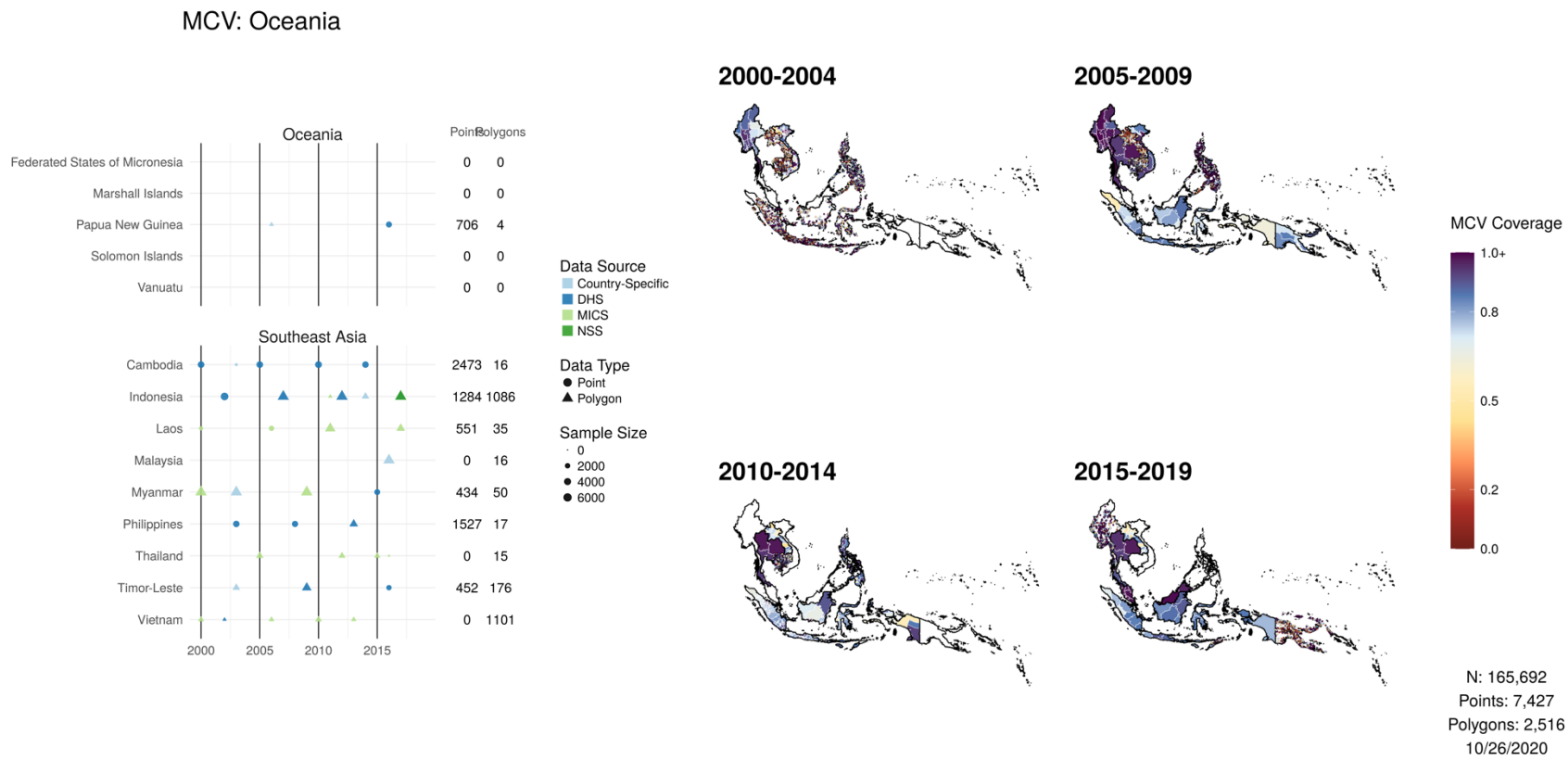
Supplementary Fig. 1e. East Asia



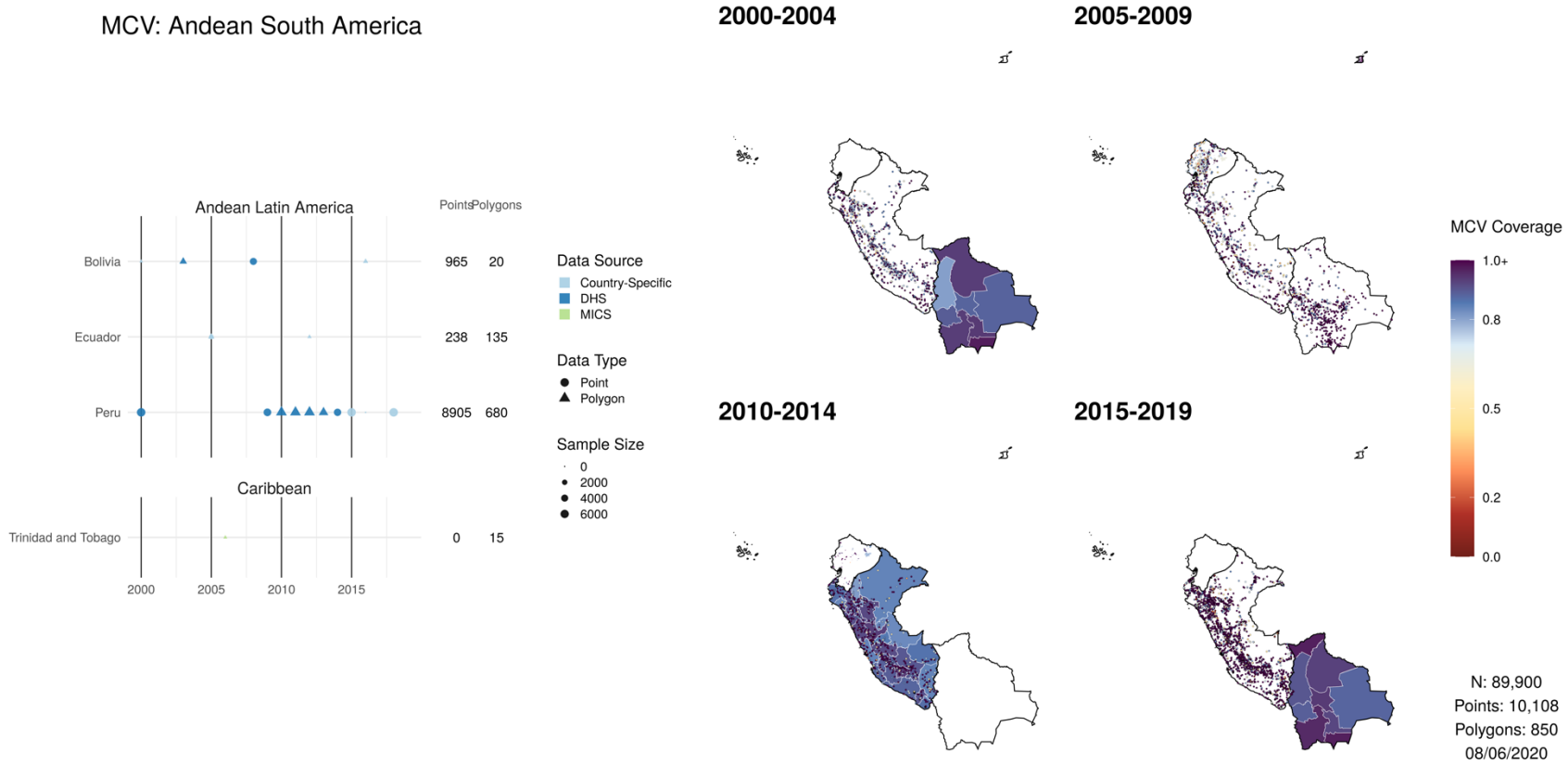
Supplementary Fig. 1f. Eastern Sub-Saharan Africa



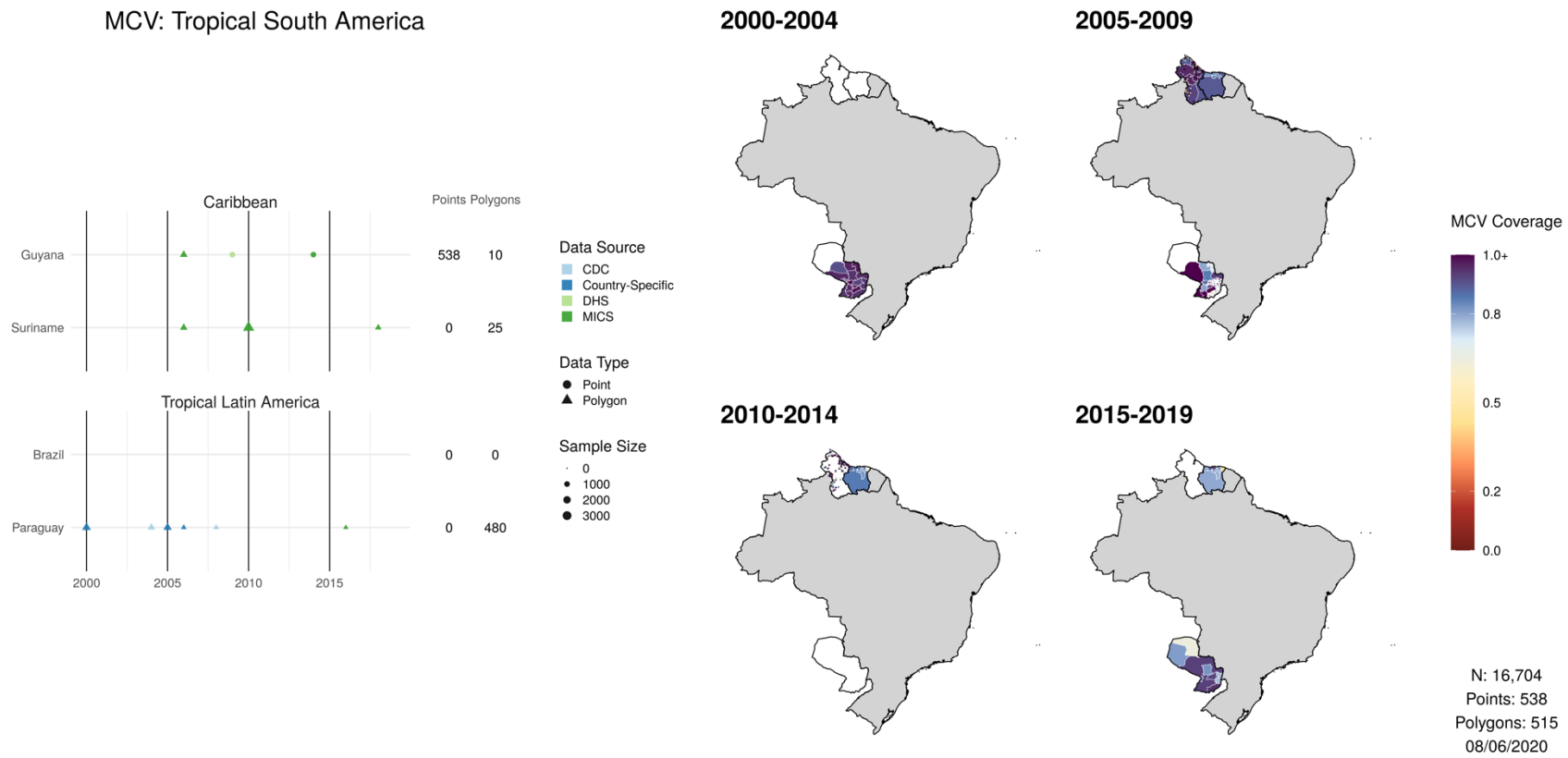
Supplementary Fig. 1g. North Africa and Middle East



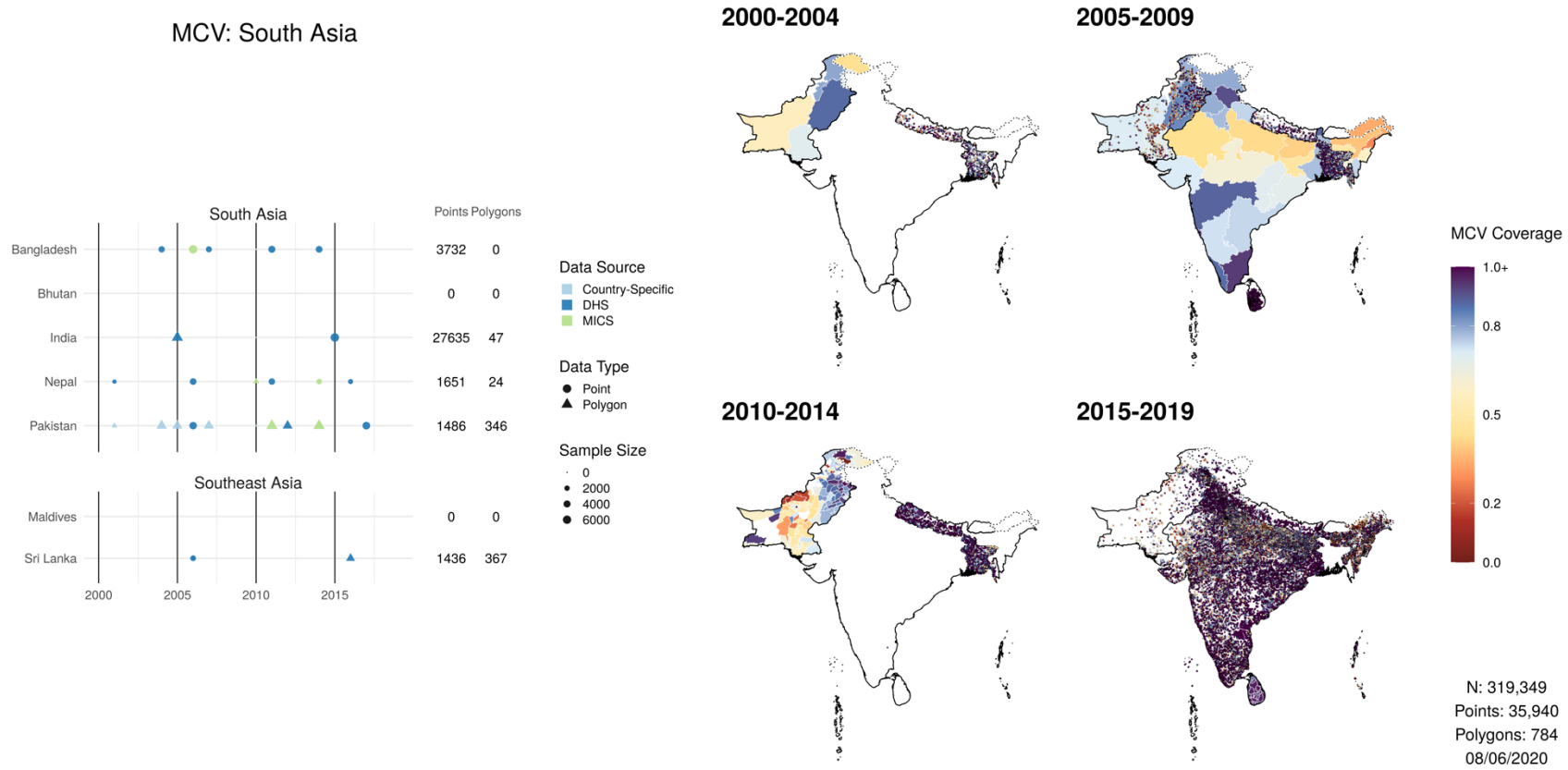
Supplementary Fig. 1h. Oceania



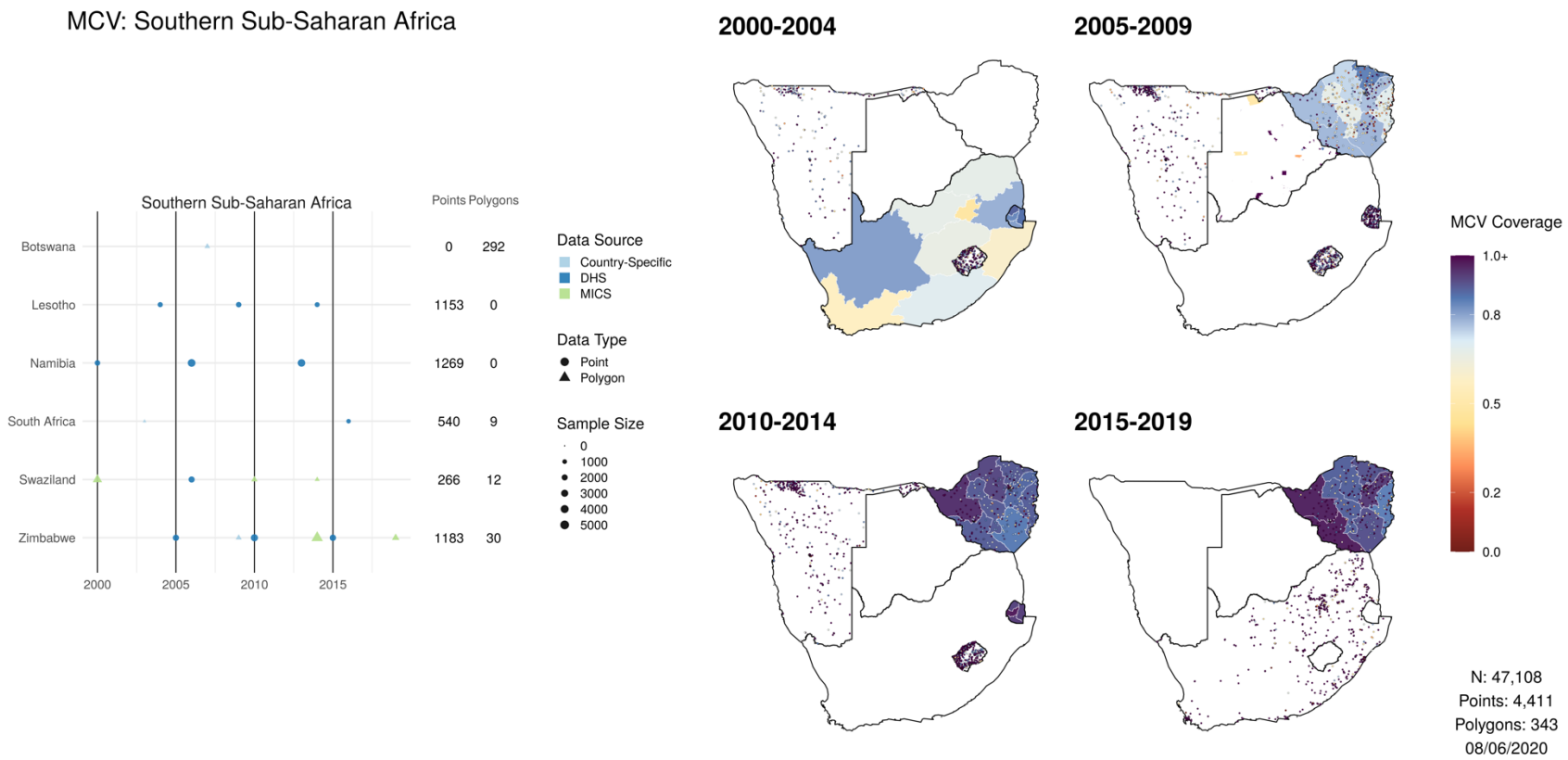
Supplementary Fig. 1i. Andean South America



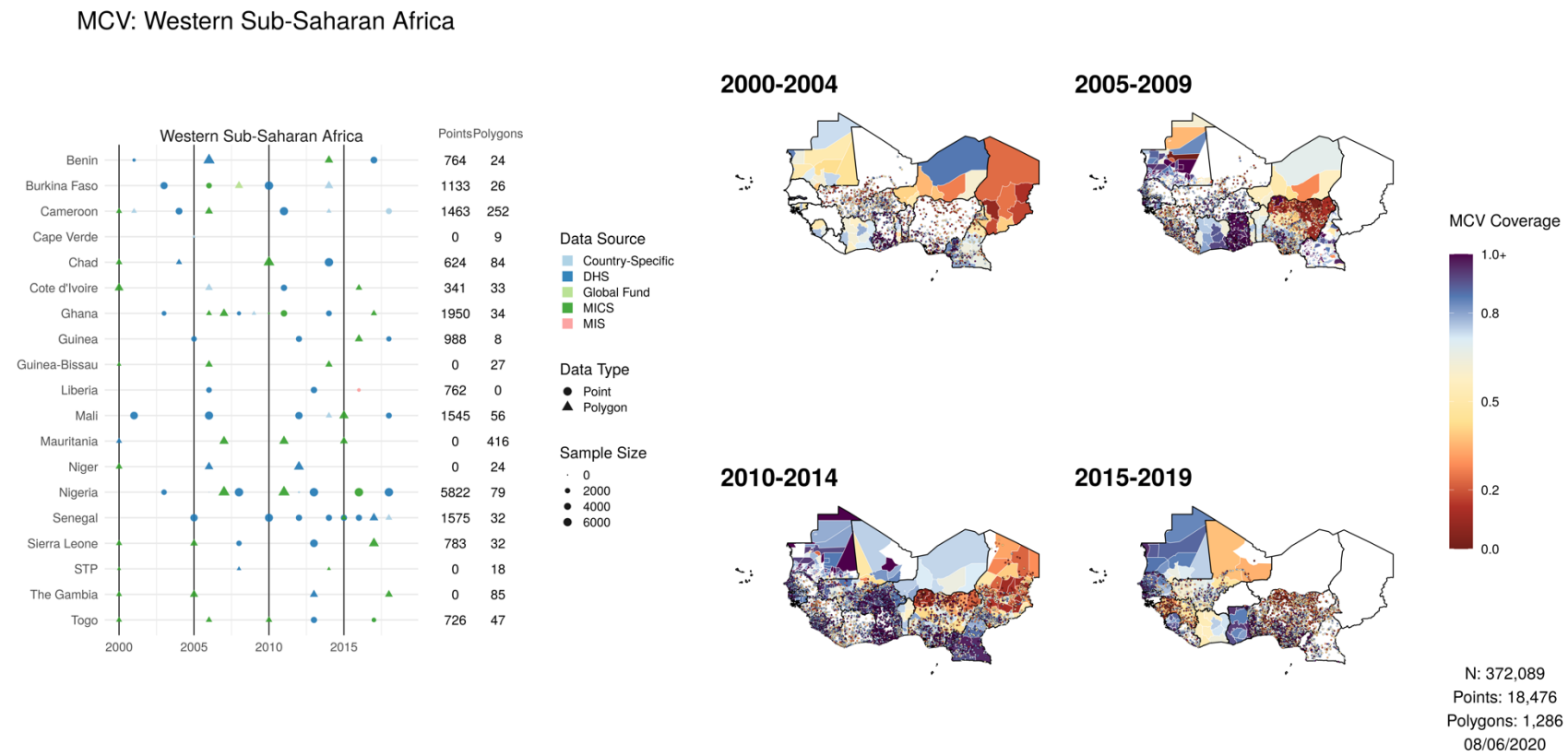
Supplementary Fig. 1j. Tropical South America



Supplementary Fig. 1k. South Asia

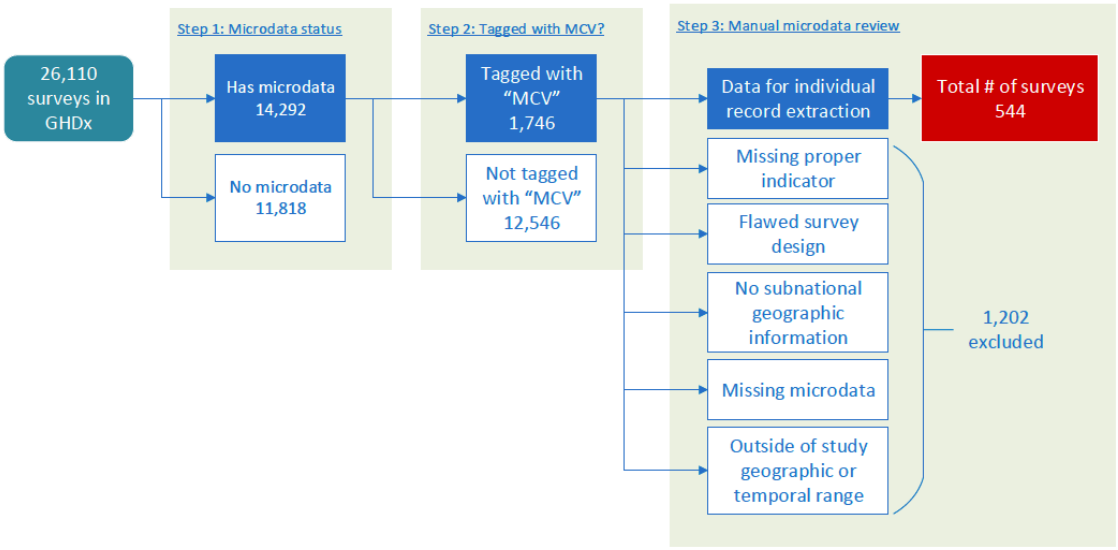


Supplementary Fig. 11. Southern Sub-Saharan Africa

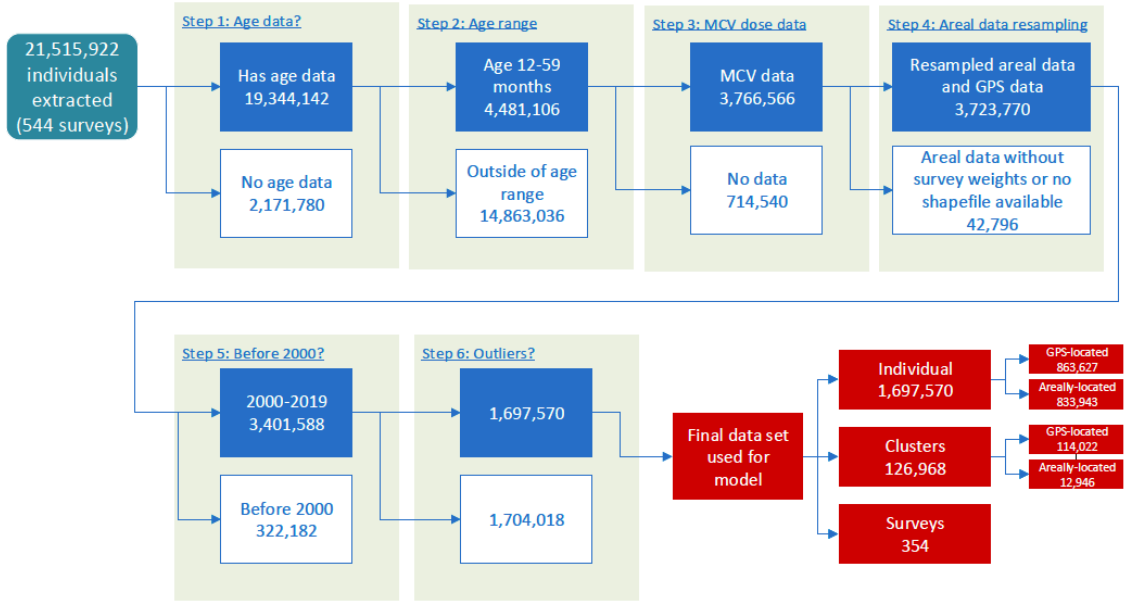


Supplementary Fig. 1m. Western Sub-Saharan Africa

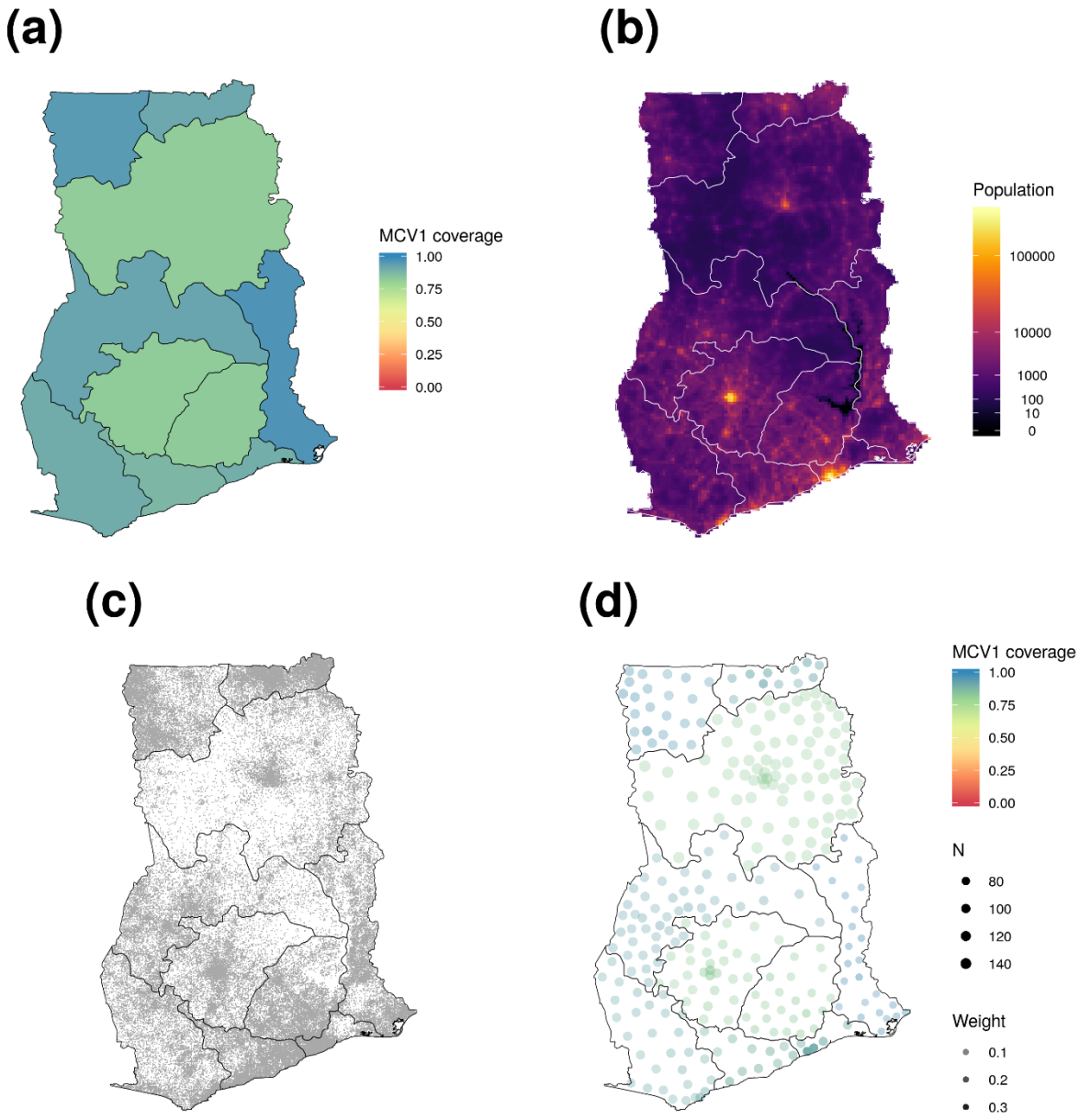
a.



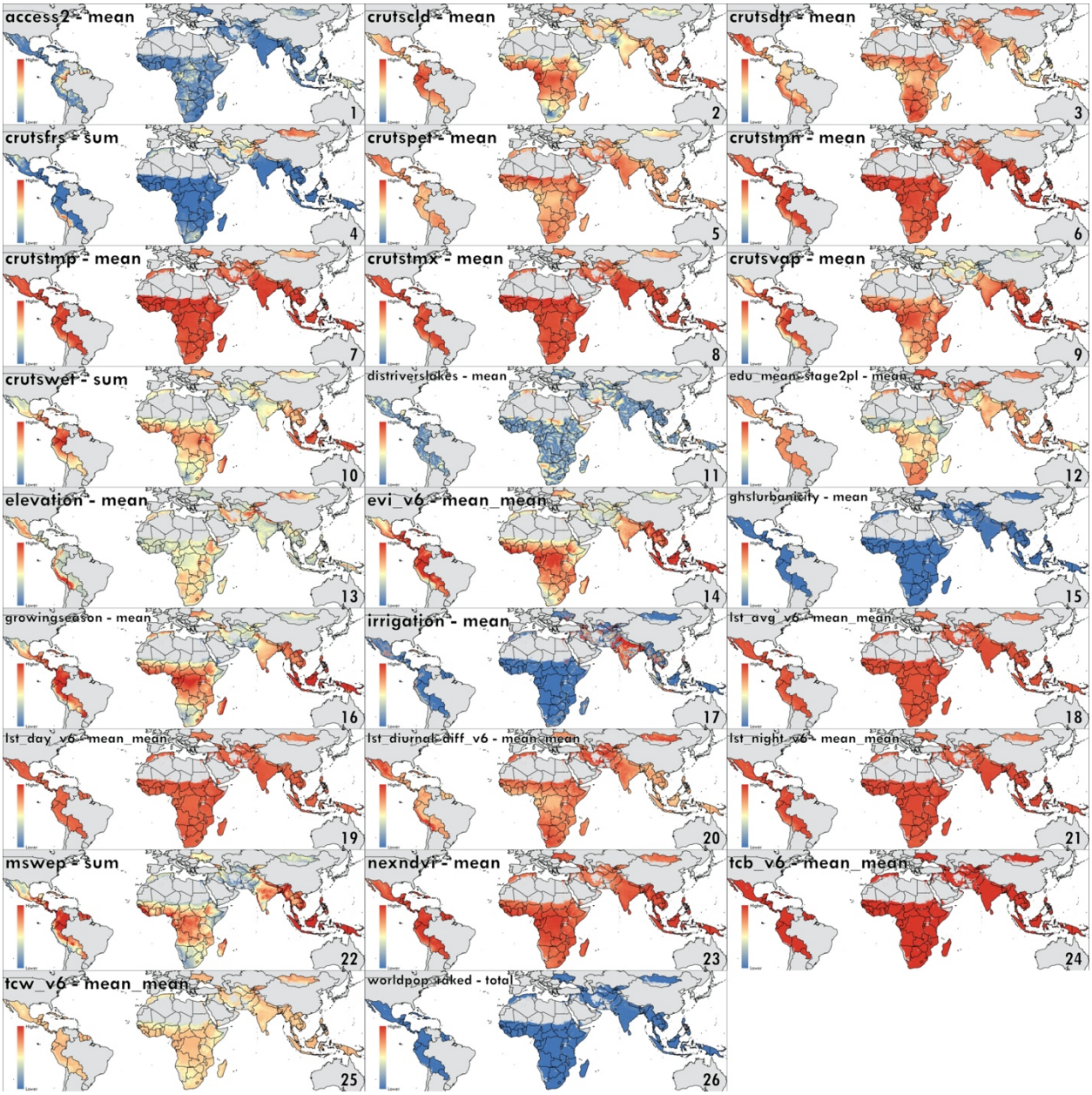
b.



Supplementary Fig. 2: Data inclusion flow chart
Survey identification from the GHDx and data loss during cleaning and processing is described below.[11] To be included in final analyses, data had to be within the countries included and within temporal range of the study, meet survey design standards, and contain individual-level microdata on age, MCV1 coverage, and subnational geographic location. Panel a indicates survey-level identification criteria and panel b indicates individual-level details after survey identification.

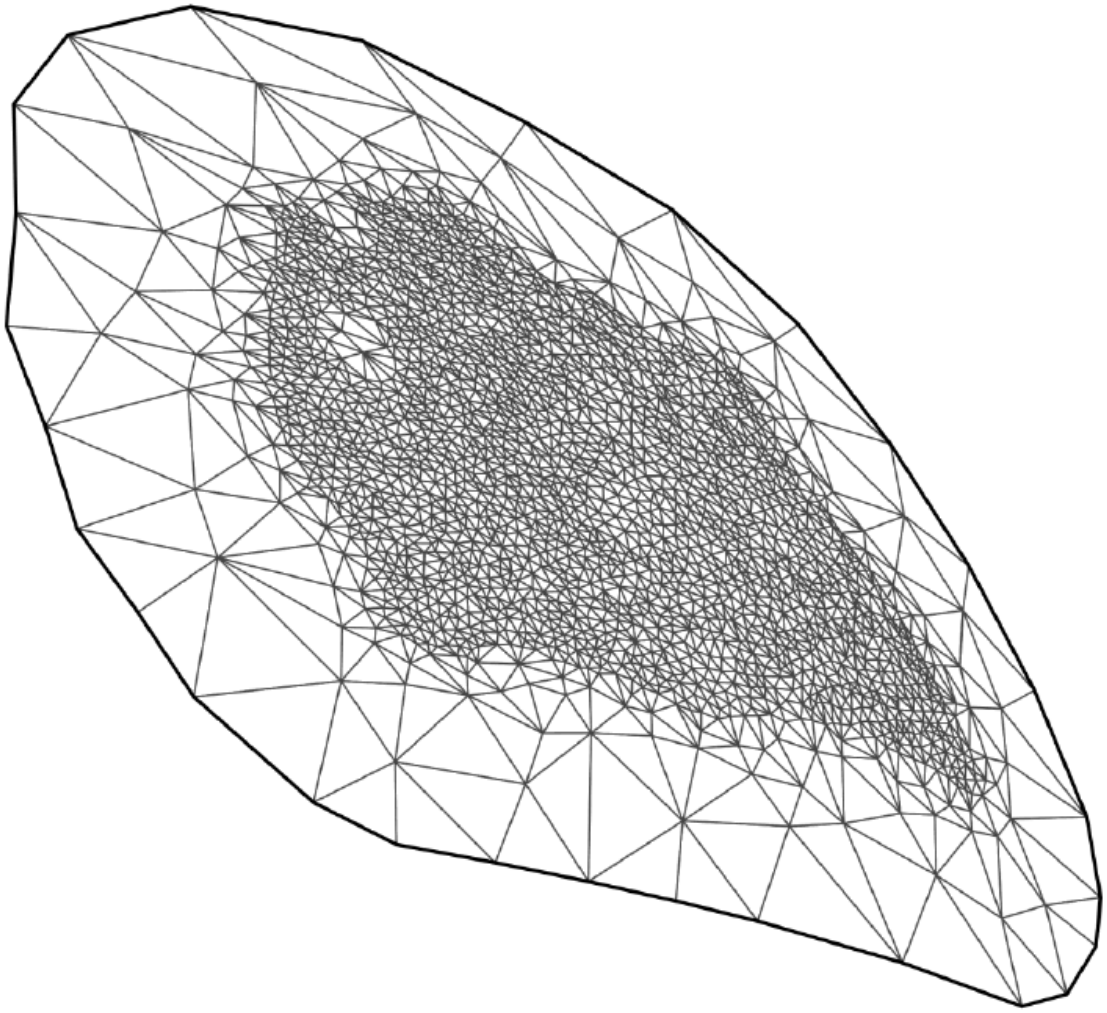


Supplementary Fig. 3: Areal data spatial resampling
Areal data was resampled for inclusion in the geospatial models using k-means clustering and underlying population weights, via weighted survey data estimates of MCV1 coverage for each areal unit in a given country-survey-year (panel a), population surface from WorldPop used during the resampling process (panel b), 10,000 randomly sampled points proportional to the underlying population weights of panel b (panel c), and weighted integration points following k-means clustering to be used in the geospatial model (panel d).



Supplementary Fig. 4: Geospatial covariates used in modelling
Twenty-six candidate geospatial layers of covariates possibly related to MCV1 coverage were selected for use in the stacked generalisation modelling process via a variance inflation factor selection algorithm per region. Individual covariates are cited in Supplementary Table 6. Covariates include the following, and are shown in 2019 or the most recent year available: access to roads [*access2*], cloud cover percentage [*crutscld*], mean diurnal temperature range [*crutsdtr*], frost day frequency [*crutsfrs*], mean potential evapotranspiration per day per month [crutspet], average daily minimum temperature [*crutstmn*], average daily mean temperature [*crutstmp*], average daily maximum temperature [*crutstmx*], mean vapour pressure [*crutsvap*], monthly wet day frequency [*crutswet*], distance from rivers or lakes [*distriverslakes*],

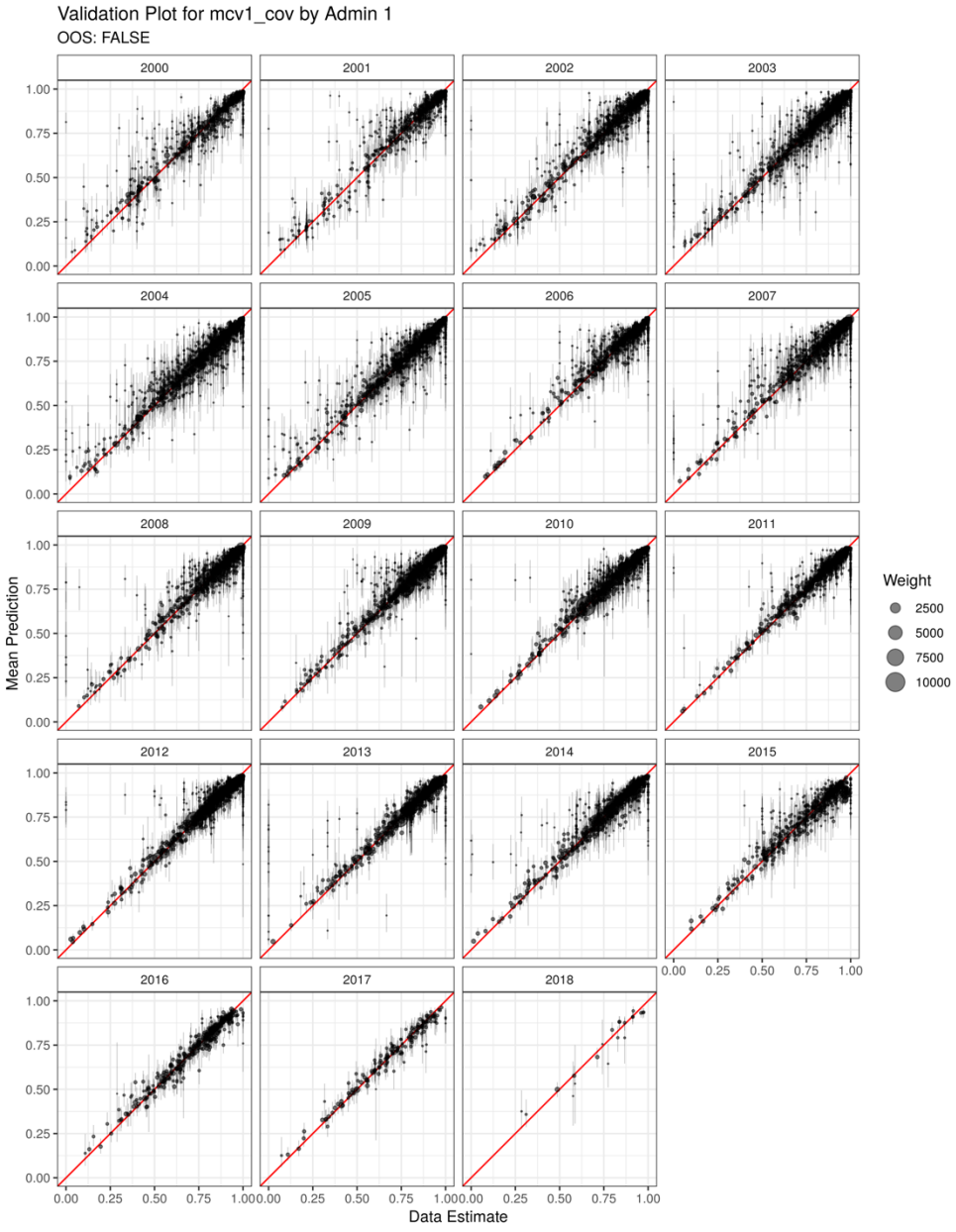
mean years of education among 15–49 year-old females (maternal education) [*edu-mean-stage2pl*], elevation [*elevation*], enhanced vegetation index [*evi_v6*], urban or rural [*ghsurbanicity*], length of growing season [*growingseason*], irrigation [*irrigation*], average land surface temperature [*lst_av_v6*], daytime land surface temperature [*lst_day_v6*], difference between daytime and nighttime land surface temperature [*lst_diurnal_v6*], nighttime land surface temperature [*lst_night_v6*], multi-source weighted-ensemble precipitation [*mswep*], normalised difference vegetation index [*nexndvi*], tasseled-cap brightness [*tcb_v6*], tasseled-cap wetness [*tcw_v6*], and total population [*worldpop_raked*]. Pixels that are grey in colour are either not included in the analysis, or have been classified by being "barren or sparsely vegetated" or had fewer than 10 people per 1 × 1-km pixel.[15,26]



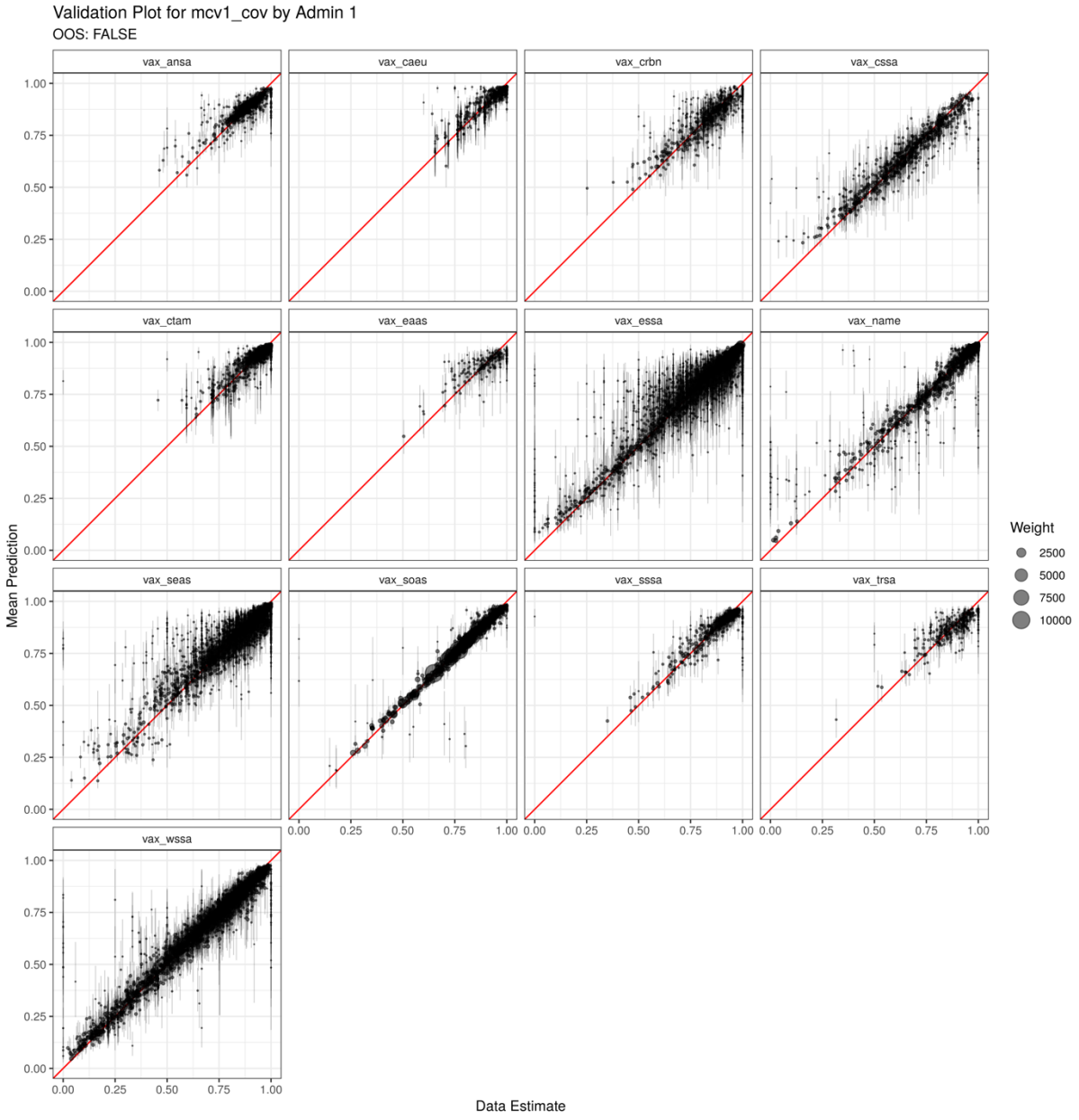
Supplementary Fig. 5: Example of finite spatial mesh

For the Southern sub-Saharan Africa region, the fine-scale mesh over land in the modelling region and the coarser buffer region are shown.

Supplementary Figs 6–7: First administrative level in-sample validation plots
For each plot, the survey data and mean posterior prediction of coverage are compared. The size per dot is proportional to the sample size in the underlying data. Estimates are shown by region and year. Since there were only data through 2018, the years included only span through 2018. Regions are labelled as the following: Andean South America [*vax_ansa*], Central Asia Eastern Europe [*vax_caeu*], Caribbean [*vax_crbn]*, Central sub-Saharan Africa [*vax_cssa*], Central America [*vax_ctam*], East Asia [*vax_eaas*], East sub-Saharan Africa [*vax_essa*], North Africa and Middle East [*vax_name*], South East Asia, [*vax_seas*], South Asia [*vax_soas*], Southern sub-Saharan Africa [*vax_sssa*], Tropical South America [*vax_trsa*], and Western sub-Saharan Africa [*vax_wssa*].

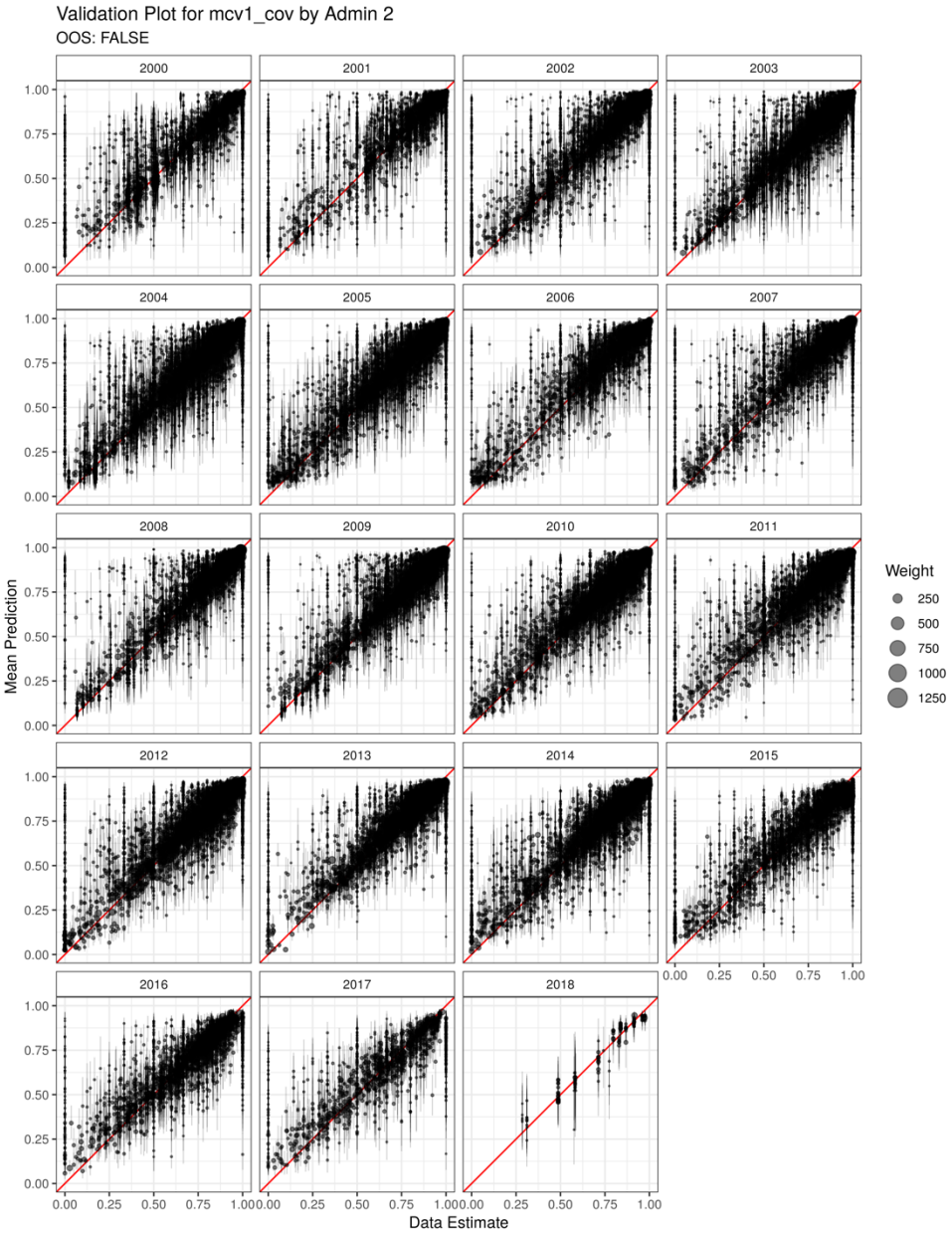


Supplementary Fig. 6: First administrative level, in-sample validation plot, by year

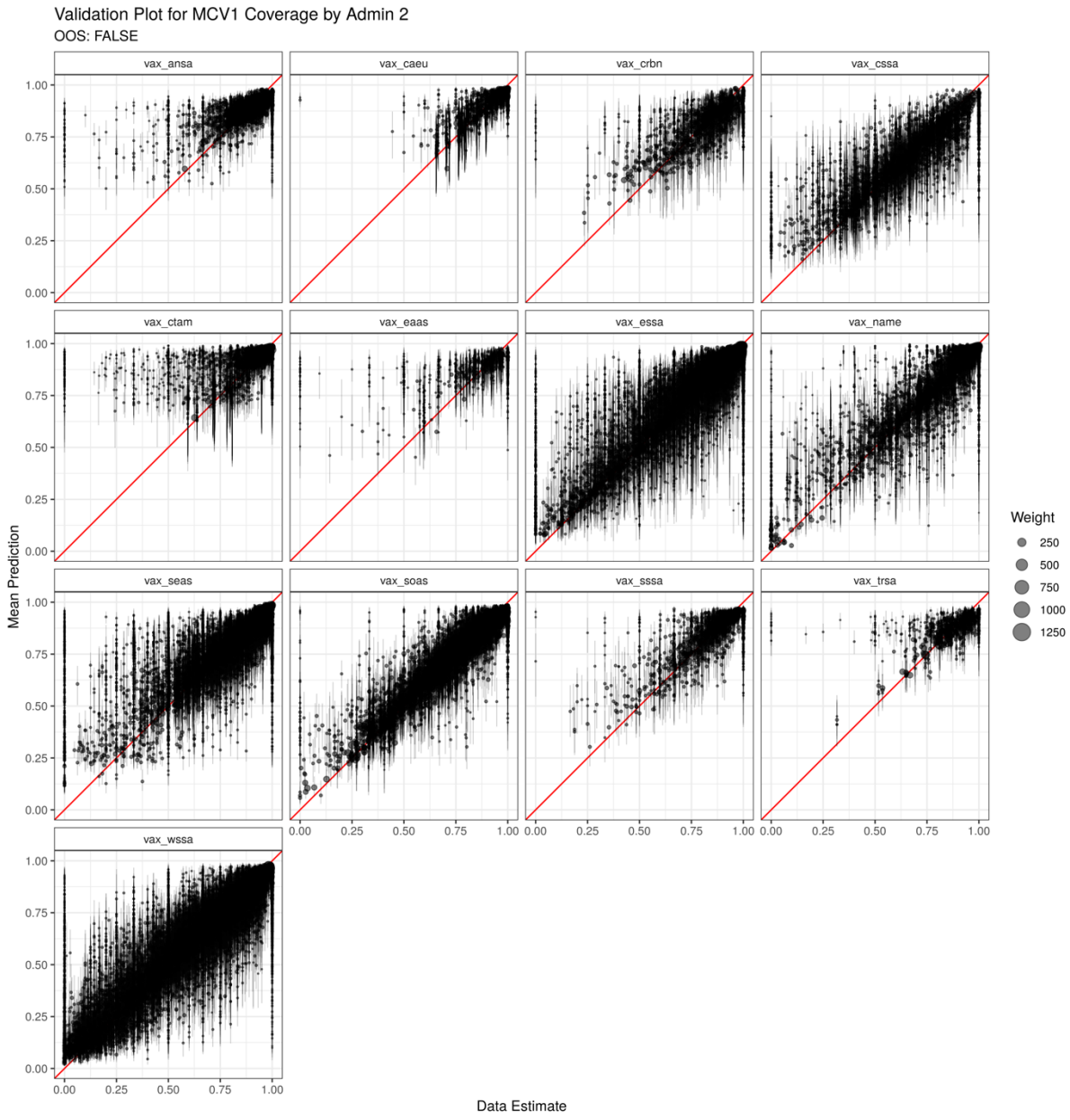


Supplementary Fig. 7: First administrative level, in-sample validation plot, by region

Supplementary Figs 8–9: Second administrative level in-sample validation plots
For each plot, the survey data and mean posterior prediction of coverage are compared. The size per dot is proportional to the sample size in the underlying data. Estimates are shown by region and year. Since there were only data through 2018, the years included only span through 2018. Regions are labelled as the following: Andean South America [*vax_ansa*], Central Asia Eastern Europe [*vax_caeu*], Caribbean [*vax_crbn]*, Central sub-Saharan Africa [*vax_cssa*], Central America [*vax_ctam*], East Asia [*vax_eaas*], East sub-Saharan Africa [*vax_essa*], North Africa and Middle East [*vax_name*], South East Asia, [*vax_seas*], South Asia [*vax_soas*], Southern sub-Saharan Africa [*vax_sssa*], Tropical South America [*vax_trsa*], and Western sub-Saharan Africa [*vax_wssa*].

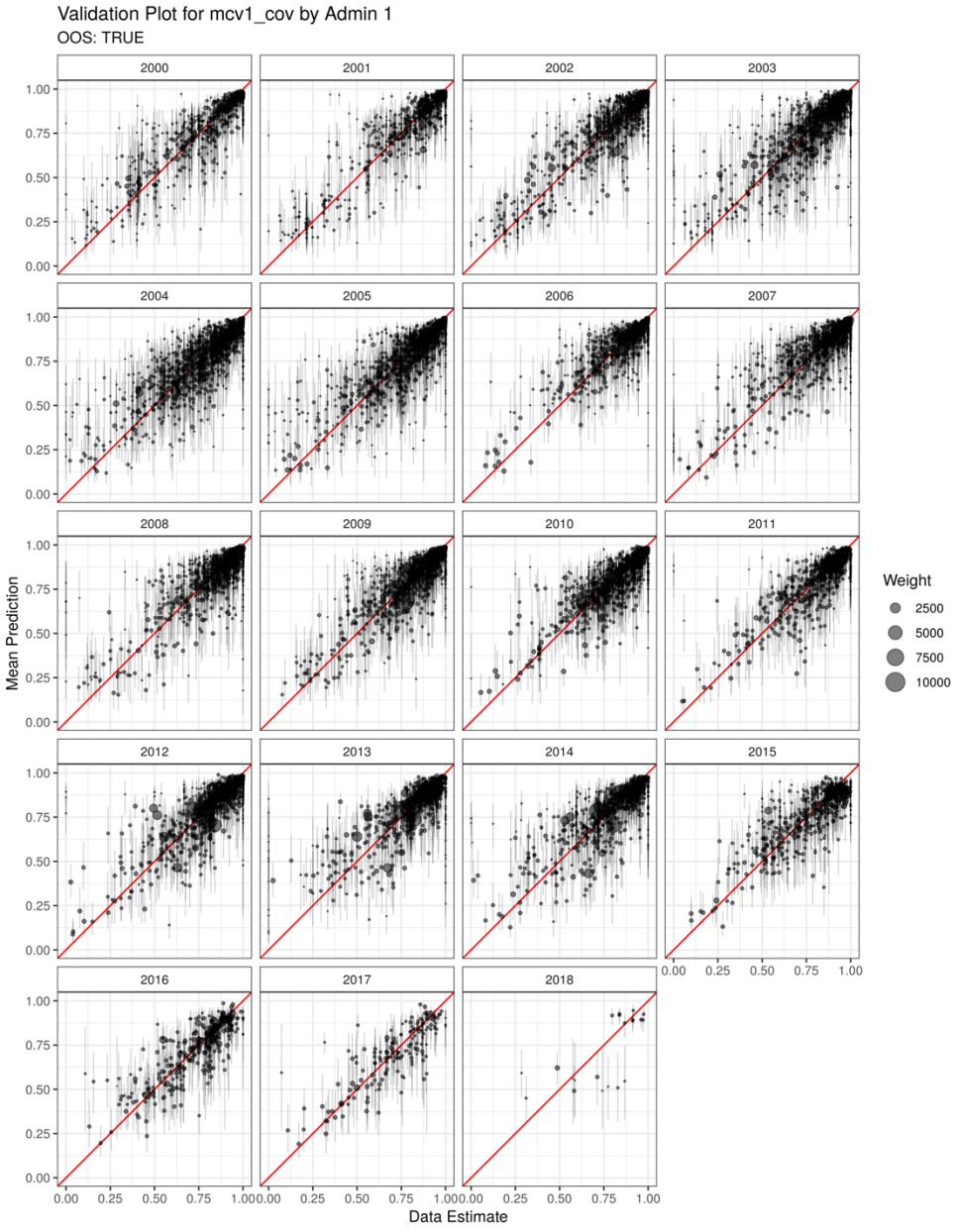


Supplementary Fig. 8: Second administrative level, in-sample validation plot, by year

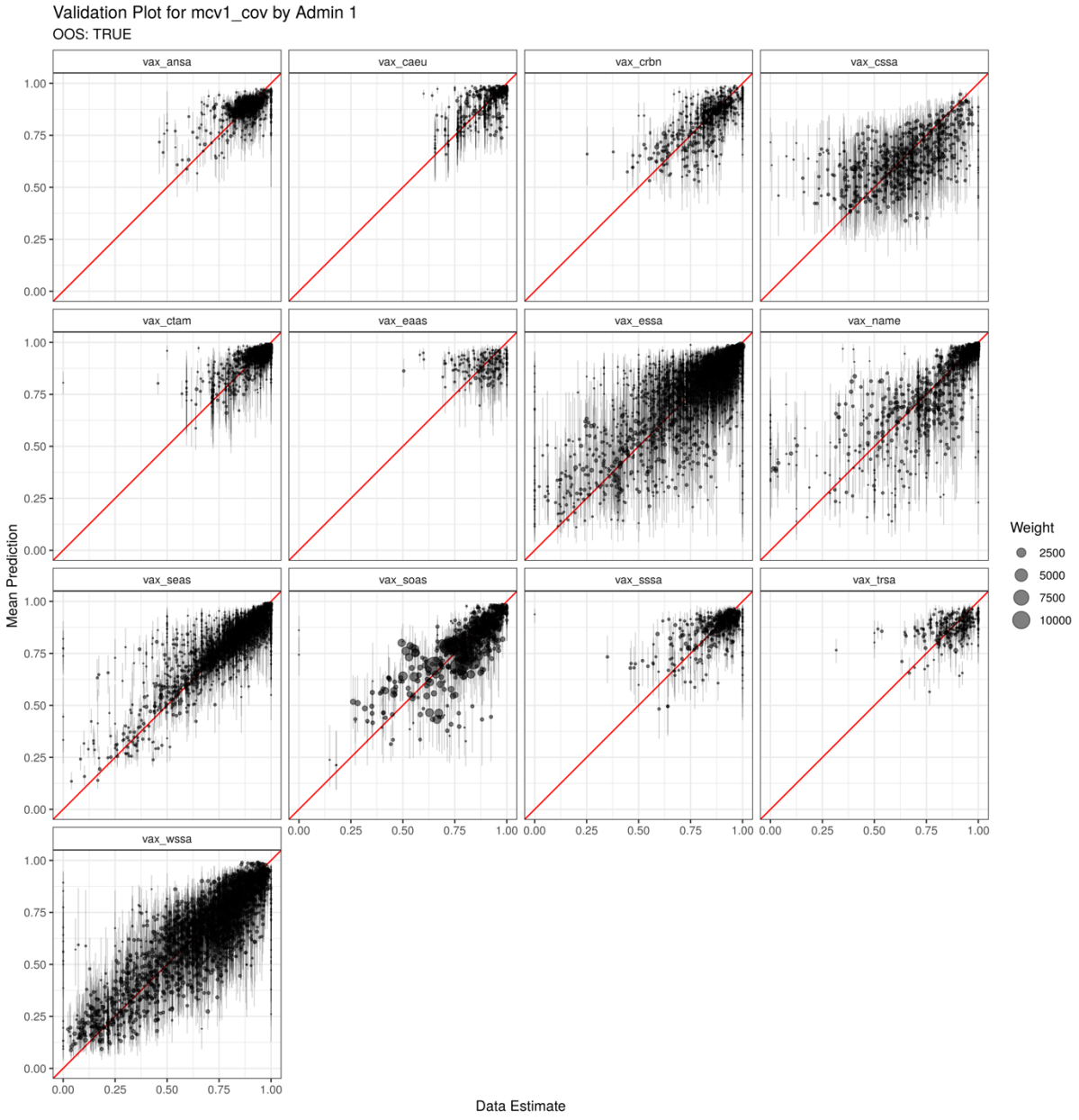


Supplementary Fig. 9: Second administrative level, in-sample validation plot, by region

Supplementary Figs 10–11: First administrative level out-of-sample validation plots
For each plot, the survey data and mean posterior prediction of coverage are compared. The size per dot is proportional to the sample size in the underlying data. Estimates are shown by region and year. Since there were only data through 2018, the years included only span through 2018. Regions are labelled as the following: Andean South America [*vax_ansa*], Central Asia Eastern Europe [*vax_caeu*], Caribbean [*vax_crbn]*, Central sub-Saharan Africa [*vax_cssa*], Central America [*vax_ctam*], East Asia [*vax_eaas*], East sub-Saharan Africa [*vax_essa*], North Africa and Middle East [*vax_name*], South East Asia, [*vax_seas*], South Asia [*vax_soas*], Southern sub-Saharan Africa [*vax_sssa*], Tropical South America [*vax_trsa*], and Western sub-Saharan Africa [*vax_wssa*].



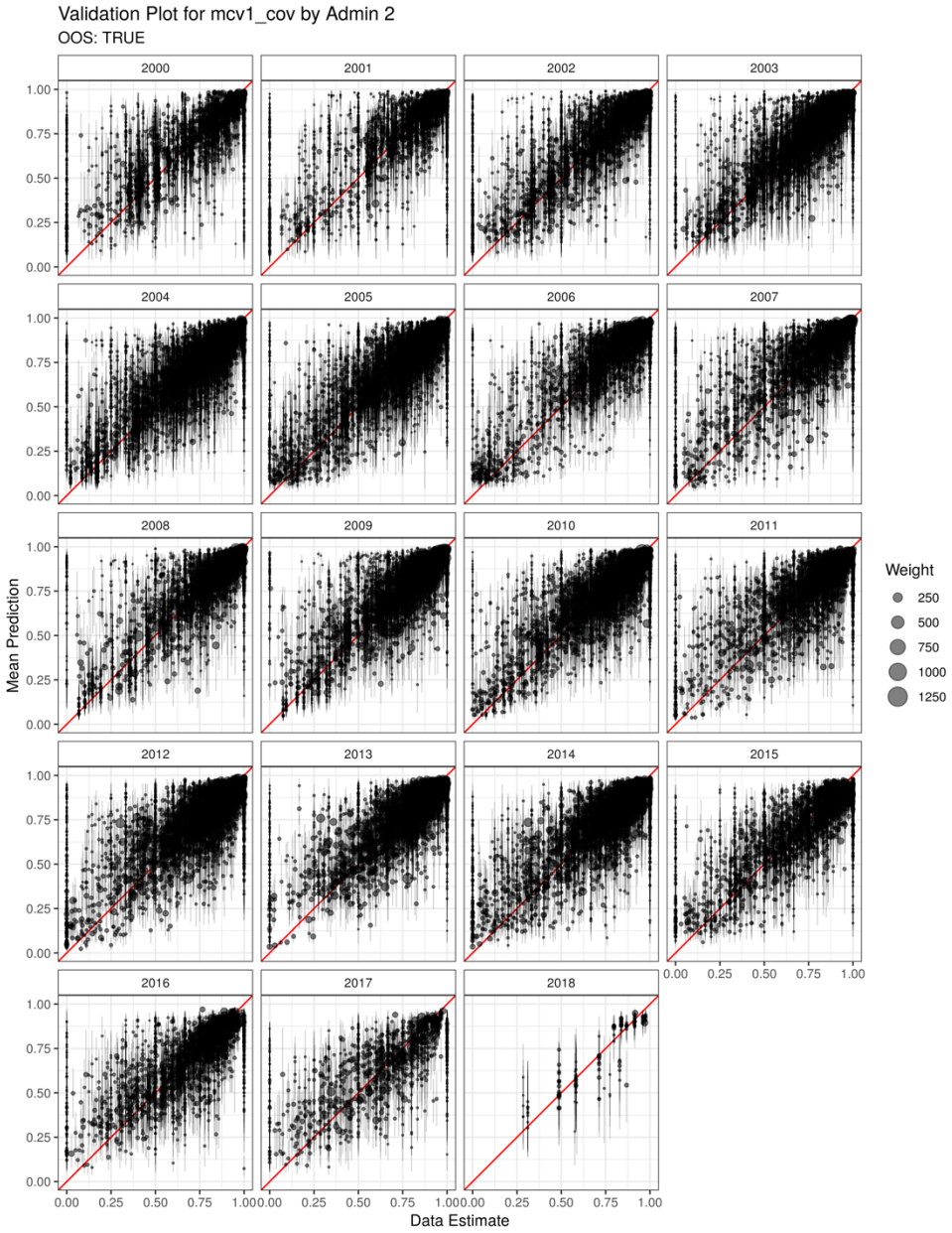
Supplementary Fig. 10: First administrative level, out-of-sample validation plot, by year



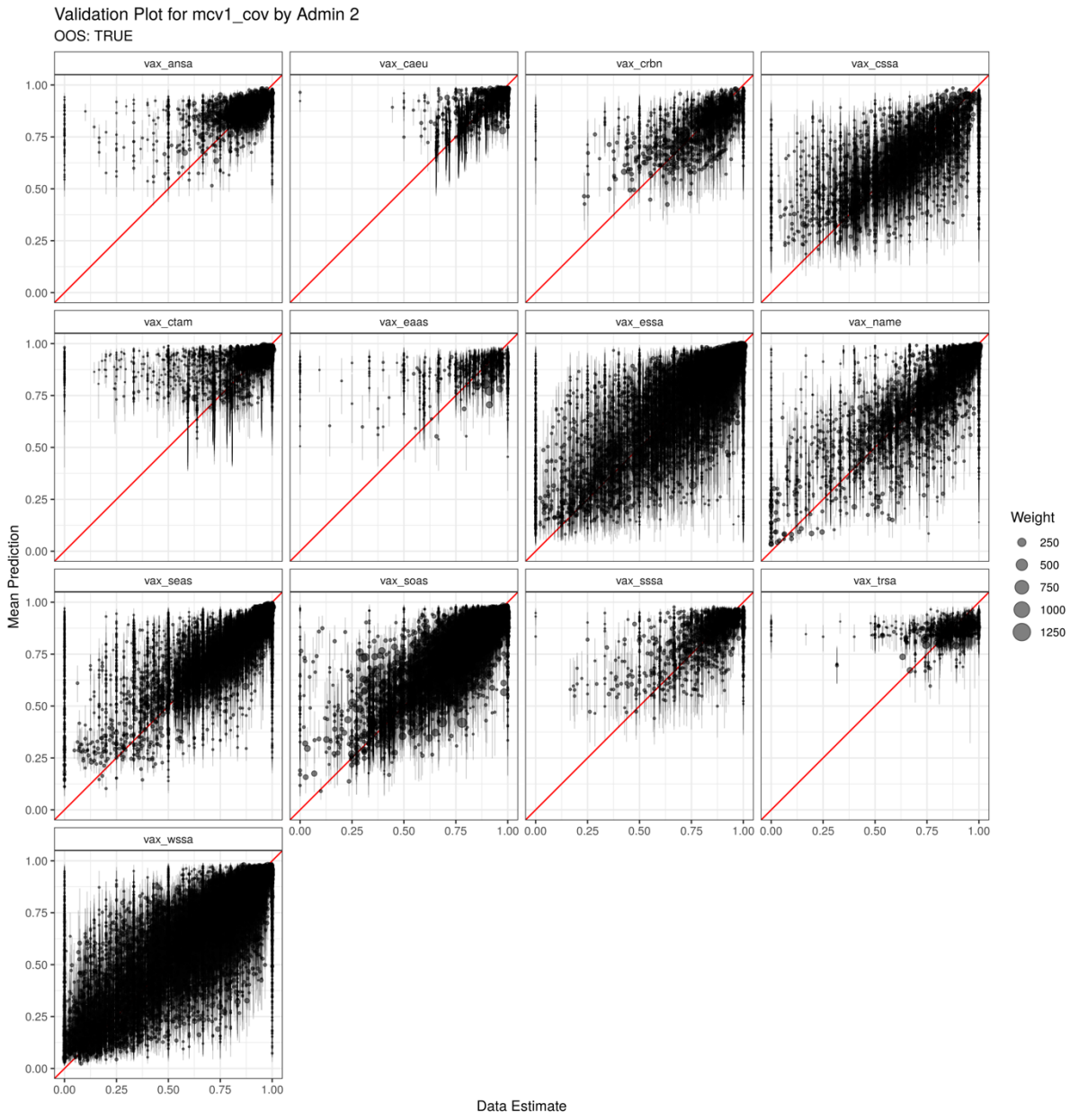
Supplementary Fig. 11: First administrative level, out-of-sample validation plot, by region

Supplementary Figs 12–13: Second administrative level out-of-sample validation plots

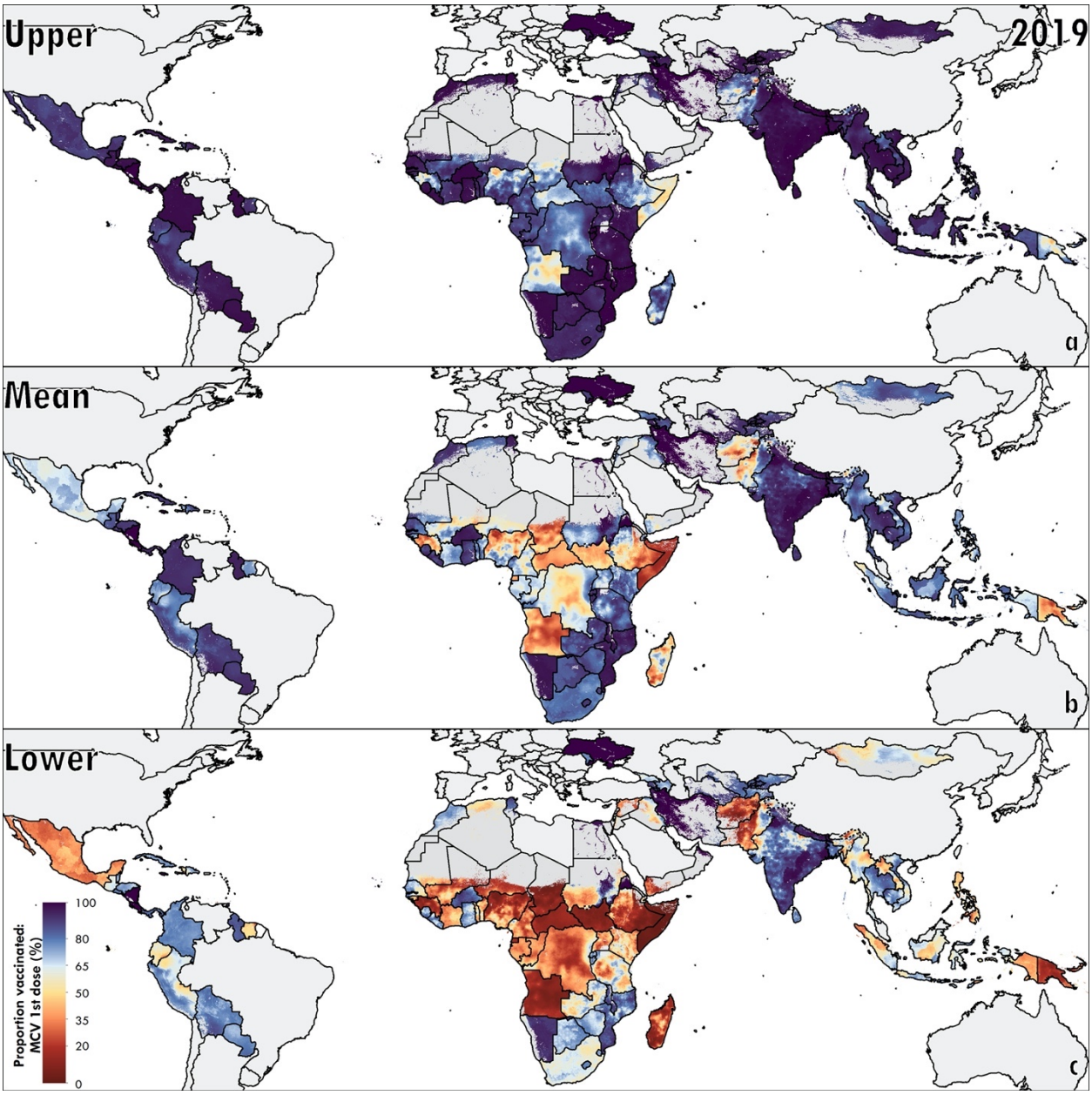
For each plot, the survey data and mean posterior prediction of coverage are compared. The size per dot is proportional to the sample size in the underlying data. Estimates are shown by region and year. Since there were only data through 2018, the years included only span through 2018. Regions are labelled as the following: Andean South America [*vax_ansa*], Central Asia Eastern Europe [*vax_caeu*], Caribbean [*vax_crbn]*, Central sub-Saharan Africa [*vax_cssa*], Central America [*vax_ctam*], East Asia [*vax_eaas*], East sub-Saharan Africa [*vax_essa*], North Africa and Middle East [*vax_name*], South East Asia, [*vax_seas*], South Asia [*vax_soas*], Southern sub-Saharan Africa [*vax_sssa*], Tropical South America [*vax_trsa*], and Western sub-Saharan Africa [*vax_wssa*].



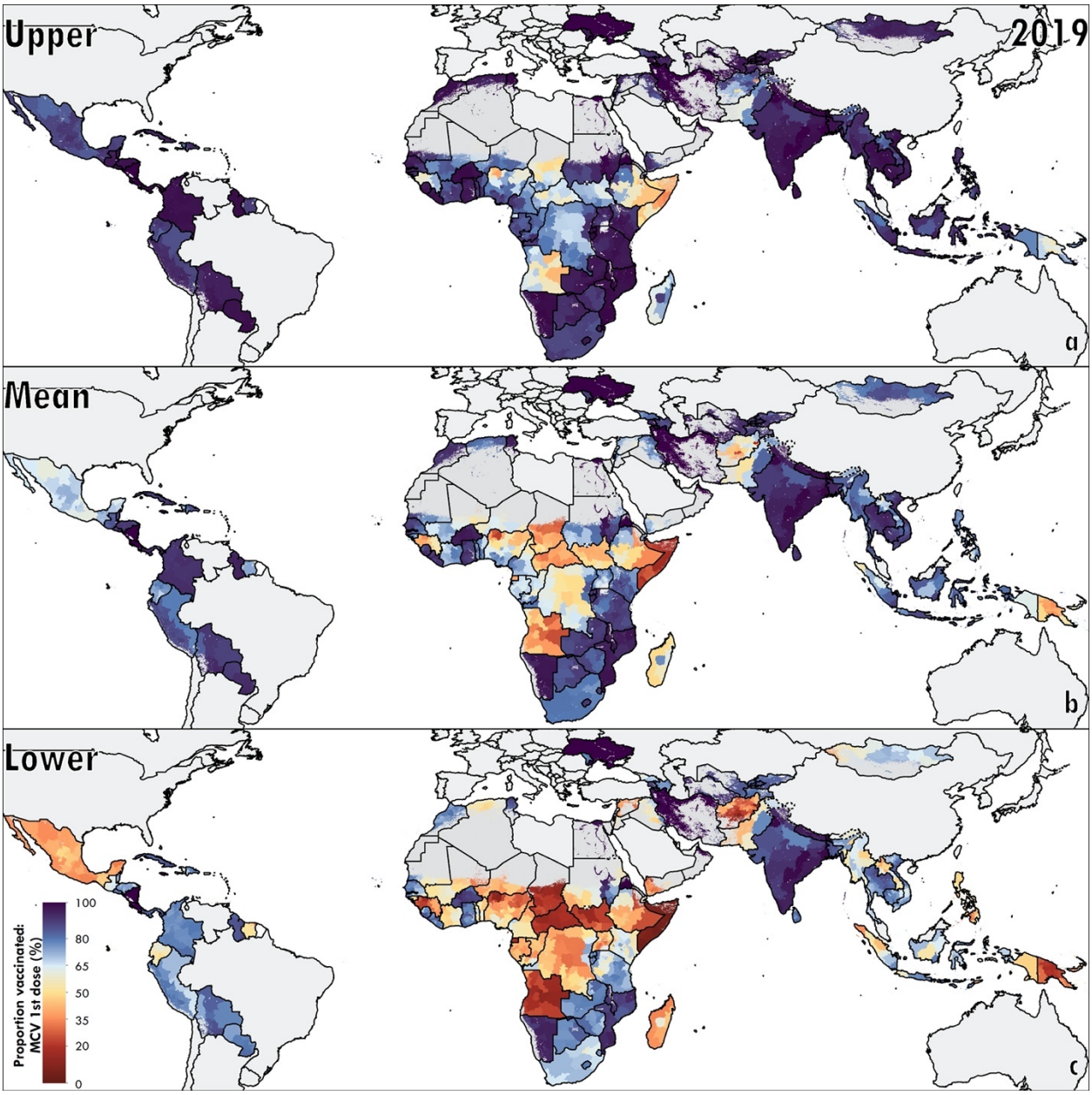
Supplementary Fig. 12: Second administrative level, out-of-sample validation plot, by year



Supplementary Fig. 13: Second administrative level, out-of-sample validation plot, by region

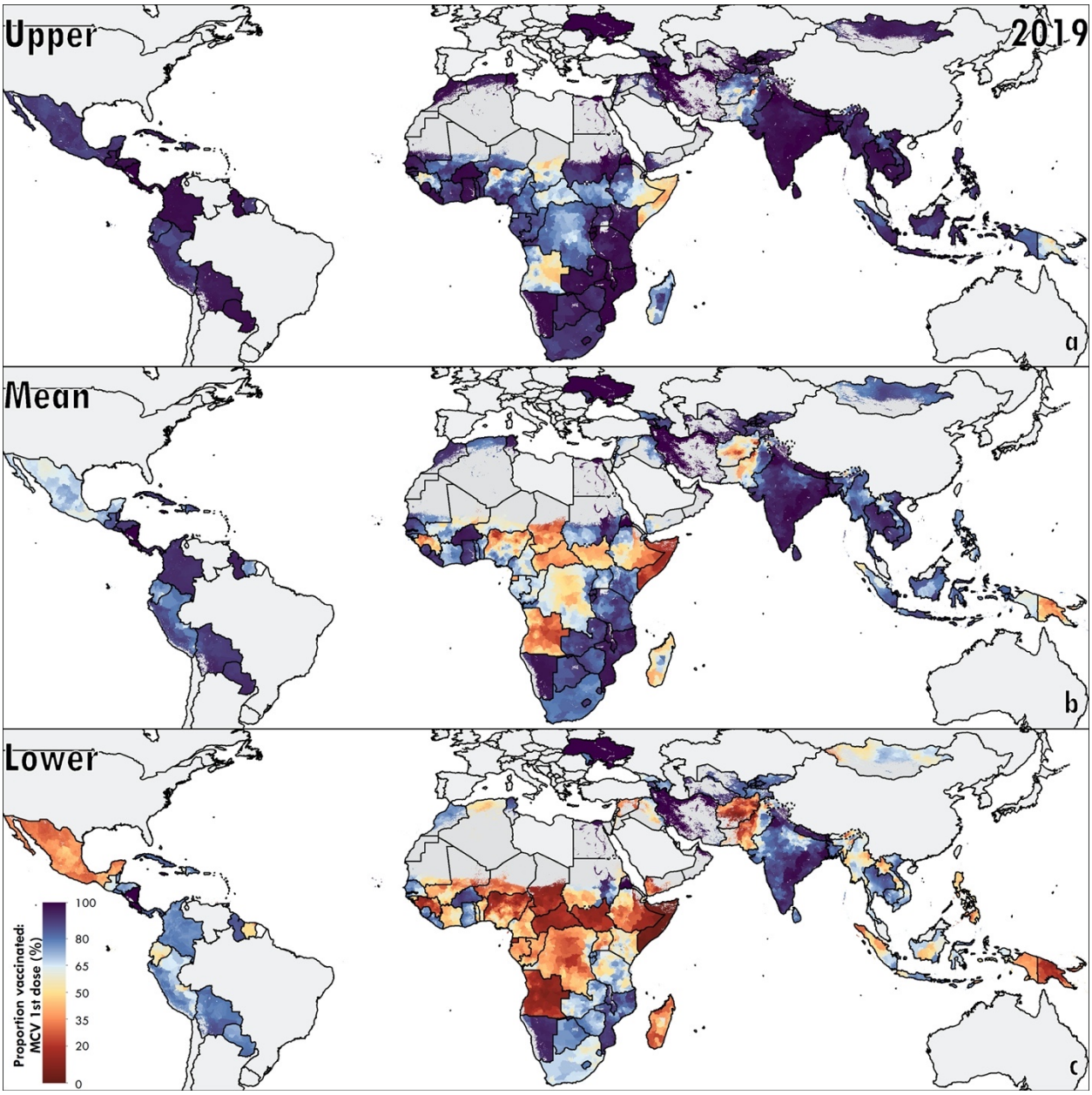


Supplementary Fig. 14: Pixel-level mean, lower, and upper uncertainty limits of MCV1 coverage, 2019 Posterior means and 95% uncertainty intervals are shown at the 5 × 5-km pixel level. Pixels that are grey in colour are either not included in the analysis, or have been classified by being "barren or sparsely vegetated" or had fewer than 10 people per 1 × 1-km pixel[15,26].



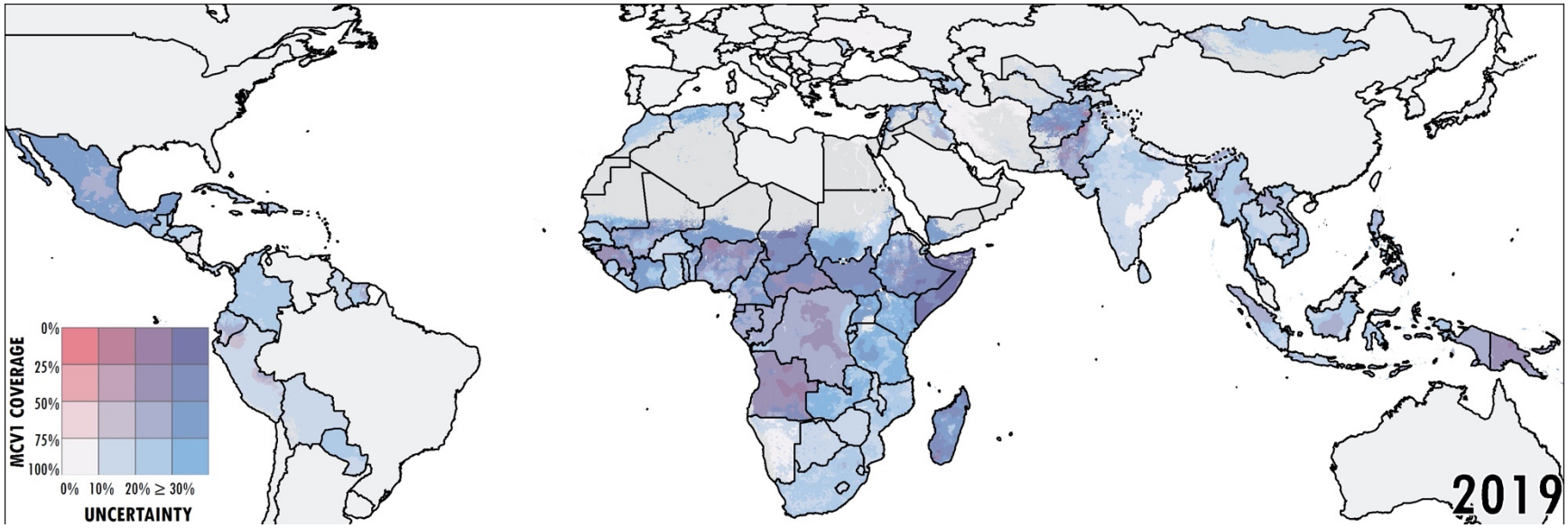
Supplementary Fig. 15: First administrative level mean, lower, and upper uncertainty limits of MCV1 coverage, 2019

Posterior means and 95% uncertainty intervals are shown at the first administrative level. Pixels that are grey in colour are either not included in the analysis, or have been classified by being "barren or sparsely vegetated" or had fewer than 10 people per 1 × 1-km pixel[15,26].

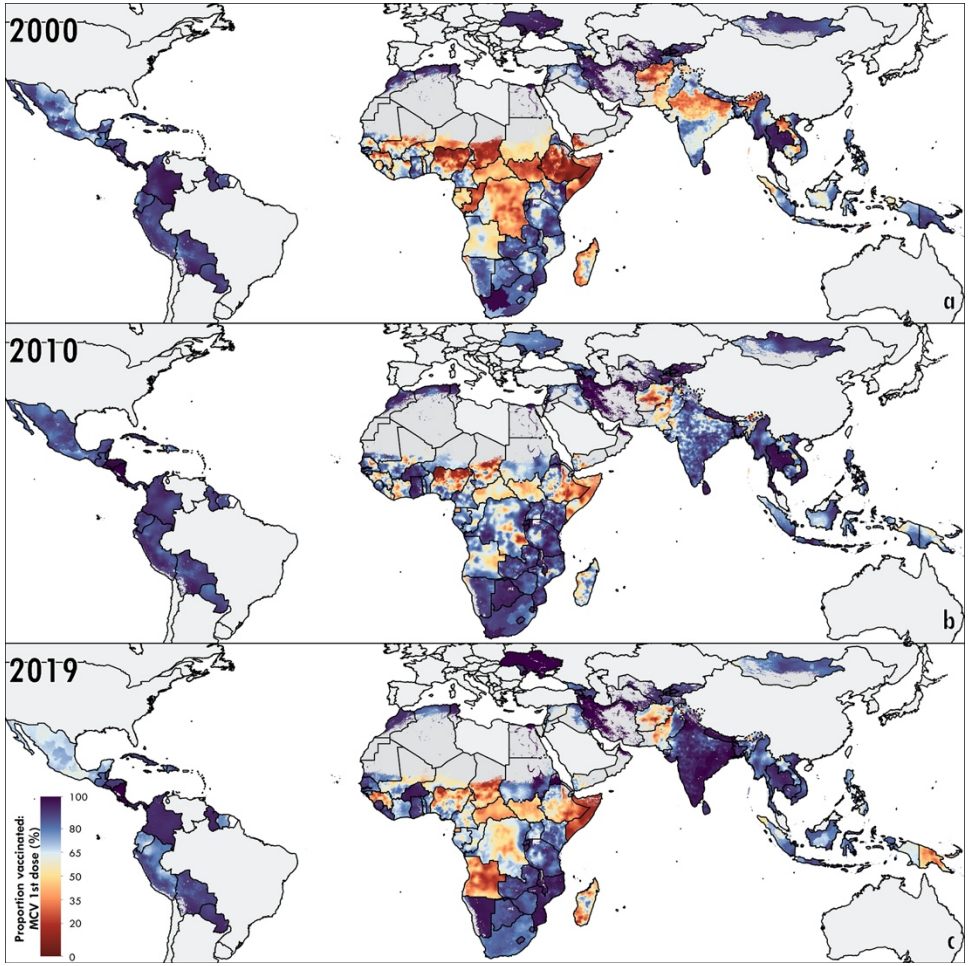


Supplementary Fig. 16: Second administrative level mean, lower, and upper uncertainty limits of MCV1 coverage, 2019

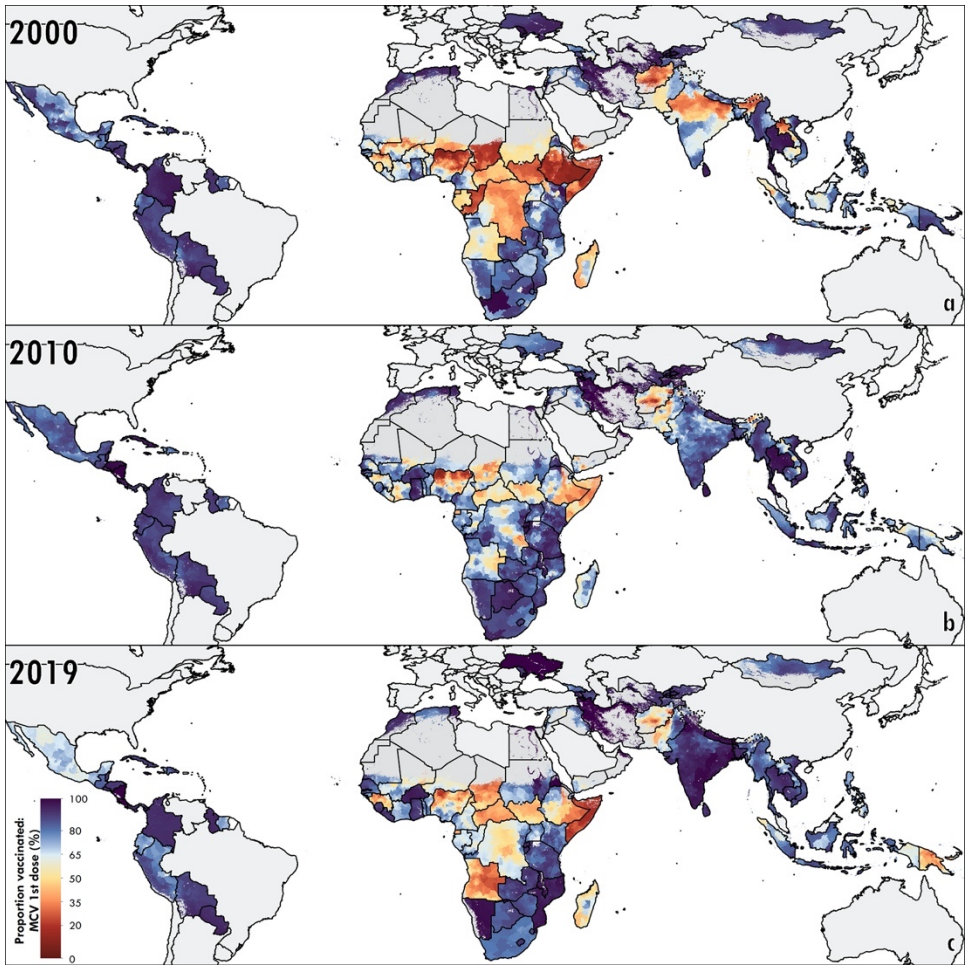
Posterior means and 95% uncertainty intervals are shown at the second administrative level. Pixels that are grey in colour are either not included in the analysis, or have been classified by being "barren or sparsely vegetated" or had fewer than 10 people per 1 × 1-km pixel[15,26].



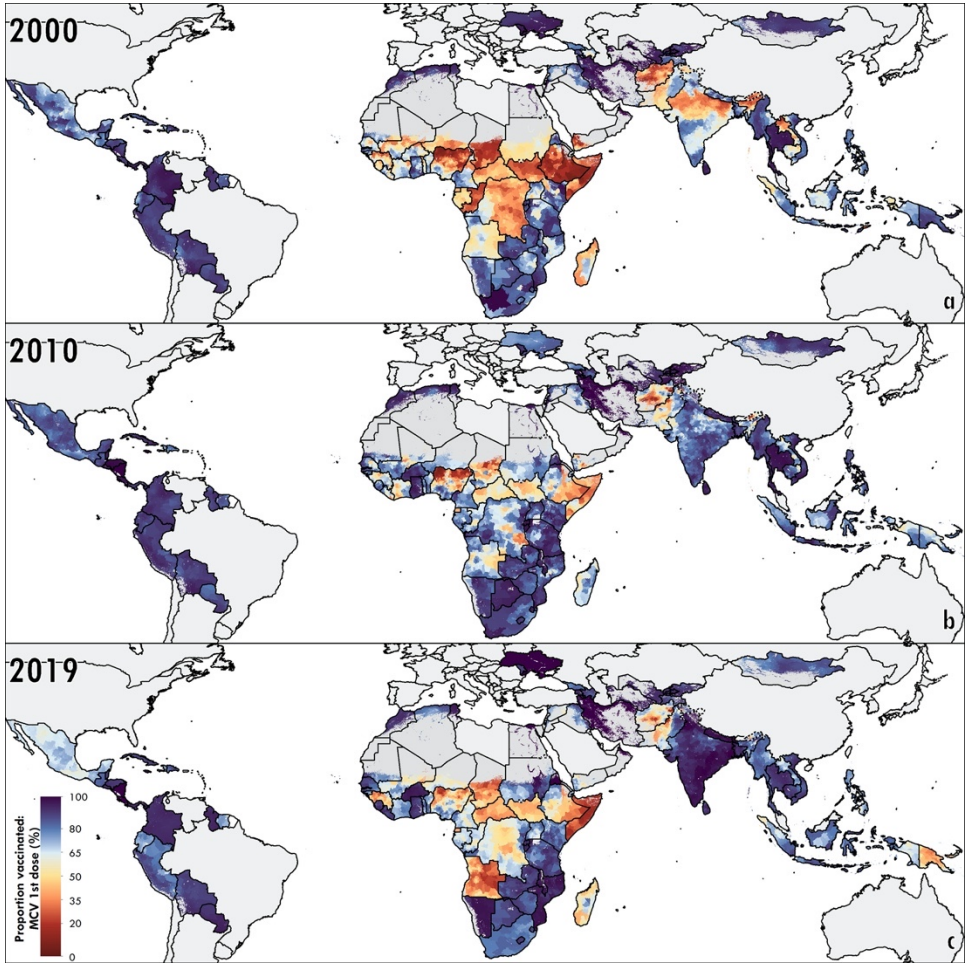
Supplementary Fig. 17: District level MCV1 coverage as function of uncertainty via Coffey-Feingold-Bromberg metric, 2019
Intensity of pink indicates areas that have lower uncertainty and lower coverage; intensity of blue indicates areas with higher coverage but also higher uncertainty. Purple indicates areas that have both low coverage and also higher uncertainty. Pixels that are grey in colour are either not included in the analysis, or have been classified by being "barren or sparsely vegetated" or had fewer than 10 people per 1 × 1-km pixel[15,26].



Supplementary Fig. 18: Estimated first-dose measles-containing vaccine (MCV1) coverage among districts in 101 low- and middle-income countries, 2000–2019, full age cohort model.
MCV1 coverage among target population in only the target age cohort in districts in 2000 (a), 2010 (b), and 2019 (c). Countries excluded from the analysis and pixels classified as 'barren or sparsely vegetated' based on European Space Agency Climate Change Initiative (ESA-CCI) satellite data or with fewer people than ten per 1 × 1-km pixel based on WorldPop estimates are masked in grey[15,26].



Supplementary Fig. 19: Estimated first-dose measles-containing vaccine (MCV1) coverage among districts in 101 low- and middle-income countries, 2000–2019, target age and t+1 cohort model.
MCV1 coverage among target population in only the target age and t+1 cohorts in districts in 2000 (a), 2010 (b), and 2019 (c). Countries excluded from the analysis and pixels classified as 'barren or sparsely vegetated' based on European Space Agency Climate Change Initiative (ESA-CCI) satellite data or with fewer people than ten per 1 × 1-km pixel based on WorldPop estimates are masked in grey[15,26].



Supplementary Fig. 20: Estimated first-dose measles-containing vaccine (MCV1) coverage among districts in 101 low- and middle-income countries, 2000–2019, target age cohort only model.
MCV1 coverage among target population in only the target age cohort only in districts in 2000 (a), 2010 (b), and 2019 (c). Countries excluded from the analysis and pixels classified as 'barren or sparsely vegetated' based on European Space Agency Climate Change Initiative (ESA-CCI) satellite data or with fewer people than ten per 1 × 1-km pixel based on WorldPop estimates are masked in grey[15,26].

4.0 Supplementary Tables

Supplementary Table 1: GATHER compliance checklist

Item number	Checklist item	Reported on page number(s):
Objectives and funding		
1	Define the indicator(s), populations (including age, sex, and geographic entities), and time period(s) for which estimates were made.	Methods (Overview); Supplementary Section 1.2
2	List the funding sources for the work.	Acknowledgements
Data inputs		
For all data inputs from multiple sources that are synthesised as part of the study:		
3	Describe how the data were identified and how the data were accessed.	Methods (Data); Supplementary Information 1.3
4	Specify the inclusion and exclusion criteria. Identify all ad hoc exclusions.	Methods (Data); Supplementary Information 1.3
5	Provide information on all included data sources and their main characteristics. For each data source used, report reference information or contact name/institution, population represented, data collection method, year(s) of data collection, sex and age range, diagnostic criteria or measurement method, and sample size, as relevant.	Supplementary Information 1.3; Supplementary Table 4
6	Identify and describe any categories of input data that have potentially important biases (e.g., based on characteristics listed in item 5).	Supplementary Table 4
For data inputs that contribute to the analysis but were not synthesised as part of the study:		
7	Describe and give sources for any other data inputs.	Supplementary Tables 6-7
For all data inputs:		
8	Provide all data inputs in a file format from which data can be efficiently extracted (e.g., a spreadsheet rather than a PDF), including all relevant meta-data listed in item 5. For any data inputs that cannot be shared because of ethical or legal reasons, such as third-party ownership, provide a contact name or the name of the institution that retains the right to the data.	Supplementary Table 4; http://ghdx.healthdata.org/lbd-publication-data-input-sources
Data analysis		
9	Provide a conceptual overview of the data analysis method. A diagram might be helpful.	Methods (Overview); Supplementary Information 1.4; Supplementary Fig. 1
10	Provide a detailed description of all steps of the analysis, including mathematical formulae. This description should cover, as relevant, data cleaning, data pre-processing, data adjustments and weighting of data sources, and mathematical or statistical model(s).	Methods (Geostatistcial model; Post-estimation; Model validation; Post hoc inequality analyses); Supplementary Information 1.3 – 1.4
11	Describe how candidate models were evaluated and how the final model(s) were selected.	Methods (Validation)

12	Provide the results of an evaluation of model performance, if done, as well as the results of any relevant sensitivity analysis.	Methods (Validation); Supplementary Figs. 6-13; Supplementary Tables 9-12
13	Describe methods for calculating uncertainty of the estimates. State which sources of uncertainty were, and were not, accounted for in the uncertainty analysis.	Methods (Post-estimation)
14	State how analytic or statistical source used to generate estimates can be accessed.	Data availability; Code availability
Results and discussion		
15	Provide published estimates in a file format from which data can be efficiently extracted.	Data availability
16	Report a quantitative measure of uncertainty of the estimates (e.g., uncertainty intervals).	Main text (Tracking uneven progress in routine MCV1 coverage); Supplementary Figs. 14-16, 17
17	Interpret results in light of existing evidence. If updating a previous set of estimates, describe the reasons for changes in estimates.	Discussion
18	Discuss limitations that affect interpretation of the estimates.	Methods (Limitations)

Supplementary Table 2: MCV1 vaccination schedule by country
Immunisation schedule for MCV1 per WHO record, for each country in analysis[27].

Country	Age
Afghanistan	9 months
Algeria	11 months
Angola	9 months
Armenia	12 months
Azerbaijan	12 months
Bangladesh	9 months
Belize	12 months
Benin	9 months
Bhutan	9 months
Bolivia	12 months
Botswana	9 months
Burkina Faso	9 months
Burundi	9 months
Cambodia	9 months
Cameroon	9 months
Cape Verde	9 months
Central African Republic	9 months
Chad	9 months
Colombia	12 months
Comoros	9 months
Costa Rica	15 months
Côte d'Ivoire	9 months
Cuba	12 months
Democratic Republic of the Congo	9 months
Djibouti	9 months
Dominican Republic	12 months
Ecuador	12 months

Egypt	12 months
El Salvador	12 months
Equatorial Guinea	9 months
Eritrea	9 months
Ethiopia	9 months
Gabon	9 months
Gambia	9 months
Ghana	18 months
Guatemala	12 months
Guinea	9 months
Guinea-Bissau	9 months
Guyana	12 months
Haiti	9 months
Honduras	12 months
India	9 months
Indonesia	9 months
Iran	12 months
Iraq	9 months
Jamaica	12 months
Jordan	9 months
Kenya	9 months
Kyrgyzstan	12 months
Laos	9 months
Lesotho	9 months
Liberia	9 months
Madagascar	9 months
Malawi	9 months
Malaysia	6 months
Mali	9 months

Mauritania	9 months
Mexico	12 months
Moldova	12 months
Mongolia	9 months
Morocco	9 months
Mozambique	9 months
Myanmar	9 months
Namibia	9 months
Nepal	9 months
Nicaragua	12 months
Niger	9 months
Nigeria	9 months
Pakistan	9 months
Papua New Guinea	9 months
Paraguay	12 months
Peru	12 months
Philippines	9 months
Republic of Congo	8 months
Rwanda	9 months
Sâo Tomé and Príncipe	9 months
Senegal	9 months
Sierra Leone	9 months
Somalia	9 months
South Africa	6 months
South Sudan	9 months
Sri Lanka	9 months
Sudan	9 months
Suriname	12 months
Swaziland	9 months

Syria	6 months
Tajikistan	12 months
Tanzania	9 months
Thailand	9 months
Timor-Leste	9 months
Togo	9 months
Trinidad and Tobago	12 months
Turkmenistan	12 months
Uganda	9 months
Ukraine	12 months
Uzbekistan	12 months
Vietnam	9 months
Yemen	9 months
Zambia	9 months
Zimbabwe	9 months

Supplementary Table 3: List of countries considered for analysis stratified by Socio-Demographic Index (SDI) level and Decade of Vaccine (DoV) status

Countries included in analyses, stratified by SDI are listed. Countries not included in low, low-middle, or middle SDI classifications but are included in DoV priority countries are also listed[9,10]. All countries included in the DoV priority list are indicated by *.

Low SDI (0 – 0.455)	**Low-middle SDI (0.455 – 0.606)**	**Middle SDI (0.606 – 0.688)**	**DoV priority**
Afghanistan*	Angola*	Algeria	Armenia*
Benin*	Bangladesh*	Botswana	Azerbaijan*
Burkina Faso*	Belize*	Cuba*	Iran*
Burundi*	Bolivia*	Colombia	Malaysia*
Central African Republic*	Cambodia*	Costa Rica	Moldova*
Chad*	Cameroon*	Ecuador	Turkmenistan*
Comoros*	Cape Verde	Egypt*	Ukraine*
Côte d'Ivoire*	Djibouti*	Equatorial Guinea	
Democratic Republic of the Congo*	Dominican Republic	Gabon	
Eritrea*	El Salvador*	Guyana*	
Ethiopia*	Ghana*	Indonesia*	
Guinea*	Guatemala*	Iraq*	
Guinea-Bissau*	Honduras*	Jamaica	
Haiti*	India*	Mexico	
Liberia*	Honduras*	Mongolia*	
Madagascar*	India*	Namibia	
Malawi*	Kenya*	Panama	
Mali*	Kyrgyzstan*	Paraguay*	
Mozambique*	Laos*	Peru	
Nepal*	Lesotho*	South Africa	
Niger*	Mauritania*	Sri Lanka*	
Papua New Guinea*	Morocco*	Suriname	
Rwanda*	Myanmar*	Syria*	
Senegal*	Nicaragua*	Thailand	
Sierra Leone*	Nigeria*	Tunisia	
Somalia*	Pakistan*	Turkmenistan*	
South Sudan*	Philippines*	Uzbekistan*	
Tanzania*	Republic of the Congo*	Vietnam*	
The Gambia*	Sâo Tomé and Príncipe*		
Togo*	Sudan*		
Uganda*	Swaziland (eSwatini)*		
Yemen*	Tajikistan*		
	Timor-Leste*		
	Zambia*		
	Zimbabwe*		

Supplementary Table 4: Input sources included in final analysis
List of sources with GHDx identification number included in the final analysis along with number of GPS and areally located clusters is provided. These sources can also be explored following this link to the GHDx input data sources tool: http://ghdx.healthdata.org/lbd-publication-data-input-sources.

GHDx id	Country	GPS-located clusters	Areally-located clusters	Number of children included	Series	Year(s)	Citation	Link
18468	Afghanistan	0	27	1179	Afghanistan Health Survey 2006	2006	Indian Institute of Health Management Research (IIHMR), Johns Hopkins University, Ministry of Public Health (Afghanistan). Afghanistan Health Survey 2006.	GHDx
157018	Afghanistan	0	309	18436	Afghanistan Demographic and Health Survey 2015-2016	2015-2016	Central Statistics Organization (Afghanistan), ICF International, Ministry of Public Health (Afghanistan). Afghanistan Demographic and Health Survey 2015-2016. Fairfax, United States of America: ICF International, 2017.	GHDx
627	Algeria	0	42	195	Algeria Family Health Survey 2002-2003	2002-2003	National Office of Statistics (Algeria), Ministry of Health, Population and Hospital Reform (Algeria), League of Arab States. Algeria Family Health Survey 2002-2003.	GHDx
210614	Algeria	0	7	8761	Algeria Multiple Indicator Cluster Survey 2012-2013	2012-2013	Ministry of Health and Population (Algeria), United Nations Children's Fund (UNICEF). Algeria Multiple Indicator Cluster Survey 2012-2013. New York, United States of America: United Nations Children's Fund (UNICEF), 2018.	GHDx
687	Angola	0	18	1054	Angola Multiple Indicator Cluster Survey 2001	2001	National Institute of Statistics (Angola), United Nations Children's Fund (UNICEF). Angola Multiple Indicator Cluster Survey 2001. New York, United States of America: United Nations Children's Fund (UNICEF).	GHDx
30394	Angola	0	18	4840	Angola Integrated Inquiry into People's Well-Being 2008-2009	2008-2009	National Institute of Statistics (Angola), Oxford Policy Management, United Nations Children's Fund (UNICEF). Angola Integrated Inquiry into People's Well-Being 2008-2009.	GHDx

218555	Angola	624	0	5841	Angola Demographic and Health Survey 2015-2016	2015-2016	ICF International, Ministry of Health (Angola), National Institute of Statistics (Angola), United Nations Children's Fund (UNICEF). Angola Demographic and Health Survey 2015-2016. Fairfax, United States of America: ICF International, 2017.	GHDx
31750	Armenia	269	0	1357	Armenia Demographic and Health Survey 2010	2010	ICF Macro, Ministry of Health (Armenia), National Statistical Service of the Republic of Armenia. Armenia Demographic and Health Survey 2010. Fairfax, United States of America: ICF International, 2015.	GHDx
218563	Armenia	198	0	568	Armenia Demographic and Health Survey 2015-2016	2015-2016	ICF International, Ministry of Health (Armenia), National Statistical Service of the Republic of Armenia. Armenia Demographic and Health Survey 2015-2016. Fairfax, United States of America: ICF International, 2017.	GHDx
18865	Azerbaijan	0	9	1586	Azerbaijan Demographic and Health Survey 2006	2006	Macro International, Inc, State Statistical Committee of Azerbaijan. Azerbaijan Demographic and Health Survey 2006. Fairfax, United States of America: ICF International.	GHDx
951	Bangladesh	1813	0	17878	Bangladesh Multiple Indicator Cluster Survey 2006	2006	Bangladesh Bureau of Statistics (BBS), Mitra and Associates, United Nations Children's Fund (UNICEF). Bangladesh Multiple Indicator Cluster Survey 2006. New York, United States of America: United Nations Children's Fund (UNICEF).	GHDx
18902	Bangladesh	359	0	4004	Bangladesh Demographic and Health Survey 2004	2004	Mitra and Associates, ORC Macro. Bangladesh Demographic and Health Survey 2004. Fairfax, United States of America: ICF International.	GHDx
18913	Bangladesh	361	0	3641	Bangladesh Demographic and Health Survey 2007	2007	Macro International, Inc, Mitra and Associates, National Institute of Population Research and Training (NIPORT). Bangladesh Demographic and Health Survey 2007. Fairfax, United States of America: ICF International, 2009.	GHDx
55956	Bangladesh	600	0	5069	Bangladesh Demographic and Health Survey 2011-2012	2011-2012	ICF Macro, Mitra and Associates, National Institute of Population Research and Training (NIPORT). Bangladesh Demographic and Health Survey 2011-2012. Calverton, United States of America: ICF Macro.	GHDx

157021	Bangladesh	598	0	4583	Bangladesh Demographic and Health Survey 2014	2014	ICF International, Mitra and Associates, National Institute of Population Research and Training (NIPORT). Bangladesh Demographic and Health Survey 2014. Fairfax, United States of America: ICF International, 2015.	GHDx
261683	Bangladesh	1	0	149	Bangladesh - Dhaka Malnutrition and Enteric Disease Study 2009-2014	2009-2014	Fogarty International Center, National Institutes of Health (NIH), Foundation for the National Institutes of Health (FNIH), International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). Bangladesh - Dhaka Malnutrition and Enteric Disease Study 2009-2014.	GHDx
1089	Belize	0	6	452	Belize Multiple Indicator Cluster Survey 2006	2006	Statistical Institute of Belize, United Nations Children's Fund (UNICEF). Belize Multiple Indicator Cluster Survey 2006. New York, United States of America: United Nations Children's Fund (UNICEF).	GHDx
76699	Belize	0	6	943	Belize Multiple Indicator Cluster Survey 2011	2011	Statistical Institute of Belize, United Nations Children's Fund (UNICEF). Belize Multiple Indicator Cluster Survey 2011. New York, United States of America: United Nations Children's Fund (UNICEF), 2013.	GHDx
264910	Belize	0	6	512	Belize Multiple Indicator Cluster Survey 2015-2016	2015-2016	Government of Belize, Statistical Institute of Belize, UN Resident Coordinator Fund (UN ResCor), United Nations Children's Fund (UNICEF), United Nations Development Programme (UNDP). Belize Multiple Indicator Cluster Survey 2015-2016. New York, United States of America: United Nations Children's Fund (UNICEF), 2018.	GHDx
18950	Benin	225	0	923	Benin Demographic and Health Survey 2001	2001	National Institute of Statistics and Economic Analysis (INSAE) (Benin), ORC Macro. Benin Demographic and Health Survey 2001. Fairfax, United States of America: ICF International.	GHDx
18959	Benin	0	12	8518	Benin Demographic and Health Survey 2006	2006	Macro International, Inc, National Institute of Statistics and Economic Analysis (INSAE) (Benin), National Program Against AIDS (PNLS) (Benin). Benin Demographic and Health Survey 2006. Fairfax, United States of America: ICF International.	GHDx

206075	Benin	0	12	4820	Benin Multiple Indicator Cluster Survey 2014	2014	National Institute of Statistics and Economic Analysis (INSAE) (Benin), United Nations Children's Fund (UNICEF). Benin Multiple Indicator Cluster Survey 2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2017.	GHDx
218565	Benin	539	0	4720	Benin Demographic and Health Survey 2017-2018	2017-2018	Hubert Koutoukou Maga National University Hospital Center (CNHU-HKM)(Benin), ICF International, National Institute of Statistics and Economic Analysis (INSAE) (Benin), National Malaria Control Program, Ministry of Health (Benin), Permanent Secretariat of the Food Council and Nutrition (SP-CAN)(Benin). Benin Demographic and Health Survey 2017-2018. Fairfax, United States of America: ICF International, 2018.	GHDx
19001	Bolivia	0	8	4216	Bolivia Demographic and Health Survey 2003-2004	2003-2004	Macro International, Inc, Ministry of Health and Sports (Bolivia), National Institute of Statistics (Bolivia). Bolivia Demographic and Health Survey 2003-2004. Fairfax, United States of America: ICF International.	GHDx
19016	Bolivia	965	0	5134	Bolivia Demographic and Health Survey 2008	2008	Macro International, Inc, Ministry of Health and Sports (Bolivia), National Institute of Statistics (Bolivia). Bolivia Demographic and Health Survey 2008. Fairfax, United States of America: ICF International.	GHDx
323944	Bolivia	0	9	1834	Bolivia Demographic and Health Survey 2016	2016	Ministry of Health (Bolivia), National Institute of Statistics (Bolivia). Bolivia Demographic and Health Survey 2016. La Paz, Bolivia: National Institute of Statistics (Bolivia), 2017.	GHDx
22125	Botswana	0	292	1183	Botswana Family Health Survey 2007-2008	2007-2008	Central Statistics Office (Botswana). Botswana Family Health Survey 2007-2008. Gaborone, Botswana: Central Statistics Office (Botswana), 2009.	GHDx
1927	Burkina Faso	195	0	3185	Burkina Faso Multiple Indicator Cluster Survey 2006	2006	National Institute of Statistics and Demography (Burkina Faso), United Nations Children's Fund (UNICEF). Burkina Faso Multiple Indicator Cluster Survey 2006. New York, United States of America: United Nations Children's Fund (UNICEF).	GHDx

19088	Burkina Faso	397	0	5361	Burkina Faso Demographic and Health Survey 2003	2003	Macro International, Inc, National Institute of Statistics and Demography (Burkina Faso). Burkina Faso Demographic and Health Survey 2003. Fairfax, United States of America: ICF International.	GHDx
19133	Burkina Faso	541	0	7730	Burkina Faso Demographic and Health Survey 2010-2011	2010-2011	ICF Macro, Ministry of Health (Burkina Faso), National Institute of Statistics and Demography (Burkina Faso). Burkina Faso Demographic and Health Survey 2010-2011. Fairfax, United States of America: ICF International.	GHDx
26642	Burkina Faso	0	13	4193	Burkina Faso Global Fund Household Health Coverage Survey 2008	2008	Global Fund to Fight Aids Tuberculosis and Malaria (GFATM). Burkina Faso Global Fund Household Health Coverage Survey 2008.	GHDx
236156	Burkina Faso	0	13	7148	Burkina Faso Continuous Multisectoral Survey 2014	2014	National Institute of Statistics and Demography (Burkina Faso), World Bank. Burkina Faso Continuous Multisectoral Survey 2014. Washington DC, United States of America: World Bank.	GHDx
1981	Burundi	0	524	3924	Burundi Multiple Indicator Cluster Survey 2005	2005	United Nations Children's Fund (UNICEF), Burundi Institute of Statistics and Economic Studies, United Nations Population Fund (UNFPA). Burundi Multiple Indicator Cluster Survey 2005. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
30431	Burundi	375	0	4955	Burundi Demographic and Health Survey 2010-2011	2010-2011	Burundi Institute of Statistics and Economic Studies, ICF International, Ministry of Public Health and the Fight Against AIDS (Burundi). Burundi Demographic and Health Survey 2010-2011. Fairfax, United States of America: ICF International, 2012.	GHDx
286766	Burundi	542	0	3960	Burundi Demographic and Health Survey 2016-2017	2016-2017	Burundi Institute of Statistics and Economic Studies, ICF International, Ministry of Public Health and the Fight Against AIDS (Burundi). Burundi Demographic and Health Survey 2016-2017. Fairfax, United States of America: ICF International, 2018.	GHDx
19167	Cambodia	548	0	4465	Cambodia Demographic	2005-2006	Macro International, Inc, National Institute of Public Health (Cambodia), National Institute of Statistics	GHDx

					and Health Survey 2005-2006		(Cambodia). Cambodia Demographic and Health Survey 2005-2006. Fairfax, United States of America: ICF International.	
30379	Cambodia	607	0	4726	Cambodia Demographic and Health Survey 2010-2011	2010-2011	ICF Macro, Ministry of Health (Cambodia), National Institute of Statistics (Cambodia). Cambodia Demographic and Health Survey 2010-2011. Fairfax, United States of America: ICF International.	GHDx
30963	Cambodia	239	16	763	Cambodia Socio-Economic Survey 2003-2005	2003-2005	National Institute of Statistics (Cambodia), Statistics Sweden. Cambodia Socio-Economic Survey 2003-2005. Phnom Penh, Cambodia: National Institute of Statistics (Cambodia).	GHDx
157024	Cambodia	609	0	4123	Cambodia Demographic and Health Survey 2014	2014	ICF International, Ministry of Health (Cambodia), National Institute of Statistics (Cambodia). Cambodia Demographic and Health Survey 2014. Fairfax, United States of America: ICF International, 2017.	GHDx
2039	Cameroon	0	12	1403	Cameroon Household Survey 2001	2001	National Institute of Statistics (Cameroon), Directorate of Statistics and National Accounts, Ministry of Economics and Finance (Cameroon), AFRISTAT. Cameroon Household Survey 2001. Yaounde, Cameroon: National Institute of Statistics (Cameroon).	GHDx
2063	Cameroon	0	218	3661	Cameroon Multiple Indicator Cluster Survey 2006	2006	United Nations Children's Fund (UNICEF), National Institute of Statistics (Cameroon). Cameroon Multiple Indicator Cluster Survey 2006. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
19211	Cameroon	458	0	4790	Cameroon Demographic and Health Survey 2004	2004	Macro International, Inc, National Institute of Statistics (Cameroon). Cameroon Demographic and Health Survey 2004. Fairfax, United States of America: ICF International.	GHDx
19274	Cameroon	576	0	7174	Cameroon Demographic and Health Survey 2011	2011	ICF International, Ministry of Economy, Planning and Regional Development (Cameroon), Ministry of Public Health (Cameroon), National Institute of Statistics (Cameroon), Pasteur Center of Cameroon. Cameroon	GHDx

							Demographic and Health Survey 2011. Fairfax, United States of America: ICF International.	
244455	Cameroon	0	12	1552	Cameroon Multiple Indicator Cluster Survey 2014	2014	Ministry of Public Health (Cameroon), National Institute of Statistics (Cameroon), United Nations Children's Fund (UNICEF). Cameroon Multiple Indicator Cluster Survey 2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2017.	GHDx
413167	Cameroon	429	0	3550	Cameroon Demographic and Health Survey 2018-2019	2018-2019	ICF International, Ministry of Public Health (Cameroon), National Institute of Statistics (Cameroon). Cameroon Demographic and Health Survey 2018-2019. Fairfax, United States of America: ICF International.	GHDx
21442	Cape Verde	0	9	436	Cape Verde Demographic and Health Survey 2005	2005	Macro International, Inc, Ministry of Health (Cape Verde), National Institute of Statistics (Cape Verde). Cape Verde Demographic and Health Survey 2005.	GHDx
2223	Central African Republic	0	16	7446	Central African Republic Multiple Indicator Cluster Survey 2006	2006	United Nations Children's Fund (UNICEF). Central African Republic Multiple Indicator Cluster Survey 2006. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
82832	Central African Republic	0	17	8245	Central African Republic Multiple Indicator Cluster Survey 2010-2011	2010-2011	Central African Institute of Statistics, Economic and Social Studies (ICASEES) (Central African Republic), ICF International. Central African Republic Multiple Indicator Cluster Survey 2010-2011. Fairfax, United States of America: ICF International, 2013.	GHDx
19315	Chad	0	9	3346	Chad Demographic and Health Survey 2004	2004	Macro International, Inc, National Institute for Statistics, Economic and Demographic Studies (INSEED) (Chad). Chad Demographic and Health Survey 2004. Fairfax, United States of America: ICF International.	GHDx
76701	Chad	0	60	11799	Chad Multiple Indicator	2010	Ministry of Planning, Economy, and International Cooperation (Chad), National Institute for Statistics,	GHDx

					Cluster Survey 2010		Economic and Demographic Studies (INSEED) (Chad), United Nations Children's Fund (UNICEF). Chad Multiple Indicator Cluster Survey 2010. New York, United States of America: United Nations Children's Fund (UNICEF), 2014.	
157025	Chad	624	0	11687	Chad Demographic and Health Survey 2014-2015	2014-2015	ICF International, National Institute for Statistics, Economic and Demographic Studies (INSEED) (Chad). Chad Demographic and Health Survey 2014-2015. Fairfax, United States of America: ICF International, 2016.	GHDx
19324	Colombia	0	33	9349	Colombia Demographic and Health Survey 2004-2005	2004-2005	Macro International, Inc, Profamilia (Colombia). Colombia Demographic and Health Survey 2004-2005. Fairfax, United States of America: ICF International, 2005.	GHDx
21281	Colombia	3972	0	12067	Colombia Demographic and Health Survey 2009-2010	2009-2010	ICF Macro, Profamilia (Colombia). Colombia Demographic and Health Survey 2009-2010. Fairfax, United States of America: ICF International, 2011.	GHDx
76850	Comoros	239	0	1672	Comoros Demographic and Health Survey 2012-2013	2012-2013	General Directorate of Statistics and Forecasting (Comoros), ICF International. Comoros Demographic and Health Survey 2012-2013. Fairfax, United States of America: ICF International.	GHDx
19391	Congo	0	12	968	Congo Demographic and Health Survey 2005	2005	Macro International, Inc, National Center for Statistics and Economic Studies (Congo, Rep.). Congo Demographic and Health Survey 2005. Fairfax, United States of America: ICF International.	GHDx
56151	Congo	0	12	5702	Congo Demographic and Health Survey 2011-2012	2011-2012	ICF International, Ministry of Health (Congo, Rep.), National Center for Statistics and Economic Studies (Congo, Rep.). Congo Demographic and Health Survey 2011-2012. Fairfax, United States of America: ICF International.	GHDx
234733	Congo	0	11	3764	Congo Multiple	2014-2015	National Institute of Statistics (INS) (Congo, Rep.), United Nations Children's Fund (UNICEF). Congo Multiple	GHDx

					Indicator Cluster Survey 2014-2015		Indicator Cluster Survey 2014-2015. New York, United States of America: United Nations Children's Fund (UNICEF), 2018.	
125596	Costa Rica	0	7	1349	Costa Rica Multiple Indicator Cluster Survey 2011	2011	Costa Rican Demographic Association, Ministry of Health (Costa Rica), United Nations Children's Fund (UNICEF). Costa Rica Multiple Indicator Cluster Survey 2011. New York, United States of America: United Nations Children's Fund (UNICEF), 2013.	GHDx
164089	Costa Rica	2	0	2	Costa Rica Survey of Family Health Services and Expenses 2008	2008	Central American Population Center, University of Costa Rica. Costa Rica Survey of Family Health Services and Expenses 2008. San José, Costa Rica: Central American Population Center, University of Costa Rica.	GHDx
18533	Cote d'Ivoire	341	0	4017	Côte d'Ivoire Demographic and Health Survey 2011-2012	2011-2012	ICF International, Ministry of the Fight Against AIDS (Côte d'Ivoire), National Institute of Statistics (Côte d'Ivoire). Côte d'Ivoire Demographic and Health Survey 2011-2012. Fairfax, United States of America: ICF International.	GHDx
26433	Cote d'Ivoire	0	11	3587	Côte d'Ivoire Multiple Indicator Cluster Survey 2006	2006	United Nations Children's Fund (UNICEF), National Institute of Statistics (Côte d'Ivoire). Côte d'Ivoire Multiple Indicator Cluster Survey 2006. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
218611	Cote d'Ivoire	0	11	3003	Cote d'Ivoire Multiple Indicator Cluster Survey 2016	2016	National Institute of Statistics (Côte d'Ivoire), United Nations Children's Fund (UNICEF). Cote d'Ivoire Multiple Indicator Cluster Survey 2016. New York, United States of America: United Nations Children's Fund (UNICEF), 2018.	GHDx
3310	Cuba	0	4	1840	Cuba Multiple Indicator Cluster Survey 2006	2006	United Nations Children's Fund (UNICEF), National Bureau of Statistics (Cuba). Cuba Multiple Indicator Cluster Survey 2006. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
60935	Cuba	0	15	3155	Cuba Multiple Indicator Cluster Survey 2010-2011	2010-2011	Ministry of Public Health (Cuba), United Nations Children's Fund (UNICEF). Cuba Multiple Indicator Cluster Survey 2010-2011. New York, United States of America: United Nations Children's Fund (UNICEF).	GHDx

169975	Cuba	0	2	1214	Cuba Multiple Indicator Cluster Survey 2014	2014	Ministry of Public Health (Cuba), National Office of Statistics (Cuba), United Nations Children's Fund (UNICEF). Cuba Multiple Indicator Cluster Survey 2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2005.	GHDx
3161	Democratic Republic of the Congo	0	11	2520	Democratic Republic of the Congo Multiple Indicator Cluster Survey 2001	2001	Ministry of Planning and Reconstruction (Congo, DR), United Nations Children's Fund (UNICEF). Congo, DR Multiple Indicator Cluster Survey 2001. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
19381	Democratic Republic of the Congo	293	0	4552	Democratic Republic of the Congo Demographic and Health Survey 2007	2007	Macro International, Inc, Ministry of Planning (Congo, DR). Democratic Republic of the Congo Demographic and Health Survey 2007. Fairfax, United States of America: ICF International.	GHDx
26998	Democratic Republic of the Congo	357	0	6204	Democratic Republic of the Congo Multiple Indicator Cluster Survey 2010	2010	National Statistical Institute (Congo, DR), Ministry of Planning (Congo, DR), United Nations Children's Fund (UNICEF). Congo, DR Multiple Indicator Cluster Survey 2010. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
76878	Democratic Republic of the Congo	492	0	9472	Democratic Republic of the Congo Demographic and Health Survey 2013-2014	2013-2014	ICF International, Ministry of Planning and Monitoring Implementation of the Revolution of Modernity (Congo, DR), Ministry of Public Health (Congo, DR), National Institute of Statistics (Congo, DR). Democratic Republic of the Congo Demographic and Health Survey 2013-2014. Fairfax, United States of America: ICF International, 2014.	GHDx
437955	Democratic Republic of the Congo	0	26	7970	Democratic Republic of the Congo Multiple	2017-2018	National Statistical Institute (Congo, DR), Ministry of Planning (Congo, DR), United Nations Children's Fund (UNICEF). Congo, DR Multiple Indicator Cluster Survey	GHDx

					Indicator Cluster Survey 2017-2018		2010. New York, United States: United Nations Children's Fund (UNICEF).	
3392	Djibouti	0	1	470	Djibouti Family Health Survey 2002	2002	Department of Statistics and Demographic Studies (Djibouti), League of Arab States, Ministry of Health (Djibouti), Pan Arab Project for Family Health (PAPFAM). Djibouti Family Health Survey 2002.	GHDx
3404	Djibouti	35	1	1362	Djibouti Multiple Indicator Cluster Survey 2006	2006	Ministry of Economy, Finance, and Planning in charge of Privatization (Djibouti), Ministry of Health (Djibouti), United Nations Children's Fund (UNICEF). Djibouti Multiple Indicator Cluster Survey 2006. New York, United States of America: United Nations Children's Fund (UNICEF).	GHDx
218035	Djibouti	0	6	732	Djibouti Family Health Survey 2012	2012	Department of Statistics and Demographic Studies (Djibouti), League of Arab States, Ministry of Health (Djibouti), Pan Arab Project for Family Health (PAPFAM). Djibouti Family Health Survey 2012.	GHDx
3441	Dominican Republic	0	32	2630	Dominican Republic National Multipurpose Household Survey 2007	2007	National Statistics Office (Dominican Republic). Dominican Republic National Multipurpose Household Survey 2007. Santo Domingo, Dominican Republic: National Statistics Office (Dominican Republic).	GHDx
3455	Dominican Republic	0	32	1195	Dominican Republic National Multipurpose Household Survey 2006	2006	National Statistics Office (Dominican Republic), United Nations Children's Fund (UNICEF). Dominican Republic National Multipurpose Household Survey 2006. Santo Domingo, Dominican Republic: National Statistics Office (Dominican Republic).	GHDx
19444	Dominican Republic	0	32	2243	Dominican Republic Demographic and Health Survey 2002	2002	Center for Social and Demographic Studies (Dominican Republic) (CESDEM), Macro International, Inc. Dominican Republic Demographic and Health Survey 2002. Fairfax, United States of America: ICF International.	GHDx
19456	Dominican Republic	1396	0	6410	Dominican Republic	2007	Center for Social and Demographic Studies (Dominican Republic) (CESDEM), Macro International, Inc.	GHDx

					Demographic and Health Survey 2007		Dominican Republic Demographic and Health Survey 2007. Fairfax, United States of America: ICF International.	
21198	Dominican Republic	0	9	514	Dominican Republic Special Demographic and Health Survey 2007	2007	Center for Social and Demographic Studies (Dominican Republic) (CESDEM), Macro International, Inc. Dominican Republic Special Demographic and Health Survey 2007. Fairfax, United States of America: ICF International.	GHDx
77819	Dominican Republic	503	0	2097	Dominican Republic Demographic and Health Survey 2013	2013	Center for Social and Demographic Studies (Dominican Republic) (CESDEM), ICF International, Ministry of Public Health and Social Assistance (Dominican Republic). Dominican Republic Demographic and Health Survey 2013. Fairfax, United States of America: ICF International, 2014.	GHDx
165645	Dominican Republic	108	0	483	Dominican Republic Special Demographic and Health Survey 2013	2013	Center for Social and Demographic Studies (Dominican Republic) (CESDEM), ICF International, National Public Health Laboratory (Dominican Republic). Dominican Republic Special Demographic and Health Survey 2013. Fairfax, United States of America: ICF International, 2015.	GHDx
200697	Dominican Republic	0	10	3872	Dominican Republic Multiple Indicator Cluster Survey 2014	2014	National Statistics Office (Dominican Republic), United Nations Children's Fund (UNICEF). Dominican Republic Multiple Indicator Cluster Survey 2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2016.	GHDx
46924	Ecuador	238	83	4184	Ecuador Living Conditions Survey 2005-2006	2005-2006	National Institute of Statistics and Censuses (Ecuador), Inter-American Development Bank (IDB). Ecuador Living Conditions Survey 2005-2006. Quito, Ecuador: National Institute of Statistics and Censuses (Ecuador).	GHDx
153674	Ecuador	0	52	1411	Ecuador National Health and	2012	Ministry of Public Health (Ecuador), National Institute of Statistics and Censuses (Ecuador). Ecuador National Health and Nutrition Survey 2012.	GHDx

					Nutrition Survey 2012			
19521	Egypt	1264	0	7602	Egypt Demographic and Health Survey 2005	2005	El-Zanaty and Associates, Macro International, Inc, Ministry of Health and Population (Egypt), Population Council (Egypt). Egypt Demographic and Health Survey 2005. Fairfax, United States of America: ICF International.	GHDx
19529	Egypt	763	0	2223	Egypt Interim Demographic and Health Survey 2003	2003	El-Zanaty and Associates, Macro International, Inc, Ministry of Health and Population (Egypt), Population Council (Egypt). Egypt Interim Demographic and Health Survey 2003. Fairfax, United States of America: ICF International.	GHDx
26842	Egypt	1181	0	5834	Egypt Demographic and Health Survey 2008	2008	El-Zanaty and Associates, Macro International, Inc, Ministry of Health and Population (Egypt). Egypt Demographic and Health Survey 2008. Fairfax, United States of America: ICF International.	GHDx
154897	Egypt	1714	0	11980	Egypt Demographic and Health Survey 2014	2014	El-Zanaty and Associates, ICF International, Ministry of Health and Population (Egypt). Egypt Demographic and Health Survey 2014. Fairfax, United States of America: ICF International.	GHDx
200636	El Salvador	0	14	1562	El Salvador Multiple Indicator Cluster Survey 2014	2014	General Administration of Statistics and Censuses (El Salvador), Ministry of Health (El Salvador), United Nations Children's Fund (UNICEF). El Salvador Multiple Indicator Cluster Survey 2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2017.	GHDx
76884	Equatorial Guinea	0	2	962	Equatorial Guinea Demographic and Health Survey 2011	2011	ICF International, Ministry of Health and Social Welfare (Equatorial Guinea), Ministry of Planning, Economic Development and Public Investment (Equatorial Guinea). Equatorial Guinea Demographic and Health Survey 2011. Fairfax, United States of America: ICF International, 2012.	GHDx
19539	Eritrea	0	6	2300	Eritrea Demographic and Health Survey 2002	2002	Macro International, Inc, National Statistics and Evaluation Office (Eritrea). Eritrea Demographic and Health Survey 2002. Fairfax, United States of America: ICF International.	GHDx

224938	Eritrea	0	6	2058	Eritrea National EPI Coverage Survey 2013	2013	Ministry of Health (Eritrea), United Nations Children's Fund (UNICEF), World Health Organization (WHO). Eritrea National EPI Coverage Survey 2013.	GHDx
249999	Eritrea	0	6	1574	Eritrea Population and Health Survey 2010	2010	Kenya Medical Research Institute (KEMRI), National Statistics Office (Eritrea), The Fafo Research Foundation. Eritrea Population and Health Survey 2010.	GHDx
19557	Ethiopia	524	0	5126	Ethiopia Demographic and Health Survey 2005	2005	Macro International, Inc, Population and Housing Census Commissions Office (PHCCO). Ethiopia Demographic and Health Survey 2005. Fairfax, United States of America: ICF International.	GHDx
21301	Ethiopia	570	0	6425	Ethiopia Demographic and Health Survey 2010-2011	2010-2011	Central Statistical Agency (Ethiopia), ICF Macro, Ministry of Health (Ethiopia). Ethiopia Demographic and Health Survey 2010-2011. Fairfax, United States of America: ICF International.	GHDx
218568	Ethiopia	611	0	3683	Ethiopia Demographic and Health Survey 2016	2016	Central Statistical Agency (Ethiopia), ICF International. Ethiopia Demographic and Health Survey 2016. Fairfax, United States of America: ICF International, 2017.	GHDx
416582	Ethiopia	0	11	1025	Ethiopia Special Demographic and Health Survey 2019	2019	Central Statistical Agency (Ethiopia), Ethiopian Public Health Institute (EPHI), ICF International, Ministry of Health (Ethiopia). Ethiopia Special Demographic and Health Survey 2019.	GHDx
76706	Gabon	328	0	3618	Gabon Demographic and Health Survey 2012	2012	General Directorate of Statistics (Gabon), ICF International, Ministry of Economy, Employment and Sustainable Development (Gabon), Ministry of Health (Gabon). Gabon Demographic and Health Survey 2012. Fairfax, United States of America: ICF International, 2013.	GHDx
3935	Gambia	0	35	3927	Gambia Multiple Indicator Cluster Survey 2005-2006	2005-2006	Gambia Bureau of Statistics (GBOS), United Nations Children's Fund (UNICEF). Gambia Multiple Indicator Cluster Survey 2005-2006. New York, United States of America: United Nations Children's Fund (UNICEF).	GHDx

77384	Gambia	0	36	4235	Gambia Demographic and Health Survey 2013	2013	Gambia Bureau of Statistics (GBOS), ICF International, Ministry of Health and Social Welfare (The Gambia). Gambia Demographic and Health Survey 2013. Fairfax, United States of America: ICF International, 2015.	GHDx
424884	Gambia	0	7	3602	Gambia Multiple Indicator Cluster Survey 2018	2018	Gambia Bureau of Statistics (GBOS), United Nations Children's Fund (UNICEF). Gambia Multiple Indicator Cluster Survey 2018. New York, United States of America: United Nations Children's Fund (UNICEF), 2019.	GHDx
4694	Ghana	0	10	2059	Ghana Multiple Indicator Cluster Survey 2006	2006	Ministry of Health (MOH) (Ghana), Ghana Statistical Service and United Nations Children's Fund (UNICEF). Ghana Multiple Indicator Cluster Survey 2006. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
19627	Ghana	402	0	2116	Ghana Demographic and Health Survey 2003	2003	Ghana Statistical Service, Macro International, Inc. Ghana Demographic and Health Survey 2003. Fairfax, United States of America: ICF International.	GHDx
21188	Ghana	391	0	1548	Ghana Demographic and Health Survey 2008	2008	Ghana Statistical Service, Macro International, Inc, Ministry of Health (Ghana). Ghana Demographic and Health Survey 2008. Fairfax, United States of America: ICF International.	GHDx
56241	Ghana	5	0	258	Ghana - Accra Multiple Indicator Cluster Survey 2010-2011	2010-2011	Institute of Statistical, Social and Economic Research, University of Ghana, United Nations Children's Fund (UNICEF). Ghana - Accra Multiple Indicator Cluster Survey 2010-2011. New York, United States of America: United Nations Children's Fund (UNICEF), 2014.	GHDx
63993	Ghana	730	0	4182	Ghana Multiple Indicator Cluster Survey 2011	2011	Centers for Disease Control and Prevention (CDC), Ghana Statistical Service, Government of Japan, ICF Macro, Ministry of Health (Ghana), Navrongo Health Research Centre, United Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA), United States Agency for International Development (USAID). Ghana Multiple Indicator Cluster Survey 2011. New York, United States of America: United Nations Children's Fund (UNICEF), 2013.	GHDx

157027	Ghana	422	0	3299	Ghana Demographic and Health Survey 2014	2014	Ghana Health Service, Ghana Statistical Service, ICF International. Ghana Demographic and Health Survey 2014. Fairfax, United States of America: ICF International, 2016.	GHDx
160576	Ghana	0	4	5033	Ghana District Multiple Indicator Cluster Survey 2007-2008	2007-2008	Ghana Statistical Service, Ministry of Health (Ghana), United Nations Children's Fund (UNICEF). Ghana District Multiple Indicator Cluster Survey 2007-2008.	GHDx
236205	Ghana	0	10	1365	Ghana Socioeconomic Panel Survey 2009-2010	2009-2010	Economic Growth Center, Yale University, Institute of Statistical, Social and Economic Research, University of Ghana. Ghana Socioeconomic Panel Survey 2009-2010. Washington DC, United States: World Bank.	GHDx
437993	Ghana	0	10	3357	Ghana Multiple Indicator Cluster Survey 2017-2018	2017-2018	Centers for Disease Control and Prevention (CDC), Ghana Statistical Service, Government of Japan, ICF Macro, Ministry of Health (Ghana), Navrongo Health Research Centre, United Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA), United States Agency for International Development (USAID). Ghana Multiple Indicator Cluster Survey 2017-2018. New York, United States of America: United Nations Children's Fund (UNICEF), 2013.	GHDx
4779	Guatemala	0	22	4150	Guatemala Reproductive Health Survey 2008-2009	2008-2009	Guatemala Ministry of Health and Social Assistance, University of Valle and Division of Reproductive Health-Centers for Disease Control and Prevention (CDC). Guatemala Reproductive Health Survey 2008-2009. Atlanta, United States: Centers for Disease Control and Prevention (CDC).	GHDx
27563	Guatemala	326	0	1054	Guatemala Reproductive Health Survey 2002	2002	Guatemala Ministry of Health and Social Assistance, University of Valle, Division of Reproductive Health-Centers for Disease Control and Prevention (CDC). (2003) Guatemala Reproductive Health Survey 2002. Atlanta, United States: Centers for Disease Control and Prevention (CDC).	GHDx

19683	Guinea	291	0	3028	Guinea Demographic and Health Survey 2005	2005	Macro International, Inc, National Statistics Directorate (Guinea). Guinea Demographic and Health Survey 2005. Fairfax, United States of America: ICF International.	GHDx
69761	Guinea	300	0	3738	Guinea Demographic and Health Survey 2012	2012	ICF Macro, Ministry of Health and Public Hygiene (Guinea), National Institute of Statistics (Guinea). Guinea Demographic and Health Survey 2012. Fairfax, United States of America: ICF International.	GHDx
303458	Guinea	0	8	4324	Guinea Multiple Indicator Cluster Survey 2016	2016	National Institute of Public Health (NPHI) (Guinea), National Institute of Statistics (Guinea), National Malaria Control Program (Guinea), United Nations Children's Fund (UNICEF). Guinea Multiple Indicator Cluster Survey 2016. New York, United States of America: United Nations Children's Fund (UNICEF), 2018.	GHDx
396957	Guinea	397	0	2626	Guinea Demographic and Health Survey 2018	2018	Ministry of Health (Guinea), Ministry of Planning and Economic Development (Guinea), National Institute of Statistics (Guinea). Guinea Demographic and Health Survey 2018. Fairfax, United States of America: ICF International, 2019.	GHDx
4818	Guinea-Bissau	0	9	3426	Guinea-Bissau Multiple Indicator Cluster Survey 2006	2006	United Nations Children's Fund (UNICEF), Government of Guinea-Bissau. Guinea-Bissau Multiple Indicator Cluster Survey 2006. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
174049	Guinea-Bissau	0	9	3003	Guinea-Bissau Multiple Indicator Cluster Survey 2014	2014	National Statistics Institute (Guinea-Bissau), United Nations Children's Fund (UNICEF). Guinea-Bissau Multiple Indicator Cluster Survey 2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2016.	GHDx
4926	Guyana	0	10	1849	Guyana Multiple Indicator Cluster Survey 2006-2007	2006-2007	United Nations Children's Fund (UNICEF), Bureau of Statistics (Guyana). Guyana Multiple Indicator Cluster Survey 2006. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
21348	Guyana	294	0	1348	Guyana Demographic	2009	Bureau of Statistics (Guyana), ICF Macro, Ministry of Health (Guyana). Guyana Demographic and Health Survey	GHDx

					and Health Survey 2009		2009. Fairfax, United States of America: ICF International, 2011.	
200598	Guyana	244	0	1326	Guyana Multiple Indicator Cluster Survey 2014	2014	Bureau of Statistics (Guyana), Ministry of Health (Guyana), United Nations Children's Fund (UNICEF). Guyana Multiple Indicator Cluster Survey 2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2016.	GHDx
19720	Haiti	332	0	3146	Haiti Demographic and Health Survey 2005-2006	2005-2006	Haitian Institute of Childhood (IHE), Haitian Institute of Statistics and Informatics, Macro International, Inc. Haiti Demographic and Health Survey 2005-2006. Fairfax, United States of America: ICF International.	GHDx
26680	Haiti	0	9	1481	Haiti Global Fund Household Survey 2008	2008	Global Fund to Fight Aids Tuberculosis and Malaria (GFATM). Haiti Global Fund Household Survey 2008.	GHDx
65118	Haiti	437	0	3904	Haiti Demographic and Health Survey 2012	2012	Centers for Disease Control and Prevention (CDC), Haitian Institute of Childhood (IHE), Haitian Institute of Statistics and Informatics, Macro International, Inc. Haiti Demographic and Health Survey 2012. Fairfax, United States of America: ICF International.	GHDx
218574	Haiti	441	0	2421	Haiti Demographic and Health Survey 2016-2017	2016-2017	Haitian Institute of Childhood (IHE), Haitian Institute of Statistics and Informatics, ICF International, Ministry of Public Health and Population (Haiti). Haiti Demographic and Health Survey 2016-2017. Fairfax, United States of America: ICF International.	GHDx
19728	Honduras	0	16	6277	Honduras Demographic and Health Survey 2005-2006	2005-2006	Macro International, Inc, National Institute of Statistics (Honduras), Secretary of Health (Honduras). Honduras Demographic and Health Survey 2005-2006. Fairfax, United States of America: ICF International.	GHDx
95440	Honduras	1111	0	5974	Honduras Demographic and Health Survey 2011-2012	2011-2012	ICF Macro, National Institute of Statistics (Honduras). Honduras Demographic and Health Survey 2011-2012. Fairfax, United States of America: ICF International.	GHDx

19963	India	0	29	32394	India Demographic and Health Survey 2005-2006	2005-2006	International Institute for Population Sciences (India), Macro International, Inc. India Demographic and Health Survey 2005-2006. Fairfax, United States of America: ICF International.	GHDx
157050	India	27634	18	162073	India Demographic and Health Survey 2015-2016	2015-2016	ICF International, International Institute for Population Sciences (India), Ministry of Health and Family Welfare (India). India Demographic and Health Survey 2015-2016. Fairfax, United States of America: ICF International, 2018.	GHDx
261875	India	1	0	129	India - Vellore Malnutrition and Enteric Disease Study 2009-2014	2009-2014	Fogarty International Center, National Institutes of Health (NIH), Foundation for the National Institutes of Health (FNIH). India - Vellore Malnutrition and Enteric Disease Study 2009-2014.	GHDx
6464	Indonesia	0	15	2183	Indonesia Family Life Survey 2007-2008	2007-2008	Center for Population and Policy Studies, Gadjah Mada University (Indonesia), RAND Corporation, SurveyMETER. Indonesia Family Life Survey 2007-2008. Santa Monica, United States of America: RAND Corporation.	GHDx
20011	Indonesia	1284	0	6055	Indonesia Demographic and Health Survey 2002-2003	2002-2003	Macro International, Inc, Ministry of Health (Indonesia), National Family Planning Coordinating Board (Indonesia), Statistics Indonesia. Indonesia Demographic and Health Survey 2002-2003. Fairfax, United States of America: ICF International.	GHDx
20021	Indonesia	0	33	10349	Indonesia Demographic and Health Survey 2007	2007	Macro International, Inc, Ministry of Health (Indonesia), National Family Planning Coordinating Board (Indonesia), Statistics Indonesia. Indonesia Demographic and Health Survey 2007. Fairfax, United States of America: ICF International.	GHDx
76705	Indonesia	0	33	10226	Indonesia Demographic and Health Survey 2012	2012	ICF International, Ministry of Health (Indonesia), National Population and Family Planning Board (Indonesia), Statistics Indonesia. Indonesia Demographic and Health Survey 2012. Fairfax, United States of America: ICF International.	GHDx

104042	Indonesia	0	3	832	Indonesia - West Papua Multiple Indicator Cluster Survey 2011	2011	Ministry of Home Affairs (Indonesia), National Development Planning Agency (BAPPENAS) (Indonesia), Statistics Indonesia, United Nations Children's Fund (UNICEF). Indonesia - West Papua Multiple Indicator Cluster Survey 2011. New York, United States of America: United Nations Children's Fund (UNICEF), 2013.	GHDx
104043	Indonesia	0	3	885	Indonesia - Papua Multiple Indicator Cluster Survey 2011	2011	Ministry of Home Affairs (Indonesia), National Development Planning Agency (BAPPENAS) (Indonesia), Statistics Indonesia, United Nations Children's Fund (UNICEF). Indonesia - Papua Multiple Indicator Cluster Survey 2011. New York, United States of America: United Nations Children's Fund (UNICEF), 2013.	GHDx
264956	Indonesia	0	932	3107	Indonesia Family Life Survey 2014-2015	2014-2015	RAND Corporation, SurveyMETER. Indonesia Family Life Survey 2014-2015. Santa Monica, United States of America: RAND Corporation, 2016.	GHDx
286781	Indonesia	0	33	6794	Indonesia Demographic and Health Survey 2017	2017	Ministry of Health (Indonesia), National Population and Family Planning Board (Indonesia), Statistics Indonesia. Indonesia Demographic and Health Survey 2017. Fairfax, United States of America: ICF International, 2019.	GHDx
395694	Indonesia	0	34	17816	Indonesia National Socioeconomic Survey 2017	2017	Central Bureau of Statistics (Indonesia). Indonesia National Socioeconomic Survey 2017. Jakarta, Indonesia: Central Bureau of Statistics (Indonesia), 2018.	GHDx
81416	Iran	0	30	5681	Iran Multiple Indicator Demographic and Health Survey 2010	2010	Ministry of Health and Medical Education (Iran), Statistical Centre of Iran. Iran Multiple Indicator Demographic and Health Survey 2010.	GHDx
7028	Iraq	0	18	9666	Iraq Multiple Indicator Cluster Survey 2006	2006	United Nations Children's Fund (UNICEF), Central Organization for Statistics and Information Technology (Iraq), Kurdistan Regional Statistics Office. Iraq Multiple Indicator Cluster Survey 2006. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
76707	Iraq	0	18	7485	Iraq Multiple Indicator	2011	Central Organization for Statistics and Information Technology (Iraq), Kurdistan Regional Statistics Office,	GHDx

					Cluster Survey 2011		Ministry of Health (Iraq), United Nations Children's Fund (UNICEF). Iraq Multiple Indicator Cluster Survey 2011. New York, United States of America: United Nations Children's Fund (UNICEF), 2013.	
385708	Iraq	0	190	6098	Iraq Multiple Indicator Cluster Survey 2018	2018	Central Statistical Organization (Iraq), United Nations Children's Fund (UNICEF). Iraq Multiple Indicator Cluster Survey 2018. New York, United States of America: United Nations Children's Fund (UNICEF), 2019.	GHDx
7149	Jamaica	0	14	850	Jamaica Multiple Indicator Cluster Survey 2005	2005	Statistical Institute of Jamaica (STATIN) and United Nations Children's Fund (UNICEF). Jamaica Multiple Indicator Cluster Survey 2005. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
141336	Jamaica	0	14	979	Jamaica Multiple Indicator Cluster Survey 2011	2011	Statistical Institute of Jamaica, United Nations Children's Fund (UNICEF). Jamaica Multiple Indicator Cluster Survey 2011. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	GHDx
20073	Jordan	489	0	2381	Jordan Demographic and Health Survey 2002	2002	Department of Statistics (Jordan), Macro International, Inc. Jordan Demographic and Health Survey 2002. Fairfax, United States of America: ICF International.	GHDx
20083	Jordan	916	0	6058	Jordan Demographic and Health Survey 2007	2007	Department of Statistics (Jordan), Macro International, Inc. Jordan Demographic and Health Survey 2007. Fairfax, United States of America: ICF International.	GHDx
77517	Jordan	802	0	6137	Jordan Demographic and Health Survey 2012	2012	Department of Statistics (Jordan), ICF International. Jordan Demographic and Health Survey 2012. Fairfax, United States of America: ICF International.	GHDx
356955	Jordan	929	0	4006	Jordan Demographic and Health Survey 2017-2018	2017-2018	Department of Statistics (Jordan), ICF International. Jordan Demographic and Health Survey 2017-2018. Fairfax, United States of America: ICF International, 2019.	GHDx

7375	Kenya	1134	0	3372	Kenya Integrated Household Budget Survey 2005-2006	2005-2006	Central Bureau of Statistics (Kenya), UK Department for International Development (DFID), United States Agency for International Development (USAID), European Union (EU), Danish International Development Agency (DANIDA), World Bank (WB), United Nations Development Programme (UNDP). Kenya Integrated Household Budget Survey 2005-2006. Nairobi, Kenya: Central Bureau of Statistics (Kenya).	GHDx
7401	Kenya	590	0	8563	Kenya - Eastern Province Multiple Indicator Cluster Survey 2008	2008	Kenya National Bureau of Statistics, United Nations Children's Fund (UNICEF). Kenya - Eastern Province Multiple Indicator Cluster Survey 2008. Nairobi, Kenya: Kenya National Bureau of Statistics.	GHDx
21365	Kenya	396	0	3328	Kenya Demographic and Health Survey 2008-2009	2008-2009	ICF Macro, Kenya Medical Research Institute (KEMRI), Kenya National Bureau of Statistics, Ministry of Public Health and Sanitation (Kenya), National AIDS and STI Control Programme (NASCOP) (Kenya), National Aids Control Council (NACC), National Coordinating Agency for Population and Development (Kenya). Kenya Demographic and Health Survey 2008-2009. Fairfax, United States of America: ICF International.	GHDx
56420	Kenya	0	1	277	Kenya - Coast Multiple Indicator Cluster Survey 2009	2009	Kenya National Bureau of Statistics, United Nations Children's Fund (UNICEF). Kenya - Coast Multiple Indicator Cluster Survey 2009. New York, United States of America: United Nations Children's Fund (UNICEF), 2014.	GHDx
135416	Kenya	289	0	2894	Kenya - Nyanza Province Multiple Indicator Cluster Survey 2011	2011	Kenya National Bureau of Statistics, United Nations Children's Fund (UNICEF). Kenya - Nyanza Province Multiple Indicator Cluster Survey 2011. Nairobi, Kenya: Kenya National Bureau of Statistics.	GHDx

157057	Kenya	1581	0	12164	Kenya Demographic and Health Survey 2014	2014	ICF International, Kenya Medical Research Institute (KEMRI), Kenya National Bureau of Statistics, Ministry of Health (Kenya), National AIDS Control Council (Kenya), National Council for Population and Development (Kenya). Kenya Demographic and Health Survey 2014. Fairfax, United States of America: ICF International.	GHDx
203654	Kenya	40	0	520	Kenya - Bungoma County Multiple Indicator Survey 2013-2014	2013-2014	Kenya National Bureau of Statistics, Population Studies and Research Institute, University of Nairobi (Kenya), United Nations Children's Fund (UNICEF). Kenya - Bungoma County Multiple Indicator Survey 2013-2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	GHDx
203663	Kenya	48	0	474	Kenya - Kakamega County Multiple Indicator Survey 2013-2014	2013-2014	Kenya National Bureau of Statistics, Population Studies and Research Institute, University of Nairobi (Kenya), United Nations Children's Fund (UNICEF). Kenya - Kakamega County Multiple Indicator Survey 2013-2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	GHDx
203664	Kenya	49	0	596	Kenya - Turkana County Multiple Indicator Survey 2013-2014	2013-2014	Kenya National Bureau of Statistics, Population Studies and Research Institute, University of Nairobi (Kenya), United Nations Children's Fund (UNICEF). Kenya - Turkana County Multiple Indicator Survey 2013-2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	GHDx
7540	Kyrgyzstan	182	2	1677	Kyrgyzstan Multiple Indicator Cluster Survey 2005-2006	2005-2006	United Nations Children's Fund (UNICEF), National Statistical Committee of the Kyrgyz Republic. Kyrgyzstan Multiple Indicator Cluster Survey 2005-2006. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
77518	Kyrgyzstan	312	0	2456	Kyrgyzstan Demographic and Health Survey 2012	2012	ICF International, Ministry of Health (Kyrgyzstan), National Statistical Committee of the Kyrgyz Republic. Kyrgyzstan Demographic and Health Survey 2012. Fairfax, United States of America: ICF International.	GHDx

408226	Kyrgyzstan	188	3	1273	Kyrgyzstan Multiple Indicator Cluster Survey 2018	2018	National Statistical Committee of the Kyrgyz Republic, United Nations Children's Fund (UNICEF). Kyrgyzstan Multiple Indicator Cluster Survey 2018. New York, United States of America: United Nations Children's Fund (UNICEF), 2019.	GHDx
7629	Laos	298	0	2724	Laos Multiple Indicator Cluster Survey 2006	2006	United Nations Children's Fund (UNICEF), Department of Statistics (Laos), Ministry of Health (Laos). Laos Multiple Indicator Cluster Survey 2006. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
103973	Laos	0	17	7503	Laos Multiple Indicator Cluster Survey 2011-2012	2011-2012	Ministry of Education and Sports (Laos), Ministry of Health (Laos), Ministry of Planning and Investment (Laos). Laos Multiple Indicator Cluster Survey 2011-2012. New York, United States of America: United Nations Children's Fund (UNICEF), 2013.	GHDx
375362	Laos	0	18	5047	Laos Multiple Indicator Cluster Survey 2017	2017	Lao Statistics Bureau, Ministry of Education and Sports (Laos), Ministry of Health (Laos), United Nations Children's Fund (UNICEF). Laos Multiple Indicator Cluster Survey 2017. New York, United States of America: United Nations Children's Fund (UNICEF), 2018.	GHDx
20167	Lesotho	371	0	1864	Lesotho Demographic and Health Survey 2004-2005	2004-2005	Bureau of Statistics (Lesotho), Macro International, Inc, Ministry of Health and Social Welfare (Lesotho). Lesotho Demographic and Health Survey 2004-2005. Fairfax, United States of America: ICF International.	GHDx
21382	Lesotho	392	0	2077	Lesotho Demographic and Health Survey 2009-2010	2009-2010	ICF Macro, Ministry of Health and Social Welfare (Lesotho). Lesotho Demographic and Health Survey 2009-2010. Fairfax, United States of America: ICF International.	GHDx
157058	Lesotho	390	0	1713	Lesotho Demographic and Health Survey 2014	2014	ICF International, Ministry of Health and Social Welfare (Lesotho). Lesotho Demographic and Health Survey 2014. Fairfax, United States of America: ICF International.	GHDx
20191	Liberia	291	0	3102	Liberia Demographic and Health	2006-2007	Liberia Institute for Statistics and Geo-information Services (LISGIS), Macro International, Inc. Liberia	GHDx

					Survey 2006-2007		Demographic and Health Survey 2006-2007. Fairfax, United States of America: ICF International.	
77385	Liberia	322	0	4107	Liberia Demographic and Health Survey 2013	2013	ICF International, Liberia Institute for Statistics and Geo-information Services (LISGIS), National AIDS and STI Control Program (NACP), Ministry of Health and Social Welfare (Liberia). Liberia Demographic and Health Survey 2013. Fairfax, United States of America: ICF International.	GHDx
286768	Liberia	149	0	1101	Liberia Malaria Indicator Survey 2016	2016	ICF International, Liberia Institute for Statistics and Geo-information Services (LISGIS), National Malaria Control Program (Liberia). Liberia Malaria Indicator Survey 2016. Fairfax, United States of America: ICF International, 2017.	GHDx
20223	Madagascar	0	6	3022	Madagascar Demographic and Health Survey 2003-2004	2003-2004	Macro International, Inc, National Institute of Statistics (Madagascar). Madagascar Demographic and Health Survey 2003-2004. Fairfax, United States of America: ICF International.	GHDx
21409	Madagascar	585	0	6672	Madagascar Demographic and Health Survey 2008-2009	2008-2009	ICF Macro, National Institute of Statistics (Madagascar). Madagascar Demographic and Health Survey 2008-2009. Fairfax, United States of America: ICF International.	GHDx
125594	Madagascar	127	0	1705	Madagascar - South Multiple Indicator Cluster Survey 2012	2012	National Institute of Statistics (Madagascar), United Nations Children's Fund (UNICEF). Madagascar - South Multiple Indicator Cluster Survey 2012. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	GHDx
399853	Madagascar	766	0	5012	Madagascar Multiple Indicator Cluster Survey 2018	2018	National Institute of Statistics (Madagascar), United Nations Children's Fund (UNICEF). Madagascar Multiple Indicator Cluster Survey 2018. 2019.	GHDx
7919	Malawi	0	26	14466	Malawi Multiple Indicator Cluster Survey 2006	2006	United Nations Children's Fund (UNICEF), National Statistics Office (Malawi). Malawi Multiple Indicator Cluster Survey 2006. New York, United States: United Nations Children's Fund (UNICEF).	GHDx

20263	Malawi	520	0	5657	Malawi Demographic and Health Survey 2004-2005	2004-2005	Macro International, Inc, National Statistical Office of Malawi. Malawi Demographic and Health Survey 2004-2005. Fairfax, United States of America: ICF International.	GHDx
21393	Malawi	826	0	10826	Malawi Demographic and Health Survey 2010	2010	ICF Macro, National Statistical Office of Malawi. Malawi Demographic and Health Survey 2010. Fairfax, United States of America: ICF International.	GHDx
161662	Malawi	0	31	7573	Malawi Multiple Indicator Cluster Survey 2013-2014	2013-2014	National Statistical Office of Malawi, United Nations Children's Fund (UNICEF). Malawi Multiple Indicator Cluster Survey 2013-2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	GHDx
218581	Malawi	849	0	6489	Malawi Demographic and Health Survey 2015-2016	2015-2016	Emory University and Centers for Disease Control & Prevention Collaboration, ICF International, Ministry of Health (Malawi), National Statistical Office of Malawi. Malawi Demographic and Health Survey 2015-2016. Fairfax, United States of America: ICF International, 2017.	GHDx
327852	Malawi	0	32	4519	Malawi Integrated Household Survey 2016-2017	2016-2017	National Statistical Office. Malawi - Fourth Integrated Household Survey 2016-2017, Ref. MWI_2016_IHS-IV_v02_M. Dataset downloaded from [http://microdata.worldbank.org/index.php/catalog/2936] on [December 18, 2017].	GHDx
284410	Malaysia	0	16	10878	Malaysia National Health and Morbidity Survey 2016	2016	Institute for Public Health, Ministry of Health (Malaysia), National Institutes of Health (NIH). Malaysia National Health and Morbidity Survey 2016.	GHDx
20274	Mali	405	0	7116	Mali Demographic and Health Survey 2006	2006	Macro International, Inc, Ministry of Health (Mali), National Directorate of Statistics and Informatics (DNSI) (Mali). Mali Demographic and Health Survey 2006. Fairfax, United States of America: ICF International.	GHDx
20315	Mali	399	0	2170	Mali Demographic	2001	Macro International, Inc, National Directorate of Statistics and Informatics (DNSI) (Mali), Planning and Statistics Unit, Ministry of Health (Mali). Mali Demographic and	GHDx

					and Health Survey 2001		Health Survey 2001. Fairfax, United States of America: ICF International.	
77388	Mali	413	0	5605	Mali Demographic and Health Survey 2012-2013	2012-2013	ICF International, INFO-STAT (Mali), Ministry of Health (Mali), National Institute of Statistics (INSTAT) (Mali), Planning and Statistics Unit, Ministry of Health (Mali). Mali Demographic and Health Survey 2012-2013. Fairfax, United States of America: ICF International, 2014.	GHDx
248224	Mali	0	8	6261	Mali Multiple Indicator Cluster Survey 2015	2015	Ministry of Health (Mali), Ministry of Planning (Mali), National Institute of Statistics (INSTAT) (Mali), United Nations Children's Fund (UNICEF). Mali Multiple Indicator Cluster Survey 2015. New York, United States of America: United Nations Children's Fund (UNICEF), 2017.	GHDx
260407	Mali	0	48	2800	Mali Agricultural Integrated Economic Survey 2014-2015	2014-2015	Ministry of Rural Development (Mali), National Institute of Statistics (INSTAT) (Mali), World Bank. Mali Agricultural Integrated Economic Survey 2014-2015. Washington DC, United States of America: World Bank.	GHDx
398033	Mali	328	0	3479	Mali Demographic and Health Survey 2018	2018	ICF International, National Institute of Statistics (INSTAT) (Mali). Mali Demographic and Health Survey 2018. Fairfax, United States of America: ICF International, 2019.	GHDx
8115	Mauritania	0	196	5660	Mauritania Multiple Indicator Cluster Survey 2007	2007	National Office of Statistics (Mauritania), United Nations Children's Fund (UNICEF). Mauritania Multiple Indicator Cluster Survey 2007. New York, United States of America: United Nations Children's Fund (UNICEF).	GHDx
152783	Mauritania	0	194	5357	Mauritania Multiple Indicator Cluster Survey 2011	2011	National Office of Statistics (Mauritania), United Nations Children's Fund (UNICEF). Mauritania Multiple Indicator Cluster Survey 2011. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	GHDx
267343	Mauritania	0	13	4606	Mauritania Multiple Indicator	2015	National Office of Statistics (Mauritania), United Nations Children's Fund (UNICEF). Mauritania Multiple Indicator	GHDx

					Cluster Survey 2015		Cluster Survey 2015. New York, United States of America: United Nations Children's Fund (UNICEF), 2018.	
8442	Mexico	0	126	3889	Mexico Family Life Survey 2002	2002	Center for Research and Teaching in Economics (CIDE) (Mexico), Ibero-American University, National Institute of Perinatology (Mexico), National Institute of Statistics and Geography (INEGI) (Mexico). Mexico Family Life Survey 2002.	GHDx
8618	Mexico	0	578	8852	Mexico National Survey of Health and Nutrition 2005-2006	2005-2006	National Institute of Public Health (Mexico). Mexico National Survey of Health and Nutrition 2005-2006. Cuernavaca, Mexico: National Institute of Public Health (Mexico).	GHDx
8684	Mexico	0	1	10	Mexico National Performance Evaluation Survey 2002-2003	2002-2003	National Institute of Public Health (Mexico), Secretariat of Health (Mexico), World Health Organization (WHO). Mexico National Performance Evaluation Survey 2002-2003.	GHDx
81748	Mexico	0	689	5067	Mexico National Survey of Health and Nutrition 2011-2012	2011-2012	National Institute of Public Health (Mexico). Mexico National Survey of Health and Nutrition 2011-2012. Cuernavaca, Mexico: National Institute of Public Health (Mexico).	GHDx
264590	Mexico	0	5	3157	Mexico Multiple Indicator Cluster Survey 2015	2015	National Institute of Public Health (Mexico), United Nations Children's Fund (UNICEF). Mexico Multiple Indicator Cluster Survey 2015. New York, United States: United Nations Children's Fund (UNICEF), 2017.	GHDx
20339	Moldova	342	0	845	Moldova Demographic and Health Survey 2005	2005	Macro International, Inc, National Scientific and Applied Center for Preventive Medicine (Moldova). Moldova Demographic and Health Survey 2005. Fairfax, United States of America: ICF International.	GHDx
140200	Moldova	0	4	1042	Moldova Multiple	2012	Ministry of Health (Moldova), National Bureau of Statistics (Moldova), United Nations Children's Fund	GHDx

					Indicator Cluster Survey 2012		(UNICEF). Moldova Multiple Indicator Cluster Survey 2012. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	
8777	Mongolia	0	22	2089	Mongolia Multiple Indicator Cluster Survey 2005	2005	National Statistical Office of Mongolia, United Nations Children's Fund (UNICEF). Mongolia Multiple Indicator Cluster Survey 2005. New York, United States of America: United Nations Children's Fund (UNICEF).	GHDx
76704	Mongolia	0	217	2448	Mongolia Multiple Indicator Cluster Survey 2010	2010	National Statistical Office of Mongolia, United Nations Children's Fund (UNICEF). Mongolia Multiple Indicator Cluster Survey 2010. New York, United States of America: United Nations Children's Fund (UNICEF), 2013.	GHDx
189045	Mongolia	0	23	503	Mongolia - Khuvsgul Multiple Indicator Cluster Survey 2012	2012	National Statistical Office of Mongolia, Statistics Department of Khuvsgul Aimag (Mongolia), United Nations Children's Fund (UNICEF). Mongolia - Khuvsgul Multiple Indicator Cluster Survey 2012. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	GHDx
189048	Mongolia	0	1	259	Mongolia - Nalaikh District Multiple Cluster Indicator Survey 2012	2012	National Statistical Office of Mongolia, Statistics Department, Governor’s Office of the Nalaikh (Mongolia), United Nations Children's Fund (UNICEF). Mongolia - Nalaikh District Multiple Cluster Indicator Survey 2012. New York, United States of America: United Nations Children's Fund (UNICEF), 2017.	GHDx
335994	Mongolia	0	80	432	Mongolia - Khuvsgul Multiple Indicator Cluster Survey 2016	2016	National Statistical Office of Mongolia, United Nations Children's Fund (UNICEF). Mongolia - Khuvsgul Multiple Indicator Cluster Survey 2016. New York, United States of America: United Nations Children's Fund (UNICEF), 2018.	GHDx
336042	Mongolia	0	7	144	Mongolia - Nalaikh District Multiple	2016	National Statistical Office of Mongolia, United Nations Children's Fund (UNICEF). Mongolia - Nalaikh District Multiple Indicator Cluster Survey 2016. New York, United	GHDx

					Indicator Cluster Survey 2016		States of America: United Nations Children's Fund (UNICEF), 2018.	
427952	Mongolia	0	447	2194	Mongolia Multiple Indicator Cluster Survey 2018	2018	Government of Mongolia, National Statistical Office of Mongolia, United Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA). Mongolia Multiple Indicator Cluster Survey 2018. New York, United States of America: United Nations Children's Fund (UNICEF), 2019.	GHDx
20361	Morocco	476	0	3548	Morocco Demographic and Health Survey 2003-2004	2003-2004	League of Arab States, Macro International, Inc, Ministry of Health (Morocco). Morocco Demographic and Health Survey 2003-2004. Fairfax, United States of America: ICF International.	GHDx
126909	Morocco	0	59	1691	Morocco National Survey on Population and Family Health 2010-2011	2010-2011	Ministry of Health (Morocco), Pan Arab Project for Family Health (PAPFAM), United Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA), World Health Organization (WHO). Morocco National Survey on Population and Family Health 2010-2011.	GHDx
20394	Mozambique	0	11	6833	Mozambique Demographic and Health Survey 2003-2004	2003-2004	Macro International, Inc, National Institute of Statistics (INE) (Mozambique). Mozambique Demographic and Health Survey 2003-2004. Fairfax, United States of America: ICF International.	GHDx
27031	Mozambique	67	593	8027	Mozambique Multiple Indicator Cluster Survey 2008-2009	2008-2009	United Nations Children's Fund (UNICEF), National Statistics Institute (Mozambique). Mozambique Multiple Indicator Cluster Survey 2008-2009. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
55975	Mozambique	609	0	7803	Mozambique Demographic and Health Survey 2011	2011	ICF Macro, Manhica Health Research Center (CISM), Ministry of Health (Mozambique), National Institute of Statistics (INE) (Mozambique). Mozambique Demographic and Health Survey 2011. Fairfax, United States of America: ICF International.	GHDx

157060	Mozambique	305	0	3648	Mozambique AIDS Indicator Survey 2015	2015	Centers for Disease Control and Prevention (CDC), ICF International, Ministry of Health (Mozambique), National Institute of Health (Mozambique), National Institute of Statistics (INE) (Mozambique). Mozambique AIDS Indicator Survey 2015. Fairfax, United States of America: ICF International, 2018.	GHDx
90696	Myanmar	0	17	10601	Myanmar Multiple Indicator Cluster Survey 2009-2010	2009-2010	Ministry of Health (Myanmar), Ministry of National Planning and Economic Development (Myanmar), United Nations Children's Fund (UNICEF). Myanmar Multiple Indicator Cluster Survey 2009-2010.	GHDx
141910	Myanmar	0	17	9368	Myanmar Multiple Indicator Cluster Survey 2003	2003	Ministry of Health (Myanmar), United Nations Children's Fund (UNICEF). Myanmar Multiple Indicator Cluster Survey 2003.	GHDx
157061	Myanmar	434	0	3374	Myanmar Demographic and Health Survey 2015-2016	2015-2016	ICF International, Ministry of Health and Sports (Myanmar). Myanmar Demographic and Health Survey 2015-2016. Fairfax, United States of America: ICF International, 2017.	GHDx
20428	Namibia	483	0	4520	Namibia Demographic and Health Survey 2006-2007	2006-2007	Macro International, Inc, Ministry of Health and Social Services (Namibia). Namibia Demographic and Health Survey 2006-2007. Fairfax, United States of America: ICF International.	GHDx
150382	Namibia	530	0	4331	Namibia Demographic and Health Survey 2013	2013	ICF International, Ministry of Health and Social Services (Namibia), Namibia Institute of Pathology, Namibia Statistics Agency. Namibia Demographic and Health Survey 2013. Fairfax, United States of America: ICF International.	GHDx
20450	Nepal	241	0	1724	Nepal Demographic and Health Survey 2001	2001	Macro International, Inc, Ministry of Health and Population (Nepal), New ERA. Nepal Demographic and Health Survey 2001. Fairfax, United States of America: ICF International.	GHDx

20462	Nepal	260	0	4497	Nepal Demographic and Health Survey 2006	2006	Macro International, Inc, Ministry of Health and Population (Nepal), New ERA. Nepal Demographic and Health Survey 2006. Fairfax, United States of America: ICF International.	GHDx
21240	Nepal	289	0	4200	Nepal Demographic and Health Survey 2011	2011	ICF Macro, Ministry of Health and Population (Nepal), New ERA. Nepal Demographic and Health Survey 2011. Fairfax, United States of America: ICF International.	GHDx
39999	Nepal	0	24	2137	Nepal Multiple Indicator Cluster Survey 2010	2010	United Nations Children's Fund (UNICEF), Central Bureau of Statistics (Nepal). Nepal Multiple Indicator Cluster Survey 2010. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
162317	Nepal	483	0	2904	Nepal Multiple Indicator Cluster Survey 2014	2014	Central Bureau of Statistics (Nepal), United Nations Children's Fund (UNICEF). Nepal Multiple Indicator Cluster Survey 2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	GHDx
286782	Nepal	378	0	2504	Nepal Demographic and Health Survey 2016-2017	2016-2017	ICF International, Ministry of Health (Nepal), New ERA. Nepal Demographic and Health Survey 2016-2017. Fairfax, United States of America: ICF International, 2017.	GHDx
9270	Nicaragua	619	0	3140	Nicaragua Reproductive Health Survey 2006-2007	2006-2007	Division of Reproductive Health, Centers for Disease Control and Prevention (CDC), National Institute for Development Information (Nicaragua). Nicaragua Reproductive Health Survey 2006-2007. Managua, Nicaragua: National Institute for Development Information (Nicaragua).	GHDx
20499	Niger	0	8	4923	Niger Demographic and Health Survey 2006	2006	Department of Statistics and National Accounts (Niger), Macro International, Inc. Niger Demographic and Health Survey 2006. Fairfax, United States of America: ICF International.	GHDx
74393	Niger	0	8	6906	Niger Demographic and Health Survey 2012	2012	ICF International, Ministry of Public Health (Niger), National Institute of Statistics (Niger). Niger Demographic and Health Survey 2012. Fairfax, United States of America: ICF International.	GHDx

9516	Nigeria	0	37	9891	Nigeria Multiple Indicator Cluster Survey 2007	2007	United Nations Children's Fund (UNICEF), National Bureau of Statistics (Nigeria). Nigeria Multiple Indicator Cluster Survey 2007. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
20567	Nigeria	357	0	2961	Nigeria Demographic and Health Survey 2003	2003	Department for International Development (DFiD) (United Kingdom), National Population Commission of Nigeria, ORC Macro, United Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA). Nigeria Demographic and Health Survey 2003. Fairfax, United States of America: ICF International.	GHDx
21433	Nigeria	885	0	14647	Nigeria Demographic and Health Survey 2008	2008	Macro International, Inc, National Population Commission of Nigeria. Nigeria Demographic and Health Survey 2008. Fairfax, United States of America: ICF International, 2009.	GHDx
24890	Nigeria	0	5	7	Nigeria General Household Survey 2007	2007	Central Bank of Nigeria, National Bureau of Statistics (Nigeria), Nigerian Communications Commission (NCC). Nigeria General Household Survey 2007. Abuja, Nigeria: National Bureau of Statistics (Nigeria).	GHDx
76703	Nigeria	0	37	14503	Nigeria Multiple Indicator Cluster Survey 2011	2011	National Bureau of Statistics (Nigeria), United Nations Children's Fund (UNICEF). Nigeria Multiple Indicator Cluster Survey 2011. New York, United States of America: United Nations Children's Fund (UNICEF), 2013.	GHDx
77390	Nigeria	889	0	16651	Nigeria Demographic and Health Survey 2013	2013	ICF International, National Population Commission of Nigeria. Nigeria Demographic and Health Survey 2013. Fairfax, United States of America: ICF International.	GHDx
151797	Nigeria	178	0	261	Nigeria General Household Survey 2012-2013	2012-2013	National Bureau of Statistics (Nigeria). Nigeria General Household Survey 2012-2013. Washington DC, United States of America: World Bank.	GHDx
218613	Nigeria	2164	0	10935	Nigeria Multiple Indicator	2016-2017	National Agency for the Control of AIDS (Nigeria), National Bureau of Statistics (Nigeria), National Primary Health Care Development Agency (NPHCDA) (Nigeria),	GHDx

					Cluster Survey with National Immunization Coverage Survey Supplement 2016-2017		United Nations Children's Fund (UNICEF). Nigeria Multiple Indicator Cluster Survey with National Immunization Coverage Survey Supplement 2016-2017. New York, United States of America: United Nations Children's Fund (UNICEF), 2018.	
408484	Nigeria	1349	0	11525	Nigeria Demographic and Health Survey 2018	2018	Federal Ministry of Health (Nigeria), ICF International, National Population Commission (NPC). Nigeria Demographic and Health Survey 2018. Fairfax, United States of America: ICF International, 2019.	GHDx
9720	Pakistan	0	6	2304	Pakistan Integrated Household Survey/ Household Integrated Economic Survey 2001-2002	2001-2002	Federal Bureau of Statistics (Pakistan). Pakistan Integrated Household Survey 2001-2002. Islamabad, Pakistan: Federal Bureau of Statistics (Pakistan).	GHDx
9951	Pakistan	0	4	10128	Pakistan Social and Living Standards Measurement Survey/ Household Integrated Economic Survey 2004-2005	2004-2005	Federal Bureau of Statistics (Pakistan). Pakistan Social and Living Standards Measurement Survey 2004-2005. Islamabad, Pakistan: Federal Bureau of Statistics (Pakistan).	GHDx
20595	Pakistan	929	0	5797	Pakistan Demographic and Health Survey 2006-2007	2006-2007	Macro International, Inc, National Institute of Population Studies (Pakistan). Pakistan Demographic and Health Survey 2006-2007. Fairfax, United States of America: ICF International.	GHDx

24818	Pakistan	0	4	10788	Pakistan Social and Living Standards Measurement Survey/ Household Integrated Economic Survey 2005-2006	2005-2006	Federal Bureau of Statistics (Pakistan). Pakistan Social and Living Standards Measurement Survey 2005-2006. Islamabad, Pakistan: Federal Bureau of Statistics (Pakistan).	GHDx
30634	Pakistan	0	4	10111	Pakistan Social and Living Standards Measurement Survey/ Household Integrated Economic Survey 2007-2008	2007-2008	Federal Bureau of Statistics (Pakistan). Pakistan Social and Living Standards Measurement Survey 2007-2008. Islamabad, Pakistan: Federal Bureau of Statistics (Pakistan).	GHDx
77521	Pakistan	0	119	8150	Pakistan Demographic and Health Survey 2012-2013	2012-2013	ICF International, National Institute of Population Studies (Pakistan), Pakistan Bureau of Statistics. Pakistan Demographic and Health Survey 2012-2013. Fairfax, United States of America: ICF International.	GHDx
104236	Pakistan	0	145	25306	Pakistan - Punjab Multiple Indicator Cluster Survey 2011	2011	Bureau of Statistics Punjab (Pakistan), United Nations Children's Fund (UNICEF), United Nations Development Programme (UNDP). Pakistan - Punjab Multiple Indicator Cluster Survey 2011. New York, United States of America: United Nations Children's Fund (UNICEF), 2013.	GHDx
232763	Pakistan	0	28	5887	Pakistan - Sindh Multiple Indicator Cluster Survey 2014	2014	Bureau of Statistics, Planning and Development Department, Government of Sindh (Pakistan), Global Alliance for Improved Nutrition (GAIN), Pakistan Council of Research in Water Resource (PCRWR), United Nations Children's Fund (UNICEF). Pakistan - Sindh Multiple	GHDx

							Indicator Cluster Survey 2014. Fairfax, United States of America: ICF International, 2016.	
236266	Pakistan	0	36	10479	Pakistan - Punjab Multiple Indicator Cluster Survey 2014	2014	Bureau of Statistics Punjab (Pakistan), United Nations Children's Fund (UNICEF). Pakistan - Punjab Multiple Indicator Cluster Survey 2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	GHDx
261883	Pakistan	1	0	256	Pakistan - Naushahro Feroze Malnutrition and Enteric Disease Study 2009-2014	2009-2014	Aga Khan University, Fogarty International Center, National Institutes of Health (NIH), Foundation for the National Institutes of Health (FNIH). Pakistan - Naushahro Feroze Malnutrition and Enteric Disease Study 2009-2014.	GHDx
286783	Pakistan	556	0	6058	Pakistan Demographic and Health Survey 2017-2018	2017-2018	ICF International, Ministry of National Health Services, Regulations & Coordination (Pakistan), National Institute of Population Studies (Pakistan). Pakistan Demographic and Health Survey 2017-2018. Fairfax, United States of America: ICF International, 2018.	GHDx
9999	Palestine	0	16	6136	Palestine Family Health Survey 2006-2007	2006-2007	League of Arab States, Palestinian Central Bureau of Statistics, United Nations Children's Fund (UNICEF). Palestine Family Health Survey 2006-2007.	GHDx
125591	Palestine	0	16	3909	Palestine Multiple Indicator Cluster Survey 2010	2010	Ministry of Health (Palestine), Palestinian Central Bureau of Statistics, United Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA). Palestine Multiple Indicator Cluster Survey 2010. New York, United States of America: United Nations Children's Fund (UNICEF), 2014.	GHDx
161590	Palestine	0	16	1540	Palestine Multiple Indicator Cluster Survey 2014	2014	Ministry of Health (Palestine), Palestinian Central Bureau of Statistics, United Nations Children's Fund (UNICEF). Palestine Multiple Indicator Cluster Survey 2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	GHDx

161587	Panama	0	509	4458	Panama Multiple Indicator Cluster Survey 2013	2013	National Institute of Statistics and Census (Panama), United Nations Children's Fund (UNICEF). Panama Multiple Indicator Cluster Survey 2013. New York, United States of America: United Nations Children's Fund (UNICEF).	GHDx
44870	Papua New Guinea	0	4	1255	Papua New Guinea Demographic and Health Survey 2006-2007	2006-2007	National Statistical Office (Papua New Guinea), National Statistics Office (Philippines). Papua New Guinea Demographic and Health Survey 2006-2007.	GHDx
426238	Papua New Guinea	706	0	3540	Papua New Guinea Demographic and Health Survey 2016-2018	2016-2018	ICF International, National Statistical Office (Papua New Guinea). Papua New Guinea Demographic and Health Survey 2016-2018. Fairfax, United States of America: ICF International, 2019.	GHDx
10370	Paraguay	0	16	1534	Paraguay Reproductive Health Survey 2004	2004	Division of Reproductive Health-Centers for Disease Control and Prevention (CDC). (2005): Paraguay Reproductive Health Survey 2004. Asunción, Paraguay, Paraguayan Center for Population Studies (CEPEP).	GHDx
27525	Paraguay	0	55	939	Paraguay Reproductive Health Survey 2008	2008	Paraguay Center for Population Studies (CEPEP). Paraguay Reproductive Health Survey 2008. Asunción, Paraguay: Paraguayan Center for Population Studies (CEPEP).	GHDx
41830	Paraguay	0	371	1694	Paraguay Permanent Household Survey 2005	2005	Department of Statistics, Surveys and Censuses (Paraguay). Paraguay Permanent Household Survey 2005. Asunción, Paraguay: Department of Statistics, Surveys and Censuses (Paraguay).	GHDx
41837	Paraguay	0	13	812	Paraguay Permanent Household Survey 2006	2006	Department of Statistics, Surveys and Censuses (Paraguay). Paraguay Permanent Household Survey 2006. Asunción, Paraguay: Department of Statistics, Surveys and Censuses (Paraguay).	GHDx
324470	Paraguay	0	9	896	Paraguay Multiple Indicator	2016	General Directorate of Statistics, Surveys and Censuses (Paraguay), Ministry of Public Health and Social Welfare (Paraguay), United Nations Children's Fund (UNICEF).	GHDx

					Cluster Survey 2016		Paraguay Multiple Indicator Cluster Survey 2016. New York, United States of America: United Nations Children's Fund (UNICEF), 2017.	
210182	Peru	1150	0	5566	Peru Continuous Demographic and Health Survey 2014 - INEI	2014	ICF International, Ministry of Health (Peru), National Institute of Statistics and Informatics (Peru), National Police of Peru (PNP). Peru Continuous Demographic and Health Survey 2014 - INEI. Lima, Peru: National Institute of Statistics and Informatics (Peru), 2015.	GHDx
210231	Peru	0	608	5504	Peru Continuous Demographic and Health Survey 2013 - INEI	2013	ICF International, National Institute of Statistics and Informatics (Peru). Peru Continuous Demographic and Health Survey 2013 - INEI. Lima, Peru: National Institute of Statistics and Informatics (Peru), 2014.	GHDx
270404	Peru	1103	0	6127	Peru Continuous Demographic and Health Survey 2009	2009	National Institute of Statistics and Informatics (Peru), ORC Macro. Peru Continuous Demographic and Health Survey 2009. Fairfax, United States of America: ICF International.	GHDx
270469	Peru	0	24	7344	Peru Continuous Demographic and Health Survey 2010	2010	National Institute of Statistics and Informatics (Peru). Peru Continuous Demographic and Health Survey 2010. Fairfax, United States of America: ICF International.	GHDx
270470	Peru	0	24	7275	Peru Continuous Demographic and Health Survey 2011	2011	Macro International, Inc, National Institute of Statistics and Informatics (Peru). Peru Continuous Demographic and Health Survey 2011. Fairfax, United States of America: ICF International.	GHDx
270471	Peru	0	24	7614	Peru Continuous Demographic and Health Survey 2012	2012	Macro International, Inc, National Institute of Statistics and Informatics (Peru). Peru Continuous Demographic and Health Survey 2012. Fairfax, United States of America: ICF International.	GHDx

303663	Peru	1573	0	11290	Peru Demographic and Family Health Survey 2015	2015	National Institute of Statistics and Informatics (Peru). Peru Demographic and Family Health Survey 2015. Lima, Peru: National Institute of Statistics and Informatics (Peru), 2017.	GHDx
303664	Peru	19	0	105	Peru Demographic and Family Health Survey 2016	2016	National Institute of Statistics and Informatics (Peru). Peru Demographic and Family Health Survey 2016. Lima, Peru: National Institute of Statistics and Informatics (Peru), 2017.	GHDx
407869	Peru	3681	0	14487	Peru Demographic and Family Health Survey 2018	2018	National Institute of Statistics and Informatics (Peru). Peru Demographic and Family Health Survey 2018. Lima, Peru: National Institute of Statistics and Informatics (Peru), 2019.	GHDx
20699	Philippines	788	0	4173	Philippines Demographic and Health Survey 2003	2003	Macro International, Inc, National Statistics Office (Philippines). Philippines Demographic and Health Survey 2003. Fairfax, United States of America: ICF International.	GHDx
21421	Philippines	739	0	3831	Philippines Demographic and Health Survey 2008	2008	Macro International, Inc, National Statistics Office (Philippines). Philippines Demographic and Health Survey 2008. Fairfax, United States of America: ICF International, 2010.	GHDx
142943	Philippines	0	17	4202	Philippines Demographic and Health Survey 2013	2013	ICF International, Philippines Statistics Authority. Philippines Demographic and Health Survey 2013. Fairfax, United States of America: ICF International, 2014.	GHDx
20740	Rwanda	456	0	8235	Rwanda Demographic and Health Survey 2005	2005	Macro International, Inc, National Institute of Statistics of Rwanda. Rwanda Demographic and Health Survey 2005. Fairfax, United States of America: ICF International.	GHDx
21222	Rwanda	246	0	5328	Rwanda Interim Demographic and Health	2007-2008	Macro International, Inc, Ministry of Health (Rwanda), National Institute of Statistics of Rwanda. Rwanda Interim Demographic and Health Survey 2007-2008. Fairfax, United States of America: ICF International.	GHDx

					Survey 2007-2008			
56040	Rwanda	492	0	8877	Rwanda Demographic and Health Survey 2010-2011	2010-2011	ICF Macro, Ministry of Health (Rwanda), National Institute of Statistics of Rwanda. Rwanda Demographic and Health Survey 2010-2011. Fairfax, United States of America: ICF International.	GHDx
151437	Rwanda	0	5	10988	Rwanda Integrated Household Living Conditions Survey 2010-2011	2010-2011	National Institute of Statistics of Rwanda. Rwanda Integrated Household Living Conditions Survey 2010-2011. Kigali, Rwanda: National Institute of Statistics of Rwanda.	GHDx
157063	Rwanda	492	0	8052	Rwanda Demographic and Health Survey 2014-2015	2014-2015	ICF International, Ministry of Health (Rwanda), National Institute of Statistics of Rwanda. Rwanda Demographic and Health Survey 2014-2015. Fairfax, United States of America: ICF International, 2016.	GHDx
26866	Sao Tome and Principe	0	7	1125	Sao Tome and Principe Demographic and Health Survey 2008-2009	2008-2009	ICF Macro, Ministry of Health (Sao Tome and Principe), National Institute of Statistics (Sao Tome and Principe). Sao Tome and Principe Demographic and Health Survey 2008-2009. Fairfax, United States of America: ICF International.	GHDx
214640	Sao Tome and Principe	0	7	786	Sao Tome and Principe Multiple Indicator Cluster Survey 2014	2014	Global Fund to Fight Aids Tuberculosis and Malaria (GFATM), ICF International, National Center for Endemic Diseases (CNE) (Sao Tome and Principe), National Institute of Statistics (Sao Tome and Principe), United Nations Children's Fund (UNICEF), United Nations Development Programme (UNDP). Sao Tome and Principe Multiple Indicator Cluster Survey 2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2016.	GHDx
26855	Senegal	366	0	5667	Senegal Demographic	2005	Ministry of Health and Prevention (Senegal), Research Center for Human Development (Senegal). Senegal	GHDx

					and Health Survey 2005		Demographic and Health Survey 2005. Fairfax, United States of America: ICF International.	
56063	Senegal	385	0	6884	Senegal Demographic and Health Survey 2010-2011	2010-2011	Center for Research in Human Development (CRDH), Cheikh Anta Diop University, Hospital Aristide Le Dantec, ICF Macro, National Agency of Statistics and Demography (Senegal). Senegal Demographic and Health Survey 2010-2011. Fairfax, United States of America: ICF International.	GHDx
111432	Senegal	200	0	3969	Senegal Continuous Demographic and Health Survey 2012-2013	2012-2013	ICF International, Ministry of Health and Social Action (Senegal), National Agency of Statistics and Demography (Senegal). Senegal Continuous Demographic and Health Survey 2012-2013. Fairfax, United States of America: ICF International.	GHDx
191270	Senegal	196	0	3891	Senegal Continuous Demographic and Health Survey 2014	2014	Cheikh Anta Diop University, ICF International, National Agency of Statistics and Demography (Senegal). Senegal Continuous Demographic and Health Survey 2014. Fairfax, United States of America: ICF International.	GHDx
218592	Senegal	214	0	3969	Senegal Continuous Demographic and Health Survey 2015	2015	Cheikh Anta Diop University, ICF International, National Agency of Statistics and Demography (Senegal). Senegal Continuous Demographic and Health Survey 2015. Fairfax, United States of America: ICF International, 2016.	GHDx
286772	Senegal	214	0	3856	Senegal Continuous Demographic and Health Survey 2016	2016	ICF International, Ministry of Health and Social Action (Senegal), National Agency of Statistics and Demography (Senegal). Senegal Continuous Demographic and Health Survey 2016. Fairfax, United States of America: ICF International, 2017.	GHDx
287639	Senegal	0	4	1683	Senegal - Dakar Urban Multiple Indicator Cluster Survey 2015-2016	2015-2016	National Agency of Statistics and Demography (Senegal), United Nations Children's Fund (UNICEF). Senegal - Dakar Urban Multiple Indicator Cluster Survey 2015-2016. New York, United States of America: United Nations Children's Fund (UNICEF), 2018.	GHDx
353526	Senegal	0	14	4601	Senegal Continuous	2017	ICF International, Ministry of Health and Social Action (Senegal), National Agency of Statistics and Demography	GHDx

					Demographic and Health Survey 2017		(Senegal), Unit for the Fight Against Malnutrition (Senegal). Senegal Continuous Demographic and Health Survey 2017. Fairfax, United States of America: ICF International, 2018.	
450419	Senegal	0	14	2534	Senegal Continuous Demographic and Health Survey 2018	2018	Directorate of Forecasting and Statistics, Ministry of the Economy, Finance and Planning (Senegal), ICF International, Ministry of Health and Social Action (Senegal), United States Agency for International Development (USAID). Senegal Continuous Demographic and Health Survey 2018. Fairfax, United States of America: ICF International, 2020.	GHDx
11649	Sierra Leone	0	14	3216	Sierra Leone Multiple Indicator Cluster Survey 2005	2005	United Nations Children's Fund (UNICEF), Statistics Sierra Leone. Sierra Leone Multiple Indicator Cluster Survey 2005. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
21258	Sierra Leone	348	0	2823	Sierra Leone Demographic and Health Survey 2008	2008	Macro International, Inc, Statistics Sierra Leone. Sierra Leone Demographic and Health Survey 2008. Fairfax, United States of America: ICF International.	GHDx
131467	Sierra Leone	435	0	6222	Sierra Leone Demographic and Health Survey 2013	2013	ICF International, Ministry of Health and Sanitation (Sierra Leone), Statistics Sierra Leone. Sierra Leone Demographic and Health Survey 2013. Fairfax, United States of America: ICF International, 2014.	GHDx
218619	Sierra Leone	0	14	6874	Sierra Leone Multiple Indicator Cluster Survey 2017	2017	Statistics Sierra Leone, United Nations Children's Fund (UNICEF). Sierra Leone Multiple Indicator Cluster Survey 2017. New York, United States of America: United Nations Children's Fund (UNICEF), 2018.	GHDx
11774	Somalia	0	18	3554	Somalia Multiple Indicator Cluster Survey 2006	2006	Pan Arab Project for Family Health (PAPFAM), United Nations Children's Fund (UNICEF). Somalia Multiple Indicator Cluster Survey 2006. New York, United States of America: United Nations Children's Fund (UNICEF).	GHDx
91507	Somalia	244	0	2562	Somalia - Somaliland	2011	Ministry of National Planning and Development (Somaliland), United Nations Children's Fund (UNICEF).	GHDx

					Multiple Indicator Cluster Survey 2011		Somalia - Somaliland Multiple Indicator Cluster Survey 2011. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	
91508	Somalia	0	3	792	Somalia - Northeast Zone Multiple Indicator Cluster Survey 2011	2011	Puntland Ministry of Planning and International Cooperation (Somalia), United Nations Children's Fund (UNICEF). Somalia - Northeast Zone Multiple Indicator Cluster Survey 2011. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	GHDx
20798	South Africa	0	9	436	South Africa Demographic and Health Survey 2003-2004	2003-2004	Department of Health (South Africa), Macro International, Inc, South African Medical Research Council. South Africa Demographic and Health Survey 2003-2004.	GHDx
157064	South Africa	540	0	1379	South Africa Demographic and Health Survey 2016	2016	Department of Health (South Africa), ICF International, South African Medical Research Council, Statistics South Africa. South Africa Demographic and Health Survey 2016. Fairfax, United States of America: ICF International, 2019.	GHDx
18815	Sri Lanka	1436	342	4223	Sri Lanka Demographic and Health Survey 2006-2007	2006-2007	Department of Census and Statistics (Sri Lanka), Macro International, Inc. Sri Lanka Demographic and Health Survey 2006-2007. 2009.	GHDx
326837	Sri Lanka	0	25	4883	Sri Lanka Demographic and Health Survey 2016	2016	Department of Census and Statistics (Sri Lanka), ICF International. Sri Lanka Demographic and Health Survey 2016.	GHDx
32189	Sudan	0	10	1420	Sudan - South Multiple Indicator Cluster Survey 2010	2010	Central Bureau of Statistics (Sudan), Federal Ministry of Health (Sudan), Government of Sudan, Ministry of Health (South Sudan), Southern Sudan Centre for Census, Statistics and Evaluation. Sudan - South Multiple Indicator Cluster Survey 2010. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	GHDx

153643	Sudan	0	15	3369	Sudan - North Multiple Indicator Cluster Survey 2010	2010	Central Bureau of Statistics (Sudan), Ministry of Health (South Sudan). Sudan - North Multiple Indicator Cluster Survey 2010. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	GHDx
200617	Sudan	0	18	6835	Sudan Multiple Indicator Cluster Survey 2014	2014	Central Bureau of Statistics (Sudan), Federal Ministry of Health (Sudan), United Nations Children's Fund (UNICEF). Sudan Multiple Indicator Cluster Survey 2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2016.	GHDx
12289	Suriname	0	5	1333	Suriname Multiple Indicator Cluster Survey 2006	2006	General Statistical Office (Suriname), United Nations Children's Fund (UNICEF). Suriname Multiple Indicator Cluster Survey 2006. New York, United States of America: United Nations Children's Fund (UNICEF).	GHDx
81203	Suriname	0	10	3384	Suriname Multiple Indicator Cluster Survey 2010	2010	General Bureau of Statistics (Suriname), Ministry of Planning and Development Cooperation (Suriname), Ministry of Social Affairs and Housing (Suriname), United Nations Children's Fund (UNICEF). Suriname Multiple Indicator Cluster Survey 2010. New York, United States of America: United Nations Children's Fund (UNICEF), 2013.	GHDx
427983	Suriname	0	10	1613	Suriname Multiple Indicator Cluster Survey 2018	2018	General Bureau of Statistics (Suriname), Ministry of Planning and Development Cooperation (Suriname), Ministry of Social Affairs and Housing (Suriname), United Nations Children's Fund (UNICEF). Suriname Multiple Indicator Cluster Survey 2018. New York, United States of America: United Nations Children's Fund (UNICEF), 2019.	GHDx
20829	Swaziland	266	0	2768	Swaziland Demographic and Health Survey 2006-2007	2006-2007	Central Statistical Office (Swaziland), Macro International, Inc. Swaziland Demographic and Health Survey 2006-2007. Fairfax, United States of America: ICF International.	GHDx
30325	Swaziland	0	4	1555	Swaziland Multiple	2010	Central Statistical Office (Swaziland), United Nations Children's Fund (UNICEF). Swaziland Multiple Indicator	GHDx

					Indicator Cluster Survey 2010		Cluster Survey 2010. New York, United States of America: United Nations Children's Fund (UNICEF).	
200707	Swaziland	0	4	2090	Swaziland Multiple Indicator Cluster Survey 2014	2014	Central Statistical Office (Swaziland), United Nations Children's Fund (UNICEF), United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Population Fund (UNFPA). Swaziland Multiple Indicator Cluster Survey 2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2016.	GHDx
12379	Syria	0	1	494	Syria Family Health Survey 2001	2001	Central Bureau of Statistics (Syria), League of Arab States. Syria Family Health Survey 2001.	GHDx
12399	Syria	0	14	1152	Syria Multiple Indicator Cluster Survey 2006	2006	United Nations Children's Fund (UNICEF), Central Bureau of Statistics (Syria), Ministry of Health (Syria), Pan Arab Project for Family Health (PAPFAM). Syria Multiple Indicator Cluster Survey 2006. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
12608	Tajikistan	0	5	3251	Tajikistan Multiple Indicator Cluster Survey 2005	2005	United Nations Children's Fund (UNICEF), State Committee on Statistics of the Republic of Tajikistan. Tajikistan Multiple Indicator Cluster Survey 2005. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
74460	Tajikistan	340	0	3835	Tajikistan Demographic and Health Survey 2012	2012	ICF International, Ministry of Health (Tajikistan), Statistical Agency under the President of the Republic of Tajikistan. Tajikistan Demographic and Health Survey 2012. Fairfax, United States of America: ICF International, 2013.	GHDx
341838	Tajikistan	338	0	1784	Tajikistan Demographic and Health Survey 2017	2017	ICF International, Statistical Agency under the President of the Republic of Tajikistan. Tajikistan Demographic and Health Survey 2017. Fairfax, United States of America: ICF International, 2018.	GHDx
20875	Tanzania	0	26	4889	Tanzania Demographic and Health	2004-2005	Macro International, Inc, National Bureau of Statistics (Tanzania). Tanzania Demographic and Health Survey 2004-2005. Fairfax, United States of America: ICF International.	GHDx

					Survey 2004-2005			
21331	Tanzania	457	0	4592	Tanzania Demographic and Health Survey 2009-2010	2009-2010	ICF Macro, National Bureau of Statistics (Tanzania). Tanzania Demographic and Health Survey 2009-2010. Fairfax, United States of America: ICF International.	GHDx
218593	Tanzania	605	0	4226	Tanzania Demographic and Health Survey 2015-2016	2015-2016	ICF International, Ministry of Health (Zanzibar), Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDEC) (Tanzania), National Bureau of Statistics (Tanzania), Office of the Chief Government Statistician (OCGS) (Zanzibar). Tanzania Demographic and Health Survey 2015-2016. Fairfax, United States of America: ICF International, 2016.	GHDx
12732	Thailand	0	4	5626	Thailand Multiple Indicator Cluster Survey 2005-2006	2005-2006	National Statistical Office (Thailand), United Nations Children's Fund (UNICEF). Thailand Multiple Indicator Cluster Survey 2005-2006. New York, United States of America: United Nations Children's Fund (UNICEF).	GHDx
148649	Thailand	0	5	6171	Thailand Multiple Indicator Cluster Survey 2012	2012	College of Population Studies, Chulalongkorn University (Thailand), Institute for Population and Social Research, Mahidol University (Thailand), International Health Policy Program (Thailand), Ministry of Education (Thailand), Ministry of Public Health (Thailand), Ministry of Social Development and Human Security (MSDHS) (Thailand), National Health Security Office (Thailand), National Statistical Office (Thailand), Thai Health Promotion Foundation, United Nations Children's Fund (UNICEF). Thailand Multiple Indicator Cluster Survey 2012. New York, United States of America: United Nations Children's Fund (UNICEF), 2016.	GHDx
296646	Thailand	0	5	8084	Thailand Multiple Indicator Cluster Survey 2015-2016	2015-2016	National Health Security Office (Thailand), National Statistical Office (Thailand), United Nations Children's Fund (UNICEF). Thailand Multiple Indicator Cluster Survey 2015-2016. New York, United States of America: United Nations Children's Fund (UNICEF), 2018.	GHDx

331377	Thailand	0	1	822	Thailand - Bangkok Small Community Multiple Indicator Cluster Survey 2016	2016	National Health Security Office (Thailand), National Statistical Office (Thailand), United Nations Children's Fund (UNICEF). Thailand - Bangkok Small Community Multiple Indicator Cluster Survey 2016. New York, United States of America: United Nations Children's Fund (UNICEF), 2018.	GHDx
20888	Timor-Leste	0	163	3131	Timor-Leste Demographic and Health Survey 2003	2003	ACIL Australia Pty Ltd., Australian National University, Ministry of Health (Timor-Leste), National Statistics Directorate (Timor-Leste), University of Newcastle (Australia). Timor-Leste Demographic and Health Survey 2003. Newcastle, Australia: University of Newcastle (Australia).	GHDx
21274	Timor-Leste	0	13	5673	Timor-Leste Demographic and Health Survey 2009-2010	2009-2010	ICF Macro, Ministry of Finance (Timor-Leste), National Statistics Directorate (Timor-Leste). Timor-Leste Demographic and Health Survey 2009-2010. Fairfax, United States of America: ICF International.	GHDx
286785	Timor-Leste	452	0	2761	Timor-Leste Demographic and Health Survey 2016	2016	ICF International, National Statistics Directorate (Timor-Leste). Timor-Leste Demographic and Health Survey 2016. Fairfax, United States of America: ICF International, 2018.	GHDx
12896	Togo	0	6	2453	Togo Multiple Indicator Cluster Survey 2006	2006	Directorate General of Statistics and National Accounting (Togo), United Nations Children's Fund (UNICEF). Togo Multiple Indicator Cluster Survey 2006. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
40021	Togo	0	6	2801	Togo Multiple Indicator Cluster Survey 2010	2010	Directorate General of Statistics and National Accounting (Togo), United Nations Children's Fund (UNICEF). Togo Multiple Indicator Cluster Survey 2010. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
77515	Togo	330	0	3934	Togo Demographic and Health Survey 2013-2014	2013-2014	Directorate General of Statistics and National Accounts (Togo), ICF International, Ministry of Health (Togo), Ministry of Planning, Development and Zoning (Togo). Togo Demographic and Health Survey 2013-2014. Fairfax, United States of America: ICF International, 2015.	GHDx

393869	Togo	0	6	1262	Incomplete immunization among children aged 12-23 months in Togo: a multilevel analysis of individual and contextual factors	2017	Ekouevi DK, Gbeasor-Komlanvi FA, Yaya I, Zida-Compaore WI, Boko A, Sewu E, Lacle A, Ndibu N, Toke Y, Landoh DE. Incomplete immunization among children aged 12-23 months in Togo: a multilevel analysis of individual and contextual factors. BMC Public Health. 2018; 18(1): 952.	GHDx
429991	Togo	396	0	1943	Togo Multiple Indicator Cluster Survey 2017	2017	Directorate General of Statistics and National Accounting (Togo), United Nations Children's Fund (UNICEF). Togo Multiple Indicator Cluster Survey 2010. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
12950	Trinidad and Tobago	0	15	1294	Trinidad and Tobago Multiple Indicator Cluster Survey 2006	2006	Central Statistical Office (Trinidad and Tobago) and United Nations Children's Fund (UNICEF). Trinidad and Tobago Multiple Indicator Cluster Survey 2006. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
76709	Tunisia	0	9	3179	Tunisia Multiple Indicator Cluster Survey 2011-2012	2011-2012	Ministry of Regional Development and Planning (Tunisia), National Institute of Statistics (Tunisia), United Nations Children's Fund (UNICEF). Tunisia Multiple Indicator Cluster Survey 2011-2012. New York, United States of America: United Nations Children's Fund (UNICEF), 2014.	GHDx
13064	Turkmenistan	0	6	1479	Turkmenistan Multiple Indicator Cluster Survey 2006	2006	Ministry of Foreign Affairs (Turkmenistan), Ministry of Health and Medical Industry (Turkmenistan), National Institute of State Statistics and Information (Turkmenistan), United Nations Children's Fund (UNICEF). Turkmenistan Multiple Indicator Cluster Survey 2006. New York, United States of America: United Nations Children's Fund (UNICEF), 2016.	GHDx
264583	Turkmenistan	0	6	955	Turkmenistan Multiple	2015-2016	State Committee on Statistics of Turkmenistan, United Nations Children's Fund (UNICEF). Turkmenistan	GHDx

					Indicator Cluster Survey 2015-2016		Multiple Indicator Cluster Survey 2015-2016. New York, United States of America: United Nations Children's Fund (UNICEF), 2017.	
21014	Uganda	336	0	5324	Uganda Demographic and Health Survey 2006	2006	Macro International, Inc, Uganda Bureau of Statistics. Uganda Demographic and Health Survey 2006. Fairfax, United States of America: ICF International.	GHDx
56021	Uganda	400	0	5567	Uganda Demographic and Health Survey 2011	2011	ICF Macro, Uganda Bureau of Statistics. Uganda Demographic and Health Survey 2011. Fairfax, United States of America: ICF International.	GHDx
81004	Uganda	230	4	611	Uganda Living Standards Measurement Survey - Integrated Survey on Agriculture 2009-2010	2009-2010	Uganda Bureau of Statistics. Uganda Living Standards Measurement Survey - Integrated Survey on Agriculture 2009-2010. Washington DC, United States of America: World Bank.	GHDx
93320	Uganda	0	80	5997	Uganda National Service Delivery Survey 2008	2008	Ministry of Public Service (Uganda), Uganda Bureau of Statistics. Uganda National Service Delivery Survey 2008.	GHDx
142934	Uganda	264	0	427	Uganda Living Standards Measurement Survey - Integrated Survey on Agriculture 2010-2011	2010-2011	Uganda Bureau of Statistics. Uganda Living Standards Measurement Survey - Integrated Survey on Agriculture 2010-2011. Washington DC, United States of America: World Bank.	GHDx
142935	Uganda	307	0	649	Uganda Living Standards Measurement Survey -	2011-2012	Uganda Bureau of Statistics. Uganda Living Standards Measurement Survey - Integrated Survey on Agriculture 2011-2012. Washington DC, United States of America: World Bank.	GHDx

					Integrated Survey on Agriculture 2011-2012			
264959	Uganda	0	287	505	Uganda Living Standards Measurement Survey - Integrated Survey on Agriculture 2013-2014	2013-2014	Government of the Netherlands, Uganda Bureau of Statistics, World Bank. Uganda Living Standards Measurement Survey - Integrated Survey on Agriculture 2013-2014. Washington DC, United States of America: World Bank.	GHDx
286780	Uganda	684	0	7479	Uganda Demographic and Health Survey 2016	2016	ICF International, Uganda Bureau of Statistics. Uganda Demographic and Health Survey 2016. Fairfax, United States of America: ICF International, 2018.	GHDx
132739	Ukraine	0	5	2574	Ukraine Multiple Indicator Cluster Survey 2012	2012	StatInform Consulting, State Statistics Service (Ukraine), Ukrainian Center for Social Reforms (UCSR), United Nations Children's Fund (UNICEF). Ukraine Multiple Indicator Cluster Survey 2012. New York, United States of America: United Nations Children's Fund (UNICEF), 2014.	GHDx
13445	Uzbekistan	0	6	3087	Uzbekistan Multiple Indicator Cluster Survey 2006	2006	United Nations Children's Fund (UNICEF), State Committee of the Republic of Uzbekistan on Statistics. Uzbekistan Multiple Indicator Cluster Survey 2006. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
13719	Vietnam	0	8	1760	Vietnam Multiple Indicator Cluster Survey 2006	2006	General Statistics Office (Vietnam), United Nations Children's Fund (UNICEF). Vietnam Multiple Indicator Cluster Survey 2006. New York, United States of America: United Nations Children's Fund (UNICEF).	GHDx
21058	Vietnam	0	41	982	Vietnam Demographic and Health Survey 2002	2002	General Statistics Office (Vietnam), Macro International, Inc. Vietnam Demographic and Health Survey 2002. Fairfax, United States of America: ICF International.	GHDx

57999	Vietnam	0	568	2262	Vietnam Multiple Indicator Cluster Survey 2010-2011	2010-2011	General Statistics Office (Vietnam), United Nations Children's Fund (UNICEF). Vietnam Multiple Indicator Cluster Survey 2010-2011. New York, United States of America: United Nations Children's Fund (UNICEF).	GHDx
152735	Vietnam	0	476	1497	Vietnam	2013-2014	General Statistics Office (Vietnam), United Nations Children's Fund (UNICEF). Vietnam Multiple Indicator Cluster Survey 2013-2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	GHDx
13795	Yemen	0	418	2159	Yemen Family Health Survey 2003	2003	Central Statistical Organization (Yemen), League of Arab States, Ministry of Public Health and Population (Yemen), Pan Arab Project for Family Health (PAPFAM). Yemen Family Health Survey 2003.	GHDx
13816	Yemen	0	21	2169	Yemen Multiple Indicator Cluster Survey 2006	2006	Ministry of Health (Yemen) and United Nations Children's Fund (UNICEF). Yemen Multiple Indicator Cluster Survey 2006. New York, United States: United Nations Children's Fund (UNICEF).	GHDx
112500	Yemen	0	528	9114	Yemen Demographic and Health Survey 2013	2013	Central Statistical Organization (Yemen), ICF International, Ministry of Public Health and Population (Yemen). Yemen Demographic and Health Survey 2013. Fairfax, United States of America: ICF International.	GHDx
14027	Zambia	0	72	3132	Zambia Living Conditions Monitoring Survey 2002-2003	2002-2003	Central Statistical Office (Zambia). Zambia Living Conditions Monitoring Survey 2002-2003. Lusaka, Zambia: Central Statistical Office (Zambia).	GHDx
21102	Zambia	0	72	1892	Zambia Demographic and Health Survey 2001-2002	2001-2002	Central Board of Health (Zambia), Central Statistical Office (Zambia), Macro International, Inc. Zambia Demographic and Health Survey 2001-2002. Fairfax, United States of America: ICF International.	GHDx
21117	Zambia	319	0	5302	Zambia Demographic	2007	Central Statistical Office (Zambia), Macro International, Inc. Zambia Demographic and Health Survey 2007. Fairfax, United States of America: ICF International.	GHDx

					and Health Survey 2007			
26702	Zambia	0	22	2237	Zambia Global Fund Household Health Coverage Survey 2008	2008	Central Statistical Office (Zambia). Zambia Global Fund Household Health Coverage Survey 2008. Lusaka, Zambia: Central Statistical Office (Zambia).	GHDx
77516	Zambia	719	0	11048	Zambia Demographic and Health Survey 2013-2014	2013-2014	Central Statistical Office (Zambia), ICF International, Ministry of Health (Zambia), Tropical Diseases Research Centre, University Teaching Hospital (Zambia), University of Zambia. Zambia Demographic and Health Survey 2013-2014. Fairfax, United States of America: ICF International.	GHDx
21163	Zimbabwe	394	0	2811	Zimbabwe Demographic and Health Survey 2005-2006	2005-2006	Central Statistical Office (Zimbabwe), Macro International, Inc. Zimbabwe Demographic and Health Survey 2005-2006. Fairfax, United States of America: ICF International.	GHDx
35493	Zimbabwe	0	10	1916	Zimbabwe Multiple Indicator Monitoring Survey 2009	2009	Central Statistical Office (Zimbabwe). Zimbabwe Multiple Indicator Monitoring Survey 2009. New York, United States of America: United Nations Children's Fund (UNICEF).	GHDx
55992	Zimbabwe	391	0	3824	Zimbabwe Demographic and Health Survey 2010-2011	2010-2011	ICF Macro, Zimbabwe National Statistics Agency. Zimbabwe Demographic and Health Survey 2010-2011. Calverton, United States of America: ICF Macro, 2012.	GHDx
152720	Zimbabwe	0	10	8033	Zimbabwe Multiple Indicator Cluster Survey 2014	2014	United Nations Children's Fund (UNICEF), Zimbabwe National Statistics Agency. Zimbabwe Multiple Indicator Cluster Survey 2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	GHDx
157066	Zimbabwe	398	0	3031	Zimbabwe Demographic	2015	ICF International, National Microbiology Reference Laboratory, Harare Central Hospital (NMRL) (Zimbabwe), Zimbabwe National Statistics Agency. Zimbabwe	GHDx

					and Health Survey 2015		Demographic and Health Survey 2015. Fairfax, United States of America: ICF International, 2016.	
431951	Zimbabwe	0	10	2381	Zimbabwe Multiple Indicator Cluster Survey 2019	2019	United Nations Children's Fund (UNICEF), Zimbabwe National Statistics Agency. Zimbabwe Multiple Indicator Cluster Survey 2019. New York, United States of America: United Nations Children's Fund (UNICEF), 2020.	GHDx

Supplementary Table 5: Survey sources excluded from analysis
Citations, series, country, and years provided for each excluded data set along with rationale for their exclusion. This table includes results of all LMICs from the GHDx, whether they were included in final analysis or not.

Country	Series	Year(s)	Citation	Rationale for exclusion
Albania	Albania Multiple Indicator Cluster Survey 2005	2005	National Institute of Statistics (Albania), United Nations Children's Fund (UNICEF). Albania Multiple Indicator Cluster Survey 2005. New York, United States: United Nations Children's Fund (UNICEF).	Estimates considered implausible. Survey estimates are systematically low compared to admin estimates and estimates from other established series (2004-2006 DHS)
Albania	Albania Demographic and Health Survey 2017-2018	2017-2018	Albania Institute of Public Health (IPH), Albania Institute of Statistics (INSTAT), ICF International. Albania Demographic and Health Survey 2017-2018. Fairfax, United States of America: ICF International, 2019.	Survey outliered due to absence of required survey variable indicators and reliability concerns.
Angola	Angola Core Welfare Indicators Questionnaire Survey 2011	2011	Ministry of Planning and Territorial Development (Angola), National Institute of Statistics (Angola). Angola Core Welfare Indicators Questionnaire Survey 2011. Luanda, Angola: National Institute of Statistics (Angola).	Estimates considered implausible. Survey estimates are systematically low compared to admin estimates
Armenia	Armenia Demographic and Health Survey 2005	2005	MOH Center for Health Information and Statistics, Macro International, Inc, National Statistical Service (NSS). Armenia Demographic and Health Survey 2005. Fairfax, United States of America: ICF International.	Outliered due to small sample size and reliability concerns. Estimates considered implausibly low compared to admin estimates
Bangladesh	Bangladesh - Dhaka Malnutrition and Enteric Disease Study 2009-2014	2009-2014	Fogarty International Center, National Institutes of Health (NIH), Foundation for the National Institutes of Health (FNIH), International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). Bangladesh - Dhaka Malnutrition and Enteric Disease Study 2009-2014.	Survey estimates include implausibly high coverage rates of 100%
Bangladesh	Bangladesh GAVI FCE Measles-Rubella Post-Vaccine	2014	Institute for Health Metrics and Evaluation (IHME), International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B). Bangladesh GAVI FCE Measles-Rubella Post-	Post-campaign surveys make it difficult to distinguish routine immunization coverage from campaign coverage.

	Campaign Household Survey 2014		Vaccine Campaign Household Survey 2014. Seattle, United States of America: Institute for Health Metrics and Evaluation (IHME), 2017.	
Benin	Benin Demographic and Health Survey 2011-2012	2011-2012	ICF International, National Institute of Statistics and Economic Analysis (INSAE) (Benin), National Program Against AIDS (PNLS) (Benin). Benin Demographic and Health Survey 2011-2012. Fairfax, United States: ICF International, 2014.	Estimates considered implausible. Survey estimates are systematically low compared to admin estimates and estimates from other established survey series (2009-2012 Benin Health Statistical Yearbook, 2008 External Review of the Extended Programme on Immunisation)
Burkina Faso	Burkina Faso Core Welfare Indicators Questionnaire Survey 2005	2005	National Institute of Statistics and Demography (Burkina Faso), World Bank. Burkina Faso Core Welfare Indicators Questionnaire Survey 2005. Ouagadougou, Burkina Faso: National Institute of Statistics and Demography (Burkina Faso).	Estimates considered implausible. Survey estimates are inconsistent with admin estimates and estimates from other established survey series (Burkina Faso Multiple Indicator Cluster Survey 2006, Burkina Faso Demographic and Health Survey 2003)
Burkina Faso	Burkina Faso Core Welfare Indicators Questionnaire Survey 2007	2007	National Institute of Statistics and Demography (INSD). Burkina Faso Core Welfare Indicators Questionnaire Survey 2007. Ouagadougou, Burkina Faso: National Institute of Statistics and Demography (INSD), 2008.	Estimates considered implausible. Survey estimates are inconsistent with admin estimates and estimates from other established survey series (Burkina Faso Multiple Indicator Cluster Survey 2006, Burkina Faso Demographic and Health Survey 2003)
Cambodia	Cambodia Socio-Economic Survey 2009	2009	National Institute of Statistics (Cambodia), Statistics Sweden. Cambodia Socio-Economic Survey 2009. Phnom Penh, Cambodia: National Institute of Statistics (Cambodia).	Estimates considered implausible. Survey estimates are inconsistent with admin estimates and estimates from other established survey series (Cambodia Demographic and Health Survey 2005-2006, Cambodia Demographic and Health Survey 2010-2011)
Congo	Congo Demographic and Health Survey 2005	2005	Macro International, Inc, National Center for Statistics and Economic Studies (Congo, Rep.). Congo Demographic and Health Survey 2005. Fairfax, United States of America: ICF International.	Cohort years 2000-2003 removed due to implausible coverage rates.

Costa Rica	Costa Rica National Health Survey 2006	2006	Central American Population Center, University of Costa Rica. Costa Rica National Health Survey 2006. San José, Costa Rica: Central American Population Center, University of Costa Rica.	Estimates considered implausible. Survey estimates are systematically low compared to admin estimates and estimates from other established survey series (2007-2008 MICS)
Djibouti	Djibouti Family Health Survey 2002	2002	Department of Statistics and Demographic Studies (Djibouti), League of Arab States, Ministry of Health (Djibouti), Pan Arab Project for Family Health (PAPFAM). Djibouti Family Health Survey 2002.	Large difference in cohort coverage, with older cohorts having implausibly high coverage compare to younger cohorts.
Ecuador	Ecuador Reproductive Health Survey 2004	2004	Center for Studies of Population and Social Development (CEPAR) (Ecuador) and Division of Reproductive Health-Centers for Disease Control and Prevention (CDC). (2005) Ecuador Reproductive Health Survey 2004. Quito, Ecuador: CEPAR.	Estimates considered implausible. Survey reports an anomalous drop in coverage in 2004 that is inconsistent with admin estimates and estimates from other established survey series (2005-2006 Ecuador Living Conditions Survey)
El Salvador	El Salvador Reproductive Health Survey 2002-2003	2002-2003	Asociación demográfica salvadoreña (ADS), Division of Reproductive Health-Centers for Disease Control and Prevention (CDC). (2004) El Salvador Reproductive Health Survey 2002-2003. San Salvador, El Salvador: ADS.	Survey estimates include implausibly high coverage rates of 100%
El Salvador	El Salvador Reproductive Health Survey 2008	2008	Asociación demográfica salvadoreña (ADS), Division of Reproductive Health-Centers for Disease Control and Prevention (CDC). (2009) El Salvador Reproductive Health Survey 2008. San Salvador, El Salvador: ADS.	Estimates considered implausible. Survey estimates are systematically low compared to admin estimates and estimates from other established survey series (2012-2013 MICS)
Ethiopia	Ethiopia Welfare Monitoring Survey 2004	2004	Central Statistical Agency (Ethiopia). Ethiopia Welfare Monitoring Survey 2004.	Estimates considered implausible. Survey estimates are systematically high compared to admin estimates and estimates from other established surveys series (2001-2003 DHS, 2001 National EPI Coverage Survey)
Georgia	Georgia Multiple Indicator Cluster Survey 2005	2005	National Center for Disease Control (Georgia), State Department of Statistics of Georgia, United Nations Children's Fund (UNICEF). Georgia Multiple Indicator Cluster Survey 2005. New	Estimates considered implausible. Survey estimates are systematically low compared to admin estimates

			York, United States: United Nations Children's Fund (UNICEF).	
Ghana	Ghana Living Standards Measurement Survey 2012-2013	2012-2013	Ghana Statistical Service, World Bank. Ghana Living Standards Measurement Survey 2012-2013. Accra, Ghana: Ghana Statistical Service.	Estimates considered implausible. Survey estimates are systematically low compared to admin estimates
Guatemala	Guatemala Demographic and Health Survey 2014-2015	2014-2015	ICF International, Institute of Nutrition of Central America and Panama, Ministry of Public Health and Social Assistance (Guatemala), National Statistics Institute (Guatemala), Secretary of Planning and Programming of the Presidency (Segeplan) (Guatemala). Guatemala Demographic and Health Survey 2014-2015. Fairfax, United States: ICF International, 2017.	Estimates considered implausible. Survey estimates are systematically high compared to admin estimates and trends from other established surveys in nearby years (2008-2009 Guatemala Reproductive Health Survey)
Honduras	Honduras Survey of Living Conditions 2004	2004	National Institute of Statistics (Honduras). Honduras Survey of Living Conditions 2004. Tegucigalpa, Honduras: National Institute of Statistics (Honduras).	Survey estimates include implausibly high coverage rates of 100%
India	India District Level Household Survey 2007-2008	2007-2008	International Institute for Population Sciences (India). India District Level Household Survey 2007-2008. Mumbai, India: International Institute for Population Sciences (India), 2010.	Estimates considered implausible. Survey estimates are systematically high compared to admin estimates and estimates from other established survey series (2003-2004 DHS, 2004-2005 India Human Development Survey, 2005 India Coverage Evaluation Survey)
India	India - Vellore Malnutrition and Enteric Disease Study 2009-2014	2009-2014	Fogarty International Center, National Institutes of Health (NIH), Foundation for the National Institutes of Health (FNIH). India - Vellore Malnutrition and Enteric Disease Study 2009-2014.	2010 estimates considered implausibly low compared to other survey years.
India	India District Level Household	2012-2014	International Institute for Population Sciences (India). India District Level Household Survey 2012-2014. New Delhi, India: Ministry of Health and Family Welfare (India).	Estimates considered implausible. Coverage estimates are greater than 12% higher than coverage reported by India Demographic and

	Survey 2012-2014			Health Survey 2015-2016 for the same cohort years.
Indonesia	Indonesia Family Life Survey 2000	2000	Center for Population and Policy Studies, Gadjah Mada University (Indonesia), RAND Corporation. Indonesia Family Life Survey 2000. Santa Monica, United States: RAND Corporation.	Estimates considered implausible. Survey estimates are systematically high compared to admin estimates and estimates from other established survey series (1996-1999 DHS)
Indonesia	Indonesia National Socioeconomic Survey 2006	2004-2013	Statistics Indonesia. Indonesia National Socioeconomic Survey 2006.	Estimates considered implausible. Survey estimates are inconsistent with admin estimates and estimates from other established survey series (2007-2008 Indonesia Family Life Survey, 2003-2005 DHS)
Indonesia	Indonesia Family Life Survey East 2012	2012	National Team for the Acceleration of Poverty Reduction (TNP2K) (Indonesia), SurveyMETER, University of Southern California, World Bank. Indonesia Family Life Survey East 2012.	Estimates considered implausible. Survey estimates are inconsistent with admin estimates and estimates from other established survey series (2008-2011 DHS)
Kenya	Kenya - North Eastern Province Multiple Indicator Cluster Survey 2007	2007	Kenya National Bureau of Statistics, United Nations Children's Fund (UNICEF). Kenya - North Eastern Province Multiple Indicator Cluster Survey 2007. Nairobi, Kenya: Kenya National Bureau of Statistics.	Estimates considered implausible. Survey estimates are systematically low compared to admin estimates and estimates from other established survey series (2005-2006 Kenya Integrated Household Budget Survey, 2004-2006 DHS)
Kyrgyzstan	Kyrgyzstan Multiple Indicator Cluster Survey 2014	2014	National Statistical Committee of the Kyrgyz Republic, United Nations Children's Fund (UNICEF). Kyrgyzstan Multiple Indicator Cluster Survey 2014. New York, United States of America: United Nations Children's Fund (UNICEF), 2015.	Implausibly low coverage estimates of 0% for some age cohorts.
Lebanon	Lebanon Family Health Survey 2004	2004	Central Administration of Statistics (Lebanon), League of Arab States, Ministry of Social Affairs (Lebanon), Pan Arab Project for Family Health (PAPFAM). Lebanon Family Health Survey 2004.	Data was only collected at national level

Lebanon	Palestinians in Lebanon Multiple Indicator Cluster Survey 2005-2006	2005-2006	Palestinian Central Bureau of Statistics, Pan Arab Project for Family Health (PAPFAM), United Nations Children's Fund (UNICEF). Palestinians in Lebanon Multiple Indicator Cluster Survey 2005-2006. New York, United States: United Nations Children's Fund (UNICEF).	Estimates considered implausible. Survey estimates are inconsistent with both admin estimates and estimates from other established survey series (2006-2007 Palestine Family Health Survey)
Lebanon	Palestinians in Lebanon Multiple Indicator Cluster Survey 2011	2011	Palestinian Central Bureau of Statistics, United Nations Children's Fund (UNICEF). Palestinians in Lebanon Multiple Indicator Cluster Survey 2011. New York, United States: United Nations Children's Fund (UNICEF), 2013.	Estimates considered implausible. Survey estimates are inconsistent with both admin estimates and estimates from other established survey series (2004 Lebanon Family Health Survey)
Moldova	Moldova Multiple Indicator Cluster Survey 2000	2000	National Scientific and Applied Center for Preventive Medicine (NCPM) (Moldova), United Nations Children's Fund (UNICEF). Moldova Multiple Indicator Cluster Survey 2000. New York, United States: United Nations Children's Fund (UNICEF).	Estimates considered implausible. Survey estimates are systematically high compared to admin estimates and estimates from other established survey series (2002-2004 DHS)
Mali	Mali Multiple Indicator Cluster Survey 2009-2010	2009-2010	Ministry of Health (Mali), National Institute of Statistics (INSTAT) (Mali), United Nations Children's Fund (UNICEF). Mali Multiple Indicator Cluster Survey 2009-2010. New York, United States: United Nations Children's Fund (UNICEF), 2017.	Estimates considered implausible. Survey estimates are inconsistent with both admin estimates and estimates from other established survey series (2008-2011 DHS, 2010-2013 World Bank Living Standards Measurement Survey)
Mexico	Mexico Family Life Survey 2005-2006	2005-2006	California Center for Population Research (CCPR), University of California Los Angeles (UCLA), Center for Research and Teaching in Economics (CIDE) (Mexico), Ibero-American University, National Institute of Public Health (Mexico). Mexico Family Life Survey 2005-2006.	Estimates considered implausible. Survey estimates are inconsistent with both admin estimates and estimates from other established survey series (2008-2009 Mexican National Health and Nutrition Survey)
Mexico	Mexico Family Life Survey 2008-2013	2008-2013	Center for Research and Teaching in Economics (CIDE) (Mexico), Duke University, Ibero-American University, National Institute of Public Health (Mexico), University of	Estimates considered implausible. Sudden drop in coverage inconsistent with admin estimates and estimates from other established survey series (Mexico National Survey of Health and Nutrition

			California, Los Angeles (UCLA). Mexico Family Life Survey 2008-2013.	2011-2012, Mexico Multiple Indicator Cluster Survey 2015)
Mongolia	Mongolia Multiple Indicator Cluster Survey 2013	2013	Government of Mongolia, National Statistical Office of Mongolia, United Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA). Mongolia Multiple Indicator Cluster Survey 2013. New York, United States: United Nations Children's Fund (UNICEF), 2016.	Estimates considered implausible. Sudden drop in coverage inconsistent with admin estimates and MICS estimates from neighboring years
Morocco	Morocco National Survey on Population and Family Health 2010-2011	2010-2011	Ministry of Health (Morocco), Pan Arab Project for Family Health (PAPFAM), United Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA), World Health Organization (WHO). Morocco National Survey on Population and Family Health 2010-2011.	Estimates for cohort year 2008 removed due to 100% coverage. Other cohort years retained
Nepal	Nepal Living Standards Measurement Survey 2003-2004	2009-2014	Fogarty International Center, National Institutes of Health (NIH), Foundation for the National Institutes of Health (FNIH), Institute of Medicine, Tribhuvan University, University of Bergen, Walter Reed/AFRIMS Research Unit Nepal (WARUN). Nepal - Bhaktapur Malnutrition and Enteric Disease Study 2009-2014.	Estimates considered implausible. Survey estimates include implausibly high coverage rates of 100%
Nepal	Nepal - Bhaktapur Malnutrition and Enteric Disease Study 2009-2014	2014-2015	National Institute of Statistics (Niger), World Bank. Niger National Survey on Household Living Conditions and Agriculture 2014-2015. Washington DC, United States of America: World Bank.	Estimates considered implausible. Survey estimates include implausibly high coverage rates of 100%
Niger	Niger National Survey on Household Living Conditions and Agriculture 2014-2015	2014-2015	National Institute of Statistics (Niger), World Bank. Niger National Survey on Household Living Conditions and Agriculture 2014-2015. Washington DC, United States of America: World Bank.	Estimates outliered due to reliability concerns, survey design, and implausibly low coverage.

Nigeria	Nigeria Reproductive Health, Child Health, and Education Household, School, and Health Facility Baseline Surveys 2005	2005	MEASURE Evaluation Project, Carolina Population Center, University of North Carolina, Center for Research, Evaluation, and Resource Development (CRERD), Center for Communication Programs, Bloomberg School of Public Health, Johns Hopkins, Creative Associates International, Constella Futures, Adolescent Health and Information Project (Nigeria), Federation of Muslim Women's Associations of Nigeria (FOMWAN), Nigerian Medical Association, Management Sciences for Health (MSH), Civil Society Action Coalition on Education For All. Nigeria Reproductive Health, Child Health, and Education Household, School, and Health Facility Baseline Surveys 2005. Chapel Hill, United States: MEASURE Evaluation Project, Carolina Population Center, University of North Carolina.	Estimates considered implausible. Survey estimates are inconsistent with both admin estimates and estimates from other established survey series (1999-2007 DHS, 2007-2010 MICS)
Nigeria	Nigeria General Household Survey 2007	2007	Central Bank of Nigeria, National Bureau of Statistics (Nigeria), Nigerian Communications Commission (NCC). Nigeria General Household Survey 2007. Abuja, Nigeria: National Bureau of Statistics (Nigeria).	Estimates considered implausible. Survey estimates are systematically low compared to admin estimates and estimates from other established survey series (1999-2007 DHS, 2007-2010 MICS)
Nigeria	Nigeria Reproductive Health, Child Health, and Education Household, School, and Health Facility Midline Surveys 2007	2007	MEASURE Evaluation Project, Carolina Population Center, University of North Carolina, Center for Research, Evaluation, and Resource Development (CRERD), Center for Communication Programs, Bloomberg School of Public Health, Johns Hopkins, Creative Associates International, Constella Futures, Adolescent Health and Information Project (Nigeria), Federation of Muslim Women's Associations of Nigeria (FOMWAN), Nigerian Medical Association, Management Sciences for Health (MSH), Civil Society Action Coalition on Education For All. Nigeria Reproductive Health,	Estimates considered implausible. Survey estimates are inconsistent with both admin estimates and estimates from other established survey series (1999-2007 DHS, 2007-2010 MICS)

			Child Health, and Education Household, School, and Health Facility Midline Surveys 2007. Chapel Hill, United States: MEASURE Evaluation Project, Carolina Population Center, University of North Carolina.	
Nigeria	Nigeria Living Standards Survey 2008-2010	2008-2010	National Bureau of Statistics (Nigeria). Nigeria Living Standards Survey 2008-2010. Abuja, Nigeria: National Bureau of Statistics (Nigeria).	Estimates considered implausible. Survey estimates are systematically high compared to admin estimates and estimates from other established survey series (1999-2007 DHS, 2007-2010 MICS)
Nigeria	Nigeria General Household Survey 2010-2011	2010-2011	National Bureau of Statistics (Nigeria). Nigeria General Household Survey 2010-2011. Abuja, Nigeria: National Bureau of Statistics (Nigeria).	Estimates considered implausible. Survey estimates are systematically high compared to admin estimates and estimates from other established survey series (2009 DHS, 2009 MICS, 2009 Nigeria Reproductive Health, Child Health, and Education Household, School, and Health Facility Survey, 2009-2012 Nigeria Annual Abstract of Statistics)
Nigeria	Nigeria General Household Survey 2012-2013	2012-2013	National Bureau of Statistics (Nigeria). Nigeria General Household Survey 2012-2013. Washington DC, United States: World Bank.	Estimates considered implausible. Survey estimates are systematically low compared to admin estimates and estimates from other established survey series (2011 DHS)
Nigeria	Nigeria Multiple Indicator Cluster Survey with National Immunization Coverage Survey Supplement 2016-2017	2016-2017	National Agency for the Control of AIDS (Nigeria), National Bureau of Statistics (Nigeria), National Primary Health Care Development Agency (NPHCDA) (Nigeria), United Nations Children's Fund (UNICEF). Nigeria Multiple Indicator Cluster Survey with National Immunization Coverage Survey Supplement 2016-2017. New York, United States: United Nations Children's Fund (UNICEF), 2018.	Estimates considered implausible. Survey estimates are systematically high compared to admin estimates and estimates from other established survey series (1999-2007 DHS)
Pakistan	Pakistan Social and Living Standards Measurement	2014-2015	Pakistan Bureau of Statistics. Pakistan Social and Living Standards Measurement Survey 2014-2015. Islamabad, Pakistan: Pakistan Bureau of Statistics, 2016.	Estimates considered implausible. Survey estimates are inconsistent with admin estimates and estimates from other established survey series

	Survey 2014-2015			(2010-2011 DHS, 2011 Pakistan National Nutrition Survey)
Peru	Peru Continuous Demographic and Health Survey 2003-2008	2003-2008	Ministry of Economy and Finance (Peru), National Institute of Statistics and Informatics (Peru), ORC Macro. Peru Continuous Demographic and Health Survey 2003-2008. Fairfax, United States of America: ICF International.	Survey outliered due to absence of required survey variable indicators.
Peru	Peru - Loreto Malnutrition and Enteric Disease Study 2009-2014	2009-2014	Fogarty International Center, National Institutes of Health (NIH), Foundation for the National Institutes of Health (FNIH), Johns Hopkins Bloomberg School of Public Health. Peru - Loreto Malnutrition and Enteric Disease Study 2009-2014.	Estimates considered implausible. Survey estimates include implausibly high coverage rates of 100%
Qatar	Qatar Multiple Indicator Cluster Survey 2012	2012	Ministry of Development Planning and Statistics (Qatar), Qatar Foundation for Education, Science and Community Development, Qatar Statistics Authority, Supreme Council of Health (Qatar), United Nations Children's Fund (UNICEF). Qatar Multiple Indicator Cluster Survey 2012. New York, United States: United Nations Children's Fund (UNICEF), 2018.	Estimates considered implausible. Survey estimates are systematically low
Sierra Leone	Sierra Leone Multiple Indicator Cluster Survey 2010	2010	Statistics Sierra Leone, United Nations Children's Fund (UNICEF). Sierra Leone Multiple Indicator Cluster Survey 2010. New York, United States: United Nations Children's Fund (UNICEF).	Estimates considered implausible. Survey estimates are systematically high compared to admin estimates and estimates from other established surveys over the same period (2006-2009 DHS)
Uganda	Uganda National Service Delivery Survey 2004	2004	Ministry of Public Service (Uganda), Uganda Bureau of Statistics. Uganda National Service Delivery Survey 2004. OpenMicroData.	Estimates considered implausible. Survey estimates are systematically high compared to estimates from other established surveys over the same period (Uganda Demographic and Health Survey 2000-2001, Uganda Demographic and Health Survey 2011). Also, some households were not covered due to insecurity in the districts of Gulu, Lira, Katakwi, Kitgum, and Pader; while in Karamoja region (Kotido, Nakapiripirit and

				Moroto) due to mobility of the pastoralist communities.
Uganda	Uganda Gavi FCE Household Survey 2015	2015	Institute for Health Metrics and Evaluation (IHME), Infectious Diseases Research Collaboration (IDRC). Uganda Gavi FCE Household Survey 2015. Seattle, United States: Institute for Health Metrics and Evaluation (IHME), 2017.	Estimates considered implausible. Survey estimates are inconsistent with admin estimates and estimates from other established survey series (Uganda Living Standards Measurement Survey - Integrated Survey on Agriculture 2013-2014, Uganda Demographic and Health Survey 2016)
Yemen	Yemen - Dhamar Nutritional Status and Mortality Survey 2013	2013	Ministry of Public Health and Population (Yemen), Yemen UNICEF. Yemen - Dhamar Nutritional Status and Mortality Survey 2013.	Estimates considered implausible. Survey estimates include implausibly high coverage rates of 100%

Supplementary Table 6: Geospatial covariates used in modelling
For each covariate used in modelling, temporal resolutions and references are provided below.

Covariate	Temporal resolution	Source	Reference	NID
Travel time to nearest settlement	Static	Oxford	Weiss, D. J., et al. A global map of travel time to cities to assess inequalities in accessibility in 2015. Nature 533, 333-336 (2018).	417828
Distance from rivers or lakes	Static	Natural Earth Data (derived)	Available at: http://www.naturalearthdata.com/downloads/10m-physical-vectors/10m-rivers-lake-centerlines/ AND http://www.worldwildlife.org/pages/global-lakes-and-wetlands-database	418521 and 418284
Elevation	Static	NOAA GLOBE	Available at: https://www.ngdc.noaa.gov/mgg/topo/gltiles.html	238858
Population	Annual	WorldPop	Lloyd, C. T., et al. Global spatio-temporally harmonised datasets for producing high-resolution gridded population distribution datasets. Big Earth Data. 2096(4471): 2574-5417 (2019). World Pop. Get data. Available at: http://www.worldpop.org.uk/data/get_data/. (Accessed: 22th January 2019)	420764
Urban or rural	Annual	European Commission / GHS	Pesaresi, M. et al. Operating procedure for the production of the Global Human Settlement Layer from Landsat data of the epochs 1975, 1990, 2000, and 2014. (Publications Office of the European Union, 2016). Available at: http://ghsl.jrc.ec.europa.eu/data.php	418851
Irrigation	Static	University of Frankfurt and FAO	Siebert, S., Doll, P., Hoogeveen, J., Faures, J.-M., Frenken, K., & Feick, S. Development and validation of the global map of irrigation areas. Hydrology and Earth System Sciences 9, 535-547 (2005). Goethe-Universität. Generation of a digital global map of irrigation areas. Available at: https://www.unifrankfurt.de/45218039/Global_Irrigation_Map. (Accessed: 25th July 2017). Also from: http://www.fao.org/nr/water/aquastat/irrigationmap/index10.stm	419086
Cloud cover percentage	Annual	Climatic Research Unit	Harris, I., Osborn, T.J., Jones, P. et al. Version 4 of the CRU TS monthly high-resolution gridded multivariate climate dataset. Sci Data 7, 109 (2020). https://doi.org/10.1038/s41597-020-0453-3	450685

			High-resolution gridded datasets (and derived products). Available at: https://crudata.uea.ac.uk/cru/data/hrg/.	
Mean diurnal temperature range	Annual	Climatic Research Unit	Harris, I., Osborn, T.J., Jones, P. et al. Version 4 of the CRU TS monthly high-resolution gridded multivariate climate dataset. Sci Data 7, 109 (2020). https://doi.org/10.1038/s41597-020-0453-3 High-resolution gridded datasets (and derived products). Available at: https://crudata.uea.ac.uk/cru/data/hrg/.	450685
Frost day frequency	Annual	Climatic Research Unit	Harris, I., Osborn, T.J., Jones, P. et al. Version 4 of the CRU TS monthly high-resolution gridded multivariate climate dataset. Sci Data 7, 109 (2020). https://doi.org/10.1038/s41597-020-0453-3 High-resolution gridded datasets (and derived products). Available at: https://crudata.uea.ac.uk/cru/data/hrg/.	450685
Mean potential evapotranspiration per day per month	Annual	Climatic Research Unit	Harris, I., Osborn, T.J., Jones, P. et al. Version 4 of the CRU TS monthly high-resolution gridded multivariate climate dataset. Sci Data 7, 109 (2020). https://doi.org/10.1038/s41597-020-0453-3 High-resolution gridded datasets (and derived products). Available at: https://crudata.uea.ac.uk/cru/data/hrg/.	450685
Average daily minimum temperature	Annual	Climatic Research Unit	Harris, I., Osborn, T.J., Jones, P. et al. Version 4 of the CRU TS monthly high-resolution gridded multivariate climate dataset. Sci Data 7, 109 (2020). https://doi.org/10.1038/s41597-020-0453-3 High-resolution gridded datasets (and derived products). Available at: https://crudata.uea.ac.uk/cru/data/hrg/.	450685
Average daily mean temperature	Annual	Climatic Research Unit	Harris, I., Osborn, T.J., Jones, P. et al. Version 4 of the CRU TS monthly high-resolution gridded multivariate climate dataset. Sci Data 7, 109 (2020). https://doi.org/10.1038/s41597-020-0453-3 High-resolution gridded datasets (and derived products). Available at: https://crudata.uea.ac.uk/cru/data/hrg/.	450685
Average daily maximum temperature	Annual	Climatic Research Unit	Harris, I., Osborn, T.J., Jones, P. et al. Version 4 of the CRU TS monthly high-resolution gridded multivariate climate dataset. Sci Data 7, 109 (2020). https://doi.org/10.1038/s41597-020-0453-3	450685

			High-resolution gridded datasets (and derived products). Available at: https://crudata.uea.ac.uk/cru/data/hrg/.	
Mean vapour pressure	Annual	Climatic Research Unit	Harris, I., Osborn, T.J., Jones, P. et al. Version 4 of the CRU TS monthly high-resolution gridded multivariate climate dataset. Sci Data 7, 109 (2020). https://doi.org/10.1038/s41597-020-0453-3 High-resolution gridded datasets (and derived products). Available at: https://crudata.uea.ac.uk/cru/data/hrg/.	450685
Monthly wet day frequency	Annual	Climatic Research Unit	Harris, I., Osborn, T.J., Jones, P. et al. Version 4 of the CRU TS monthly high-resolution gridded multivariate climate dataset. Sci Data 7, 109 (2020). https://doi.org/10.1038/s41597-020-0453-3 High-resolution gridded datasets (and derived products). Available at: https://crudata.uea.ac.uk/cru/data/hrg/.	450685
Enhanced vegetation index	Annual	Moderate Resolution Imaging Spectroradiometer (MODIS)	Weiss, D. J. et al. An effective approach for gapfilling continental scale remotely sensed timeseries. Isprs J. Photogramm. Remote Sens. 98, 106–118 (2014). USGS & NASA. Vegetation indices 16-Day L3 global 500m MOD13A1 dataset. Available at: https://lpdaac.usgs.gov/products/mcd12q1v006/. (2020)	422343
Growing season length	Static	FAO Global Agro-Ecological Zone (GAEZ) project	Available at: http://www.fao.org/nr/gaez/about-data-portal/en/	419508
Normalised difference vegetation index	Annual	MODIS	NASA & NOAA. Advanced Very High Resolution Radiometer (AVHRR) Normalized Difference Vegetation Index (NDVI) dataset. Available at: https://www.nasa.gov/nex. (Accessed: 25th July 2017)	419645
Multi-source Weighted-Ensemble Precipitation	Annual	Princeton University	Beck, H.E., A.I.J.M. van Dijk, V. Levizzani, J. Schellekens, D.G. Miralles, B. Martens, A. de Roo: MSWEP: 3-hourly 0.25 global gridded precipitation (1979-2015) by merging gauge, satellite, and reanalysis data, Hydrology and Earth System Sciences, 21(1), 589-615, 2017. Available at: https://data.princetonclimate.com/opendap.	419634

Tasseled cap brightness	Annual	MODIS	Lobser, S.E., Cohen, W.B. MODIS tasseled cap: land cover characteristics expressed through transformed MODIS data. International Journal of Remote Sensing. 28(22): 5079-5101 (2007). Available at: https://modis.gsfc.nasa.gov/data/dataprod/mod43.php	420102
Tasseled cap wetness	Annual	MODIS	Lobser, S.E., Cohen, W.B. MODIS tasseled cap: land cover characteristics expressed through transformed MODIS data. International Journal of Remote Sensing. 28(22): 5079-5101 (2007). Available at: https://modis.gsfc.nasa.gov/data/dataprod/mod43.php.	420102
Average land surface temperature	Annual	MODIS	Weiss, D. J. et al. An effective approach for gapfilling continental scale remotely sensed timeseries. Isprs J. Photogramm. Remote Sens. 98, 106–118 (2014). Available at https://modis.gsfc.nasa.gov/data/dataprod/mod11.php	420096
Daytime land surface temperature	Annual	MODIS	Weiss, D. J. et al. An effective approach for gapfilling continental scale remotely sensed timeseries. Isprs J. Photogramm. Remote Sens. 98, 106–118 (2014). Available at https://modis.gsfc.nasa.gov/data/dataprod/mod11.php	420096
Difference between daytime and nighttime land surface temperature	Annual	MODIS	Weiss, D. J. et al. An effective approach for gapfilling continental scale remotely sensed timeseries. Isprs J. Photogramm. Remote Sens. 98, 106–118 (2014). Available at https://modis.gsfc.nasa.gov/data/dataprod/mod11.php	420096
Nighttime land surface temperature	Annual	MODIS	Weiss, D. J. et al. An effective approach for gapfilling continental scale remotely sensed timeseries. Isprs J. Photogramm. Remote Sens. 98, 106–118 (2014). Available at https://modis.gsfc.nasa.gov/data/dataprod/mod11.php	420096
Mean years of education among 15–49 year-old females (maternal education)	Annual	IHME	Graetz, N., Woyczynski, L., Wilson, K.F. et al. Mapping disparities in education across low- and middle-income countries. Nature 577, 235–238 (2020). Available at: http://internal-ghdx.healthdata.org/record/ihme-data/lmic-education-geospatial-estimates-2000-2017\	N/A

Supplementary Table 7: Covariates used per region in stacked generalisation ensemble modelling after variance inflation factor algorithm for covariate selection
Regions are defined as the following: Andean South America [*ANSA*], Central Asia Eastern Europe [*CAEU*], Caribbean [*CRBN]*, Central sub-Saharan Africa [*CSSA*], Central America [*CTAM*], East Asia [*EAAS*], East sub-Saharan Africa [*ESSA*], North Africa and Middle East [*NAME*], South East Asia, [*SEAS*], South Asia [*SOAS*], Southern sub-Saharan Africa [*SSSA*], Tropical South America [*TRSA*], and Western sub-Saharan Africa [*WSSA*]. A "Yes" indicates the covariate was selected per region and a "No" indicates the covariate was not selected.

Covariate	ANSA	CAEU	CRBN	CSSA	CTAM	EAAS	ESSA	NAME	SEAS	SOAS	SSSA	TRSA	WSSA
Access to roads	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distance from rivers or lakes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Elevation	No	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Population	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Urban or rural	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Irrigation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cloud cover percentage	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes
Mean diurnal temperature range	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Frost day frequency	Yes	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes
Mean potential evapotranspiration per day per month	Yes	No	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Average daily minimum temperature	No	No	No	No	No	No	No	No	No	No	No	No	Yes
Average daily mean temperature	No	No	No	No	No	No	No	No	No	No	No	No	No
Average daily maximum temperature	No	No	No	Yes	Yes	No	No	No	Yes	No	No	Yes	No
Mean vapour pressure	No	Yes	Yes	No	No	No	No	Yes	No	No	No	No	No

Monthly wet day frequency	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	No	No
Enhanced vegetation index	No	No	No	No	No	No	No	No	Yes	Yes	No	Yes	No
Growing season length	No	Yes	Yes	No	No	No	No	Yes	Yes	No	Yes	Yes	No
Normalised difference vegetation index	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Multi-source Weighted-Ensemble Precipitation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tasseled cap brightness	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Tasseled cap wetness	Yes	Yes	No	No	Yes	Yes	No	No	No	Yes	Yes	No	No
Daytime land surface temperature	Yes	No	No	No	Yes	No	No	No	No	No	No	No	No
Nighttime land surface temperature	No	No	Yes	Yes	No	No	No	No	No	No	No	No	Yes
Difference between daytime and nighttime land surface temperature	No	Yes	Yes	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
Maternal education	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Supplementary Table 8: Fitted model parameters and final penalised control prior specification

Means and upper and lower quantiles of fitted model parameters for the posterior distribution are given by region. Final penalised control prior $\boldsymbol{\rho_0}$ selection also reported per region. Regions are defined as the following: Andean South America [*ANSA*], Central Asia Eastern Europe [*CAEU*], Caribbean [*CRBN]*, Central sub-Saharan Africa [*CSSA*], Central America [*CTAM*], East Asia [*EAAS*], East sub-Saharan Africa [*ESSA*], North Africa and Middle East [*NAME*], South East Asia, [*SEAS*], South Asia [*SOAS*], Southern sub-Saharan Africa [*SSSA*], Tropical South America [*TRSA*], and Western sub-Saharan Africa [*WSSA*].

Region	Quantile	Intercept	GAM	Lasso	GBM	Nominal range	ρ_0	Nominal variance	AR1 ρ	Precision	Country random effect precision
ANSA	0.025	-0.096	-0.069	-0.451	0.741	0.051	--	0.188	0.858	483.038	116.753
	0.500	0.16	0.122	-0.165	1.043	0.078	0.039	0.321	0.919	2350.766	1271.491
	0.975	0.416	0.313	0.120	1.345	0.116	--	0.526	0.952	8875.4	6886.637
CAEU	0.025	-0.022	0.227	-0.382	0.362	0.024	--	0.166	0.660	267.156	71.467
	0.500	0.121	0.451	-0.118	0.666	0.036	0.033	0.249	0.799	1706.392	1073.213
	0.975	0.264	0.677	0.145	0.970	0.052	--	0.358	0.877	8356.505	6743.526
CRBN	0.025	-0.037	-0.051	-0.339	0.751	0.008	--	0.103	0.728	4.249	183.241
	0.500	0.097	0.150	-0.135	0.985	0.013	0.028	0.168	0.873	6.448	1409.929
	0.975	0.230	0.351	0.068	1.220	0.022	--	0.255	0.932	9.492	8238.198
CSSA	0.025	-0.381	-0.091	-0.105	0.744	0.045	--	0.451	0.852	732.748	10.315
	0.500	-0.165	0.057	0.067	0.875	0.052	0.034	0.535	0.879	2750.245	52.537
	0.975	0.051	0.206	0.239	1.006	0.060	--	0.644	0.903	10671.613	252.011
CTAM	0.025	-0.302	-0.175	-0.388	0.932	0.068	--	0.390	0.763	286.604	116.760
	0.500	-0.024	-0.008	-0.145	1.153	0.102	0.054	0.597	0.855	1878.183	1279.972
	0.975	0.254	0.160	0.097	1.374	0.159	--	0.941	0.918	8353.858	6701.157
EAAS	0.025	-0.316	-0.228	-0.082	0.140	0.045	--	0.246	0.567	180.566	149.156
	0.500	0.079	0.185	0.324	0.491	0.087	0.045	0.547	0.798	1631.491	1439.261
	0.975	0.474	0.595	0.731	0.843	0.153	--	1.066	0.905	8095.035	8197.362
ESSA	0.025	-0.058	0.109	-0.036	0.511	0.031	--	0.956	0.872	11.950	15.820
	0.500	0.126	0.264	0.111	0.625	0.034	0.048	1.088	0.890	14.666	26.269
	0.975	0.309	0.420	0.258	0.738	0.038	--	1.202	0.903	18.344	55.881
NAME	0.025	0.016	-0.064	-0.070	0.759	0.048	--	0.649	0.878	774.166	135.331
	0.500	0.224	0.020	0.078	0.889	0.057	0.061	0.816	0.905	2800.478	1247.523
	0.975	0.433	0.132	0.219	1.019	0.068	--	1.028	0.925	9871.623	6942.145

SEAS	0.025	0.192	0.314	0.125	0.075	0.192	--	0.629	0.931	902.225	5.223
	0.500	0.322	0.461	0.216	0.094	0.322	0.051	0.892	0.95	3170.129	19.516
	0.975	0.452	0.607	0.309	0.110	0.452	--	1.145	0.96	11388.874	137.374
SOAS	0.025	-0.017	0.075	-0.003	0.701	0.023	--	0.718	0.924	501.285	2.430
	0.500	0.272	0.151	0.077	0.772	0.025	0.036	0.814	0.934	2315.602	11.398
	0.975	0.561	0.227	0.157	0.843	0.027	--	0.887	0.940	10218.148	42.347
SSSA	0.025	0.036	-0.142	-0.442	0.969	0.025	--	0.244	0.563	336.787	186.477
	0.500	0.157	0.038	-0.217	1.179	0.034	0.025	0.319	0.703	1918.747	1563.802
	0.975	0.277	0.218	0.007	1.390	0.048	--	0.419	0.798	8854.038	7359.890
TRSA	0.025	-0.441	-0.072	-0.044	0.473	0.078	--	0.217	0.531	206.004	144.793
	0.500	0.067	-0.033	0.257	0.773	0.147	0.044	0.605	0.833	1628.357	1394.899
	0.975	0.576	0.013	0.556	1.074	0.299	--	1.771	0.952	7627.442	7199.690
WSSA	0.025	-0.104	0.061	0.126	0.547	0.028	--	0.724	0.858	24.589	21.278
	0.500	0.029	0.150	0.235	0.614	0.030	0.049	0.796	0.870	35.217	60.381
	0.975	0.162	0.246	0.339	0.682	0.031	--	0.852	0.878	65.410	208.613

Supplementary Table 9a–b: First administrative level in-sample fit metrics

In-sample fit statistics are provided for first administrative levels, by both year and modelling region, along with the number of surveys per year. Regions are defined as the following: Andean South America [*ANSA*], Central Asia Eastern Europe [*CAEU*], Caribbean [*CRBN]*, Central sub-Saharan Africa [*CSSA*], Central America [*CTAM*], East Asia [*EAAS*], East sub-Saharan Africa [*ESSA*], North Africa and Middle East [*NAME*], South East Asia, [*SEAS*], South Asia [*SOAS*], Southern sub-Saharan Africa [*SSSA*], Tropical South America [*TRSA*], and Western sub-Saharan Africa [*WSSA*].

a) Predictive in-sample metrics by year

Year	# surveys	Mean Error	Absolute Mean Error	RMSE	Median SS	Correlation	95% Cov
2000	33	0.00053692	0.02635373	0.04231509	46.0363422	0.97994849	0.97877094
2001	37	0.0009708	0.02605133	0.04024005	44.6298732	0.97737563	0.97554964
2002	56	2.34E-05	0.02424297	0.03745372	42	0.98443402	0.9636974
2003	72	0.00243208	0.02095623	0.03623518	43.0737074	0.97992682	0.95475457
2004	75	0.00021764	0.02210362	0.03725476	51.8042602	0.98083166	0.96617166
2005	67	0.00129004	0.02162749	0.03718889	51.9133479	0.9817879	0.96095419
2006	44	-0.0024252	0.023592	0.0364414	49	0.98383887	0.95499233
2007	55	-0.0011763	0.02287269	0.0372812	39	0.98268483	0.96655247
2008	61	0.00293164	0.02198287	0.03474891	49.3144316	0.98064814	0.95838031
2009	80	0.00092838	0.01805624	0.02979466	54.0691397	0.98451572	0.94511165
2010	65	-0.0005564	0.02004318	0.03082232	63	0.98573271	0.94623312
2011	56	0.00046661	0.01823046	0.02828082	61.6804272	0.98690118	0.96439813
2012	57	0.00154442	0.01512939	0.02533908	72	0.98830327	0.97722976
2013	51	0.00125432	0.0142874	0.02439052	89	0.98751972	0.97659502
2014	39	-0.0006373	0.01540902	0.02823571	60	0.98658157	0.98080389
2015	30	0.01347675	0.03553002	0.04983321	96.5	0.97359943	0.82523967
2016	25	0.00071699	0.02007698	0.03075514	137	0.98372424	0.96828173
2017	12	-0.0016224	0.01913547	0.02805477	117.937189	0.9906914	0.98273656
2018	2	-0.0009848	0.02614406	0.03233535	93.3276923	0.98519003	0.98927971

b) Predictive in-sample metrics by region

Region	Mean Error	Absolute Mean Error	RMSE	Median SS	Correlation	95% Cov
ANSA	5.11E-05	0.01637548	0.02509985	134.468578	0.9156748	0.91890569
CAEU	0.00043577	0.02298082	0.03273594	16.3927678	0.90704614	0.96232358
CRBN	0.00113856	0.03177861	0.04568725	46	0.92520688	0.98642848
CSSA	0.00020721	0.02810706	0.04010708	93	0.97394071	0.98093556
CTAM	0.00073975	0.01918668	0.0281529	59.5419267	0.9069162	0.96960494
EAAS	0.00177776	0.02889506	0.04342324	27.036481	0.88900484	0.9725173
ESSA	0.00063204	0.02084235	0.03772253	30	0.97831948	0.9817295
NAME	0.00171722	0.01971767	0.03230932	77	0.98587959	0.96784038
SEAS	0.00526308	0.03746742	0.05447697	16.1065991	0.94308048	0.88517549
SOAS	0.00052722	0.00875791	0.0148395	209.556704	0.99401275	0.96138823
SSSA	0.00074742	0.02030037	0.03027176	79	0.95790943	0.98497672
TRSA	0.00222705	0.0309591	0.04262648	35	0.88806962	0.9705352
WSSA	0.00065904	0.02168152	0.0312355	129.274825	0.99044181	0.9659038

Supplementary Table 10a–b: Second administrative level in-sample fit metrics

In-sample fit statistics are provided for second administrative levels, by both year and modelling region, along with the number of surveys per year. Regions are defined as the following: Andean South America [*ANSA*], Central Asia Eastern Europe [*CAEU*], Caribbean [*CRBN]*, Central sub-Saharan Africa [*CSSA*], Central America [*CTAM*], East Asia [*EAAS*], East sub-Saharan Africa [*ESSA*], North Africa and Middle East [*NAME*], South East Asia, [*SEAS*], South Asia [*SOAS*], Southern sub-Saharan Africa [*SSSA*], Tropical South America [*TRSA*], and Western sub-Saharan Africa [*WSSA*].

a) Predictive in-sample metrics by year

Year	# surveys	Mean Error	Absolute Mean Error	RMSE	Median SS	Correlation	95% Cov
2000	33	0.00055443	0.05654278	0.09811363	4	0.90842575	0.97912349
2001	37	0.0009936	0.05522176	0.09651392	4	0.89288495	0.97571901
2002	56	5.82E-05	0.04932417	0.08542299	4.82131901	0.92791321	0.96448719
2003	72	0.00245723	0.04297837	0.07219868	5.08379584	0.93061094	0.95386247
2004	75	0.00011671	0.04569372	0.07704234	5.38316321	0.9277682	0.96634161
2005	67	0.00122365	0.04515145	0.07299875	7	0.93828568	0.95923504
2006	44	-0.0025486	0.04849309	0.07650222	7.16909864	0.93591081	0.95487512
2007	55	-0.0009849	0.04796788	0.08243783	5	0.92731906	0.96855446
2008	61	0.00300661	0.04014995	0.06701189	5	0.93616091	0.9596579
2009	80	0.00108027	0.03742898	0.06477792	4.81470714	0.93960644	0.94748026
2010	65	-0.0005959	0.04472063	0.07132594	6.82345885	0.93786648	0.94465938
2011	56	0.00048929	0.04877053	0.07925216	6.47812137	0.91824284	0.96421503
2012	57	0.00164323	0.04506436	0.07179587	8	0.93015831	0.97752475
2013	51	0.0013939	0.04064388	0.06380981	7.03390651	0.93644966	0.97626159
2014	39	-0.0007658	0.04580421	0.07261361	6	0.93269463	0.98153882
2015	30	0.01383076	0.06062786	0.0877248	12	0.92388174	0.82729539
2016	25	0.00059757	0.04860972	0.07904682	11	0.91943344	0.97175523
2017	12	-0.0012481	0.06393478	0.09924336	9	0.91149812	0.98034004
2018	2	-0.0016765	0.03281482	0.04229367	11.8941708	0.97411665	0.98962449

b) Predictive in-sample metrics by region

	Mean Error	Absolute Mean Error	RMSE	Median SS	Correlation	95% Cov
ANSA	8.39E-05	0.03686722	0.06324687	9.25872298	0.68455009	0.91765183
CAEU	0.00052046	0.03597987	0.05529659	1.6357065	0.79865872	0.96322514
CRBN	0.00100688	0.05451513	0.08113386	9	0.82208926	0.98842882
CSSA	9.54E-05	0.0555715	0.08770973	9	0.90516314	0.98036271
CTAM	0.0006236	0.04386879	0.08254381	2	0.60240256	0.97027574
EAAS	0.00204573	0.06911484	0.11563918	1.35976537	0.62498241	0.97201757
ESSA	0.0006909	0.04544783	0.07583879	10	0.9251329	0.98189334
NAME	0.00176904	0.03817814	0.06700717	5	0.94340503	0.96706453
SEAS	0.00544513	0.06349269	0.10428847	3	0.83191054	0.88778324
SOAS	0.00056308	0.03499376	0.05106628	18.188021	0.9539919	0.9612275
SSSA	0.00091458	0.04383531	0.06695007	15.2583897	0.84967729	0.98568338
TRSA	0.00196177	0.0432823	0.07032544	3.65083624	0.75854069	0.96925537
WSSA	0.00067849	0.05308181	0.08344501	9	0.94175485	0.96661521

Supplementary Table 11a–b: First administrative level out-of-sample fit metrics

Out-of-sample fit statistics are provided first administrative levels, by both year and modelling region, along with the number of surveys per year. Regions are defined as the following: Andean South America [*ANSA*], Central Asia Eastern Europe [*CAEU*], Caribbean [*CRBN]*, Central sub-Saharan Africa [*CSSA*], Central America [*CTAM*], East Asia [*EAAS*], East sub-Saharan Africa [*ESSA*], North Africa and Middle East [*NAME*], South East Asia, [*SEAS*], South Asia [*SOAS*], Southern sub-Saharan Africa [*SSSA*], Tropical South America [*TRSA*], and Western sub-Saharan Africa [*WSSA*].

a) Predictive out-of-sample metrics by year

Year	# surveys	Mean Error	Absolute Mean Error	RMSE	Median SS	Correlation	95% Cov
2000	33	0.00109608	0.05892839	0.08701755	46.0363422	0.90870324	0.93675611
2001	37	0.00604213	0.0532355	0.08293942	44.6298732	0.90235839	0.90739097
2002	56	0.00423353	0.07072861	0.10108503	42	0.87802169	0.8929278
2003	72	0.01007656	0.06968165	0.10026723	43.0737074	0.83821621	0.9040794
2004	75	0.00201912	0.06638141	0.09497559	51.8042602	0.86485974	0.91461614
2005	67	0.00737509	0.0614735	0.08816797	51.9133479	0.89244413	0.92099329
2006	44	-0.0019245	0.05374569	0.07677644	49	0.92331759	0.92384506
2007	55	0.00370613	0.0581578	0.08810045	39	0.89710094	0.91424082
2008	61	0.01334289	0.05877675	0.08935583	49.3144316	0.8709797	0.90457104
2009	80	0.01533936	0.05951215	0.08277292	54.0691397	0.88274276	0.90919968
2010	65	0.00443667	0.06209517	0.09188177	63	0.86255137	0.90610095
2011	56	0.00972485	0.05753966	0.08487157	61.6804272	0.8783782	0.93934
2012	57	0.00647198	0.06522642	0.09535599	72	0.82011745	0.93209742
2013	50	0.00546607	0.06826785	0.09609485	89	0.78241634	0.9283279
2014	39	0.00033541	0.07196178	0.10376123	60	0.80460077	0.94465868
2015	30	0.01497122	0.07367801	0.09938328	96.5	0.87217776	0.8049238
2016	25	0.00293919	0.0660663	0.0965227	137	0.82945943	0.91802663
2017	12	0.00459285	0.07279136	0.10221884	117.937189	0.86442152	0.92541822
2018	2	0.00345032	0.10441635	0.12606068	93.3276923	0.76193256	0.78226911

b) Predictive out-of-sample metrics by region

Region	Mean Error	Absolute Mean Error	RMSE	Median SS	Correlation	95% Cov
ANSA	-0.0035869	0.03406898	0.04641319	134.468578	0.6409674	0.91809894
CAEU	0.00031804	0.04532475	0.0664237	16.3927678	0.5735325	0.8485832
CRBN	0.00502411	0.05673316	0.07855574	46	0.75792476	0.96676594
CSSA	0.0163004	0.10252405	0.13353253	93	0.64316062	0.8873901
CTAM	0.0028507	0.03133523	0.04382939	59.5419267	0.75196409	0.94480988
EAAS	0.01243832	0.07463007	0.10013111	27.036481	0.08308726	0.92658645
ESSA	0.0082887	0.06129358	0.09423161	30	0.85744421	0.9506731
NAME	0.00333958	0.06466844	0.11056161	77	0.81492986	0.88321762
SEAS	0.00553729	0.04345195	0.06715842	16.1065991	0.9094903	0.87136797
SOAS	0.00725594	0.07158899	0.09599978	209.556704	0.71154827	0.92697774
SSSA	-0.0040252	0.05271564	0.07651169	79	0.67767687	0.95339528
TRSA	-0.0042544	0.0606068	0.08404111	35	0.45380718	0.87566424
WSSA	0.00885015	0.07753701	0.10246178	129.274825	0.88974842	0.89856221

Supplementary Table 12a–b: Second administrative level out-of-sample fit metrics

Out-of-sample fit statistics are provided for second administrative levels, by both year and modelling region, along with the number of surveys per year. Regions are defined as the following: Andean South America [*ANSA*], Central Asia Eastern Europe [*CAEU*], Caribbean [*CRBN]*, Central sub-Saharan Africa [*CSSA*], Central America [*CTAM*], East Asia [*EAAS*], East sub-Saharan Africa [*ESSA*], North Africa and Middle East [*NAME*], South East Asia, [*SEAS*], South Asia [*SOAS*], Southern sub-Saharan Africa [*SSSA*], Tropical South America [*TRSA*], and Western sub-Saharan Africa [*WSSA*].

a) Predictive out-of-sample metrics by year

Year	# surveys	Mean Error	Absolute Mean Error	RMSE	Median SS	Correlation	95% Cov
2000	33	0.00270406	0.07782518	0.12262384	4	0.8506162	0.95151268
2001	37	0.00220842	0.07136626	0.11528163	4	0.84271056	0.94030888
2002	56	0.00257876	0.07065943	0.1104081	4.82131901	0.87541732	0.92823263
2003	72	0.0046717	0.06723186	0.10182437	5.08379584	0.85709933	0.91830692
2004	75	-1.718E-05	0.06922424	0.10471612	5.38316321	0.86102734	0.94019813
2005	67	0.00102664	0.06938524	0.10220661	7	0.87428723	0.9370929
2006	44	-0.0041778	0.06828019	0.10266948	7.16909864	0.87996406	0.92207539
2007	55	-0.0010841	0.07240422	0.11454926	5	0.85230679	0.93570283
2008	61	0.00428895	0.06157605	0.09733453	5	0.86058997	0.93435323
2009	80	0.00169011	0.06273314	0.09849461	4.81470787	0.85398882	0.91301816
2010	65	-0.0026736	0.07146478	0.10593297	6.82345825	0.85518859	0.90667115
2011	56	0.00144875	0.07293265	0.11208121	6.47812221	0.8283444	0.93889497
2012	57	0.0015987	0.07452569	0.10897109	8	0.8288919	0.94274301
2013	51	0.00171151	0.0708803	0.10269853	7.03390651	0.82265477	0.93944086
2014	39	-0.001167	0.07850075	0.11242676	6	0.82800796	0.9532038
2015	30	0.01464069	0.07984529	0.11241412	12	0.86561962	0.80632746
2016	25	0.00069926	0.07540918	0.11391859	11	0.82240423	0.92469919
2017	12	-0.003244	0.10508367	0.14553064	9	0.79498885	0.93423726
2018	2	0.00774015	0.06367272	0.09124818	11.8941708	0.87933984	0.90504853

b) Predictive out-of-sample metrics by region

Region	Mean Error	Absolute Mean Error	RMSE	Median SS	Correlation	95% Cov
ANSA	-0.0018076	0.04556895	0.0724233	9.25872298	0.53934742	0.91629933
CAEU	0.00106486	0.04704413	0.07091812	1.63570656	0.63018562	0.90066858
CRBN	0.00224646	0.07014859	0.10028029	9	0.70439486	0.97665381
CSSA	0.00171496	0.09110177	0.1326402	9	0.75815441	0.94919553
CTAM	0.0012037	0.04914668	0.08774568	2	0.52625109	0.95486638
EAAS	0.024974	0.10548164	0.14280062	1.35976537	0.31256475	0.90264126
ESSA	0.00215741	0.07170412	0.10922689	10	0.83783816	0.96159855
NAME	0.0023493	0.05327719	0.08958711	5	0.89547121	0.93217578
SEAS	0.00619067	0.06712985	0.10825644	3	0.81676836	0.8727628
SOAS	-0.00021	0.06964078	0.09894883	18.188021	0.80999656	0.92504512
SSSA	-0.0034354	0.06187324	0.09156887	15.2583897	0.68677512	0.97661508
TRSA	0.00498065	0.06784998	0.09625923	3.65083624	0.44838905	0.89373318
WSSA	0.00085017	0.0904069	0.12762859	9	0.85638995	0.91159305

Supplementary Table 13: Gini coefficients in 2000 and 2019
Gini coefficients were calculated from corresponding Lorenz curves in 2000 and 2019 and used in calculations of absolute inequality.

Country	Mean MCV1 Coverage	Gini Coefficient	Absolute Inequality	Year
Afghanistan	34.9%	0.132	0.0919	2000
	57.5%	0.121	0.1396	2019
Angola	52.5%	0.215	0.2257	2019
	64.0%	0.100	0.1281	2000
Armenia	87.8%	0.010	0.0181	2000
	93.7%	0.005	0.0098	2019
Azerbaijan	65.5%	0.070	0.0919	2000
	88.6%	0.015	0.0262	2019
Burundi	83.2%	0.034	0.0571	2000
	91.2%	0.015	0.0269	2019
Benin	71.7%	0.055	0.0792	2000
	75.7%	0.053	0.0805	2019
Burkina Faso	64.4%	0.112	0.1442	2000
	95.5%	0.007	0.0142	2019
Bangladesh	77.7%	0.056	0.0863	2000
	93.2%	0.013	0.0249	2019
Belize	86.3%	0.026	0.0456	2000
	90.7%	0.010	0.0190	2019
Bolivia	86.0%	0.041	0.0697	2000
	89.0%	0.020	0.0360	2019
Botswana	86.2%	0.020	0.0352	2000
	89.0%	0.011	0.0196	2019
Central African Republic	39.6%	0.092	0.0729	2019
	45.1%	0.088	0.0797	2000
Cote d'Ivoire	68.0%	0.079	0.1072	2000
	74.3%	0.037	0.0545	2019
Cameroon	67.8%	0.109	0.1483	2019
	72.0%	0.142	0.2040	2000
Democratic Republic of the Congo	48.2%	0.165	0.1592	2000
	66.5%	0.105	0.1401	2019
Republic of Congo	33.8%	0.134	0.0902	2000
	71.5%	0.079	0.1133	2019
Colombia	92.8%	0.017	0.0309	2000

	91.6%	0.005	0.0091	2019
Comoros	69.8%	0.017	0.0238	2000
	90.5%	0.008	0.0139	2019
Cape Verde	81.7%	0.016	0.0265	2000
	99.9%	0.000	0.0001	2019
Costa Rica	89.5%	0.006	0.0111	2000
	99.9%	0.000	0.0002	2019
Cuba	86.2%	0.015	0.0266	2000
	90.6%	0.008	0.0147	2019
Djibouti	59.9%	0.049	0.0590	2000
	84.6%	0.020	0.0345	2019
Dominican Republic	85.7%	0.011	0.0194	2019
	90.4%	0.015	0.0265	2000
Algeria	82.7%	0.017	0.0276	2019
	93.1%	0.012	0.0227	2000
Ecuador	75.2%	0.025	0.0376	2019
	82.5%	0.044	0.0728	2000
Egypt	97.3%	0.005	0.0097	2000
	99.3%	0.001	0.0017	2019
Eritrea	86.5%	0.038	0.0659	2000
	99.9%	0.001	0.0013	2019
Ethiopia	24.2%	0.302	0.1457	2000
	56.8%	0.132	0.1495	2019
Gabon	51.6%	0.043	0.0448	2000
	67.9%	0.027	0.0371	2019
Ghana	84.0%	0.053	0.0891	2000
	91.1%	0.013	0.0240	2019
Guinea	48.2%	0.144	0.1390	2019
	51.8%	0.162	0.1679	2000
Gambia	85.5%	0.017	0.0297	2019
	92.1%	0.011	0.0203	2000
Guinea-Bissau	69.8%	0.055	0.0770	2000
	78.1%	0.034	0.0529	2019
Equatorial Guinea	43.2%	0.066	0.0567	2000
	43.3%	0.079	0.0685	2019
Guatemala	78.1%	0.031	0.0481	2000
	84.8%	0.007	0.0121	2019
Guyana	91.0%	0.005	0.0093	2000
	94.7%	0.002	0.0045	2019

Honduras	87.4%	0.015	0.0262	2000
	90.2%	0.007	0.0126	2019
Haiti	70.1%	0.077	0.1081	2000
	71.6%	0.040	0.0579	2019
Indonesia	71.8%	0.076	0.1092	2000
	80.1%	0.050	0.0806	2019
India	51.5%	0.217	0.2237	2000
	92.0%	0.036	0.0669	2019
Iran	95.6%	0.016	0.0312	2000
	99.5%	0.004	0.0079	2019
Iraq	78.2%	0.053	0.0826	2019
	81.7%	0.033	0.0544	2000
Jamaica	92.3%	0.014	0.0260	2000
	100.0%	0.000	0.0001	2019
Jordan	77.7%	0.012	0.0184	2019
	96.4%	0.004	0.0081	2000
Kenya	78.4%	0.081	0.1265	2000
	82.0%	0.036	0.0595	2019
Kyrgyzstan	88.7%	0.028	0.0500	2019
	93.7%	0.015	0.0289	2000
Cambodia	63.7%	0.093	0.1189	2000
	91.1%	0.014	0.0258	2019
Laos	46.3%	0.186	0.1721	2000
	72.9%	0.057	0.0832	2019
Liberia	71.0%	0.092	0.1303	2000
	93.1%	0.015	0.0270	2019
Sri Lanka	94.5%	0.009	0.0170	2000
	90.9%	0.012	0.0223	2019
Lesotho	77.9%	0.014	0.0217	2000
	91.0%	0.003	0.0057	2019
Morocco	92.1%	0.021	0.0396	2000
	92.0%	0.006	0.0116	2019
Moldova	89.3%	0.004	0.0069	2019
	96.0%	0.003	0.0066	2000
Madagascar	58.3%	0.147	0.1710	2000
	59.6%	0.149	0.1779	2019
Mexico	67.5%	0.035	0.0466	2019
	76.7%	0.081	0.1235	2000
Mali	58.8%	0.161	0.1897	2000

	69.4%	0.080	0.1104	2019
Myanmar	80.4%	0.033	0.0529	2019
	86.8%	0.048	0.0837	2000
Mongolia	83.9%	0.027	0.0459	2019
	89.9%	0.018	0.0326	2000
Mozambique	77.6%	0.088	0.1362	2000
	95.2%	0.015	0.0286	2019
Mauritania	69.6%	0.071	0.0983	2000
	80.0%	0.047	0.0750	2019
Malawi	86.8%	0.032	0.0555	2000
	96.4%	0.004	0.0075	2019
Malaysia	86.5%	0.034	0.0592	2000
	100.0%	0.010	0.0210	2019
Namibia	83.0%	0.043	0.0714	2000
	97.0%	0.005	0.0102	2019
Niger	40.6%	0.134	0.1086	2000
	62.8%	0.054	0.0682	2019
Nigeria	39.3%	0.339	0.2669	2000
	59.1%	0.169	0.2000	2019
Nicaragua	93.1%	0.010	0.0177	2000
	99.9%	0.000	0.0006	2019
Nepal	78.9%	0.076	0.1193	2000
	97.4%	0.007	0.0146	2019
Pakistan	66.2%	0.077	0.1021	2000
	76.2%	0.099	0.1505	2019
Panama	94.3%	0.003	0.0059	2000
	93.5%	0.003	0.0060	2019
Peru	89.6%	0.011	0.0205	2000
	86.0%	0.019	0.0330	2019
Philippines	79.9%	0.047	0.0751	2000
	76.6%	0.035	0.0536	2019
Papua New Guinea	45.0%	0.139	0.1254	2019
	87.1%	0.021	0.0364	2000
Paraguay	89.7%	0.011	0.0195	2000
	93.0%	0.004	0.0071	2019
Rwanda	87.0%	0.024	0.0413	2000
	91.6%	0.012	0.0229	2019
Sudan	55.9%	0.054	0.0609	2000
	84.9%	0.083	0.1404	2019

Senegal	69.1%	0.068	0.0933	2000
	88.6%	0.019	0.0338	2019
Sierra Leone	49.8%	0.109	0.1091	2000
	89.6%	0.021	0.0385	2019
El Salvador	86.3%	0.007	0.0118	2000
	92.0%	0.004	0.0070	2019
Somalia	23.9%	0.136	0.0647	2019
	28.2%	0.175	0.0985	2000
South Sudan	30.4%	0.145	0.0880	2000
	46.3%	0.077	0.0717	2019
Sao Tome and Principe	74.1%	0.011	0.0170	2000
	99.4%	0.000	0.0006	2019
Suriname	71.8%	0.038	0.0548	2019
	77.9%	0.029	0.0458	2000
Swaziland	86.2%	0.012	0.0212	2000
	88.6%	0.005	0.0091	2019
Syria	69.6%	0.026	0.0366	2019
	77.7%	0.012	0.0189	2000
Chad	26.8%	0.212	0.1134	2000
	40.5%	0.150	0.1216	2019
Togo	59.9%	0.120	0.1437	2000
	76.5%	0.037	0.0562	2019
Thailand	90.7%	0.019	0.0339	2019
	95.0%	0.008	0.0145	2000
Tajikistan	86.5%	0.018	0.0319	2000
	90.2%	0.013	0.0227	2019
Turkmenistan	94.4%	0.004	0.0080	2019
	96.4%	0.002	0.0037	2000
Timor-Leste	36.3%	0.126	0.0915	2000
	67.7%	0.042	0.0563	2019
Trinidad and Tobago	95.0%	0.007	0.0137	2000
	93.6%	0.004	0.0072	2019
Tunisia	92.9%	0.007	0.0129	2000
	95.9%	0.005	0.0086	2019
Tanzania	83.2%	0.057	0.0947	2000
	88.1%	0.031	0.0542	2019
Uganda	66.6%	0.071	0.0939	2000
	72.2%	0.045	0.0649	2019
Ukraine	93.7%	0.012	0.0232	2000

	100.0%	0.000	0.0002	2019
Uzbekistan	92.2%	0.005	0.0099	2019
	95.4%	0.007	0.0128	2000
Vietnam	84.4%	0.064	0.1087	2000
	90.3%	0.021	0.0383	2019
Yemen	35.7%	0.240	0.1714	2000
	70.8%	0.054	0.0768	2019
South Africa	78.9%	0.084	0.1320	2000
	78.2%	0.019	0.0291	2019
Zambia	86.6%	0.028	0.0480	2000
	90.5%	0.017	0.0306	2019
Zimbabwe	71.6%	0.039	0.0560	2000
	84.7%	0.023	0.0392	2019

Supplementary Table 14: Age cohort regression coefficients
Coefficients from age cohort only regression analysis of the log of the ratios of coverage between older cohorts and the target cohort among cohorts of children with multiple survey timepoints. t-statistic and corresponding two-side p=values are presented. The t+3 cohort was significant.

	Beta	Std. Error	t-value	p-value
T+1	0.01436	0.02483	0.578	0.5646
T+2	0.05409	0.02786	1.941	0.0556
T+3	0.14564	0.02840	5.129	0.00000184***

Supplementary Table 15: Key analysis findings for multiple age cohort modelling choices
For each modelling version with various cohorting approaches, key results and themes presented in the manuscript are consistent, including proportion of districts with increasing coverage and meeting GVAP targets, as well as inequality metrics and the geographic distribution of children.

	Full cohort model	Target age, t+1 and t+2 cohort model* *Presented as main findings	Target age and t+1 cohort model	Target age cohort only model
Proportion of districts with increased coverage from 2000 to 2019	58.0% (95% UI: 51.1 – 65.6%)	57.4% (95% UI: 50.4– 64.6%)	55.9% (95% UI: 49.3 – 63.8%)	55.5% (95% UI: 49.8 – 61.5%)
Proportion of districts with increased coverage from 2000 to 2010	69.6% (95% UI: 64.9– 74.4%)	70.5% (95% UI: 66.0–75.4%)	67.9% (95% UI: 62.3 – 73.5%)	72.0% (95% UI: 67.6 – 76.3%)
Proportion of districts with increased coverage from 2010 to 2019	41.7% (95% UI: 35.5 – 49.5%)	40.1% (95% UI: 34.2–46.9%)	40.3% (95% UI: 34.5 – 47.6%)	36.9% (95% UI: 32.1 – 42.6%)
Proportion of districts meeting GVAP target in 2000	39.1%	38.4%	37.0%	37.2%
Proportion of districts meeting GVAP target in 2019	34.0%	33.2%	33.1%	34.8%
% of all unvaccinated children living in rural areas	16.2%	16.0%	16.1%	16.2%
% of all unvaccinated children living in urban areas	47.5%	47.9%	48.0%	47.6%
% of children living rural areas that are unvaccinated	33.2%	33.3%	33.1%	33.2%
% of all unvaccinated children living in urban areas	14.9%	15.2%	15.1%	14.9%

Correlation between changes in coverage and absolute inequality from 2000 - 2019	-0.49 (Pearson's product moment correlation, t = -5.65, p = 0.0000001564)	-0.47 (Pearson's product moment correlation, t = -5.36, p = 0.0000005332)	-0.45 (Pearson's product moment correlation, t = -4.95, p = 0.000003044)	-0.53 (Pearson's product moment correlation, t = -6.49, p =0.000000002564)
Number of countries with increasing inequality from 2000 - 2019	23	25	29	25

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