



Supplementary Materials for

World population stabilization unlikely this century

Patrick Gerland,* Adrian E. Raftery,* Hana Ševčíková, Nan Li, Danan Gu, Thomas Spoorenberg, Leontine Alkema, Bailey K. Fosdick, Jennifer Chunn, Nevena Lalic, Guiomar Bay, Thomas Buettner, Gerhard K. Heilig, John Wilmoth

*Corresponding author. E-mail: gerland@un.org (P.G.); raftery@u.washington.edu (A.E.R.)

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Correction: The main-paper and supplementary references have been combined into a single list.

Materials and Methods

The Probabilistic Population Projections based on the 2012 Revision of the World Population Prospects extended the classic cohort-component population projection approach (28–30) by incorporating uncertainty about future changes in fertility and mortality (7, 13). They used as input data the 2012 Revision estimates for 1950–2010 and projections assumptions for 2010–2100 for fertility age patterns, sex-ratios at birth, impact of HIV/AIDS and treatment on future mortality as well as net migration by age and sex (2).

Using a cohort-component approach, the population by five-year age groups and by sex for each country was projected from mid-2010, the base year, up to mid-2100 by five-year periods using future survival probabilities by sex and five-year age groups, as well as future counts of net migrants by age and sex and future numbers of births distributed by sex. The population in year $t+5$ is equal to the population in year t plus the intervening births and net migration, minus the intervening deaths, with the computations carried out by sex and age along cohort lines over the time interval. For each country, 10,000 population projections were computed from 2010 to 2100, each one using a projected trajectory of total fertility rates and a projected trajectory of life expectancy in the country sampled from the predictive distribution of these quantities.

For each country, the estimates by 5-year periods from 1950 to 2010 from the 2012 revision of the World Population prospects have been used as inputs for the Bayesian hierarchical models used to project the total fertility rate and life expectancy at birth for each sex. Further details about the specific data sources (31), as well as the estimation methods and analytical approach used to derive past trends for each demographic component and the base population are available elsewhere (32, 33).

Probabilistic projection model for total fertility rate

Probabilistic projections of total fertility rate (TFR) were generated using the approach proposed by Alkema et al. (6) and Raftery et al. (7).

The model is based on the observation that the typical evolution of the TFR in a country includes three broad phases, referred to as Phase I, II and III: (I) a high-fertility pre-transition phase with no systematic decline, (II) the fertility transition in which the TFR decreases from high fertility levels towards or below replacement level fertility (i.e., 2.1 children per woman), and (III) a low-fertility post-transition phase, which ultimately includes fluctuations around a country-specific long-term average.

Phase II, the fertility transition phase, was modelled by a random walk with a nonconstant drift. The drift, equal to the mathematical expectation of the TFR decline in the next five-year period, was modelled as a function of the current TFR level using a double logistic function with a country-specific set of parameters that defines the shape of the decline curve. These parameters were estimated using a Bayesian hierarchical model estimated via Markov chain Monte Carlo (MCMC) in which the country-specific decline curves arise from a world distribution (6). Following this approach, these country-specific distributions of TFR decline parameters were informed by historical trends within the country, as well as the variability in historical fertility trends of all countries that already experienced a fertility decline under similar conditions.

Phase III, the post-transition phase, was modeled by a first-order autoregressive model where the model parameters were allowed to vary between countries, following a Bayesian hierarchical model (7). The time series model used the empirical evidence from low-fertility countries that experienced fertility increases from a sub-replacement level after a completed fertility transition.

To construct projections for all countries, the Phase II model was used to generate 600,000¹ double-logistic curves for each country that were still in Phase II in 2005-2010. The sample of double-logistic curves was then used to calculate 60,000 total fertility projections based on a systematic sampling of 1/10 of the 600,000 predicted distribution of future change in TFR. Once a projected trajectory decreased to a level that was around or below replacement-level fertility, and after the pace of the fertility decline decreased to zero, future changes of fertility were calculated using the Phase III model. For all other countries already in Phase III in 2005-2010, the Phase III model was used directly.

All computations were done for 233 countries or areas (including 32 small countries or areas with populations of less than 90,000 in 2013 that did not contribute to inference about the world distribution) using the open source software implementation in the R package *bayesTFR* (34–36).

Probabilistic projection model for life expectancy at birth

Probabilistic projections of life expectancy at birth by sex were generated using the approach proposed by Raftery et al. (9, 10).

Future values of female life expectancy at birth were based on a similar modelling approach as used for TFR: female life expectancy was modelled using a random walk with drift where the drift, or pace of improvement in life expectancy, was modelled as a function of the life expectancy level using a double logistic function with a country-specific set of parameters determining the shape of the function. These parameters were estimated using a Bayesian hierarchical model estimated via MCMC in which the country-specific double-logistic parameters were sampled from a common world distribution (9). These distributions were informed by historical trends within each country (including pre-1950 data for 29 countries with good vital registration²), as well as the variability in historical mortality trends of all countries.

For a small number of countries, the four parameters of the double logistic function responsible for future gains beyond around 60 years of life expectancy were informed by the experience of the leading countries in their region.³ In the first case, this approach was used to temper over-optimistic gains for some countries in the distant future that would lead to implausible crossovers in long term projections (e.g., lagging countries today becoming leaders by 2100).⁴ In the second case, this approach was used to provide further guidance on long term potential gains for countries that have experienced

¹ Actually ten simulations were run in parallel with 62,000 MCMC iterations performed without thinning for each simulation, and the first 2,000 were discarded as burn-in.

² Historical data were only included in this analysis since 1870 due to the lack of clear mortality decline in the ten countries with earlier data.

³ Country-specific priors were specified for the first set of countries for the upper bound of the Δ_{c3} , Δ_{c4} , k^c and z^c double-logistic parameters while for the second set of countries lower bound were used for these parameters. In general, the upper quartile of the distribution of these parameters for the best performers in each region was used to inform other countries.

⁴ Afghanistan, Bangladesh, Bhutan, Bolivia, Cambodia, Cape Verde, Ecuador, Eritrea, Lao PDR, Lebanon, Madagascar, Maldives, Nepal, Nicaragua, Niger, Oman, Peru, Turkey, Western Sahara.

mortality stagnation or worsening (i.e., in the long run these countries will gradually catch up with the more advanced countries in their region).⁵

To construct probabilistic projections of female life expectancy at birth for each country, this model was used to generate 1,450,000⁶ double-logistic curves for each country. The sample of double-logistic curves was then used to calculate 100,000 projections of life expectancy at birth based on a systematic sampling of 1/14 of the 1,450,000 predicted distributions of future improvements in life expectancy.

Future values of male life expectancies at birth took into account the correlation between female and male life expectancies. Male probabilistic projections of life expectancy at birth were obtained by using a systematic sample of 100,000 female probabilistic projections of life expectancy at birth, and a gender gap autoregressive model taking into account outliers using a Student's t-distribution for the error term (10) to generate 100,000 future trajectories for each country.

For countries having ever experienced 2 per cent or more adult HIV prevalence during the period 1980 to 2010, similar probabilistic projections of life expectancy at birth by sex were performed as for other countries, but the data from these countries were not used to inform the world distribution. This initial modelling assumption led to treating the experience of the HIV/AIDS epidemic as a severe mortality crisis with limited or no significant improvements in survival except in recent years with the greater access to antiretroviral treatment. To mitigate the impact of the past HIV/AIDS mortality crisis on future pace of improvements, all projected trajectories of life expectancy by sex for each of these countries were adjusted in such a way as to ensure that the median trajectory for each country was consistent with the 2012 Revision of the World Population Prospects deterministic projection that incorporates the impact of HIV/AIDS on mortality, as well as assumptions about future potential improvements both in the reduction of the epidemic and survival due to treatment.

All computations were done for 233 countries or areas (including the 32 small countries or areas with populations of less than 90,000 in 2013, that did not contribute to inference about the world distributions) using the open source software implementation in the R package *bayesLife* (36, 37).

Probabilistic population projection model

Population projections by age and sex starting in 2010 used for each country the probabilistic projections up to 2100 of total fertility and life expectancy at birth by sex.

For each set of probabilistic trajectories of total fertility rate and life expectancy at birth by sex for a given country, age-specific rates were obtained by applying proportionate age-specific fertility patterns from the 2012 Revision for each five-year period between 2010 and 2100 to convert the total fertility into age-specific fertility rates, and a modified Lee-Carter method (38)⁷ to convert the life expectancy at birth for each sex into age-specific mortality rates using 1950-2010 mortality rates from the 2012 Revision (13, 39).

⁵ A subset of Eastern European and former Soviet Union countries that have experienced long period of stagnating or even increasing mortality.

⁶ Actually ten simulations were run in parallel with 155,000 MCMC iterations performed without thinning for each simulation, and the first 10,000 iterations for each simulation were discarded as burn-in.

⁷ The time indicator, $k(t)$, for the standard Lee-Carter approach was not projected by a random walk, but was fitted to the projected trajectories of life expectancy at birth.

These age-specific fertility rates were then applied to women in reproductive age groups (15-49) to obtain the total number of new births in each five-year period, and projected sex ratios at birth (from the 2012 Revision) were applied to split the number of births by sex. The number of deaths by age and sex was obtained by applying to each population at the beginning of each five-year period the corresponding mortality rates, and for the births that occurred during this period the associated risk of dying under age five. Finally the net number of migrants by age and sex for each five-year period from 2010 to 2100 (from the 2012 Revision) was taken into account to compute the projected population at the end of each 5-year period based on the population cohorts five-year earlier and the intervening births, deaths and net migrants by age and sex using a classic cohort-component projection model (28–30). This approach was repeated for 10,000 samples combining these probabilistic projections of components of change (i.e. fertility and mortality) with the initial starting population in 2010 and other deterministic projection parameters (i.e., net migrations and fertility age patterns) for each country.

All computations were done using the open source R package bayesPop version 5.1-3 (13, 36, 40). Internal consistency among the median estimates of all population quantities was enforced with the deterministic results from the 2012 Revision of the World Population Prospects (because of different assumptions used to project age mortality patterns): the probabilistic approach used a modified Lee-Carter approach to combine each of the 10,000 stochastic trajectories of life expectancy at birth with the 1950-2010 trends in mortality rates by age and sex for each country (13) while the deterministic approach used a more context-specific approach combining one or more projection methods with the projected probabilistic median trajectory (see section b. projection of the age pattern of mortality in (33)).

Aggregations and between-country correlations

All the basic computations were done at the country level for 233 countries or areas (including 32 countries or areas with populations of less than 90,000 in 2013), and aggregated for the whole world as well as by major geographic groupings and World Bank income groups as of July 2013 (see Table S1).

Between-country correlations not captured by the Bayesian hierarchical projection model for the total fertility rate were incorporated into the final projected trajectories for each country using the method described in (8). We found no evidence that the between-country correlations were not captured by the Bayesian hierarchical projection model for life expectancy (9).

Limitations

While these probabilistic projections incorporate uncertainty about future trends and levels of fertility and mortality for each country, they do not incorporate uncertainty about future age patterns of fertility and mortality, nor about future international net migration.

The accuracy of the United Nations projections has also been found to be particularly sensitive to measurement errors in baseline population and past demographic components (41, 42), which are often related to the gap or lag between the latest available data and the base year used for projection, but also to common data quality problems, such as non-sampling errors and discordance between data sources. While significant

methodological progress has been made recently in modeling uncertainty in past demographic estimates (43–45), these new methods have not yet been incorporated in the underlying base population used to start the projection in 2010 nor in the underlying demographic rates for 1950–2010 used to derive the probabilistic projections of total fertility rate and life expectancy at birth.

In addition, for countries with high prevalence of HIV/AIDS (more than 2 percent HIV/AIDS prevalence at any time during the epidemic), further research is currently being undertaken to better incorporate uncertainty about the future path of the epidemic in each country and its impact on mortality by age and sex (46, 47), taking into account the expanded access to treatment.

Table S1.

Aggregation table used in bayesPop with list of countries or areas used as constituents for major geographic areas and regions, as well as World Bank income groups as of July 2013.

<i>Area Code*</i>	<i>Area Name</i>	<i>Region Code*</i>	<i>Region Name</i>	<i>Country Code*</i>	<i>Country Name</i>	<i>Location Type**</i>
900	World					0
		903	Africa			2
		935	Asia			2
		908	Europe			2
		904	Latin America and the Caribbean			2
		905	Northern America			2
		909	Oceania			2
903	Africa					2
		910	Eastern Africa			3
				108	Burundi	4
				174	Comoros	4
				262	Djibouti	4
				232	Eritrea	4
				231	Ethiopia	4
				404	Kenya	4
				450	Madagascar	4
				454	Malawi	4
				480	Mauritius	4
				175	Mayotte	4
				508	Mozambique	4
				638	Reunion	4
				646	Rwanda	4
				690	Seychelles	4
				706	Somalia	4
				728	South Sudan	4
				800	Uganda	4
				834	United Republic of Tanzania	4
				894	Zambia	4
				716	Zimbabwe	4
		911	Middle Africa			3
				24	Angola	4
				120	Cameroon	4
				140	Central African Republic	4
				148	Chad	4
				178	Congo	4
				180	Democratic Republic of the Congo	4
				226	Equatorial Guinea	4
				266	Gabon	4
				678	Sao Tome and Principe	4
		912	Northern Africa			3
				12	Algeria	4
				818	Egypt	4
				434	Libya	4
				504	Morocco	4
				729	Sudan	4
				788	Tunisia	4
				732	Western Sahara	4
		913	Southern Africa			3
				72	Botswana	4
				426	Lesotho	4
				516	Namibia	4
				710	South Africa	4
				748	Swaziland	4
		914	Western Africa			3
				204	Benin	4

<i>Area Code*</i>	<i>Area Name</i>	<i>Region Code*</i>	<i>Region Name</i>	<i>Country Code*</i>	<i>Country Name</i>	<i>Location Type**</i>
				854	Burkina Faso	4
				132	Cape Verde	4
				384	Cote d'Ivoire	4
				270	Gambia	4
				288	Ghana	4
				324	Guinea	4
				624	Guinea-Bissau	4
				430	Liberia	4
				466	Mali	4
				478	Mauritania	4
				562	Niger	4
				566	Nigeria	4
				654	Saint Helena	4
				686	Senegal	4
				694	Sierra Leone	4
				768	Togo	4
		947	Sub-Saharan Africa			2
				24	Angola	4
				204	Benin	4
				72	Botswana	4
				854	Burkina Faso	4
				108	Burundi	4
				120	Cameroon	4
				132	Cape Verde	4
				140	Central African Republic	4
				148	Chad	4
				174	Comoros	4
				178	Congo	4
				384	Côte d'Ivoire	4
				180	Democratic Republic of the Congo	4
				262	Djibouti	4
				226	Equatorial Guinea	4
				232	Eritrea	4
				231	Ethiopia	4
				266	Gabon	4
				270	Gambia	4
				288	Ghana	4
				324	Guinea	4
				624	Guinea-Bissau	4
				404	Kenya	4
				426	Lesotho	4
				430	Liberia	4
				450	Madagascar	4
				454	Malawi	4
				466	Mali	4
				478	Mauritania	4
				480	Mauritius	4
				175	Mayotte	4
				508	Mozambique	4
				516	Namibia	4
				562	Niger	4
				566	Nigeria	4
				638	Réunion	4
				646	Rwanda	4
				654	Saint Helena	4
				678	Sao Tome and Principe	4
				686	Senegal	4
				690	Seychelles	4
				694	Sierra Leone	4
				706	Somalia	4
				710	South Africa	4
				728	South Sudan	4
				748	Swaziland	4
				768	Togo	4
				800	Uganda	4
				834	United Republic of Tanzania	4
				894	Zambia	4
				716	Zimbabwe	4

<i>Area Code*</i>	<i>Area Name</i>	<i>Region Code*</i>	<i>Region Name</i>	<i>Country Code*</i>	<i>Country Name</i>	<i>Location Type**</i>
935	Asia					2
		921	South-Central Asia			3
				4	Afghanistan	4
				50	Bangladesh	4
				64	Bhutan	4
				356	India	4
				364	Iran (Islamic Republic of)	4
				398	Kazakhstan	4
				417	Kyrgyzstan	4
				462	Maldives	4
				524	Nepal	4
				586	Pakistan	4
				144	Sri Lanka	4
				762	Tajikistan	4
				795	Turkmenistan	4
				860	Uzbekistan	4
		5500	Central Asia			3
				398	Kazakhstan	4
				417	Kyrgyzstan	4
				762	Tajikistan	4
				795	Turkmenistan	4
				860	Uzbekistan	4
		906	Eastern Asia			3
				156	China	4
				344	China, Hong Kong SAR	4
				446	China, Macao SAR	4
				408	Dem. People's Republic of Korea	4
				392	Japan	4
				496	Mongolia	4
				158	Other non-specified Asian areas	4
				410	Republic of Korea	4
		920	South-Eastern Asia			3
				96	Brunei Darussalam	4
				116	Cambodia	4
				360	Indonesia	4
				418	Lao People's Democratic Republic	4
				458	Malaysia	4
				104	Myanmar	4
				608	Philippines	4
				702	Singapore	4
				764	Thailand	4
				626	Timor-Leste	4
				704	Viet Nam	4
		5501	Southern Asia			3
				4	Afghanistan	4
				50	Bangladesh	4
				64	Bhutan	4
				356	India	4
				364	Iran (Islamic Republic of)	4
				462	Maldives	4
				524	Nepal	4
				586	Pakistan	4
				144	Sri Lanka	4
		922	Western Asia			3
				51	Armenia	4
				31	Azerbaijan	4
				48	Bahrain	4
				196	Cyprus	4
				268	Georgia	4
				368	Iraq	4
				376	Israel	4
				400	Jordan	4
				414	Kuwait	4
				422	Lebanon	4
				512	Oman	4
				634	Qatar	4
				682	Saudi Arabia	4
				275	State of Palestine	4

<i>Area Code*</i>	<i>Area Name</i>	<i>Region Code*</i>	<i>Region Name</i>	<i>Country Code*</i>	<i>Country Name</i>	<i>Location Type**</i>
				760	Syrian Arab Republic	4
				792	Turkey	4
				784	United Arab Emirates	4
				887	Yemen	4
908	Europe					2
		923	Eastern Europe			3
				112	Belarus	4
				100	Bulgaria	4
				203	Czech Republic	4
				348	Hungary	4
				616	Poland	4
				498	Republic of Moldova	4
				642	Romania	4
				643	Russian Federation	4
				703	Slovakia	4
				804	Ukraine	4
		924	Northern Europe			3
				830	Channel Islands	4
				208	Denmark	4
				233	Estonia	4
				234	Faeroe Islands	4
				246	Finland	4
				352	Iceland	4
				372	Ireland	4
				833	Isle of Man	4
				428	Latvia	4
				440	Lithuania	4
				578	Norway	4
				752	Sweden	4
				826	United Kingdom	4
		925	Southern Europe			3
				8	Albania	4
				20	Andorra	4
				70	Bosnia and Herzegovina	4
				191	Croatia	4
				292	Gibraltar	4
				300	Greece	4
				336	Holy See	4
				380	Italy	4
				470	Malta	4
				499	Montenegro	4
				620	Portugal	4
				674	San Marino	4
				688	Serbia	4
				705	Slovenia	4
				724	Spain	4
				807	TFYR Macedonia	4
		926	Western Europe			3
				40	Austria	4
				56	Belgium	4
				250	France	4
				276	Germany	4
				438	Liechtenstein	4
				442	Luxembourg	4
				492	Monaco	4
				528	Netherlands	4
				756	Switzerland	4
904	Latin America and the Caribbean					2
		915	Caribbean			3
				660	Anguilla	4
				28	Antigua and Barbuda	4
				533	Aruba	4
				44	Bahamas	4
				52	Barbados	4
				92	British Virgin Islands	4
				535	Caribbean Netherlands	4
				136	Cayman Islands	4
				192	Cuba	4

<i>Area Code*</i>	<i>Area Name</i>	<i>Region Code*</i>	<i>Region Name</i>	<i>Country Code*</i>	<i>Country Name</i>	<i>Location Type**</i>
				531	Curaçao	4
				212	Dominica	4
				214	Dominican Republic	4
				308	Grenada	4
				312	Guadeloupe	4
				332	Haiti	4
				388	Jamaica	4
				474	Martinique	4
				500	Montserrat	4
				630	Puerto Rico	4
				659	Saint Kitts and Nevis	4
				662	Saint Lucia	4
				670	Saint Vincent and the Grenadines	4
				534	Sint Maarten (Dutch part)	4
				780	Trinidad and Tobago	4
				796	Turks and Caicos Islands	4
				850	United States Virgin Islands	4
		916	Central America			3
				84	Belize	4
				188	Costa Rica	4
				222	El Salvador	4
				320	Guatemala	4
				340	Honduras	4
				484	Mexico	4
				558	Nicaragua	4
				591	Panama	4
		931	South America			3
				32	Argentina	4
				68	Bolivia (Plurinational State of)	4
				76	Brazil	4
				152	Chile	4
				170	Colombia	4
				218	Ecuador	4
				238	Falkland Islands (Malvinas)	4
				254	French Guiana	4
				328	Guyana	4
				600	Paraguay	4
				604	Peru	4
				740	Suriname	4
				858	Uruguay	4
				862	Venezuela (Bolivarian Republic of)	4
905	Northern America					2
				60	Bermuda	4
				124	Canada	4
				304	Greenland	4
				666	Saint Pierre and Miquelon	4
				840	United States of America	4
909	Oceania					2
		927	Australia/New Zealand			3
				36	Australia	4
				554	New Zealand	4
		928	Melanesia			3
				242	Fiji	4
				540	New Caledonia	4
				598	Papua New Guinea	4
				90	Solomon Islands	4
				548	Vanuatu	4
		954	Micronesia			3
				316	Guam	4
				296	Kiribati	4
				584	Marshall Islands	4
				583	Micronesia (Fed. States of)	4
				520	Nauru	4
				580	Northern Mariana Islands	4
				585	Palau	4
		957	Polynesia			3
				16	American Samoa	4
				184	Cook Islands	4

<i>Area Code*</i>	<i>Area Name</i>	<i>Region Code*</i>	<i>Region Name</i>	<i>Country Code*</i>	<i>Country Name</i>	<i>Location Type**</i>
				258	French Polynesia	4
				570	Niue	4
				612	Pitcairn	4
				882	Samoa	4
				772	Tokelau	4
				776	Tonga	4
				798	Tuvalu	4
				876	Wallis and Futuna Islands	4
902	Less developed regions					2
		941	Least developed countries			3
				4	Afghanistan	4
				24	Angola	4
				50	Bangladesh	4
				204	Benin	4
				64	Bhutan	4
				854	Burkina Faso	4
				108	Burundi	4
				116	Cambodia	4
				140	Central African Republic	4
				148	Chad	4
				174	Comoros	4
				180	Democratic Republic of the Congo	4
				262	Djibouti	4
				226	Equatorial Guinea	4
				232	Eritrea	4
				231	Ethiopia	4
				270	Gambia	4
				324	Guinea	4
				624	Guinea-Bissau	4
				332	Haiti	4
				296	Kiribati	4
				418	Lao People's Democratic Republic	4
				426	Lesotho	4
				430	Liberia	4
				450	Madagascar	4
				454	Malawi	4
				466	Mali	4
				478	Mauritania	4
				508	Mozambique	4
				104	Myanmar	4
				524	Nepal	4
				562	Niger	4
				646	Rwanda	4
				882	Samoa	4
				678	Sao Tome and Principe	4
				686	Senegal	4
				694	Sierra Leone	4
				90	Solomon Islands	4
				706	Somalia	4
				728	South Sudan	4
				729	Sudan	4
				626	Timor-Leste	4
				768	Togo	4
				798	Tuvalu	4
				800	Uganda	4
				834	United Republic of Tanzania	4
				548	Vanuatu	4
				887	Yemen	4
				894	Zambia	4
		934	Other less developed countries			3
				12	Algeria	4
				16	American Samoa	4
				660	Anguilla	4
				28	Antigua and Barbuda	4
				32	Argentina	4
				51	Armenia	4
				533	Aruba	4
				31	Azerbaijan	4

<i>Area Code*</i>	<i>Area Name</i>	<i>Region Code*</i>	<i>Region Name</i>	<i>Country Code*</i>	<i>Country Name</i>	<i>Location Type**</i>
				44	Bahamas	4
				48	Bahrain	4
				52	Barbados	4
				84	Belize	4
				68	Bolivia (Plurinational State of)	4
				72	Botswana	4
				76	Brazil	4
				92	British Virgin Islands	4
				96	Brunei Darussalam	4
				120	Cameroon	4
				132	Cape Verde	4
				535	Caribbean Netherlands	4
				136	Cayman Islands	4
				152	Chile	4
				156	China	4
				344	China, Hong Kong SAR	4
				446	China, Macao SAR	4
				170	Colombia	4
				178	Congo	4
				184	Cook Islands	4
				188	Costa Rica	4
				384	Côte d'Ivoire	4
				192	Cuba	4
				531	Curaçao	4
				196	Cyprus	4
				408	Dem. People's Republic of Korea	4
				212	Dominica	4
				214	Dominican Republic	4
				218	Ecuador	4
				818	Egypt	4
				222	El Salvador	4
				238	Falkland Islands (Malvinas)	4
				242	Fiji	4
				254	French Guiana	4
				258	French Polynesia	4
				266	Gabon	4
				268	Georgia	4
				288	Ghana	4
				308	Grenada	4
				312	Guadeloupe	4
				316	Guam	4
				320	Guatemala	4
				328	Guyana	4
				340	Honduras	4
				356	India	4
				360	Indonesia	4
				364	Iran (Islamic Republic of)	4
				368	Iraq	4
				376	Israel	4
				388	Jamaica	4
				400	Jordan	4
				398	Kazakhstan	4
				404	Kenya	4
				414	Kuwait	4
				417	Kyrgyzstan	4
				422	Lebanon	4
				434	Libya	4
				458	Malaysia	4
				462	Maldives	4
				584	Marshall Islands	4
				474	Martinique	4
				480	Mauritius	4
				175	Mayotte	4
				484	Mexico	4
				583	Micronesia (Fed. States of)	4
				496	Mongolia	4
				500	Montserrat	4
				504	Morocco	4

<i>Area Code*</i>	<i>Area Name</i>	<i>Region Code*</i>	<i>Region Name</i>	<i>Country Code*</i>	<i>Country Name</i>	<i>Location Type**</i>
				516	Namibia	4
				520	Nauru	4
				540	New Caledonia	4
				558	Nicaragua	4
				566	Nigeria	4
				570	Niue	4
				580	Northern Mariana Islands	4
				512	Oman	4
				158	Other non-specified Asian areas	4
				586	Pakistan	4
				585	Palau	4
				591	Panama	4
				598	Papua New Guinea	4
				600	Paraguay	4
				604	Peru	4
				608	Philippines	4
				630	Puerto Rico	4
				634	Qatar	4
				410	Republic of Korea	4
				638	Réunion	4
				654	Saint Helena	4
				659	Saint Kitts and Nevis	4
				662	Saint Lucia	4
				670	Saint Vincent and the Grenadines	4
				682	Saudi Arabia	4
				690	Seychelles	4
				702	Singapore	4
				534	Sint Maarten (Dutch part)	4
				710	South Africa	4
				144	Sri Lanka	4
				275	State of Palestine	4
				740	Suriname	4
				748	Swaziland	4
				760	Syrian Arab Republic	4
				762	Tajikistan	4
				764	Thailand	4
				772	Tokelau	4
				776	Tonga	4
				780	Trinidad and Tobago	4
				788	Tunisia	4
				792	Turkey	4
				795	Turkmenistan	4
				796	Turks and Caicos Islands	4
				784	United Arab Emirates	4
				850	United States Virgin Islands	4
				858	Uruguay	4
				860	Uzbekistan	4
				862	Venezuela (Bolivarian Republic of)	4
				704	Viet Nam	4
				876	Wallis and Futuna Islands	4
				732	Western Sahara	4
				716	Zimbabwe	4
		948	Less developed regions, excluding China			3
				4	Afghanistan	4
				12	Algeria	4
				16	American Samoa	4
				24	Angola	4
				660	Anguilla	4
				28	Antigua and Barbuda	4
				32	Argentina	4
				51	Armenia	4
				533	Aruba	4
				31	Azerbaijan	4
				44	Bahamas	4
				48	Bahrain	4
				50	Bangladesh	4
				52	Barbados	4
				84	Belize	4

<i>Area Code*</i>	<i>Area Name</i>	<i>Region Code*</i>	<i>Region Name</i>	<i>Country Code*</i>	<i>Country Name</i>	<i>Location Type**</i>
				204	Benin	4
				64	Bhutan	4
				68	Bolivia (Plurinational State of)	4
				72	Botswana	4
				76	Brazil	4
				92	British Virgin Islands	4
				96	Brunei Darussalam	4
				854	Burkina Faso	4
				108	Burundi	4
				116	Cambodia	4
				120	Cameroon	4
				132	Cape Verde	4
				535	Caribbean Netherlands	4
				136	Cayman Islands	4
				140	Central African Republic	4
				148	Chad	4
				152	Chile	4
				344	China, Hong Kong SAR	4
				446	China, Macao SAR	4
				170	Colombia	4
				174	Comoros	4
				178	Congo	4
				184	Cook Islands	4
				188	Costa Rica	4
				384	Côte d'Ivoire	4
				192	Cuba	4
				531	Curaçao	4
				196	Cyprus	4
				408	Dem. People's Republic of Korea	4
				180	Democratic Republic of the Congo	4
				262	Djibouti	4
				212	Dominica	4
				214	Dominican Republic	4
				218	Ecuador	4
				818	Egypt	4
				222	El Salvador	4
				226	Equatorial Guinea	4
				232	Eritrea	4
				231	Ethiopia	4
				238	Falkland Islands (Malvinas)	4
				242	Fiji	4
				254	French Guiana	4
				258	French Polynesia	4
				266	Gabon	4
				270	Gambia	4
				268	Georgia	4
				288	Ghana	4
				308	Grenada	4
				312	Guadeloupe	4
				316	Guam	4
				320	Guatemala	4
				324	Guinea	4
				624	Guinea-Bissau	4
				328	Guyana	4
				332	Haiti	4
				340	Honduras	4
				356	India	4
				360	Indonesia	4
				364	Iran (Islamic Republic of)	4
				368	Iraq	4
				376	Israel	4
				388	Jamaica	4
				400	Jordan	4
				398	Kazakhstan	4
				404	Kenya	4
				296	Kiribati	4
				414	Kuwait	4
				417	Kyrgyzstan	4

<i>Area Code*</i>	<i>Area Name</i>	<i>Region Code*</i>	<i>Region Name</i>	<i>Country Code*</i>	<i>Country Name</i>	<i>Location Type**</i>
				418	Lao People's Democratic Republic	4
				422	Lebanon	4
				426	Lesotho	4
				430	Liberia	4
				434	Libya	4
				450	Madagascar	4
				454	Malawi	4
				458	Malaysia	4
				462	Maldives	4
				466	Mali	4
				584	Marshall Islands	4
				474	Martinique	4
				478	Mauritania	4
				480	Mauritius	4
				175	Mayotte	4
				484	Mexico	4
				583	Micronesia (Fed. States of)	4
				496	Mongolia	4
				500	Montserrat	4
				504	Morocco	4
				508	Mozambique	4
				104	Myanmar	4
				516	Namibia	4
				520	Nauru	4
				524	Nepal	4
				540	New Caledonia	4
				558	Nicaragua	4
				562	Niger	4
				566	Nigeria	4
				570	Niue	4
				580	Northern Mariana Islands	4
				512	Oman	4
				158	Other non-specified Asian areas	4
				586	Pakistan	4
				585	Palau	4
				591	Panama	4
				598	Papua New Guinea	4
				600	Paraguay	4
				604	Peru	4
				608	Philippines	4
				630	Puerto Rico	4
				634	Qatar	4
				410	Republic of Korea	4
				638	Réunion	4
				646	Rwanda	4
				654	Saint Helena	4
				659	Saint Kitts and Nevis	4
				662	Saint Lucia	4
				670	Saint Vincent and the Grenadines	4
				882	Samoa	4
				678	Sao Tome and Principe	4
				682	Saudi Arabia	4
				686	Senegal	4
				690	Seychelles	4
				694	Sierra Leone	4
				702	Singapore	4
				534	Sint Maarten (Dutch part)	4
				90	Solomon Islands	4
				706	Somalia	4
				710	South Africa	4
				728	South Sudan	4
				144	Sri Lanka	4
				275	State of Palestine	4
				729	Sudan	4
				740	Suriname	4
				748	Swaziland	4
				760	Syrian Arab Republic	4
				762	Tajikistan	4

<i>Area Code*</i>	<i>Area Name</i>	<i>Region Code*</i>	<i>Region Name</i>	<i>Country Code*</i>	<i>Country Name</i>	<i>Location Type**</i>
				764	Thailand	4
				626	Timor-Leste	4
				768	Togo	4
				772	Tokelau	4
				776	Tonga	4
				780	Trinidad and Tobago	4
				788	Tunisia	4
				792	Turkey	4
				795	Turkmenistan	4
				796	Turks and Caicos Islands	4
				798	Tuvalu	4
				800	Uganda	4
				784	United Arab Emirates	4
				834	United Republic of Tanzania	4
				850	United States Virgin Islands	4
				858	Uruguay	4
				860	Uzbekistan	4
				548	Vanuatu	4
				862	Venezuela (Bolivarian Republic of)	4
				704	Viet Nam	4
				876	Wallis and Futuna Islands	4
				732	Western Sahara	4
				887	Yemen	4
				894	Zambia	4
				716	Zimbabwe	4
901	More developed regions					2
				8	Albania	4
				20	Andorra	4
				36	Australia	4
				40	Austria	4
				112	Belarus	4
				56	Belgium	4
				60	Bermuda	4
				70	Bosnia and Herzegovina	4
				100	Bulgaria	4
				124	Canada	4
				830	Channel Islands	4
				191	Croatia	4
				203	Czech Republic	4
				208	Denmark	4
				233	Estonia	4
				234	Faeroe Islands	4
				246	Finland	4
				250	France	4
				276	Germany	4
				292	Gibraltar	4
				300	Greece	4
				304	Greenland	4
				336	Holy See	4
				348	Hungary	4
				352	Iceland	4
				372	Ireland	4
				833	Isle of Man	4
				380	Italy	4
				392	Japan	4
				428	Latvia	4
				438	Liechtenstein	4
				440	Lithuania	4
				442	Luxembourg	4
				470	Malta	4
				492	Monaco	4
				499	Montenegro	4
				528	Netherlands	4
				554	New Zealand	4
				578	Norway	4
				616	Poland	4
				620	Portugal	4
				498	Republic of Moldova	4

<i>Area Code*</i>	<i>Area Name</i>	<i>Region Code*</i>	<i>Region Name</i>	<i>Country Code*</i>	<i>Country Name</i>	<i>Location Type**</i>
				642	Romania	4
				643	Russian Federation	4
				666	Saint Pierre and Miquelon	4
				674	San Marino	4
				688	Serbia	4
				703	Slovakia	4
				705	Slovenia	4
				724	Spain	4
				752	Sweden	4
				756	Switzerland	4
				807	TFYR Macedonia	4
				804	Ukraine	4
				826	United Kingdom	4
				840	United States of America	4
1802	World Bank (WB) Income Groups					2
		1500	WB Low-income economies (\$1,035 or less)			3
				4	Afghanistan	4
				50	Bangladesh	4
				204	Benin	4
				854	Burkina Faso	4
				108	Burundi	4
				116	Cambodia	4
				140	Central African Republic	4
				148	Chad	4
				174	Comoros	4
				408	Dem. People's Republic of Korea	4
				180	Democratic Republic of the Congo	4
				232	Eritrea	4
				231	Ethiopia	4
				270	Gambia	4
				324	Guinea	4
				624	Guinea-Bissau	4
				332	Haiti	4
				404	Kenya	4
				417	Kyrgyzstan	4
				430	Liberia	4
				450	Madagascar	4
				454	Malawi	4
				466	Mali	4
				508	Mozambique	4
				104	Myanmar	4
				524	Nepal	4
				562	Niger	4
				646	Rwanda	4
				694	Sierra Leone	4
				706	Somalia	4
				728	South Sudan	4
				762	Tajikistan	4
				768	Togo	4
				800	Uganda	4
				834	United Republic of Tanzania	4
				716	Zimbabwe	4
		1501	WB Lower-middle-income economies (\$1,036 to \$4,085)			3
				51	Armenia	4
				64	Bhutan	4
				68	Bolivia (Plurinational State of)	4
				120	Cameroon	4
				132	Cape Verde	4
				178	Congo	4
				384	Côte d'Ivoire	4
				262	Djibouti	4
				818	Egypt	4
				222	El Salvador	4
				268	Georgia	4
				288	Ghana	4
				320	Guatemala	4
				328	Guyana	4
				340	Honduras	4

<i>Area Code*</i>	<i>Area Name</i>	<i>Region Code*</i>	<i>Region Name</i>	<i>Country Code*</i>	<i>Country Name</i>	<i>Location Type**</i>
				356	India	4
				360	Indonesia	4
				296	Kiribati	4
				418	Lao People's Democratic Republic	4
				426	Lesotho	4
				478	Mauritania	4
				583	Micronesia (Fed. States of)	4
				496	Mongolia	4
				504	Morocco	4
				558	Nicaragua	4
				566	Nigeria	4
				586	Pakistan	4
				598	Papua New Guinea	4
				600	Paraguay	4
				608	Philippines	4
				498	Republic of Moldova	4
				882	Samoa	4
				678	Sao Tome and Principe	4
				686	Senegal	4
				90	Solomon Islands	4
				144	Sri Lanka	4
				275	State of Palestine	4
				729	Sudan	4
				748	Swaziland	4
				760	Syrian Arab Republic	4
				626	Timor-Leste	4
				804	Ukraine	4
				860	Uzbekistan	4
				548	Vanuatu	4
				704	Viet Nam	4
				887	Yemen	4
				894	Zambia	4
		1502	WB Upper-middle-income economies (\$4,086 to \$12,615)			3
				8	Albania	4
				12	Algeria	4
				16	American Samoa	4
				24	Angola	4
				32	Argentina	4
				31	Azerbaijan	4
				112	Belarus	4
				84	Belize	4
				70	Bosnia and Herzegovina	4
				72	Botswana	4
				76	Brazil	4
				100	Bulgaria	4
				156	China	4
				170	Colombia	4
				188	Costa Rica	4
				192	Cuba	4
				212	Dominica	4
				214	Dominican Republic	4
				218	Ecuador	4
				242	Fiji	4
				266	Gabon	4
				308	Grenada	4
				348	Hungary	4
				364	Iran (Islamic Republic of)	4
				368	Iraq	4
				388	Jamaica	4
				400	Jordan	4
				398	Kazakhstan	4
				422	Lebanon	4
				434	Libya	4
				458	Malaysia	4
				462	Maldives	4
				584	Marshall Islands	4
				480	Mauritius	4
				484	Mexico	4

<i>Area Code*</i>	<i>Area Name</i>	<i>Region Code*</i>	<i>Region Name</i>	<i>Country Code*</i>	<i>Country Name</i>	<i>Location Type**</i>
				499	Montenegro	4
				516	Namibia	4
				585	Palau	4
				591	Panama	4
				604	Peru	4
				642	Romania	4
				662	Saint Lucia	4
				670	Saint Vincent and the Grenadines	4
				688	Serbia	4
				690	Seychelles	4
				710	South Africa	4
				740	Suriname	4
				807	TFYR Macedonia	4
				764	Thailand	4
				776	Tonga	4
				788	Tunisia	4
				792	Turkey	4
				795	Turkmenistan	4
				798	Tuvalu	4
				862	Venezuela (Bolivarian Republic of)	4
		1503	WB High-income economies (\$12,616 or more)			3
				20	Andorra	4
				28	Antigua and Barbuda	4
				533	Aruba	4
				36	Australia	4
				40	Austria	4
				44	Bahamas	4
				48	Bahrain	4
				52	Barbados	4
				56	Belgium	4
				60	Bermuda	4
				96	Brunei Darussalam	4
				124	Canada	4
				136	Cayman Islands	4
				830	Channel Islands	4
				152	Chile	4
				344	China, Hong Kong SAR	4
				446	China, Macao SAR	4
				191	Croatia	4
				531	Curaçao	4
				196	Cyprus	4
				203	Czech Republic	4
				208	Denmark	4
				226	Equatorial Guinea	4
				233	Estonia	4
				234	Faeroe Islands	4
				246	Finland	4
				250	France	4
				258	French Polynesia	4
				276	Germany	4
				300	Greece	4
				304	Greenland	4
				316	Guam	4
				352	Iceland	4
				372	Ireland	4
				833	Isle of Man	4
				376	Israel	4
				380	Italy	4
				392	Japan	4
				414	Kuwait	4
				428	Latvia	4
				438	Liechtenstein	4
				440	Lithuania	4
				442	Luxembourg	4
				470	Malta	4
				492	Monaco	4
				528	Netherlands	4
				540	New Caledonia	4

<i>Area Code*</i>	<i>Area Name</i>	<i>Region Code*</i>	<i>Region Name</i>	<i>Country Code*</i>	<i>Country Name</i>	<i>Location Type**</i>
				554	New Zealand	4
				580	Northern Mariana Islands	4
				578	Norway	4
				512	Oman	4
				158	Other non-specified Asian areas	4
				616	Poland	4
				620	Portugal	4
				630	Puerto Rico	4
				634	Qatar	4
				410	Republic of Korea	4
				643	Russian Federation	4
				659	Saint Kitts and Nevis	4
				674	San Marino	4
				682	Saudi Arabia	4
				702	Singapore	4
				534	Sint Maarten (Dutch part)	4
				703	Slovakia	4
				705	Slovenia	4
				724	Spain	4
				752	Sweden	4
				756	Switzerland	4
				780	Trinidad and Tobago	4
				796	Turks and Caicos Islands	4
				784	United Arab Emirates	4
				826	United Kingdom	4
				840	United States of America	4
				850	United States Virgin Islands	4
				858	Uruguay	4

* Numerical Location Code (3-digit codes following ISO 3166-1 numeric standard) - see http://en.wikipedia.org/wiki/ISO_3166-1_numeric. Codes for aggregates including major areas and regions (i.e., 900 and above) are user-defined codes.

** Type 0 means aggregating all countries or areas of the world, type 2 is aggregating over major areas, type 3 is aggregating over regions within major areas. Type 4 refers only to countries or areas and thus, all aggregations are performed over entries of this type. For type 2, countries are matched using the “area code” column; for type 3 the matching is done using the “region code” column.

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