

WHO methods and data sources for life tables 1990-2016

Department of Information, Evidence and Research
WHO, Geneva

March 2018



Global Health Estimates Technical Paper WHO/HIS/IER/GHE/2018.2

Acknowledgments

This Technical Report was written by Colin Mathers and Jessica Ho with inputs and assistance from Dan Hogan, Wahyu Retno Mahanani, Doris Ma Fat and Gretchen Stevens. WHO life tables were primarily prepared by Jessica Ho and Colin Mathers of the Mortality and Health Analysis Unit in the WHO Department of Information, Evidence and Research (in the Health Systems and Innovation Cluster of WHO, Geneva). Data and methods used for this update of life tables were developed with advice and assistance from a WHO Lifetables Working Group, established by the WHO Reference Group on Global Health Statistics. We also drew on advice and inputs from the Interagency Group on Child Mortality Estimation (UN IGME), the UN Population Division, UNICEF and UNAIDS. We would particularly like to note the assistance and inputs provided by Patrick Gerland, Bruno Masquelier, Francois Pelletier, Danzhen You and Lucia Hug.

Estimates and analysis are available at:

http://www.who.int/gho/mortality_burden_disease/en/index.html

<http://www.who.int/gho>

For further information about the estimates and methods, please contact healthstat@who.int

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World Health Organization

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ABBREVIATIONS

ARR	Annual rate of reduction
ART	Anti-retroviral therapy
CD	Coale Demeny
DHS	USAID-supported Demographic and Health Surveys
EPP	UNAIDS Epidemic Projection Package
GHE2015	WHO Global Health Estimates 2015
GHE2016	WHO Global Health Estimates 2016
ICD	International Classification of Diseases
IFHS	Iraq Family Health Survey 2006-2007
IHME	Institute for Health Metrics and Evaluation
IMR	Infant mortality rate
MICS	UNICEF Multiple Indicator Cluster Surveys
m_x	age-specific death rates calculated from information on deaths among persons in the age group commencing at age x during a given time period and the total person-years for the population in the same age group during the same time period. For WHO and WPP2015 abridged life tables, all age groups from 5 onwards are 5-year age groups, m_0 refers to infants aged 0 (first 12 months of life) and m_1 refers to children aged 1 to 4 (ie. between exact ages 1 and 5).
NMR	Neonatal mortality rate
PCHIP	Piecewise cubic Hermite interpolating polynomials
PMTCT	Prevention of Mother to Child Transmission of HIV
PRIO	Peace Research Institute Oslo
${}_nq_x$	probability of dying between exact ages x and $x+n$.
U5MR	Under-5 mortality rate
UCDP	Uppsala Conflict Data Program
UN-IGME	Inter-agency Group for Child Mortality Estimation
UNPD	UN Population Division
VR	Vital registration
WHO	World Health Organization
WHS	2002 to 2003 WHO World Health Survey program
WPP2017	World Population Prospects 2017

1 Introduction

The World Health Organization (WHO) began producing annual life tables for all Member States in 1999. These life tables are a basic input to all WHO estimates of global, regional and country-level patterns and trends in all-cause and cause-specific mortality. After the publication of life tables for years to 2009 in the 2011 edition of World Health Statistics, WHO has shifted to a two year cycle for the updating of life tables for all Member States, and has moved towards alignment of this revision cycle with that of the World Population Prospects produced biennially by the UN Population Division.

Since 1998, WHO has been producing annual abridged life tables for Member States as part of its mandate to monitor and report on global progress in improving health. During the MDG era, WHO has been estimating time series of life tables from 1990 onwards. To support its reporting on progress towards the 2030 Agenda for Sustainable Development, WHO has released updated annual life tables for Member States for the period 1990-2016. These are available in the WHO Global Health Observatory (1) and in World Health Statistics 2018 (2). These updated life tables also provide the all-cause mortality estimates for the WHO Global Health Estimates 2016 (GHE2016) released in 2018 (1).

In recent years, WHO has liaised more closely with the United Nations Population Division (UNPD) on life tables for countries, in order to maximize the consistency of UN and WHO life tables, and to minimize differences in the use and interpretation of available data on mortality levels. For almost all WHO Member States, this update draws on the World Population Prospects 2017 (WPP2017) life tables prepared by the UN Population Division (UNPD) (3), as well as on infant and under-5 mortality rates (U5MR) have been developed and agreed upon by the Inter-agency Group for Child Mortality Estimation (UN-IGME) which is made up of WHO, UNICEF, UNPD, World Bank and academic groups (4), death registration data reported to WHO by Member States (5), and UNAIDS/WHO estimates of HIV mortality for countries with high HIV prevalence (6).

Consultations with Member States were carried out for estimates of neonatal, infant and child mortality in June-July 2017 and for life table mortality rates and life expectancies from December 2017 to January 2018.

2 WPP2017 life tables

WPP2017 was released in mid-2017 (3) and includes abridged life tables for five-year periods 1950-1955,.....,2095-2100, for age groups 0, 1, 5, 10,....., 100+ by sex . Life tables are available for 183 of the 194 WHO Member States and for 3 non-Member territories with substantial populations (Occupied Palestinian Territory, Puerto Rico and China: Province of Taiwan). The WPP2017 excluded the following 11 Member States (all with population <90,000 in 2015): Andorra, Cook Islands, Dominica, Marshall Islands, Monaco, Nauru, Niue, Palau, Saint Kitts and Nevis, San Marino, and Tuvalu. For the current update, life tables have been prepared for the 183 WHO Member States included in WPP2017, as well as for the 3 largest non-Member territories. The latter will not be released, but included only for the calculation of regional and global life tables and all-cause mortality.

For a group of 18 “high HIV countries”, the WPP life tables were developed using Spectrum to model the HIV epidemic using Spectrum inputs and assumptions for HIV provided by UNAIDS in mid 2017. For

these countries, UN Population Division has provided estimates of non-AIDS death rates in the form of model life tables indexed by e_0 time series and specification of the model life table variant used for each country (mostly Coale Demeny North). This allows calculation of implied age-sex-specific HIV death rates for these countries.

3 General approach for preparation of annual life tables

For this update, the objective was to publish WHO annual period life tables for years 1990-2016. For internal use in other analyses, we also aimed to prepare annual life tables for 1985-1989. The starting point for the preparation of WHO annual life tables was to interpolate annual values for the age-specific mortality rates m_x from the WPP2017 5-year period average m_x for each age-sex-country time series.

The WPP2017 uses the convention that a specified year (eg. 2016) refers to 1 July. Use of a hyphen (-) between years, for example, 1995-2000, signifies the full period involved, from 1 July of the first year to 1 July of the second year. WHO references to calendar years (eg 2016) refer to the period 1 January to 31 December and statistics either refer to averages or totals for the calendar year period. In practice, the annual average mortality rate for a calendar year is assumed to be essentially the same as the mortality rate at 1 July. Similarly, we assume that the 1 July population for year T is a proxy for the average population of calendar year T.

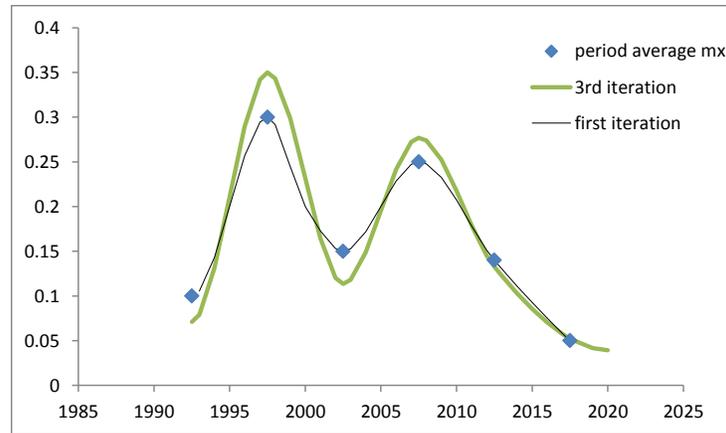
So if P_T is the 1 July population for calendar year T, then the average population for the quinquennial period 2010-2015 is the person-years for the period 1 July 2010 to 1 July 2015 divided by 5:

$$\text{Average population} = (0.5 * P_{2010} + P_{2012} + P_{2010} + P_{2013} + P_{2014} + 0.5 * P_{2015}) / 5$$

For purposes of interpolation, we assume that the quinquennial average death rate falls in the centre of the quinquennial period eg. 1 January 2003 = 2002.5 This is usually an adequate approximation to the extent that trends are reasonably linear across the quinquennial interval.

For interpolation of m_x values for annual periods 1985, 1986,2015 we used piecewise cubic Hermite interpolating polynomials (usually referred to as PCHIP). This has the desirable property that the piecewise cubics join smoothly, so that both the interpolated function and its first derivative are continuous. In addition, the interpolant is shape-preserving in the sense that it cannot overshoot locally; sections in which period m_x is increasing, decreasing or constant with time remain so after interpolation, and local extremes (maxima, minima) also remain so (7). PCHIP interpolation was implemented using a procedure called pchipolate.ado available for Stata from the Statistical Software Components (SSC) Archive, often termed the "Boston College" archive (8).

When m_x is not monotonically changing over time, and the m_x for one period represents a local maximum or minimum, the interpolated annual m_x will result in a period average m_x that is lower than the local maximum input m_x , or higher than the local minimum. This is illustrated in the following plot.



To ensure that the period average mx from the interpolated annual mx matches the inputs, the inputs were adjusted by the ratio of the original input to the new period average and the imputation repeated. Tests showed that three iterations were adequate to achieve reasonable convergence with average relative deviations in period mx below 0.001.

We defined four groups of Member States 3 non-Member territories for which data inputs and interpolation methods differed. The four groups are:

- High HIV countries 18 countries for which WPP2017 used Spectrum to explicitly model HIV mortality. The UN Population Division has provided unpublished estimates of non-HIV mortality for these countries.
- “Other” HIV countries An additional 25 countries with significant HIV epidemics for which WHO has in the past explicitly modelled HIV and non-HIV mortality trends in order to prepare life tables. These countries were not modelled using Spectrum for WPP2017.
- VR countries 82 countries and territories for which the WHO Mortality Database held mortality data from vital registration (VR) systems for 75% or more of years since 1990.
- WPP countries 61 countries and territories where interpolated mortality rates from WPP quinquennial life tables were used directly to construct annual life tables

A full list of countries in each category is provided in Annex Table A.

3.1 Interpolation of mx for countries in the WPP and VR categories

Conflict and natural disasters (mortality shocks) may cause substantial increases in death rates for specific country-years. These may or may not be reflected in available death registration or survey/census data. WHO makes estimates of these deaths by country-year as part of its overall cause of

death analyses and hence the all-cause mortality and life tables need to be consistent. Methods used for updating mortality shock estimates are summarized in Annex B.

The WPP 2017 includes the impact of large mortality shocks in some cases (eg. Rwanda 1994 genocide) but not for others (eg. Haiti 2010 earthquake). This may be obvious from 45q15 plots for large isolated mortality shocks, but much less clear for extended conflicts such as those in Afghanistan or Iraq. The assumed impact of mortality shocks included in WPP estimates may or may not be consistent with the WHO estimates of size of mortality shocks.

Annual estimates of conflict and natural disaster deaths by country, age, sex and year for the period 1985-2016 were prepared as described in Section 5 below. For countries in the VR and WPP groups, 45q15 plots were reviewed to identify country-periods for which WPP2017 had included an impact of mortality shocks. Where WPP2017 did not include the impact of isolated mortality shocks, these were added to the mx estimates after interpolation for mortality shocks where the death rate exceeded 5 per 100,000 population. Adjustments were also made for specific country-periods where WPP2017 had included some impact for a mortality shock, to replace this by the WHO estimated mortality for the shocks.

For six countries with extended conflicts, covering many of the 5-year periods in the range 1985-2016, it was assumed that the adult mortality data used to prepare WPP2017 life tables had included conflict mortality. These six countries were Afghanistan, Iraq, Sri Lanka, Somalia, Sudan and Yemen. For these countries, the WHO estimates of shock mortality for the 5-year periods were subtracted from the WPP2017 mortality rates and the 45q15 time series computed. The non-shock 45q15 were smoothed using Loess regression with bandwidth 0.8 and the smoothed 45q15 were used together with the UN model life table system (9, 10) to compute non-shock mortality rates by age and sex.

WPP2015 estimates of adult mortality for Lebanon were largely based on trends in U5MR and CD West model life tables (11). Data on adult mortality from reported household deaths in some recent censuses and surveys in the regions suggested that adult mortality is often higher than implied by CD west for a given U5MR, and adult mortality rates for Lebanon were adjusted upwards based on the region-specific relationship between 45q15, u5mr and income per capita. These rates were projected forward one year for the 2016 life tables. Additionally, Lebanon, Turkey and Jordan are three countries with very substantial de facto resident populations of Syrian refugees from 2013 onwards. For years 2013-2016, mortality rates for these three countries were adjusted using a population weighted average of estimates of the country mx and Syrian mx, using UNHCR estimates of refugee populations (12).

3.2 Interpolation of mx for high HIV and “Other HIV” countries

For countries with substantial proportion of younger adult deaths (15-60 years) due to HIV, the all-cause mortality envelopes, trends and age patterns must be consistent with the HIV mortality estimates, otherwise the “non-HIV envelopes” will have strange and implausible age and/or time trends. This will then affect most other cause of death estimates.

For development of previous WHO life tables, 43 countries were classified as “high HIV” and explicit efforts made to ensure consistency of all-cause and HIV mortality estimates. For the WPP 2017, UN

Population Division used Spectrum (13) with input assumptions consistent with those of UNAIDS in mid-2014 to model all-cause mortality for 18 countries.

For these 18 high HIV countries, provisional non-HIV mx were calculated from the model life table assumptions and e0 series provided by UN Population Division (see Table 1). We added UNAIDS 2017 estimates of HIV death rates to the non-HIV mx to recomputed total mortality mx. This led to consequential changes in trends and/or levels of all-cause 45q15 for a number of countries. To reduce these differences and to smooth trends for non-HIV mortality, some adjustments were made to the model life tables for non-HIV mortality for some countries. In the case of South Africa, all-cause death registration data adjusted for completeness was also used to assess levels of all-cause mortality, resulting in HIV mortality estimates somewhat lower than UNAIDS and WPP2015 estimates.

Table 1. UN Model life table systems (UNMLT) used for non-HIV mortality estimates in HIV countries

High HIV countries	UNMLT	Other HIV countries	UNMLT
Botswana	CD West	Mozambique	CD North
Cameroon	CD North	Namibia	CD West
Central African Republic	CD North	Rwanda	CD North
Congo	CD North	South Africa	UN Far_East_Asian
Equatorial Guinea	CD North	Swaziland	CD West
Gabon	CD North	United Republic of Tanzania	CD North
Kenya	CD North	Uganda	CD North
Lesotho	CD West	Zambia	CD North
Malawi	CD South	Zimbabwe	CD North

For 25 “other HIV countries” with significant HIV mortality, we subtracted the revised Spectrum modelled HIV mortality rates from the WPP2017 all-cause mortality rates and examined the consistency and plausibility of the resulting non-HIV mortality time trends, age trends and sex ratios. Provisional WHO mx were calculated by smoothing the implied non-HIV mortality trends and adding back the UNAIDS HIV mortality estimates.

Mortality shocks exceeding 5 deaths per 100,000 population were also added to the interpolated mortality trends.

4 Adjustments using death registration data

The WPP2017 life tables draw extensively on available death registration data to assess age-specific mortality rates mx. WHO holds time series of death registration data for around 100 countries (5). These potentially provide alternate data for preparing annual life tables, or additional data that would assist in imputation from period life tables. For 82 countries with at least 75% of the years in range 1990-2016 available, we evaluated the completeness of the all-cause deaths data and used completeness-adjusted death rates to inform the imputation of annual death rates for life tables.

4.1 Updated assessments of VR completeness

For the 82 countries with VR time series, adult completeness was assessed by comparing total registered deaths for persons aged 15 years and over in each five year period with 5-year period deaths for ages 15+ calculated from the WPP2017 life table mx together with WPP2017 population estimates for the 5-year periods.

For 39 countries, completeness estimates were very close to 100% and varied above and below 100% by typically 1 or 2 per cent at most. For these countries, child and adult completeness was assumed to be 100%. These small variations in completeness may reflect issues with the numerator for registered deaths, which can vary in some country-years in term of (a) "year of occurrence vs year of registration", (b) "provisional vs. final", (c), de-jure vs. de-facto or (d) inclusion of nationals only (as in Japan and several EU countries). It may also reflect mismatches with denominators resulting from issues around the estimation of the "de-facto" population and the inclusion of migrants and refugees in the countries (irrespective of their legal status).

For the other 43 countries, completeness varied more substantially below 100% and in a few cases at times exceeded 100%. For country-periods where estimated completeness exceeded 1.05, it was capped at 1.05. For these countries, period completeness was estimated separately by sex for age groups 15-74 years and 75 years and over. Annual completeness estimates were smoothly interpolated from the 5-year period completeness estimates using Lowess regression with a bandwidth set at 0.8. In a number of cases where completeness rates for the last 5-year period rose above 100%, completeness was capped at 100%. Rising and falling projections for latest partial 5-year period were adjusted to avoid out-of-sample trends. Identification of out of sample trends was also informed by examination of IHME estimates of completeness trends (14). Annex B compares the resulting final completeness time series for countries with IHME estimates. Completeness for child deaths under age 5 was assessed by comparison with UN-IGME estimates of child mortality (4). Annex Table C lists estimated completeness for the most recent year of death registration data for each Member State meeting inclusion criteria.

There are five countries where registered deaths reported to WHO do not include a province or territory not under government control. These are:

Cyprus:	all data refer to government controlled areas
Georgia:	excluding Abkhazia and South Osetia
Moldova:	excluding Transnistria and Bender
Russia:	1993-2003 data exclude Chechnya
Serbia:	excluding Kosovo-Metohija province

Singapore does not report deaths for non-citizen residents, who represent approximately 30% of the de-facto population. For Mauritius, the deaths reported to WHO include all of Mauritius except for the island of Rodrigues. Completeness for Mauritius was thus revised to 0.974.

Deaths in Chechnya are missing from the data reported by Russia to WHO for years 1993-2003 (corresponding to approximately 1% incompleteness). Assessed completeness was slightly less than 0.99 for most of this period, and was revised to 1.0 for males in 1990-1995 period, when it slightly exceeded 1.0.

4.2 Revision of imputed annual death rates

For 21 countries with high quality and complete death registration data, UNPD makes use of life tables prepared for the Human Mortality Database (15, 16), which corrects for age misstatement and under-reporting at older age groups. For this reason, we did not simply apply the completeness estimated for ages 15+ to all VR deaths for those ages, but adjusted for each sex separately for age groups 0-4, 5-74 and 75+. Completeness estimated for the age range 15-74 was assumed to apply also to the 5-14 year age group.

For 7 countries with less than 1 million population in 2000-2015, VR death rates were smoothed using a 3-year moving average. Annual mx for ages 5+ were calculated for each VR country-year as:

$$mx = \text{VR deaths} / (\text{WPP population estimate}) / (\text{annual age-sex-specific completeness estimate})$$

For all countries, including the 39 where completeness was set at 100% for all age groups, total deaths for ages 75 years and over were calculated from the completeness-adjusted death registration data, and distributed to 5 year age groups 75-79,....., 95-100, 100+ according to the distributions in the imputed annual life tables from WPP2017. This was to ensure that WPP adjustments for under-reporting of deaths in oldest age groups, and for age misstatement, were taken into account.

4.3 Infant and Under-five mortality

Mortality rates for infants and age group 1-4 years for the WHO life tables were derived from the UN-IGME estimates of infant mortality rates (IMR) and under 5 mortality rates (U5MR) by sex, for Member States for years 1990-2016 (4). UN-IGME annually assesses and adjusts all available surveys, censuses and vital registration data, to estimate country-specific trends in neonatal (NMR), infant (IMR) and under 5 (U5MR) mortality rates per 1,000 live births. All data sources and estimates are documented on the website www.childmortality.org. For countries with complete recording of child deaths in death registration systems, these are used as the source of data for the estimation of trends in neonatal, infant and child mortality. For countries with incomplete death registration, all other available census and survey data sources, which meet quality criteria, are used.

5 Data sources and methods for mortality shocks

5.1 Natural disasters

Estimated deaths for major natural disasters were obtained from the EM-DAT/CRED International Disaster Database (17). EM-DAT includes epidemics and some man-made disasters that are classified as transport injuries etc, these are excluded from mortality estimates for natural disasters. Age-sex distributions were based on a number of studies of earthquake deaths (18, 19) and tsunami deaths (20, 21).

5.2 Conflict deaths

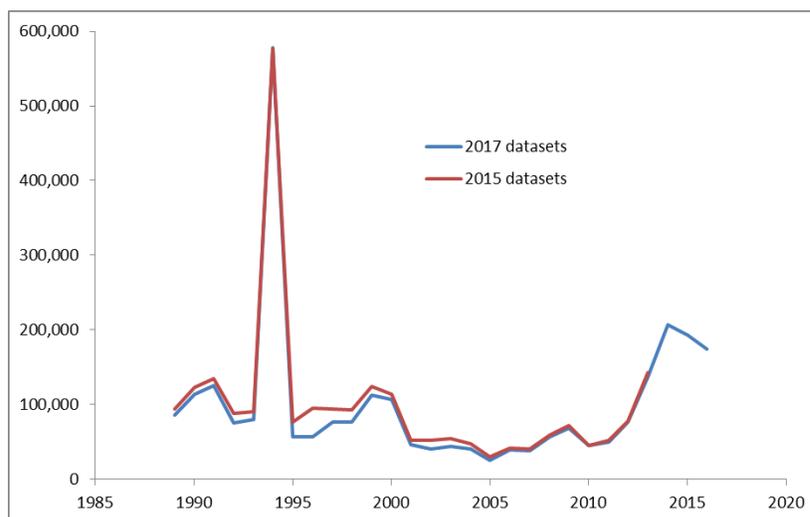
Country-specific estimates of war and conflict deaths have been updated for the entire period 1990-2016 using revised methods together with information on conflict intensity, time trends, and mortality obtained from a number of war mortality databases (described below). These estimates relate to deaths for which the underlying cause (following ICD conventions) was an injury due to war, civil insurrection or organized conflict, whether or not that injury occurred during the time of war or after cessation of hostilities. The estimates include injury deaths resulting from all organized conflicts, including organized terrorist groups, whether or not a national government was involved. They do not include deaths from other causes (such as starvation, infectious disease epidemics, lack of medical intervention for chronic diseases), which may be counterfactually attributable to war or civil conflict.

Updated country-specific estimates of war and conflict deaths for the period 1990-2016 make use of estimates of direct deaths from three datasets: *Battle-Related Deaths Dataset (version 17.1)*, *Non-State Conflict Dataset (version 17.1)*, and *One-sided Violence Dataset (version 17.1)* from 1989 to 2016 (22). Using these three datasets, instead of focusing solely on battle-related deaths, reduces the likelihood that overall direct conflict deaths are underestimated. However, it is likely that a degree of undercounting still occurs in the count-based datasets, and a revised adjustment factor of 1.91 has been applied to the annual battle death main estimates for state-state conflicts (11). No adjustments were applied to estimated conflict deaths (main estimates) for non-state conflict deaths, and one-sided violence.

Note that the application of a single adjustment factor for all state-state conflicts may result in deaths for specific conflicts being over- or under-estimated. For the following countries, the multiplier was adjusted downwards for low intensity years: Mexico (drug gangs), DR Congo, Columbia, Eritrea/Ethiopia (1990-2000). For these conflict, estimated deaths from other sources suggest that UCDP figures provide reasonable estimates without additional adjustment.

The GHE2015 life tables (11) drew on UCDP datasets available in mid-2015 for years 2000-2014 (battle deaths), 2000-2013 (1-sided and non-state deaths). Figure 2 compares global deaths from the UCDP datasets used for the GHE2015 revision with those used for the GHE2016 revision.

Figure 2 Comparison of UCDP total global conflict deaths (with battle deaths multipliers applied), for 2015 datasets (1989-2013) and 2017 datasets (1989-2016)



For several conflicts where more specific sources of information are available, these have been used to revise estimated deaths:

Afghanistan Deaths for international forces involved in conflict in Afghanistan (23) were attributed to the country of origin of the international forces and subtracted from total UCDP-estimated conflict deaths in Afghanistan.

Iraq The conflict death toll in Iraq following the US-led invasion in March 2003 has been the subject of much discussion with estimates for violent deaths to end June 2006 ranging from 47,668 (24) to 601,027 in a 2006 household survey (25). The Iraq Family Health Survey (IFHS), conducted in 2006-2007 by relevant Iraq Government Ministries in collaboration with WHO, provided new evidence on mortality in Iraq for the three years post-invasion (26). Latest counts of reported deaths in Iraq by the Iraq Body Count (24) were compared with conflict deaths for the period 2003-2006 estimated from the Iraq Family Health Survey 2006 (26). Calendar year adjustment factors for under-reporting in the Iraq Body Count data ranged from 3.3 (2003) and 3.4 (2004) to 2.3 (2006) and 2.2 (2007). An average adjustment factor of 2.2 was applied to Iraq Body Count data for more recent years to derive a time series of estimated total conflict deaths in Iraq from 2003 to 2016.

Occupied Palestinian Territories. Estimates of Israeli and Palestinian deaths were derived from statistics published by the Office for the Coordination of Humanitarian Affairs (OCHA) - Occupied Palestinian Territory (OPT) (27) and the Israeli Center for Human Rights in the Occupied Territories (28).

- Philippines Large numbers of police and extra-judicial killings have taken place in the Philippines since 1 July 2016 in the so-called “Philippines Drug War”, with Human Rights Watch estimating that more than 7,000 deaths have occurred to end February 2017 (29). According to government in December 2016 said that there had been 3,116 police killings and 2,091 extrajudicial killings, implying a total 5,207 deaths from 1 July 2016 to to 6 June 2017 (30). Based on an average of the government estimates and those of Human Rights Watch, we estimated a total 3,509 deaths in 2016 (uncertainty range 2350 to 5333).
- Syria For Syria, previous GHE2015 estimates of conflict mortality from 2011 onwards were based on UN estimates of overall conflict deaths by month and age distribution of deaths (31, 32), as well as estimates by various human rights organizations (33, 34). For this update, data from the Syrian Observatory for Human Rights (35) were used. They estimated annual documented deaths for pro- and anti-government forces, and for civilians by year from 2011 to present, totalling 319,245 deaths to end March 2017. They also estimated another 125,360 undocumented deaths for this period. We estimated annual total deaths assuming the undocumented deaths were distributed across years pro-rata according to documented deaths. There are an estimated 476, 696 total deaths for the 2011-2017 period, assuming that the numbers of deaths in 2017 are four times the total for January to March 2017. This total lies between the UCDP unadjusted total of 277,550 (2017 deaths imputed using the trend from SOHR) and the battle-field adjusted total of 508,318.
- Yemen A November 2016 report by the UN Office for the Coordination of Humanitarian Affairs (UHOCHA) estimated that more than 19 months of conflict have killed or injured nearly 44,000 people, including nearly 7,100 deaths, and forced more than 3 million people from their homes (36). These figures almost certainly understate the true extent of civilian casualties due to limited reporting mechanisms. A more recent UNOCHA statement to the UN Security Council estimated that 7,469 Yemenis had been killed by 31 December 2016 and 40,483 injured (37). This was based on reporting by health facilities that were still functioning, estimated at 45% of all health facilities (these have been targeted by parties to the conflict). Inflating upward by a factor of 1/0.45 gives a total of 16,598 deaths for 2015-2016. This is arguably conservative, since facilities are more likely to be functioning outside high conflict zones. The battlefield-adjusted total from UCDP is very similar at 17,616 deaths for 2015-2016 and the UCDP-adjusted annual estimates have been used.

Deaths due to landmines and unexploded ordinance were estimated separately by country (38). Deaths from terrorist events were separately estimated for many countries without ongoing general conflict using data from the Global Terrorism Database (39) for years 1992-2015 supplemented by summarized data based on fatality reports for 2016 and January to May 2017 (40, 41). This database and particularly the supplementary data for 2016 and 2017 include many deaths which would also be included in the UCDP estimates. To avoid double counting, terrorism deaths from these sources were not added to conflict deaths for the following countries: Afghanistan, Iraq (2003+), Israel, Nigeria, Pakistan, Occupied

Palestinian Territory. For other country-years, any excess terrorism deaths above 50% of the UCDP-adjusted total deaths were added to the UCDP-adjusted total deaths.

Legal execution deaths are included in this cause category for GHE2015. Estimated execution deaths were added for the main countries using capital punishment regularly (China, Iran, Iraq, DPR Korea, Saudi Arabia, USA and Yemen), from Amnesty International reports (42) and UN Human Rights Reports (43). Where Amnesty International estimated deaths as more than n , denoted $n+$ in tables, an estimate of $1.5*n$ was generally used. China does not release data on the use of capital punishment but available information shows that China continues to carry out substantial numbers of executions, though it has taken steps to reduce the numbers. Unofficial reports estimate that executions are now at $1/10^{\text{th}}$ the peak level of 24,000 per year (44).

Age-sex distributions for conflict deaths were revised based on available distributions of conflict deaths by age and sex for specific conflicts and on age-patterns for certain country-periods with high conflict deaths included in the WPP2015 life tables (11).

Table 2 summarizes and compares various time series of conflict deaths estimates. The revised WHO estimates for total conflict deaths (in the final column) are considerably lower than the previous WHO estimates for years 2000-2008 which used the earlier higher adjustment factor for under-reporting, which in turn are lower than the previous estimates and projections in the original Global Burden of Disease (GBD) study (45). Estimates for conflict deaths published by IHME in the first two rounds of their GBD estimates were considerably lower than the PRIO and UCDP estimates, let alone those of WHO. The IHME methods were based on a regression analysis of available all-cause mortality data for country-years in which battle deaths were reported in various databases. Lozano et al (46) cite a non-existent book supposedly published in 2012 by the University of Washington Press (47) for more detailed documentation of their methods. The most recent estimates for year 2016 (14) are higher than UCDP and somewhat lower than WHO, suggesting they have moved to use UCDP as their primary source.

Table 2. Estimated total global injury deaths (thousands) due to conflict: comparison of various time series and WHO estimates.

Year	GBD 1990 (45)	WHO 2002 (48)	IHME GBD 2010 (46)	PRIO 2017 (22)	IHME GBD 2016 (14)	WHO GHE 2016
1990	502	-	63	95	108	131
2000	656	187	53	90	104	131
2010	834		18	30	49	66
2015				118	148	211
2016				104	155	184

The revised WHO estimates for total conflict deaths (in the final column) are considerably lower than the previous WHO estimates for years 2000-2008 which used the earlier higher adjustment factor for under-reporting, which in turn are lower than the previous estimates and projections in the original Global Burden of Disease (GBD) study (45). The recently estimates for conflict deaths published by IHME in the GBD 2016 study, shown to the right, are similar to the revised GHE2016 estimates.

6 WHO estimates of life expectancy and healthy life expectancy

6.1 Life expectancy

Final estimates of age-sex-specific mortality rates for years 1990-2016 were used to compute abridged life tables for 183 WHO Member States with population of 90,000 or greater in 2015. Life expectancies at birth are reported in World Health Statistics 2018 and full life tables are available in the WHO Global Health Observatory (www.who.int/gho). Annex D presents country plots showing the resulting WHO annual estimates of 45q15 by sex for all-cause mortality and for non-HIV mortality excluding disasters and conflict deaths. Five year period estimates of 45q15 from the WPP2017 life tables are shown for comparison.

WHO applies standard methods to the analysis of Member State data to ensure comparability of estimates across countries. This will inevitably result in differences for some Member States with official estimates for quantities such as life expectancy, where a variety of different projection methods and other methods are used. These WHO estimates of mortality and life expectancies should not be regarded as the nationally endorsed statistics of Member States, which may have been derived using alternative methodologies and assumptions.

There remain substantial data gaps and deficiencies in data on levels of child and adult mortality, particularly in those regions with the highest mortality levels. Quantifiable uncertainty ranges for adult mortality are more complex to derive, and there is considerable research underway to develop improved methods for measuring adult mortality in surveys, and in assessing the systematic biases in such data. Table 6 summarizes the availability of data on levels of all-cause mortality for WHO Member States and the methods used to assess mortality and life expectancy.

A qualitative guide to the uncertainty in adult mortality and life expectancy estimates is provided by the listing of methods and data input types in Annex Table A.. The most reliable estimates are those based on death registration data assessed as complete, followed by those based on incomplete or sample death registration data with adjustments for levels of completeness. For countries without useable death registration data, uncertainties are substantially higher, and two categories can be distinguished (a) those countries where there is independent evidence on adult mortality rates from surveys or censuses and (b) those where estimates of adult mortality levels are derived from model life tables with estimated infant and child mortality rates as inputs. Those countries with significant levels of mortality due to conflict and natural disasters (say, greater than 1 death per 10,000 population per annum) will usually have additional uncertainty associated with the difficulties in estimating conflict and disaster death rates.

Estimates of the 95% uncertainty ranges for all-cause mortality are available in the GHE2016 datasets for causes of death downloadable at www.who.int/evidence/bod.

6.2 Healthy life expectancy

Previous WHO estimates for healthy life expectancy (HLE or HALE) for Member States have also been updated. The same methods have been used to prepare estimates of healthy life expectancy for WHO Member States for the year 2015 (11), using the updated WHO life tables and WHO YLD estimates based largely on YLD estimates from the Global Burden of Disease 2016 study(49), with similar adjustments to disability weights and prevalences for certain causes as previously (50).

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Annex Table A: Data sources and methods for WHO Life Tables

Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016 method	WHO VR years available*
Afghanistan	Life expectancy at birth: Estimated using the West model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) adjusted estimates of adult mortality (45q15). Adjusted estimates of adult mortality were derived from: (a) recent household deaths data from the 1979 census; (b) implied relationship between child mortality and adult mortality based on the UN South Asian and West model of the Coale-Demeny Model Life Tables; and (c) levels of adult mortality based on sample registration data from neighbouring countries for recent years. Estimates of adult mortality derived from (i) recent household deaths data from the 2010 Afghanistan Mortality Survey (AMS), (ii) parental orphanhood from the 2010 AMS (excluding the Southern region), and (iii) siblings deaths from the 2010 AMS (excluding the Southern region) adjusted for age misreporting and recall biases were also considered.	WPP	-
Albania	Life expectancy at birth: Based on life tables for 1987-2015 derived from registered deaths by age and sex and observed trends in infant and child mortality.	VR	1980, 1984-2013, 2015
Algeria	Life expectancy at birth: Based on official estimates of life expectancy derived from the number of deaths registered through 2015. Estimates were adjusted for under-reporting of deaths and deaths of non-nationals. From 1950 to 2000, the age patterns of mortality are derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the mortality patterns resulting from the blending from the South model of the Coale-Demeny Model Life Tables to the West model of the Coale-Demeny Model Life Tables from 1950 to 2000.	WPP	
Angola	Life expectancy at birth: Based on official estimates of life expectancy at birth derived with data from the 2014 census. Prior estimates have been derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables.	Other HIV	-
Antigua and Barbuda	Life expectancy at birth: Based on official estimates of life expectancy from 2000 to 2010.	VR	1961-1964, 1966, 1969-1978, 1983-2009, 2012-2014
Argentina	Life expectancy at birth: Based on registered deaths from 1950 through 2013, and the underlying population from censuses, and revised projections by the National Statistics Office (INDEC). The number of deaths was adjusted using the growth-balance method.	VR	1966-1970, 1977-2014
Armenia	Life expectancy at birth: Based on: (a) a life table derived from reported deaths by age and sex in 2011 and the 2011 census population, adjusted for underreporting of infant and child deaths, and (b) official estimates of life expectancy available from 2006 through 2015.	VR	1981-2015
Australia	Life expectancy at birth: Based on official estimates of life expectancy available through 2012-2014 and reported deaths through 2015. The age pattern of mortality is based on life tables through 2011 from the Human Mortality Database.	VR	1950-2015
Austria	Life expectancy at birth: Based on official estimates of life expectancy available through 2015. The age pattern of mortality is based on life tables through 2014 from the Human Mortality Database.	VR	1955-2016
Azerbaijan	Life expectancy at birth: Based on deaths registered through 2015 classified by age and sex and the underlying population by age and sex. Death rates were adjusted for underregistration.	VR	1981-2011
Bahamas	Life expectancy at birth: Derived from child and adult mortality estimates through 2013 by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables.	Other HIV	1969, 1971-1972, 1974-1977, 1979-2013
Bahrain	Life expectancy at birth: Based on life tables derived from official estimates of registered deaths and enumerated census population by age and sex from 1980 to 2014, adjusted for infant and child mortality. Mortality rates for older ages were adjusted. For the period 1950-1980, life tables were derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the South model of the Coale-Demeny Model Life Tables in 1950-1955, and converges over time toward the estimated 1980-1985 life table.	VR	1980- 1984, 1986-2014

Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016 method	WHO VR years available
Bangladesh	Life expectancy at birth: Based on life tables derived from age and sex-specific mortality rates from: (a) the Sample Vital Registration System from 1981 up to 2015 adjusted for infant and child mortality, (b) the 1974 Retrospective Survey of Fertility and Mortality, and (c) the 1962/65 Population Growth Estimation Experiment. Estimates are consistent with those from the 2001 and 2010 Bangladesh Maternal Mortality Surveys (based on sibling histories and household deaths in the preceding 36 months), and data gathered from Matlab Health and Demographic Surveillance System up to 2012. For the period 1970-1975, mortality was adjusted to take into account the excess mortality associated with the 1971 civil war and independence from Pakistan, and the 1974 flood and famine.	WPP	
Barbados	Life expectancy at birth: Derived from estimates of child mortality and adult mortality from vital registration data through 2007 by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables.	WPP	
Belarus	Life expectancy at birth: Based on official life tables available through 2015.	VR	1981-2015
Belgium	Life expectancy at birth: Based on official estimates of life expectancy available through 2015.	VR	1954-2014
Belize	Life expectancy at birth: Estimated using the West model of the Coale-Demeny Model Life Tables and two parameters: (a) estimates of child mortality; and (b) adjusted estimates of adult mortality from registered deaths and underlying population through 2009. From 1950 to 1995, estimated using adjusted registered deaths by age and sex and underlying population by age and sex.	Other HIV	1964-2014
Benin	Life expectancy at birth: Estimated using the North model of the Coale-Demeny Model Life Tables and implied relationships between life expectancy at birth and estimates of infant and child mortality, and between life expectancy at birth and estimates of adult mortality (45q15).	Other HIV	-
Bhutan	Life expectancy at birth: Based on a life table derived from adjusted deaths in the past 12 months by age and sex, and the population by age and sex from the 2005 census, adjusted for infant and child mortality. For 1950-2000, life tables were derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables in 1950-1955 and converges over time toward the estimated 2000-2005 life table. Life tables based on adjusted annual deaths from the 1994 National Health Survey were also considered.	WPP	-
Bolivia (Plurinational State of)	Life expectancy at birth: Based on life tables derived from: (a) deaths by age and sex, adjusted using the growth-balance method, and underlying population from the 1992, 2001 and 2012 censuses; (b) data on maternal orphanhood from the 1988 National Population and Housing Survey (ENPV); (c) official estimates of life expectancy for 2010 and 2011; and (d) estimates of infant and child mortality from the 2000 MICS and the 1989, 1994, 1998, 2003 and 2008 DHS.	WPP	2000-2003
Bosnia and Herzegovina	Life expectancy at birth: Based on official estimates of life expectancy for 1988/89 and WHO estimates for years 2000 to 2012. The estimates of war-related deaths in the period 1992-1995 were also considered.	VR	1985-1991, 1998-2011, 2014
Botswana	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables. The demographic impact of AIDS has been factored into the mortality estimates.	High HIV	
Brazil	Life expectancy at birth: Based on life tables derived from: (a) registered deaths by age and sex from 1979 through 2015, and the underlying census population by age and sex, and (b) estimates of infant and child mortality. The number of deaths was adjusted using the growth-balance method.	VR	1979-2015
Brunei Darussalam	Life expectancy at birth: Derived from child and adult mortality estimates through 2011, and from reported deaths by age and sex through 2014, by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables. Life tables are estimated using the Flexible two-dimensional model life table and Lee-Carter method.	VR	1982-2015

Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016 method	WHO VR years available
Bulgaria	Life expectancy at birth: Based on official estimates of life expectancy available through 2015. The age pattern of mortality is based on life tables through 2015 from the Human Mortality Database.	VR	1964-2014
Burkina Faso	Life expectancy at birth: Estimated using the South model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) adjusted estimates of adult mortality (45q15). Data from West African rural demographic surveillance sites and urban vital registration were also considered. Adjusted estimates of adult mortality were derived from: (a) recent household deaths data (unadjusted and adjusted for underregistration using the growth-balance and synthetic-extinct generation methods) from the 1960/61 survey, 1976, 1985, 1996 and 2006 censuses, the 1991 National Demographic Survey, and 2008 Global Fund survey; (b) parental orphanhood from the 1993, 2003 and 2010/11 DHS, 2006 MICS3 and 2006 census; (c) siblings deaths from the 1998/99, 2003 and 2010/11 DHS; (d) intercensal survivorship from successive census age distributions (smoothed and unsmoothed) for periods 1976-1985, 1985-1996 and 1996-2006; (e) implied relationship between child mortality and adult mortality based on the North model of the Coale-Demeny Model Life Tables in 1950-1955, and assumed to converge over time toward the South model of the Coale-Demeny Model Life Tables by the 1990s.	Other HIV	-
Burundi	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny model life tables, and taking into account the number of deaths due to civil strife.	Other HIV	-
Cabo Verde	Life expectancy at birth: Derived from estimates of child mortality, by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables. Official estimates of life expectancy at birth by sex for 1990 and 2000 were also considered.	WPP	-
Cambodia	Life expectancy at birth: Based on life tables derived from age and sex-specific mortality rates from: (a) recent household deaths data from the 2004 Inter-Censal Population Survey and 2008 census; (b) siblings deaths from the 2000, 2005 and 2010 DHS. Also, 1950-1955 life tables derived from estimates of child mortality were used, by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables, as well as recent household deaths data from the 1959 rural survey, and the 1962-1998 population reconstructions.	WPP	-
Cameroon	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables. The demographic impact of AIDS has been factored into the mortality estimates.	High HIV	
Canada	Life expectancy at birth: Based on official estimates of life expectancy available through 2012. Total numbers of reported deaths till 2014 were also considered. The age pattern of mortality is based on life tables through 2011 from the Human Mortality Database.	VR	1950-2012
Central African Republic	Life expectancy at birth: Estimated using the North model of the Coale-Demeny Model Life Tables and implied relationships between life expectancy at birth and estimates of infant, child, and adult (45q15) mortality. The adjusted estimates of adult mortality were derived from (a) intercensal survivorship from successive census age distributions (smoothed and unsmoothed) for the period of 1988-2000; (b) household deaths data (unadjusted and adjusted for underregistration using the growth-balance and synthetic-extinct generation methods) from the 1988 census; (c) parental orphanhood data from the 1994/95 DHS and the 1988 census; and (d) siblings deaths from the 1994/95 DHS. The demographic impact of AIDS has been factored into the mortality estimates.	High HIV	
Chad	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables.	Other HIV	-
Chile	Life expectancy at birth: Based on life tables derived from registered deaths, and population by age and sex from 1950 to 2013 adjusted for infant and child mortality. The number of deaths was adjusted using the growth-balance method,	VR	1954-2014

Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016 method	WHO VR years available
China	Life expectancy at birth: Based on life tables from: (a) the 1981, 1990, 2000 and 2010 censuses (adjusted for underestimation of child mortality and overestimation of old-age mortality); (b) surveys on causes of death in 1973/75 and 2004/05; (c) Disease Surveillance Points (DSP) system from 1991 to 2015; and (d) 1987, 1995, 2005, and 2015 population survey (1 per cent), and the annual survey on population change (1 per thousand).	WPP	-
Colombia	Life expectancy at birth: Based on life tables derived from registered deaths, and population by age and sex from 1950 to 2013, adjusted for infant and child mortality. The number of deaths was adjusted using the growth-balance method.	VR	1953-1970, 1972, 1974-1977, 1982-2013
Comoros	Life expectancy at birth: Derived from estimates of infant and child mortality, and the West model of the Coale-Demeny Model Life Tables.	WPP	-
Congo	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables. The demographic impact of AIDS has been factored into the mortality estimates.	High HIV	-
Costa Rica	Life expectancy at birth: Based on life tables derived from registered deaths, adjusted using the growth-balance method, and population by age and sex from 1950 to 2013 adjusted for infant and child mortality.	VR	1956-2014
Côte d'Ivoire	Life expectancy at birth: Estimated using the North model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) adjusted estimates of adult mortality (45q15). Adult mortality estimates are derived from (a) recent household deaths data from the 1978/79 follow-up survey, the 1998 census and the 2005 AIDS Indicator Survey (AIS), (b) parental orphanhood from the 1978/79 follow-up survey, the 1988 and 1998 censuses, the 1994 DHS, the 2000 MICS2 and the 2006 MICS3 surveys, (c) siblings deaths from the 1994 DHS and the 2005 AIS; (d) implied relationship between child mortality and adult mortality based on the South model of the Coale-Demeny Model Life Tables in 1950-1955 and assumed to converge over time toward the North model of the Coale-Demeny Model Life Tables by the 1970s.	Other HIV	-
Croatia	Life expectancy at birth: Based on deaths registered through 2013 by age and sex and the underlying population by age and sex.	VR	1982-2015
Cuba	Life expectancy at birth: Based on: (a) deaths registered through 2014 classified by age and sex and the underlying population by age and sex, and (b) estimates of infant and child mortality. The number of deaths was adjusted using the growth-balance method.	VR	1959, 1964-1965, 1968-2015
Cyprus	Life expectancy at birth: Based on: (a) official life tables; (b) deaths registered through 2015 classified by age and sex and on the underlying population by age and sex; and (c) estimates from other areas were also considered.	VR	1980-2014
Czech Republic	Life expectancy at birth: Based on official estimates of life expectancy available through 2015. The age pattern of mortality is based on life tables through 2014 from the Human Mortality Database.	VR	1982-2015
Democratic People's Republic of Korea	Life expectancy at birth: Based on the number of deaths in household during the 12-month period preceding the 1993 and 2008 censuses classified by age and sex. Estimates based on the civil registration system and published in the 2014 Socio-Economic, Demographic and Health Survey (SDHS) were also considered.	WPP	-
Democratic Republic of the Congo	Life expectancy at birth: Derived from (a) estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables, and (b) data on survival of siblings from the 2007 and 2013/14 DHS.	Other HIV	-
Denmark	Life expectancy at birth: Based on official life tables available through 2014. The age pattern of mortality is based on life tables through 2014 from the Human Mortality Database.	VR	1951-2015
Djibouti	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables.	Other HIV	
Dominican Republic	Life expectancy at birth: Based on: (a) registered deaths by age and sex through 2011, and underlying mid-year population; (b) estimates of infant and child mortality from 2000, 2006, and 2014 (preliminary) Multiple Indicator Cluster Survey (MICS); (c) estimates of infant and child mortality from the 1986, 1991, 1996, 2002, 2007 and 2013 DHS. The number of deaths was adjusted using the growth-balance method.	WPP	1956-1963, 1965-1992, 1994-2013

Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016 method	WHO VR years available
Ecuador	Life expectancy at birth: Based on: (a) registered deaths by age and sex from 1954 to 2011, with underlying mid-year population; (b) estimates from the 1989, 1994, 1999 and 2004 ENDEMAIN, and the 1987 ENDESA; and (c) estimates from the 1950, 1962, 1974, 1982, 1990, 2001 and 2010 censuses. The number of deaths was adjusted using the growth-balance method.	VR	1961, 1963-1975, 1977-2014
Egypt	Life expectancy at birth: Based on official estimates of life expectancy available through 2013. The age pattern of mortality is based on official life tables for various years from 1960 to 2012 adjusted for infant and child mortality, and adult mortality.	VR	1954-1967, 1970-1981, 1983-2015
El Salvador	Life expectancy at birth: Based on: (a) registered deaths from 1975 through 2008, and underlying population by age and sex; (b) estimates from the 1950, 1963, 1971, 1992 and 2007 censuses; (c) estimates from the 1973 to 2008 Encuesta Nacional de Salud Familiar (FESAL), the 1992 EHS, and the 1985 DHS. The number of deaths was adjusted using the growth-balance method.	WPP	1950-1974, 1981-1984, 1990-1993, 1995-2014
Equatorial Guinea	Life expectancy at birth: Estimated using the North model of the Coale-Demeny Model Life Tables and implied relationships between life expectancy at birth and estimates of infant and child mortality and between life expectancy at birth and estimates of adult mortality (45q15). The adjusted estimates of 45q15 were derived from (a) parental orphanhood data from the 2000 MICS; and (b) intercensal survivorship from successive census age distributions (smoothed and unsmoothed) for the period of 1983-1994. The demographic impact of AIDS has been factored into the mortality estimates.	High HIV	-
Eritrea	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables.	Other HIV	-
Estonia	Life expectancy at birth: Based on official life tables available through 2015.	VR	1981-1982, 1985-2015
Ethiopia	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables.	Other HIV	
Fiji	Life expectancy at birth: Based on: (a) official 1976, 1986, 1996, 2001 and 2007 estimates, and (b) deaths by age and sex registered from 1950 through 2007.	WPP	1978, 1999, 2001-2009, 2011-2012
Finland	Life expectancy at birth: Based on official estimates of life expectancy available through 2014. The age pattern of mortality is based on life tables through 2012 from the Human Mortality Database.	VR	1952-2015
France	Life expectancy at birth: Based on official life tables through 2015.	VR	1950-2014
Gabon	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables. The demographic impact of AIDS has been factored into the mortality estimates.	High HIV	-
Gambia	Life expectancy at birth: Estimated using the South model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) adjusted estimates of adult mortality (45q15). Adult mortality was derived from the relationship to child mortality implied by the North model of the Coale-Demeny Model Life Tables. Adult mortality estimates derived from recent household deaths data from the 1973 census, and from parental orphanhood from the 1973, 1983 and 2003 censuses, 2001 Baseline Survey in Lower, Central and Upper River Divisions, 2000 and 2005/06 MICS surveys and rural demographic surveillance sites were also considered. The results of the 2013 DHS were considered.	Other HIV	-
Georgia	Life expectancy at birth: Based on official estimates of life expectancy available through 2015, adjusted for underregistration.	VR	1981-1982, 1985-1992, 1994-2001, 2004-2007, 2009-2015
Germany	Life expectancy at birth: Based on official estimates of life expectancy available through 2015.	VR	1980-2015

Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016 method	WHO VR years available
Ghana	Life expectancy at birth: Estimated using the South model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) adjusted estimates of adult mortality (45q15). Adult mortality estimates were derived from: (a) recent female household deaths data from the 2007 Ghana Maternal Health Survey ; (b) parental orphanhood from the 1988, 1993, 1998, 2003 and 2008 DHS as well as 2006 MICS3 survey; (c) siblings deaths from the 2007 Ghana Maternal Health Survey; and (d) implied relationship between child mortality and adult mortality based on the North model of the Coale-Demeny Model Life Tables.	Other HIV	-
Greece	Life expectancy at birth: Based on official estimates of life expectancy available through 2014. The age pattern of mortality is based on life tables through 2014 from the Human Mortality Database.	VR	1956-2015
Grenada	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables.	VR	1985, 1988-1996, 2001-2016
Guatemala	Life expectancy at birth: Based on: (a) registered deaths by age and sex and the underlying mid-year population by age and sex through 2013; (b) age-sex-specific death rates from the 1995, 1998/99, 2002 and 2008/09 Encuestas Nacionales de Salud Materno Infantil (ENSMI); (c) age-sex-specific death rates from the 1987 and 1989 Encuestas Nacionales Socio-demográficas (ENSD); and (d) death rates by age and sex from the 1950, 1964, 1973, 1981, 1994 and 2002 censuses. The number of deaths was adjusted using the growth-balance method.	VR	1958-1971, 1974-1981, 1984, 1986-2015
Guinea	Life expectancy at birth: Estimated using the South model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) adjusted estimates of adult mortality (45q15) derived from (a) recent household deaths data from the 1954-1955 Demographic Survey, and the 1983 and 1996 censuses; (b) parental orphanhood from the 1999 and 2005 DHS ; (c) siblings deaths from the 1999, 2005 and 2012 DHS ; (d) implied relationship between child mortality and adult mortality based on the North model of the Coale-Demeny Model Life Tables in 1950-1955 and assumed to converge over time toward the South model of the Coale-Demeny Model Life Tables by the 1990s. Data from West African rural demographic surveillance sites and urban vital registration were also considered, including from the 1957 Urban Survey (Konkoure).	Other HIV	-
Guinea-Bissau	Life expectancy at birth: Estimated using the South model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) adjusted estimates of adult mortality (45q15). Adult mortality estimates were derived from (a) parental orphanhood from the 2000 and 2006 MICS surveys, and (b) implied relationship between child mortality and adult mortality based on the North model of the Coale-Demeny Model Life Tables in 1950-1955 and assumed to converge over time toward the South model of the Coale-Demeny Model Life Tables by the 1990s. Data from West African rural demographic surveillance sites (e.g., Bandim) and urban vital registration were also considered.	Other HIV	-
Guyana	Life expectancy at birth: Derived from child and adult mortality estimates through 2010 by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables. Adult mortality estimates based on the Global Burden of Disease Study 2010 were considered.	VR	1977, 1979, 1984, 1988-1999, 2001-2013
Haiti	Life expectancy at birth: Based on: (a) estimates from the 1987, 1994/95, 2000, 2005/06 and 2012 DHS; (b) estimates from the 1982 and 2003 censuses, (c) registered deaths by age and sex adjusted for incompleteness using the growth-balance method and the 1971 census population by age and sex; and (d) estimates from the 1977 Enquête Haitienne sur la Fécondité (EHF).	Other HIV	1980, 1997, 1999, 2001-2004
Honduras	Life expectancy at birth: Based on: (a) registered deaths by age and sex and the underlying mid-year population by age and sex from 1950 through 1983 and from 2000 through 2011; (b) ages-sex-specific death rates from the 2005/06 and 2011/12 ENDESA (DHS); (c) ages-sex-specific death rates from the 1991/92, 1996 and 2001 ENESF; (d) ages-sex-specific death rates from the 1987 EFHS, the 1984 MCH/PF, the 1971/72 and 1983 EDENH, the 1981 National Contraceptive Prevalence Survey (EPAH); and (e) estimates from the 1974, 1988 and 2001 censuses. The number of deaths was adjusted using the growth-balance method.	WPP	1966, 1968-1981, 1987-1990, 2008-2013

Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016method	WHO VR years available
Hungary	Life expectancy at birth: Based on official estimates of life expectancy available through 2014. The age pattern of mortality is based on life tables through 2014 from the Human Mortality Database.	VR	1955-2016
Iceland	Life expectancy at birth: Based on official estimates of life expectancy available through 2015. The age pattern of mortality is based on life tables through 2013 from the Human Mortality Database.	VR	1951-2016
India	Life expectancy at birth: Based on life tables derived from age and sex-specific mortality rates from the Sample Registration System from 1968-1969 up to 2014 adjusted for infant and child mortality, and for adult death underregistration by using the growth-balance and synthetic-extinct generation methods.	WPP	
Indonesia	Life expectancy at birth: Derived from estimates of infant, child, adult and old-age mortality. Adult and old age mortality estimates are based on: (a) the 2002/03, 2007 and 2012 DHS, (b) the 1990, 2000 and 2010 censuses, and (c) the 2007/08 Indonesia Family Life Survey (IFLS), and (d) the SUSENAS surveys (National Socio-economic Surveys).	WPP	-
Iran (Islamic Republic of)	Life expectancy at birth: Based on life tables derived from age and sex-specific mortality rates from (a) registered 2000-2012 annual deaths adjusted for infant and child mortality, and for adult death underregistration using the growth-balance and synthetic-extinct generation methods; (b) the 1956-1966 intercensal survival, 1973/76 Population Growth Survey, 1976, 1986 and 1991 censuses, and 2000 Demographic and Health Survey; and (c) estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables. For 1980-1988, excess mortality due to the war was factored in the overall mortality levels based on the PRIO Battle Deaths Dataset version 3.0, released in October 2009.	WPP	1974-1975, 1978-1985, 1987, 2013-2015
Iraq	Life expectancy at birth: Estimated using the West model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) adjusted estimates of adult mortality (45q15). Adult mortality estimates are derived from: (a) recent household deaths data from the 1973/74 Demographic Sample Survey and Sample Registration, and 1999 Child and Maternal Mortality Survey (female only); (b) parental orphanhood from the 1997 census, 2004 Iraq Living Conditions Survey and 2006 MICS3; (c) siblings deaths from the 1990 Iraq Immunization, Diarrhoeal Disease, Maternal and Childhood Mortality Survey (female only), and the 2006/07 Iraq Family Health Survey; (d) intercensal survivorship from successive census age distributions (smoothed and unsmoothed) for periods 1957-1965, 1965-1977, 1977-1987 and 1987-1997; (e) implied relationship between child mortality and adult mortality based on the West model of the Coale-Demeny Model Life Tables. For 1980-1988, excess mortality due to the war was factored in the overall mortality levels based on the PRIO Battle Deaths Dataset version 3.0, released in October 2009. For 2000-2005 and 2005-2010, excess mortality due to the war was factored in the overall mortality levels; there is a high level of uncertainty in the current estimates. The estimated numbers of war related deaths, as provided by the Iraqi Ministry of Health, have also been taken into account.	WPP	2008
Ireland	Life expectancy at birth: Based on official estimates of life expectancy through 2014. The age pattern of mortality is based on life tables through 2014 from the Human Mortality Database.	VR	1950-2014
Israel	Life expectancy at birth: Based on: (a) life tables derived from official estimates of registered deaths and enumerated census population by age and sex from 1948 to 2014, and (b) life tables through 2014 from the Human Mortality Database. Mortality rates for older ages were adjusted.	VR	1975-2015
Italy	Life expectancy at birth: Based on: (a) life tables through 2014 from the National Statistical Office (Istat) and Eurostat; (b) life tables through 2012 from the Human Mortality Database.	VR	1951-2015
Jamaica	Life expectancy at birth: Based on: (a) registered deaths by age and sex through 2005, adjusted for underreporting of infant and child deaths; (b) official estimates for 1991, 2002, 2003 and 2006; and (c) estimates from the 2001 and 2011 censuses.	Other HIV	1960-1961, 1964-1965, 1967, 1977, 1980-1991, 1996-2006, 2009-2011
Japan	Life expectancy at birth: Based on life tables derived from official estimates through 2014. The age pattern of mortality is based on life tables through 2014 from the Human Mortality Database.	VR	1950-2015

Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016method	WHO VR years available
Jordan	Life expectancy at birth: Estimated using the West model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) estimates of adult mortality (45q15) implied by the relationship between child mortality and adult mortality based on the South model of the Coale-Demeny Model Life Tables in 1950-1955 and assumed to converge over time toward the West model of the Coale-Demeny Model Life Tables by the 1980s. Life tables based on the 1961 and 1979 censuses, 1972 National Fertility Survey and 1976 WFS, indirect estimates of adult mortality based on widowhood data from the 1961 and 1979 censuses and 1976 WFS, as well as parental orphanhood from the 1976 WFS and 1981 Demographic Survey were also taken into account.	WPP	1959-1960, 1962-1966, 1968, 1970-1975, 1978-1979, 2008-2012
Kazakhstan	Life expectancy at birth: Based on official estimates of life expectancy available through 2012 adjusted for underreporting of infant and child mortality. The age pattern of mortality is derived from a life table based on 2010-2013 data.	VR	1981-1982, 1985-2015
Kenya	Life expectancy at birth: Estimated using the North model of the Coale-Demeny Model Life Tables and implied relationships between life expectancy at birth and estimates of infant and child mortality and between life expectancy at birth and estimates of adult mortality (45q15). The adjusted estimates of 45q15 were derived from: (a) household deaths data (unadjusted and adjusted for underregistration using the growth-balance and synthetic-extinct generation methods) from the 1969, 1979, 1989, 1999 and 2009 censuses; (b) parental orphanhood from the 1983, 1989, 1993, 1998, 2003, 2008/09 and 2014 Kenya DHS, the 1977 World Fertility Survey, and all censuses aforementioned; (c) siblings deaths from the 1989, 1993, 1998 2003, 2008/09 and 2014 Kenya DHS; and (d) intercensal survivorship from successive census age distributions (smoothed and unsmoothed) for the period of 1969-2009. The demographic impact of AIDS has been factored into the mortality estimates.	High HIV	-
Kiribati	Life expectancy at birth: Based on: (a) estimates in the 2005 and 2010 censuses; (b) estimates from deaths by age and sex from 1995 to 2001 and in 2011; (c) child mortality estimates by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables; and (d) estimates from the Secretariat of the Pacific Community were also considered.	WPP	1991-2001
Kuwait	Life expectancy at birth: Based on life tables derived from official estimates of registered deaths and enumerated census population by age and sex from 1964 to 2010, adjusted for infant and child mortality. Mortality rates for older ages were adjusted. For 1950-1965, life tables were derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the South model of the Coale-Demeny Model Life Tables in 1950-1955 and converges over time toward the estimated 1965-1970 life table.	WPP	1972, 1975-1987, 1993-2014
Kyrgyzstan	Life expectancy at birth: Based on official estimates of life expectancy available through 2015 adjusted for underreporting of infant and child mortality.	VR	1981-1982, 1985-2015
Lao People's Democratic Republic	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables.	WPP	-
Latvia	Life expectancy at birth: Based on official life tables available through 2015.	VR	1980-2015
Lebanon	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables. For the period 2010-2015, life expectancy at birth was adjusted to account for different mortality patterns of large Syrian refugee population.	WPP	-
Lesotho	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables. The demographic impact of AIDS has been factored into the mortality estimates.	High HIV	-

Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016 method	WHO VR years available
Liberia	Life expectancy at birth: Estimated using the South model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) adjusted estimates of adult mortality (45q15) derived from (a) recent household deaths data from the 1969-1970 and 1970-1971 Population Growth Surveys ; (b) parental orphanhood from the 2007 DHS ; (c) siblings deaths from the 2007 and 2013 DHS ; (d) implied relationship between child mortality and adult mortality based on the West model of the Coale-Demeny Model Life Tables in 1950-1955 and assumed to converge over time toward the South model of the Coale-Demeny Model Life Tables by the 1990s. Data from West African rural demographic surveillance sites and urban vital registration were also considered.	Other HIV	-
Libya	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms the East model of the Coale-Demeny Model Life Tables and converges over time toward the West model of the Coale-Demeny Model Life Tables from 1950 to 2010.	WPP	-
Lithuania	Life expectancy at birth: Based on official estimates of life expectancy available through 2015. The age pattern of mortality is based on life tables through 2013 from the Human Mortality Database.	VR	1981-1982, 1985--2016
Luxembourg	Life expectancy at birth: Based on official estimates of life expectancy available through 2014. The age pattern of mortality is based on official life tables through 2014.	VR	1955-1962, 1965-2015
Madagascar	Life expectancy at birth: Based on: (a) estimates from the 1966 Demographic Survey and the 1973 and 1993 censuses; (b) estimates derived from registered age-sex-specific deaths and underlying age-sex-specific population; (c) estimates derived from implied relationships between child mortality and adult mortality from the 1992, 1997, 2003/04 and 2008/09 DHS based on the North model of the Coale-Demeny Model Life Tables; and (d) 1966 estimates from OECD were also considered.	WPP	-
Malawi	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the South model of the Coale-Demeny Model Life Tables. Estimates from the 1987, 1998 and 2008 censuses and official estimates from the National Statistical Office of Malawi were also considered. The demographic impact of AIDS has been factored into the mortality estimates.	High HIV	-
Malaysia	Life expectancy at birth: Based on reported deaths by age and sex through 2014 and the underlying population by age and sex.	WPP	-
Maldives	Life expectancy at birth: Based on life tables derived from official estimates of registered deaths and enumerated census population by age and sex from 1975 to 2012, adjusted for infant and child mortality and for adult death underregistration for males in 1980-1985 using the growth-balance and synthetic-extinct generation methods. For 1950-1975, life tables were derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the South-Asian model of the United Nations Model Life Tables in 1950-1955 and converges over time toward the estimated 1975-1980 life table.	VR	2000-2005, 2007-2008, 2010-2011
Mali	Life expectancy at birth: Estimated using the South model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) adjusted estimates of adult mortality (45q15) derived from (a) recent household deaths data (unadjusted and adjusted for underregistration using the growth-balance and synthetic-extinct generation methods) from the 1957/58 Demographic Survey (Central Delta) and 1960/61 Demographic Survey, the 1976, 1987, 1998 and 2009 censuses; (b) parental orphanhood from the 1995-1996, 2001 and 2006 DHS ; (c) siblings deaths from the 1995-96, 2001, 2006 and 2012-2013 DHS; (d) intercensal survivorship from successive census age distributions (smoothed and unsmoothed) for periods 1976-1987, 1987-1998, and 1998-2009 ; (e) implied relationship between child mortality and adult mortality based on the North model of the Coale-Demeny Model Life Tables in 1950-55, and assumed to converge over time toward the South model of the Coale-Demeny Model Life Tables by the 1980s.	Other HIV	-
Malta	Life expectancy at birth: Based on official life tables through 2014.	VR	1955-2015

Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016 method	WHO VR years available
Mauritania	Life expectancy at birth: Estimated using the South model of the Coale-Demeny Model Life Tables and implied relationships between life expectancy at birth and estimates of infant and child mortality, and estimates of adult mortality (45q15). Adult mortality estimates were derived from: (a) parental orphanhood from the 2007 MICS, 2000/01 DHS, 1964/65 Demographic Survey and 1981/82 Fertility Survey of Mauritania (WFS), (b) siblings deaths from the 2000/01 DHS, (c) household deaths data from the 1957 Fouta Toro survey, 1977 and 1988 censuses, and (d) intercensal survivorship from successive census age distributions (smoothed and unsmoothed) for periods 1965-1977, 1977-1988 and 1988-2000.	WPP	1988
Mauritius	Life expectancy at birth: Based on official life tables through 2015.	VR	1957-2016
Mexico	Life expectancy at birth: Based on: (a) registered deaths by age and sex through 2013 and underlying population by age and sex, (b) estimates from the 1992, 2006 and 2009 Encuesta Nacional de la Dinámica Demográfica (ENADID), (c) estimates from the 1978 and 1979 ENPUMA, and the 1976 WFS, (d) estimates from the 1970, 1990, 2000 and 2010 censuses. The number of deaths was adjusted using the growth-balance method.	VR	1955-2015
Micronesia (Federated States of)	Life expectancy at birth: Based on estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables.	WPP	-
Mongolia	Life expectancy at birth: Based on official estimates of life expectancy available through 2015 adjusted for underreporting of infant and child mortality.	WPP	1994, 2016
Montenegro	Life expectancy at birth: Based on official estimates of life expectancy available through 2015. The age pattern of mortality is based on life tables for 1990, 2000, 2006.	VR	2000-2009
Morocco	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality initially conforms to the mortality patterns resulting from the blending from the East model of the Coale-Demeny Model Life Tables to the West model of the Coale-Demeny Model Life Tables from 1950 to 2000. For the period 2000-2015, life expectancy was derived from the life table of the 2009-2010 Demographic survey.	WPP	2000-2004, 2007-2014
Mozambique	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables. The demographic impact of AIDS has been factored into the mortality estimates.	High HIV	-
Myanmar	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables. Official estimates of life expectancy at birth by sex from the 1991 Myanmar Population Change and Fertility Survey and the recent household deaths data from the 2014 census were also considered.	WPP	
Namibia	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables. Official estimates from Statistics Namibia were also considered. The demographic impact of AIDS has been factored into the mortality estimates. Adjustments were made to adult male mortality levels in some periods.	High HIV	-
Nepal	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables.	WPP	
Netherlands	Life expectancy at birth: Based on official estimates of life expectancy derived from registered deaths through 2015. The age pattern of mortality is based on official life tables for 1950 to 2015.	VR	1950-2016
New Zealand	Life expectancy at birth: Based on official estimates of life expectancy available through 2013-2015. The age pattern of mortality is based on life tables through 2013 from the Human Mortality Database.	VR	1950-2013
Nicaragua	Life expectancy at birth: Based on: (a) registered births and infant and child deaths from 1968 through 2011; (b) estimates from the 1998, 2001, 2006/07, and the 2011/12 ENDESA (DHS); (c) estimates from the 1992/93 Family Health Survey, the 1993 and 2001 National Household Survey on Living Standards Measurement (LSMS); the 1985/86 National Socio-Demographic Survey, the 1978 National Retrospective Demographic Survey; and (d) estimates from the 1953, 1963, 1971, 1995 and 2005 censuses. The number of deaths was adjusted using the growth-balance method.	WPP	1959, 1961-1965, 1968-1969, 1973-1978, 1987-1994, 1996-2015

Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016 method	WHO VR years available
Niger	Life expectancy at birth: Estimated using the South model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) adjusted estimates of adult mortality (45q15). Adult mortality estimates were derived from (a) recent household deaths data (unadjusted and adjusted for underregistration using the growth-balance and synthetic-extinct generation methods) from the 1959/60 Demographic Survey, 1977, 1988 and 2001 censuses; (b) parental orphanhood from the 1988 and 2001 censuses, 1992 and 1998 DHS, 2006 DHS-MISC3; (c) siblings deaths from the 1992 DHS, 2006 DHS-MICS3 and 2012 DHS-MICS4; (d) intercensal survivorship from successive census age distributions (smoothed and unsmoothed) for periods 1977-1988, and 1988-2001; (e) implied relationship between child mortality and adult mortality based on the North model of the Coale-Demeny Model Life Tables in 1950-1955, and assumed to converge over time toward the South model of the Coale-Demeny Model Life Tables by the 1990s. Data from West African rural demographic surveillance sites and urban vital registration were also considered.	WPP	-
Nigeria	Life expectancy at birth: Estimated using the South model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) adjusted estimates of adult mortality (45q15). Adult mortality estimates were derived from: (a) recent household deaths data from the 1965-1966 Nigerian rural demographic inquiry, the 2008 and 2013 DHS, and the 2010/11 GHS; (b) parental orphanhood from the 1986, 1999, 2003, 2008 and 2013 DHS, the 2007 MICS3 and 2010/11 GHS; (c) siblings deaths from the 2008 DHS; (d) implied relationship between child mortality and adult mortality based on the North model of the Coale-Demeny Model Life Tables. Data from West African rural demographic surveillance sites including for Malumfashi in 1962-1966 and 1974-1977 and urban vital registration were also considered.	Other HIV	-
Norway	Life expectancy at birth: Based on official life tables available through 2015. The age pattern of mortality is based on life tables through 2014 from the Human Mortality Database.	VR	1951-2015
Occupied Palestinian Territory	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables.	WPP	2011
Oman	Life expectancy at birth: Based on life tables derived from official estimates of registered deaths for 2009-2011 and 2010 enumerated census population by age and sex, adjusted for infant and child mortality. For 1950-2007, life tables were derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the South model of the Coale-Demeny Model Life Tables in 1950-1955 and converges over time toward the estimated 2009-2011 life table.	WPP	2009-2010, 2014
Pakistan	Life expectancy at birth: Based on life tables derived from age and sex-specific mortality rates from: (a) the 1962-1965 Population Growth Estimation Experiment, 1968-1971 Population Growth Survey I, 1976-1979 Population Growth Survey II; (b) the 1984-2007 annual Pakistan Demographic Surveys adjusted for infant and child mortality, and for adult death underregistration for males in 1950-1970 using the growth-balance and synthetic-extinct generation methods, as well as cross-validation with other countries experiencing similar mortality levels; and (c) estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the South-Asian model of the United Nations Model Life Tables. Estimates are consistent with those based on parental survival and widowhood data from the 1984 PDS. Mortality rates for older ages were adjusted.	WPP	-
Panama	Life expectancy at birth: Based on: (a) registered deaths by age and sex and underlying population by age and sex from 1952 through 2013; (b) estimates from the 1950, 1970, 1980, 1990, 2000, and 2010 censuses; and (c) official life tables for 1960, 1970, 1979, 1989 and 1999. The number of deaths was adjusted using the growth-balance method.	VR	1954-1989, 1996-2015

Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016 method	WHO VR years available
Papua New Guinea	Life expectancy at birth: Based on: (a) infant and child mortality estimates, (b) parental survivorship (orphanhood) data by age from the 2000 census, (c) child mortality data from the 1996 and 2006 PNG DHS, by assuming that the age pattern of mortality conforms to the Far Eastern model of the United Nations Model Life Tables.	WPP	1977
Paraguay	Life expectancy at birth: Based on: (a) registered deaths by age and sex through 2006 and underlying population by age and sex; (b) estimates from the 2004 and 2008 ENDSR and the 1995/96 ENDSR; (c) estimates from the 2003 WHS, the 1998 National Maternal and Child Health Survey, the 1990 DHS, the 1987 RHS, the 1979 WFS, and the 1977 National Demographic Survey; and (d) estimates from the 1950, 1962, 1972, 1992, and 2002 censuses, and preliminary results from the 2012 census. The number of deaths was adjusted using the growth-balance method.	WPP	1970-1977, 1994-2014
Peru	Life expectancy at birth: Based on: (a) registered deaths by age and sex through 2012 and the underlying population by age and sex; (b) official estimates in 1961, 1965, 1980, 1990, 1995, 2000, and 2005; (c) estimates of infant and child mortality from 2004-2014 continuous Encuestas Demográficas y de Salud Familiar (ENDES/DHS), and the 1986, 1991/92, 1996 and 2000 ENDES; (d) estimates of infant and child mortality from the 1977/78 World Fertility Survey, the 1974/76 National Demographic Survey; and (e) estimates from the 1961, 1972, 1981, 1993, and 2007 censuses. The number of deaths was adjusted using the growth-balance method.	WPP	1966-1973, 1977-1978, 1980-1983, 1986-1992, 1994-2015
Philippines	Life expectancy at birth: Based on: (a) infant and child mortality estimates from the 1998, 2003, 2008 and 2013 DHS, and the 2006 Family Planning Survey, (b) official estimates from a life table of 2006, and (c) the West model of the Coale-Demeny Model Life Tables and the Lee-Carter method.	VR	1963-1978, 1981, 1992-2003, 2006-2011
Poland	Life expectancy at birth: Based on official estimates of life expectancy available through 2015. The age pattern of mortality is based on life tables through 2014 from the Human Mortality Database.	VR	1959-1996, 1999-2015
Portugal	Life expectancy at birth: Based on: (a) life tables through 2014 from the National Statistical Office (INE); and (b) life tables through 2015 from the Human Mortality Database.	VR	1955-1970, 1974, 1980-2003, 2007-2014
Puerto Rico	Life expectancy at birth: Based on: (a) registered deaths by age and sex through 2015 and underlying population by age and sex, and (b) official estimates of life expectancy available through 2015.	VR	1955-1966, 1969-1977, 1979-2014
Qatar	Life expectancy at birth: Based on life tables derived from official estimates of registered deaths and enumerated census population by age and sex from 1981 to 2011, adjusted for infant and child mortality. Mortality rates for older ages were adjusted. For 1950-1980, life tables were derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the South model of the Coale-Demeny Model Life Tables in 1950-1955 and converges over time toward the estimated 1980-1985 life table.	WPP	1995, 2001, 2004-2015
Republic of Korea	Life expectancy at birth: Based on official estimates of life expectancy through 2015.	VR	1985-2015
Republic of Moldova	Life expectancy at birth: Based on official estimates of life expectancy available through 2015 adjusted for underreporting of infant and child mortality. The age pattern of mortality is derived from a life table based on data for 2012.	VR	1981-1982, 1985-2016
Romania	Life expectancy at birth: Based on official life tables through 2015.	VR	1959-1978, 1980-2016
Russian Federation	Life expectancy at birth: Based on official estimates of life expectancy available through 2015. The age pattern of mortality is based on life tables through 2014 from the Human Mortality Database. Both estimates incorporate an adjustment to infant mortality.	VR	1980-2015
Rwanda	Life expectancy at birth: Based on the estimated level of infant mortality and taking into account the unusual numbers of deaths caused by the 1993-1994 civil war. The demographic impact of AIDS has been factored into the mortality estimates.	High HIV	-
Saint Lucia	Life expectancy at birth: Based on: (a) official estimates of life expectancy available through 2005; (b) registered deaths by age and sex through 2005 and underlying population by age and sex; and (c) estimates from the 1991 and 2001 censuses.	VR	1968, 1972-1973, 1975-1977, 1979-1981, 1983, 1986-2006, 2008-2014

Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016 method	WHO VR years available
Saint Vincent and the Grenadines	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables. Registered deaths by age and sex through 2009 with underlying population by age and sex were considered.	VR	1970-1972, 1974, 1977-1979, 1982-1987, 1990, 1995-2015
Samoa	Life expectancy at birth: Based on: (a) registered deaths by age and sex from 1980 through with the underlying population by age and sex, and (b) estimates from the 1999 and 2009 Samoa DHS. The age pattern of mortality was assumed to conform to the Far Eastern model of the United Nations Model Life Tables. Estimates from the 2001, 2006 and 2011 censuses were also considered.	WPP	-
Sao Tome and Principe	Life expectancy at birth: Based on: (a) official estimates and life table derived from the 2001 census; and (b) death rates calculated from registered deaths by age and sex through 1979 and underlying population by age and sex. Estimates from WHO-GBD and estimates derived from child and adult mortality using North Model of the Coale-Demeny Model Life Table were also considered.	WPP	1984-1985, 1987
Saudi Arabia	Life expectancy at birth: Based on official estimates of life expectancy at birth for 2010-2013. For 1995-2010, based on life-tables, calculated from adjusted deaths in the past 12 months by age and sex, and the population by age and sex from the 1999 Demographic Survey, 2004 census and 2007 Demographic Survey adjusted for infant and child mortality, and old-age mortality. For 1950-1995, life tables were derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the South model of the Coale-Demeny Model Life Tables in 1950-1955 and converges over time toward the West model of the Coale-Demeny Model Life Tables and the estimated 1999-2007 life tables. Life tables based on annual deaths from the 2000 Demographic Survey, and on 2005 and 2009 registered deaths were also considered.	WPP	2009, 2012
Senegal	Life expectancy at birth: Estimated using the South model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) adjusted estimates of adult mortality (45q15). Adult mortality estimates were derived from (a) recent household deaths data (unadjusted and adjusted for underregistration using the growth-balance and synthetic-extinct generation methods) from the 1978/79 Multi-round Survey, 1988, 2002 and 2013 censuses; (b) parental orphanhood from these sources and the 1986, 1992/93, 2005 DHS and 2010/11 DHS-MICS, 1988 census, and 2000 MICS; (c) siblings deaths from the 1992/93, and 2005 DHS and 2010/11 DHS-MICS; (d) intercensal survivorship from successive census age distributions (smoothed and unsmoothed) for periods 1976-1988 and 1988-2002; (e) implied relationship between child mortality and adult mortality based on the North model of the Coale-Demeny Model Life Tables in 1950-1955, assumed to converge over time toward the South model of the Coale-Demeny Model Life Tables by the 1990s; and (f) central deaths rate by age from the 2013 census.	WPP	-
Serbia	Life expectancy at birth: Based on official estimates of life expectancy available through 2015. The age pattern of mortality is based on official life tables for 1997, and for 2005 to 2012.	VR	1985-2015
Seychelles	Life expectancy at birth: Based on: (a) official estimates available through 2015, and (b) registered deaths by age and sex through 2015 and underlying population by age and sex.	WPP	1985-1987, 2001-2015
Sierra Leone	Life expectancy at birth: Estimated using the South model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) adjusted estimates of adult mortality (45q15). Adult mortality estimates were derived from: (a) recent household deaths data from the 1992 Demographic and social monitoring survey and the 2004 census; (b) parental orphanhood from the 1973 pilot census. 1974, 1985 and 2004 censuses, 2000 MICS2, 2005 MICS3, 2007 CWIQ and 2008 DHS surveys; (c) female sibling deaths from the 2005 MICS3, and sibling deaths from the 2008 and 2013 DHS; (d) intercensal survivorship from successive census age distributions (smoothed and unsmoothed) for periods 1963-1974, 1974-1985, 1985-2004; (e) implied relationship between child mortality and adult mortality based on the South model of the Coale-Demeny Model Life Tables for males, and the North model for females for the 1950-1970 period. Data from West African rural demographic surveillance sites (including from the 1973/75 Ad-hoc survey in Greater Freetown, the Western area and Makeni in the Northern Province) and urban vital registration were also considered.	Other HIV	-

Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016 method	WHO VR years available
Singapore	Life expectancy at birth: Based on official estimates of life tables through 2015.	VR	1955-2015
Slovakia	Life expectancy at birth: Based on official life tables through 2015. The age pattern of mortality is based on life tables through 2014 from the Human Mortality Database.	VR	1982-2010, 2012-2014
Slovenia	Life expectancy at birth: Based on official estimates of life expectancy available through 2014. The age pattern of mortality is based on blended life tables (from the East model of the Coale-Demeny Model Life Tables assumed to convert over time toward the empirical data in 1980) between 1950 and 1980, and official life tables from 1980 to 2014.	VR	1982-2015
Solomon Islands	Life expectancy at birth: Based on: (a) data on children ever born and surviving from the 1986 and 1999 censuses; (b) official estimates based on census analysis and WHO-GBD estimates for 2006; and (c) 1980-1984 life table based on indirect methods assuming that the pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables.	WPP	-
Somalia	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables. Estimates from GBD-WHO were also considered. Additional deaths due to the famine of 1992 and the war have been factored into the mortality estimates.	WPP	-
South Africa	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the Far Eastern model of the United Nations Model Life Tables from 1980 onwards. The demographic impact of AIDS has been factored into the mortality estimates. Official estimates from Statistics South Africa and the Actuarial Society of South Africa were also considered. For the period 1950-1970, the West model of the Coale-Demeny Life Tables was used and we assumed convergence to the Far Eastern model during the 1970s.	High HIV	1993-2015
South Sudan	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables.	Other HIV	-
Spain	Life expectancy at birth: Based on official estimates of life expectancy available through 2014. The age pattern of mortality is based on (a) registered deaths by age and sex through 2012 and underlying population by age and sex, and (b) life tables through 2014 from the Human Mortality Database.	VR	1951-2015
Sri Lanka	Life expectancy at birth: Based on: life tables derived from official estimates of registered deaths and population by age and sex from 1950 to 2010, adjusted for infant and child mortality, and for adult death underregistration for males before 1980 by using tabulations of paternal orphanhood (before marriage) by age of respondent from the 1987 Sri Lanka DHS.	WPP	1950-1968, 1977, 1980-1985, 1996-2003, 2006
Sudan	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables.	WPP	-
Suriname	Life expectancy at birth: Based on: (a) registered deaths by age and sex through 2013 and underlying population by age and sex, and (b) official estimates for 1963, 1980, 2004 and 2006.	VR	1963-1966, 1971-1973, 1975-1982, 1984-1992, 1995-2014
Swaziland	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables. The demographic impact of AIDS has been factored into the mortality estimates.	High HIV	-
Sweden	Life expectancy at birth: Based on official estimates of life expectancy available through 2015. The age pattern of mortality is based on life tables through 2014 from the Human Mortality Database.	VR	1951-2016
Switzerland	Life expectancy at birth: Based on official life tables from through 2015.	VR	1951-2015

Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016 method	WHO VR years available
Syrian Arab Republic	Life expectancy at birth: For 2005-2010, based on a life-table calculated from 2005-2007 registered deaths by age and sex, and post-censal population estimates by age and sex derived from the 2004 census and 2010 official estimates adjusted for infant and child mortality, and old-age mortality. For 1950-2005, due to the lack of adult mortality information and life tables for this period, life tables were derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms for males to the South model of the Coale-Demeny Model Life Tables in 1950-1955 and converges over time toward the West model of the Coale-Demeny Model Life Tables and the estimated 2005-2007 life table. For females a similar approach was used assuming that the age pattern of mortality conformed since 1950 to the West model. For each sex, the underlying mortality pattern and implied adult mortality, are consistent with the life table from the 1976-1979 Syrian Follow-up Demographic Survey. For the 2010-2015 period, excess mortality due to the conflict was taken into account.	WPP	1998-2010
Taiwan, China	Life expectancy at birth: Based on official estimates of life expectancy derived from registered deaths through 2015. The age pattern of mortality is based on life tables through 2014 from the Human Mortality Database.	WPP	-
Tajikistan	Life expectancy at birth: Based on registered deaths and population by age and sex through 2013, adjusted for underregistration of deaths.	VR	1981-1982, 1985-2005
Thailand	Life expectancy at birth: Based on life tables derived from official estimates of registered deaths and enumerated census population by age and sex from 1948 to 2011, adjusted for infant and child mortality and for underregistration of adult deaths.	Other HIV	1955-1987, 1990-1992, 1994-2000, 2002-2015
The former Yugoslav Republic of Macedonia	Life expectancy at birth: Based on official estimates of life expectancy available through 2014. The age pattern of mortality is based on an official life table for 2010-2014.	VR	1991-2013
Timor-Leste	Life expectancy at birth: Based on child mortality and adult mortality estimates from the 2009/10 Timor-Leste DHS. Life tables are estimated using the Flexible two-dimensional model life table and Lee-Carter method. For 1950-2005, derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables. Official estimates of life expectancy at birth for the year 2002 were also taken into account.	WPP	-
Togo	Life expectancy at birth: Estimated using the South model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) adjusted estimates of adult mortality (45q15). Adult mortality estimates were derived from (a) recent household deaths data from the 1960 survey, 1970 and 1981 censuses; (b) parental orphanhood from the 1998 DHS, 2000 MICS2 and 2006 MICS3; (c) siblings deaths from the 1998 DHS; (d) implied relationship between child mortality and adult mortality based on the North model of the Coale-Demeny Model Life Tables in 1950-1955 and assumed to converge over time toward the South model of the Coale-Demeny Model Life Tables by the 1990s.	Other HIV	-
Tonga	Life expectancy at birth: Based on: (a) the registered deaths by age and sex from 1957 to 1966 and from 1982 to 2006 and underlying population by age and sex; and (b) estimates from the 1996 and 2006 censuses by assuming that the age pattern of mortality conforms to the Far Eastern model of the United Nations Model Life Tables. Estimates from the Secretariat of the Pacific Community were also considered.	WPP	1992-2003
Trinidad and Tobago	Life expectancy at birth: Based on: (a) registered death by age and sex through 2009 and underlying population by age and sex, and (b) official estimates through 2011.	VR	1951-2011
Tunisia	Life expectancy at birth: Based on official estimates of life expectancy from 1995 to 2014 from INS Tunisia. The age pattern of mortality is based on national life table from various years adjusted for under-five mortality.	WPP	2009, 2013
Turkey	Life expectancy at birth: Based on: (a) adjusted estimates from registered deaths by age and sex from 1952 to 2006 and for 2009 with underlying population by age and sex; (b) official estimates for 1989, 2006, 2008 and 2011; and (c) estimates from 1990 to 2010 from the Turkish Institute of Statistics.	WPP	1983-1984, 1987-2002, 2004-2015
Turkmenistan	Life expectancy at birth: Based on official estimates of life expectancy available through 2006 and reported deaths by age and sex for 2012 and 2013, adjusted for underregistration of deaths.	VR	1981-1982, 1985-2015

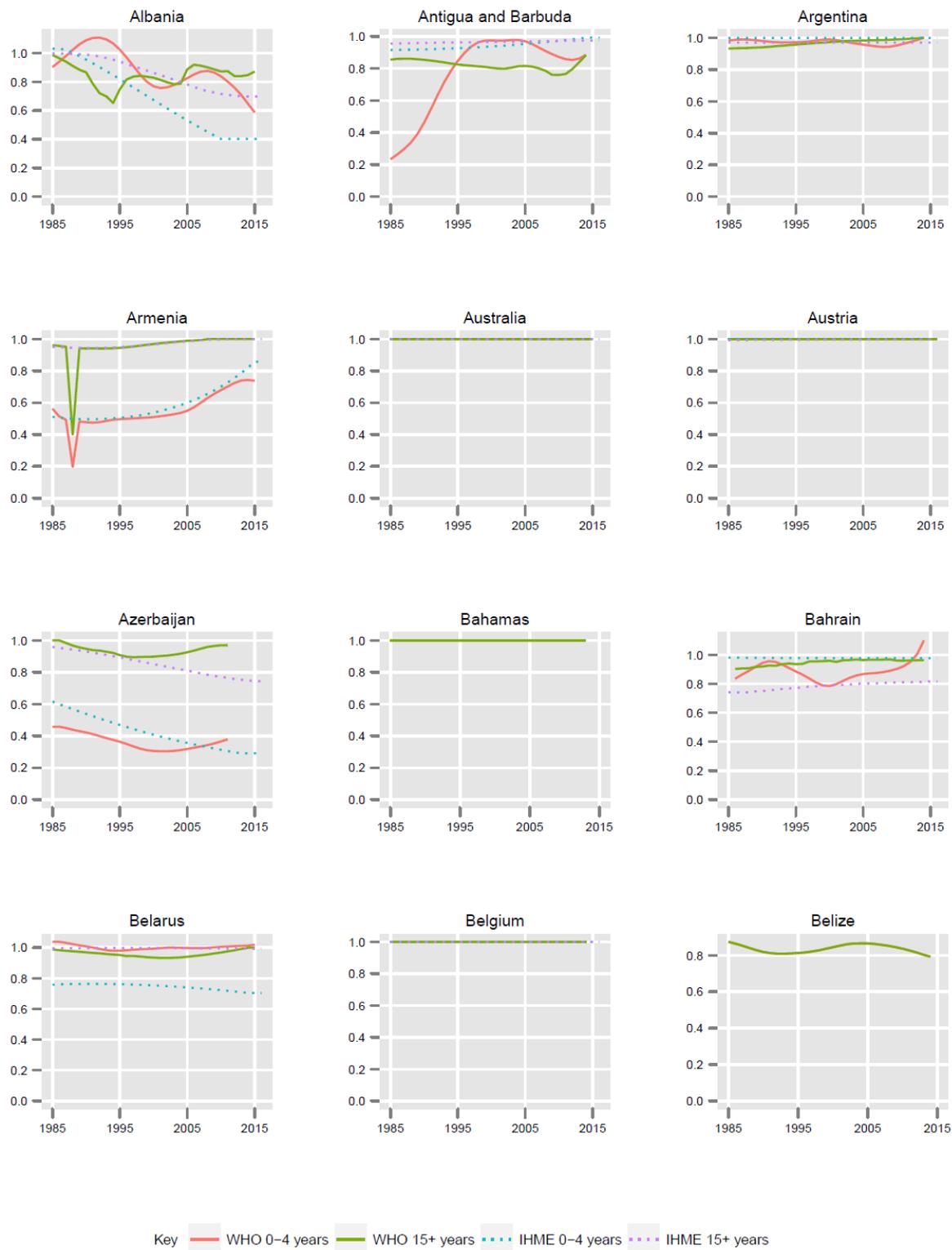
Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016 method	WHO VR years available
Uganda	Life expectancy at birth: Derived from estimates of infant and child mortality, and adult mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables. Adult mortality (45q15) estimates were based on: (a) parental orphanhood from the 1969, 1991, 2002 and 2014 censuses, and the 1988/89, 1995, 2001, 2006 and 2011 DHS; (b) siblings deaths from the above DHS; (c) intercensal survivorship from successive census age distributions (smoothed and unsmoothed) for the period of 1991-2002. The demographic impact of AIDS has been factored into the mortality estimates.	High HIV	-
Ukraine	Life expectancy at birth: Based on official estimates of life expectancy available through 2015. The age pattern of mortality is based on life tables through 2013 from the Human Mortality Database. Both estimates incorporate an adjustment to infant mortality.	VR	1981-1982, 1985-2012, 2014-2015
United Arab Emirates	Life expectancy at birth: Based on life tables derived from official estimates of registered deaths and enumerated census population by age and sex from 1988 through 2010, adjusted for infant and child mortality. Mortality rates for older ages were adjusted. For 1950-1988, life tables were derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the South model of the Coale-Demeny Model Life Tables in 1950-1955 and converges over time toward the estimated 1985-1990 life table.	WPP	2003, 2005-2010, 2012
United Kingdom	Life expectancy at birth: Based on official life tables for 2010-2012. The age pattern of mortality is based on (a) registered deaths by age and sex through 2011 and underlying population by age and sex, and (b) life tables through 2013 from the Human Mortality Database.	VR	1950-2015
United Republic of Tanzania	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables. The demographic impact of AIDS has been factored into the mortality estimates. Estimates of adult mortality were also considered. These were based on: (a) parental orphanhood from the 1978, 1988 and 2002 censuses, and the 1992, 1996, 1999, 2004/05, 2010 and 2015/16 DHS; (b) siblings deaths from the above DHS; (c) intercensal survivorship from successive census age distributions (smoothed and unsmoothed) for the period of 1988-2012.	High HIV	-
United States of America	Life expectancy at birth: Based on official estimates of life expectancy available through 2014. The age pattern of mortality is based on life tables through 2011 from the Human Mortality Database.	VR	1950-2016
Uruguay	Life expectancy at birth: Based on: (a) registered deaths by age and sex through 2013 and underlying population by age and sex; (b) official estimates from 1964 to 2008; and (c) estimates from the 1963, 1975, 1985, 1996, 2004, and 2011 censuses. The number of deaths was adjusted using the growth-balance method.	VR	1955-1960, 1963-1978, 1980-1990, 1993-2010, 2012-2015
Uzbekistan	Life expectancy at birth: Based on official estimates of life expectancy available through 2014, adjusted for underregistration of deaths.	VR	1981-1982, 1985-2005, 2009-2014
Vanuatu	Life expectancy at birth: Based on: (a) infant and child mortality estimates; (b) parental survivorship (orphanhood) data by age of respondent from the 1999 census; and (c) the assumption that the age pattern of mortality conforms to the Far Eastern model of the United Nations Model Life Tables.	WPP	-
Venezuela (Bolivarian Republic of)	Life expectancy at birth: Based on: (a) registered deaths by age and sex from 1950 through 2013 and underlying population by age and sex; (b) estimates from the 1950, 1961, 1971, 1981, 1990, 2001 and 2011 censuses; (c) official estimates for 1974, 1975, 1985, 2000-2002 and 2007; and (d) estimates from the 1977 World Fertility Survey and the 1998 Population and Family Survey. The number of deaths was adjusted using the growth-balance method.	VR	1955-1983, 1985-1990, 1992-1994, 1996-2013

Member State or territory	WPP2017 methods for estimation of life expectancy at birth	GHE2016 method	WHO VR years available
Viet Nam	Life expectancy at birth: Based on life tables derived from age and sex-specific mortality rates from: (a) recent household deaths data from the 1979, 1989, 1990 and 2009 censuses (unadjusted and adjusted for underregistration using the growth-balance and synthetic-extinct generation methods), and from the 2007 Population Change and Family Planning survey; (b) annual deaths for 2009 from the Viet Nam national sample mortality surveillance programme adjusted for infant and child mortality, and for adult death completeness according to capture-recapture survey; (c) direct and indirect estimates based on parental orphanhood and siblings survival from the 1991 Vietnam Life History Survey and 1995/98 Vietnam Longitudinal Survey; and (d) 1979-1989 intercensal survival estimates adjusted for outflows of refugees and differential completeness of census enumeration. For 1950-1970 life tables were derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the average experienced of the North and West models of the Coale-Demeny Model Life Tables in 1950-1955 and converged over time toward 1980s life tables. For 1965-1975, excess mortality due to the war was factored in the overall mortality levels based on direct and indirect adult mortality estimates derived from parental orphanhood and siblings survival from the 1991 VHS and 1995/98 VLS, and from the PRIO Battle Deaths Dataset.	WPP	-
Yemen	Life expectancy at birth: Estimated using the West model of the Coale-Demeny Model Life Tables and three parameters: (1-2) direct and indirect estimates of infant and child mortality, and (3) estimates of adult mortality (45q15). Adult mortality estimates were implied by the relationship between child mortality and adult mortality based on the South model of the Coale-Demeny Model Life Tables and assumed to converge over time toward the West model of the Coale-Demeny Model Life Tables by the 1980s. Indirect estimates of adult mortality based on widowhood data from the 1979 WFS, as well as parental orphanhood from this survey and the 2004 census were also considered. Official estimates of life expectancy at birth from the Central Statistical Organization of Yemen were also taken into account.	WPP	-
Zambia	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables. The demographic impact of AIDS has been factored into the mortality estimates.	High HIV	-
Zimbabwe	Life expectancy at birth: Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the North model of the Coale-Demeny Model Life Tables. The demographic impact of AIDS has been factored into the mortality estimates.	High HIV	-

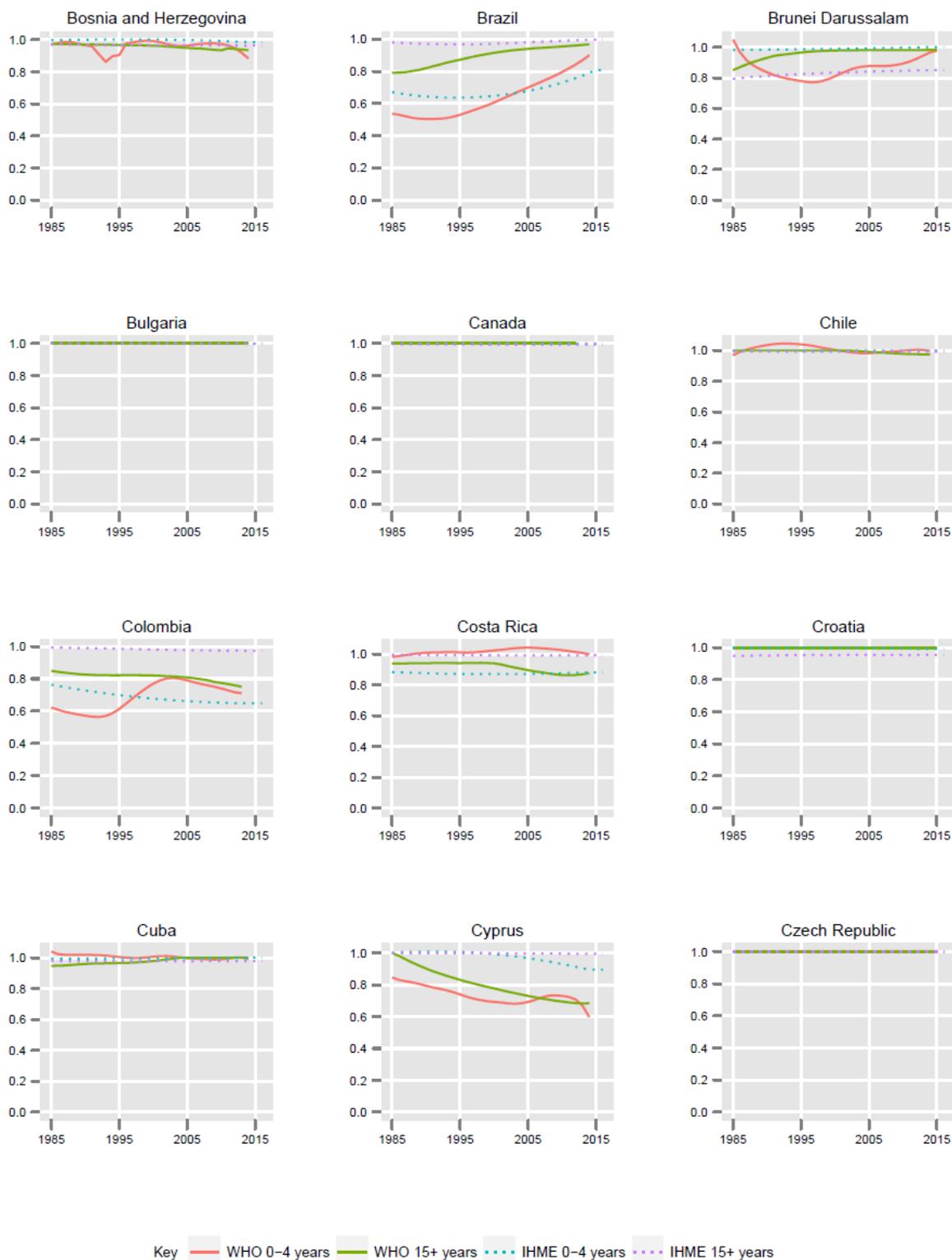
* Total registered deaths reported to WHO Mortality Database or from other available sources. This may include registered deaths for which cause of death was not recorded for some countries.

Annex B: Estimated completeness of death registration data

Annex Table B: Estimated completeness* of death registration data, by country and year, 1985-2016.



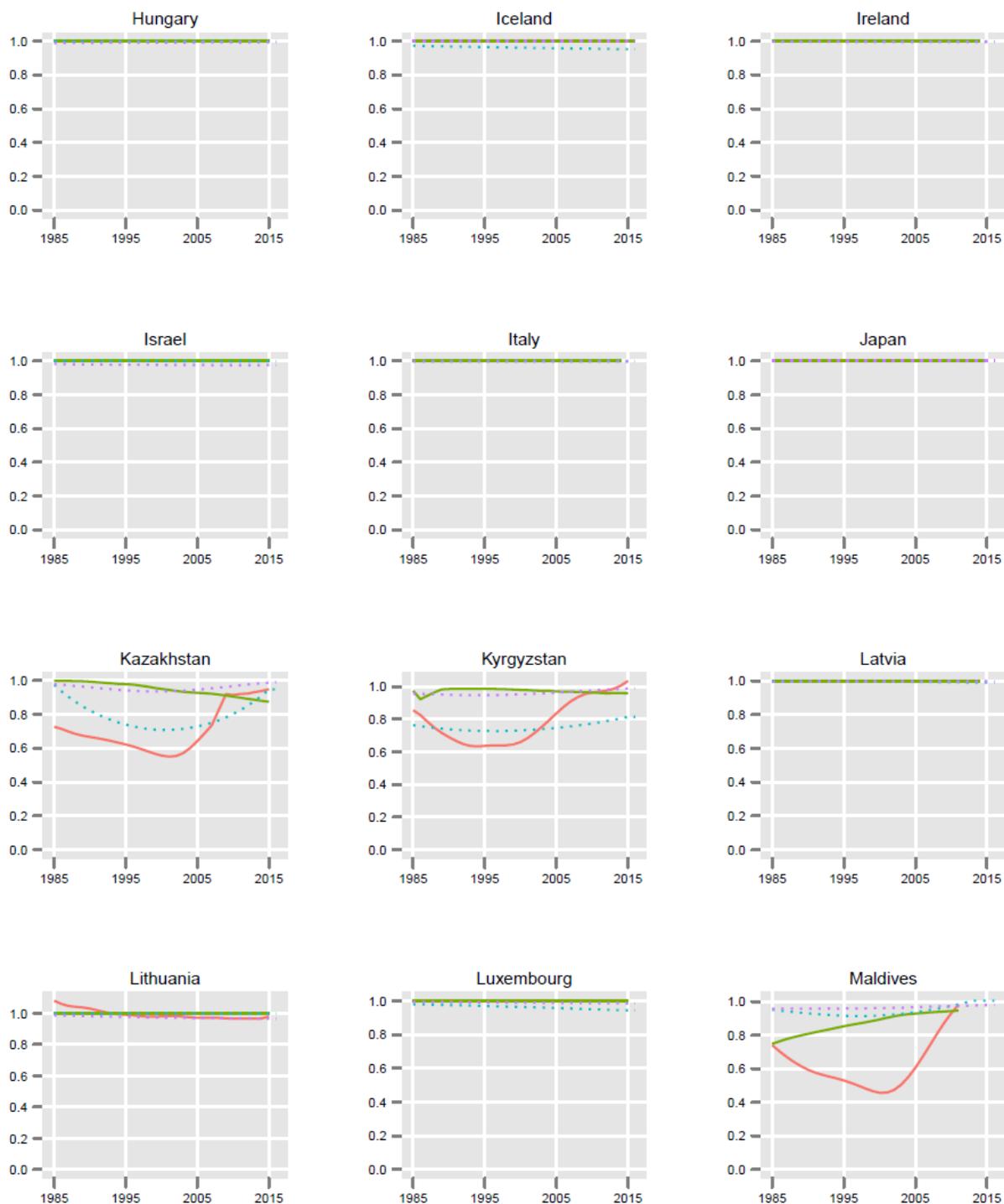
Annex Table B (continued): Estimated completeness* of death registration data, by country and year, 1985-2016.



Annex Table B (continued): Estimated completeness* of death registration data, by country and year, 1985-2016.

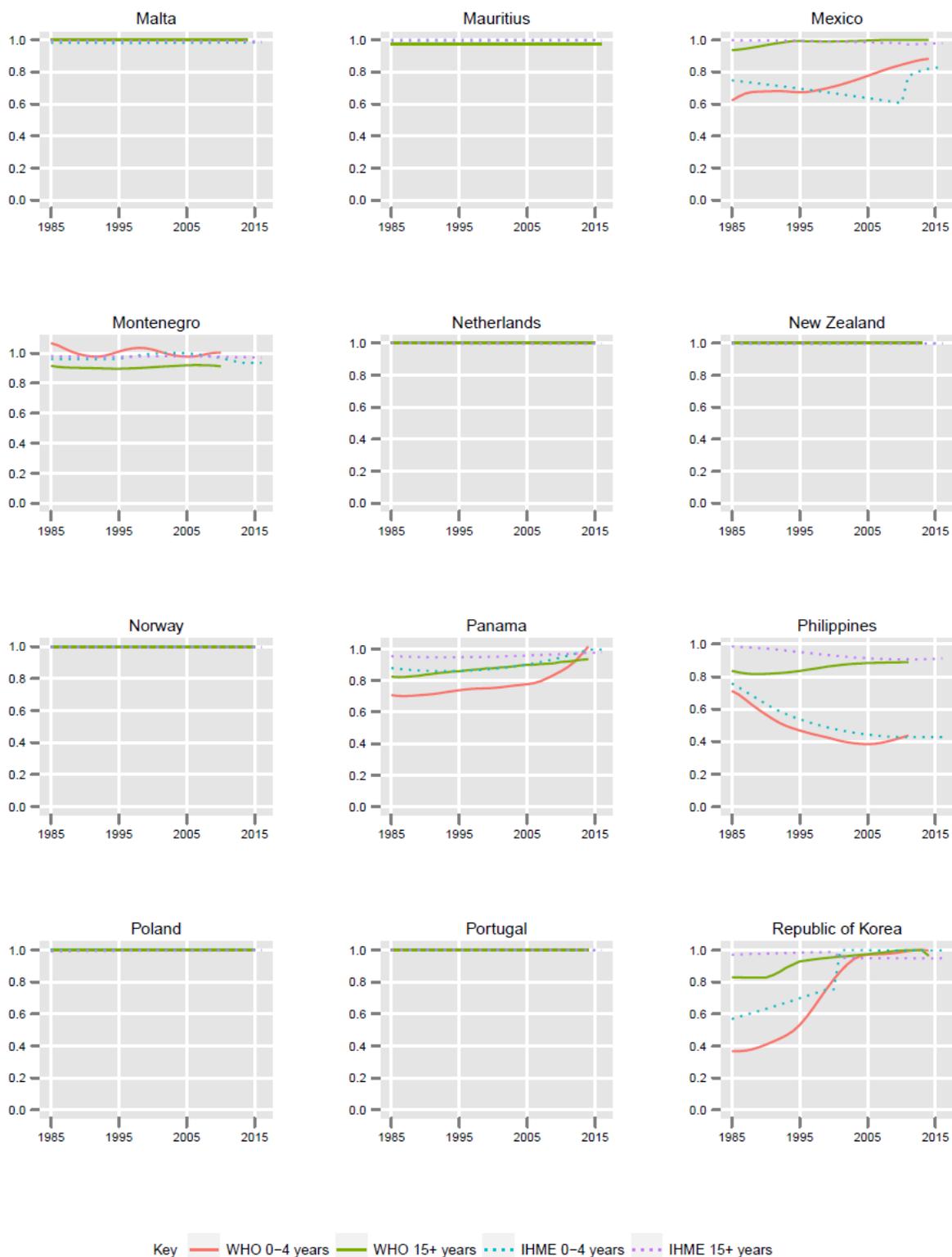


Annex Table B (continued): Estimated completeness* of death registration data, by country and year, 1985-2016.

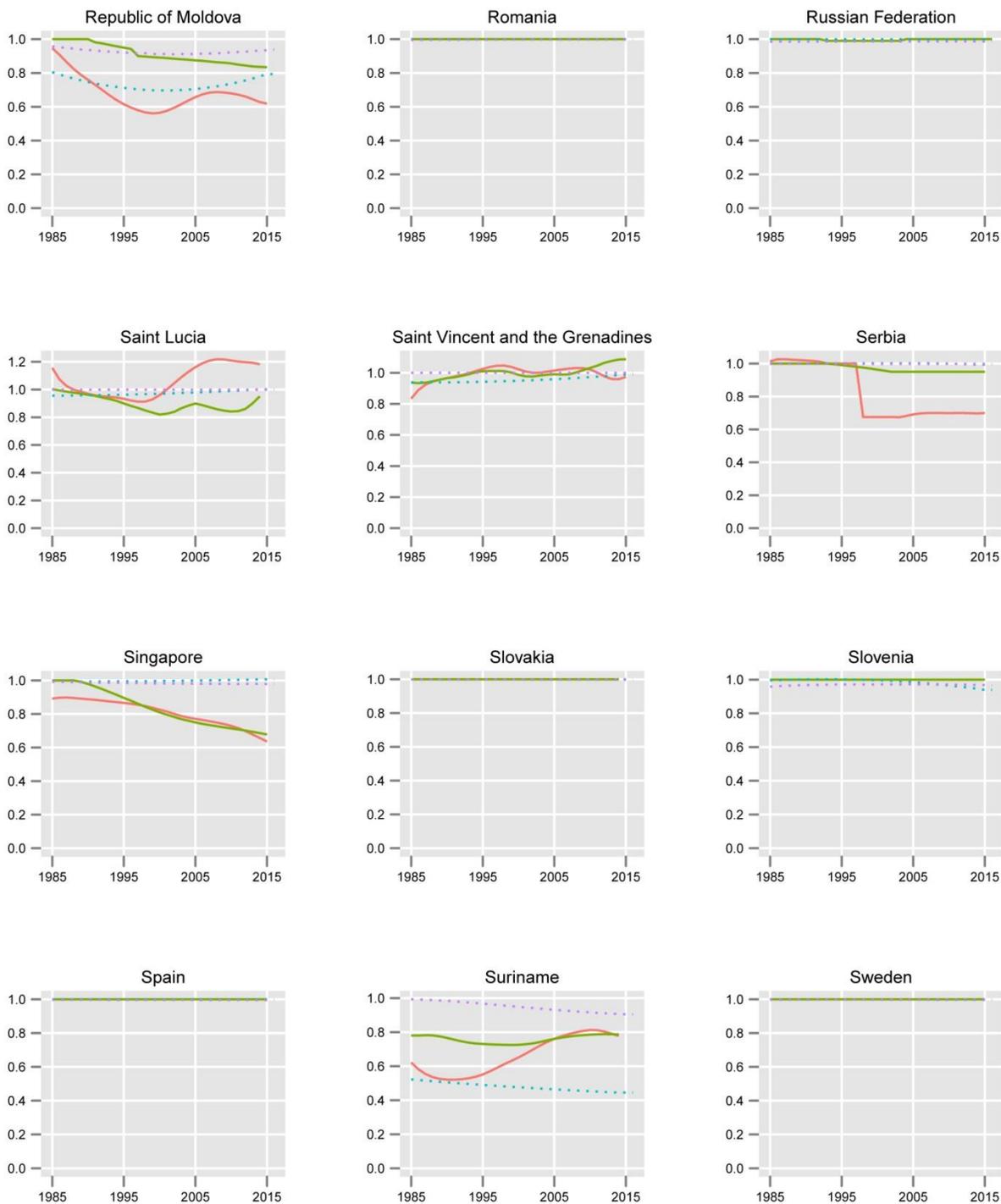


Key — WHO 0-4 years — WHO 15+ years — IHME 0-4 years — IHME 15+ years

Annex Table B (continued): Estimated completeness* of death registration data, by country and year, 1985-2016.

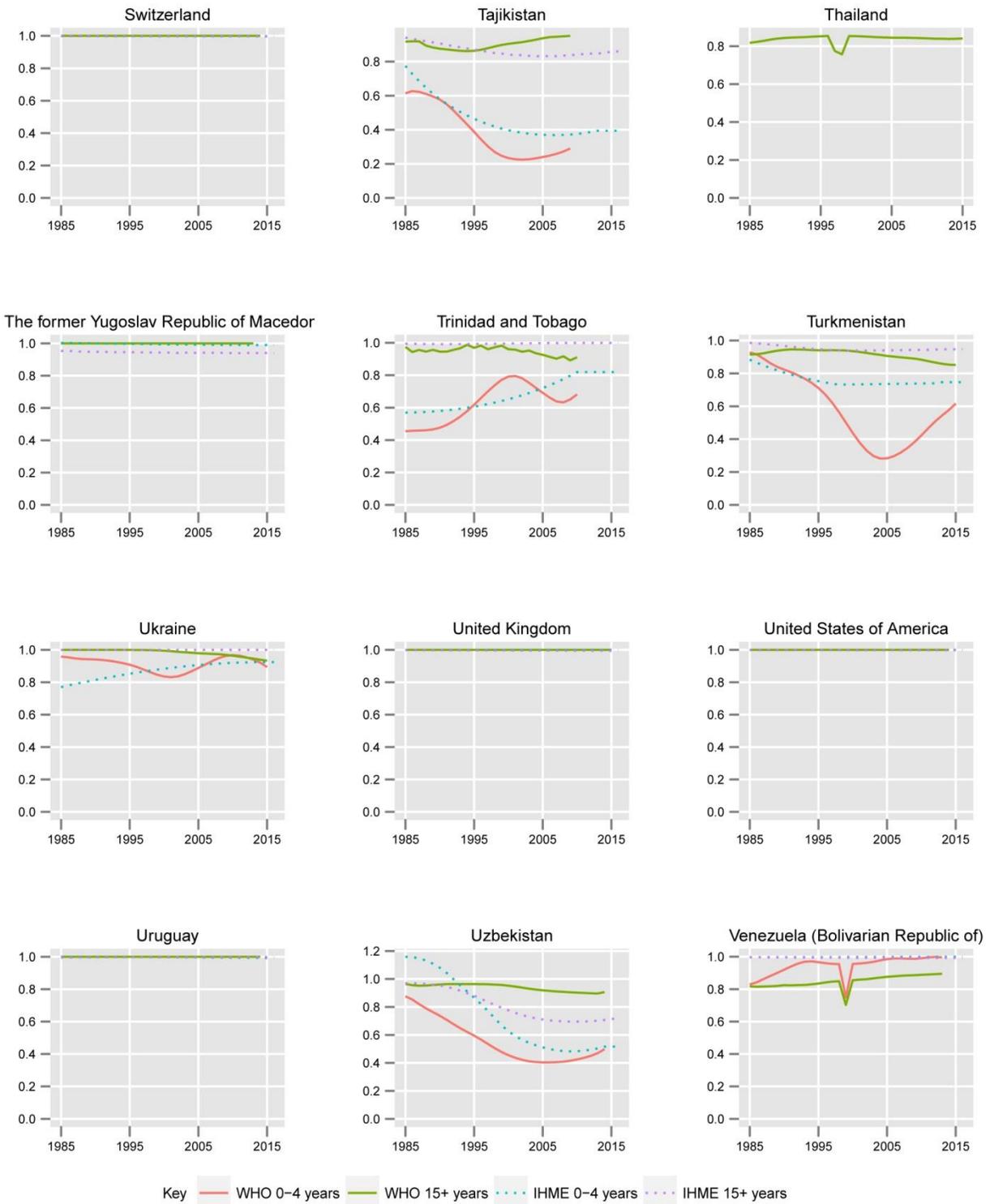


Annex Table B (continued): Estimated completeness* of death registration data, by country and year, 1985-2016.



Key WHO 0-4 years WHO 15+ years IHME 0-4 years IHME 15+ years

Annex Table B (continued): Estimated completeness* of death registration data, by country and year, 1985-2016.



* Completeness estimated for total registered deaths reported to WHO Mortality Database or from other available sources. This may include registered deaths for which cause of death was not recorded for some countries. Hence the completeness shown here may be greater than that for cause of death datasets included in the WHO Mortality Database.

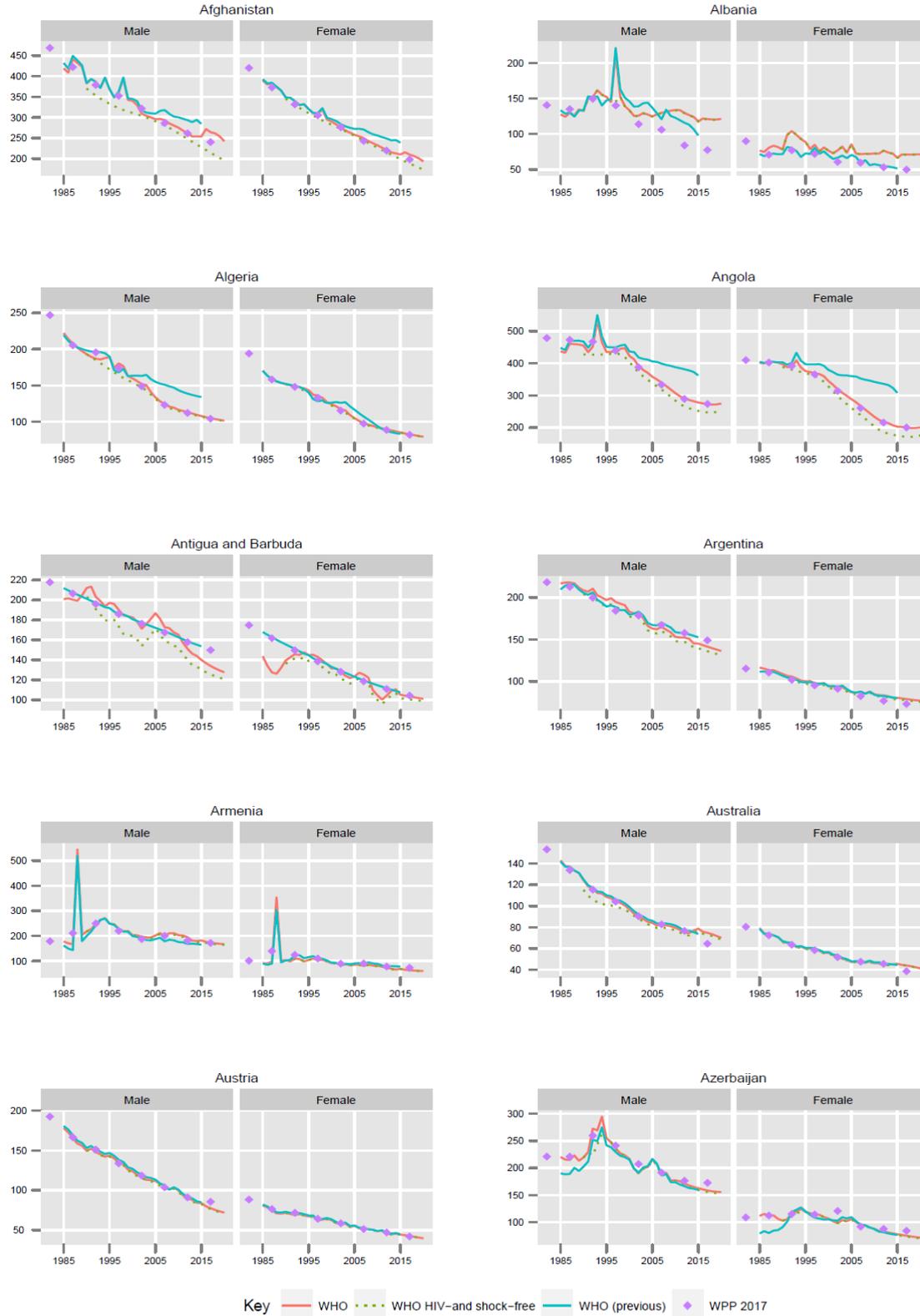
Annex C: Estimated completeness* of death registration data for most recent year

Country	Year	Completeness (%)	Country	Year	Completeness (%)
Albania	2015	87	Kyrgyzstan	2015	96
Antigua and Barbuda	2015	84	Latvia	2015	100
Argentina	2015	100	Lithuania	2016	100
Armenia	2016	100	Luxembourg	2015	100
Australia	2015	100	Maldives	2011	94
Austria	2016	100	Malta	2015	100
Azerbaijan	2011	97	Mauritius	2016	99
Bahrain	2014	96	Mexico	2015	100
Belarus	2015	100	Montenegro	2010	91
Belgium	2015	100	Netherlands	2016	100
Bosnia and Herzegovina	2014	93	New Zealand	2013	100
Brazil	2015	97	Norway	2015	100
Brunei Darussalam	2015	97	Panama	2015	92
Bulgaria	2014	100	Philippines	2011	89
Canada	2013	100	Poland	2015	100
Chile	2015	97	Portugal	2014	100
Colombia	2015	80	Puerto Rico	2015	100
Costa Rica	2014	87	Republic of Korea	2015	100
Croatia	2016	100	Republic of Moldova	2016	82
Cuba	2015	100	Romania	2016	100
Cyprus	2015	74	Russian Federation	2015	100
Czechia	2016	100	Saint Lucia	2014	97
Denmark	2015	100	Saint Vincent and the Grenadines	2015	100
Ecuador	2015	81	Serbia	2015	95
Egypt	2015	94	Singapore	2015	68
Estonia	2015	100	Slovakia	2014	100
Finland	2015	100	Slovenia	2015	100
France	2014	100	Spain	2015	100
Georgia	2015	90	Suriname	2014	80
Germany	2015	100	Sweden	2016	100
Greece	2015	100	Switzerland	2015	100
Grenada	2016	100	Tajikistan	2009	87
Guatemala	2015	100	The former Yugoslav Republic of Macedonia	2013	100
Guyana	2013	90	Trinidad and Tobago	2011	83
Hungary	2016	100	Turkmenistan	2015	85
Iceland	2016	100	Ukraine	2015	93
Ireland	2014	100	United Kingdom	2015	100
Israel	2015	100	United States of America	2016	100
Italy	2015	100	Uruguay	2015	100
Japan	2015	100	Uzbekistan	2014	93
Kazakhstan	2015	87	Venezuela (Bolivarian Republic of)	2013	89

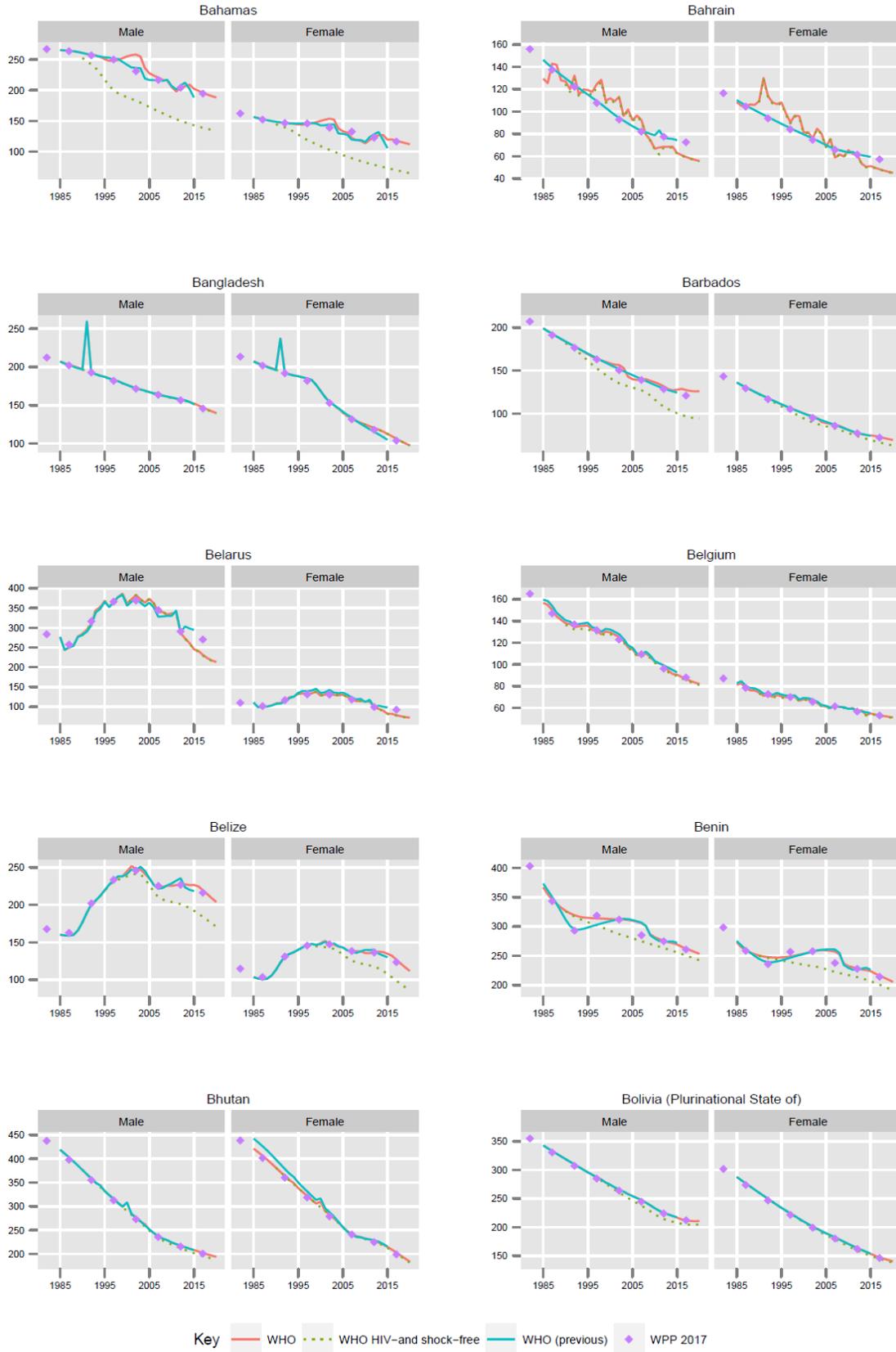
* Completeness for ages 15 and over estimated for total registered deaths reported to WHO Mortality Database or from other available sources. This may include registered deaths for which cause of death was not recorded for some countries. Hence the completeness shown here may be greater than that for cause of death datasets included in the WHO Mortality Database.

Annex D: Comparison of 45q15 estimates: WPP2017 and GHE2015/6

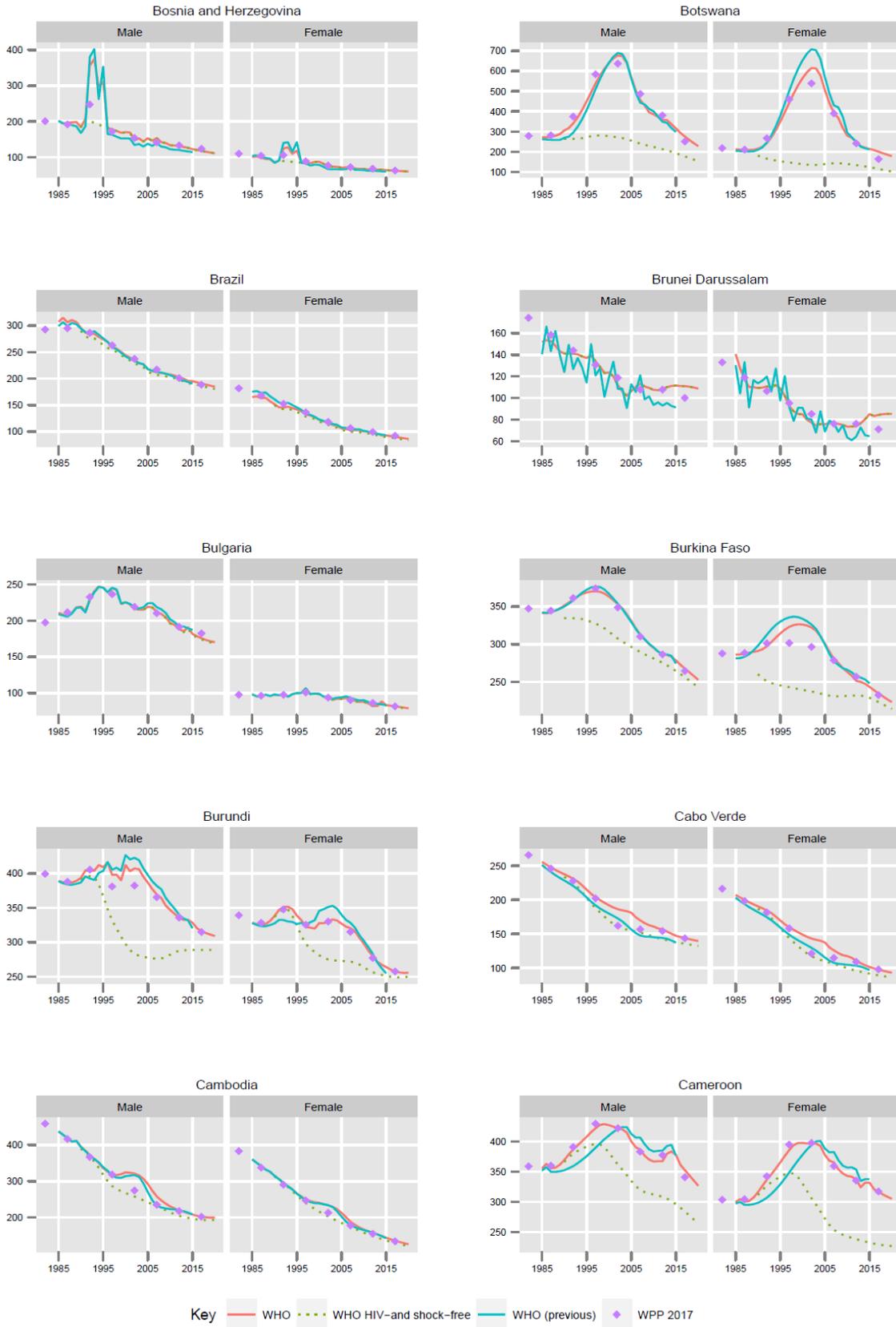
Annex Table D: GHE2016, GHE2015, WPP2017 estimates of 45q15, by country, sex and year, 1985-2020.



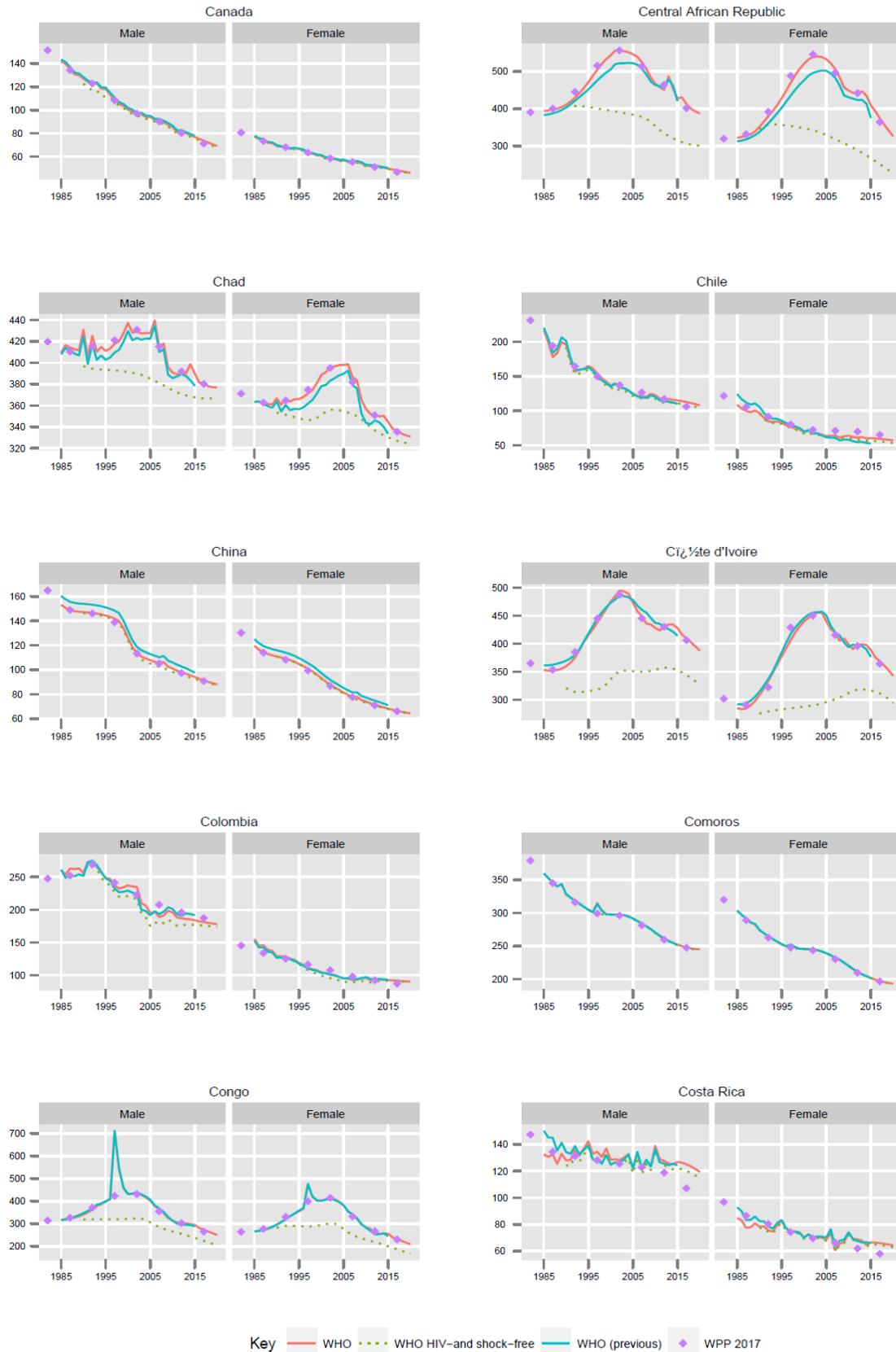
Annex Table D (continued): GHE2017, GHE2015, WPP2017 estimates of 45q15, by country, sex and year, 1985-2020.



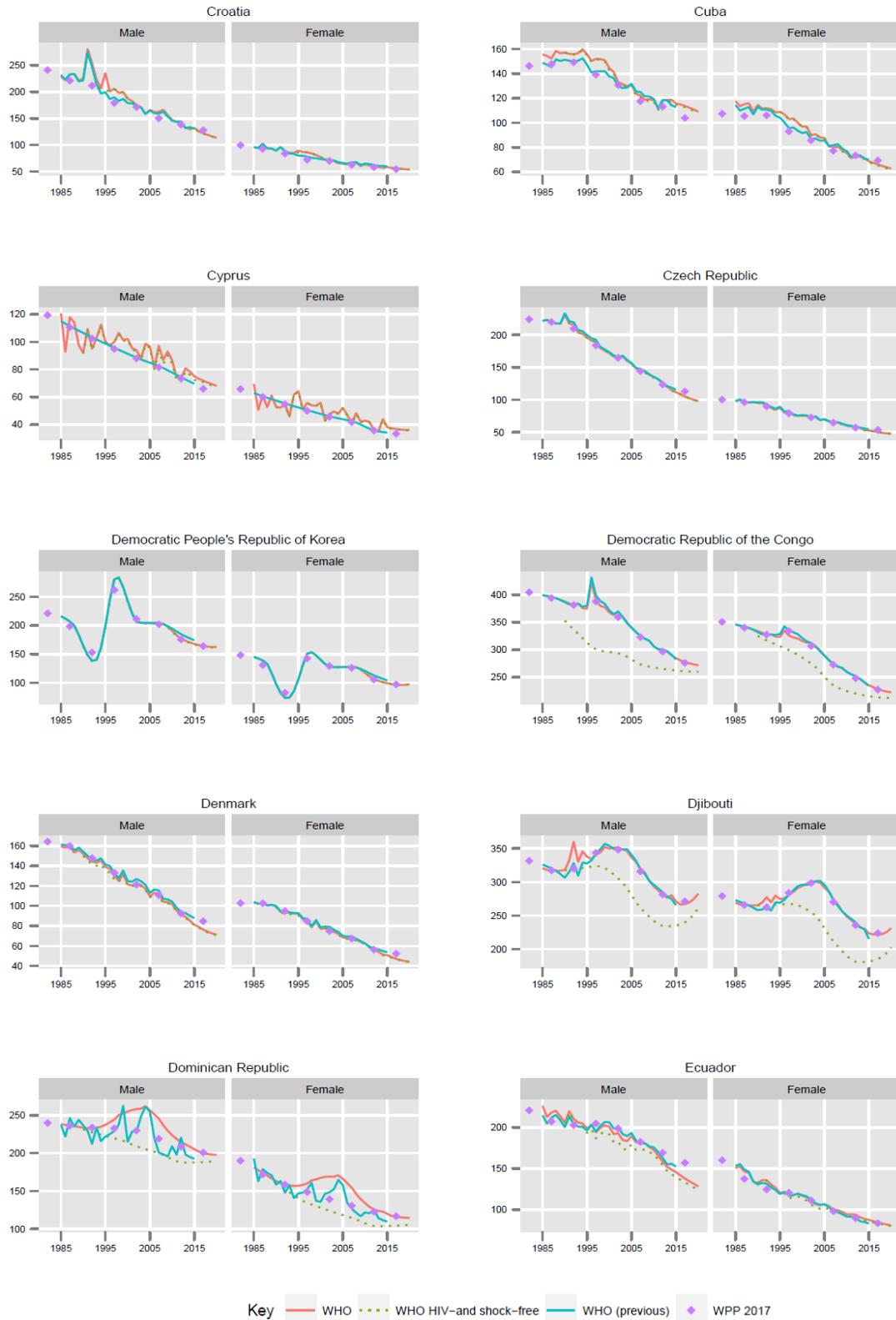
Annex Table D (continued): GHE2017, GHE2015, WPP2017 estimates of 45q15, by country, sex and year, 1985-2020.



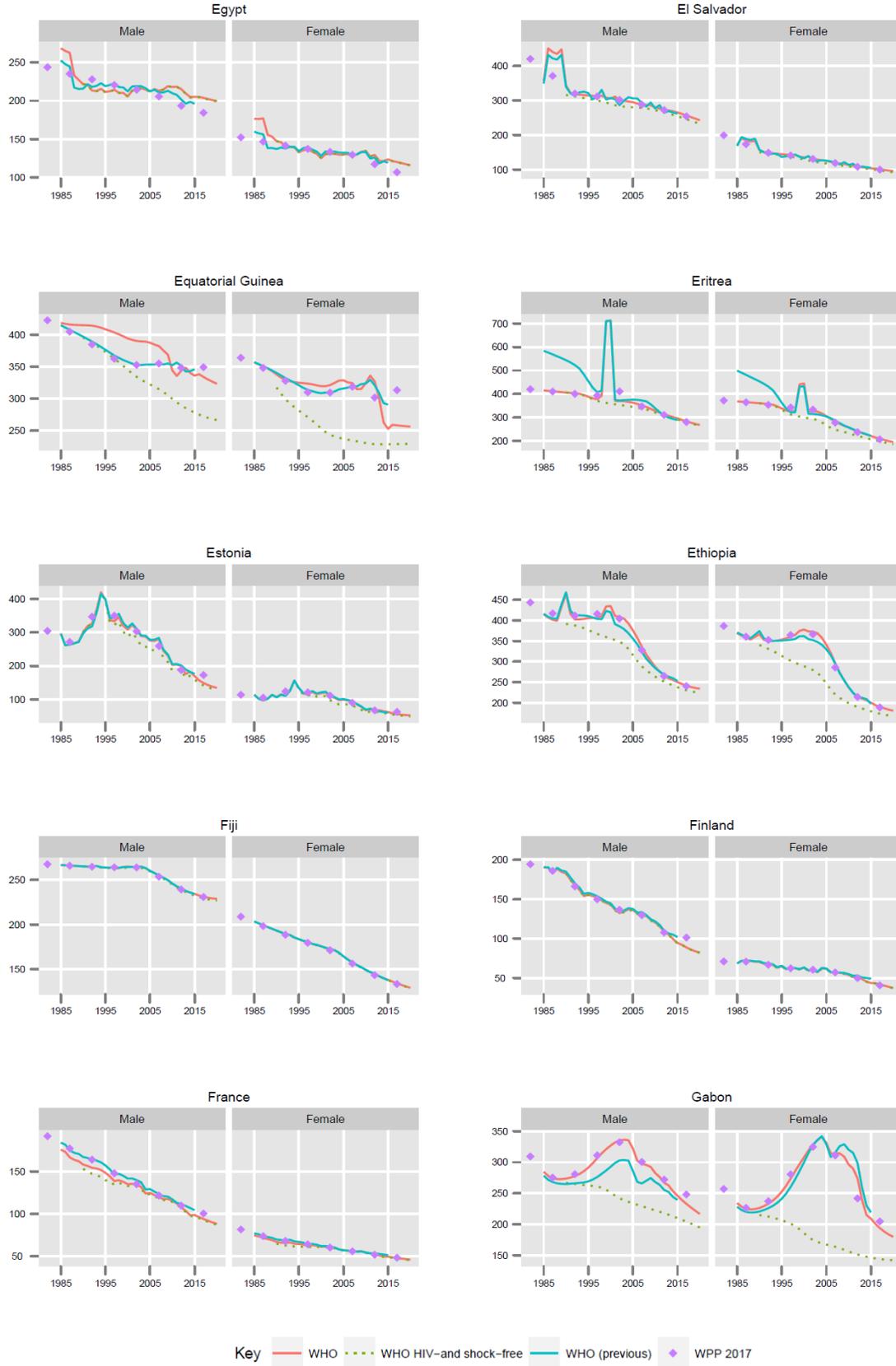
Annex Table D (continued): GHE2017, GHE2015, WPP2017 estimates of 45q15, by country, sex and year, 1985-2020.



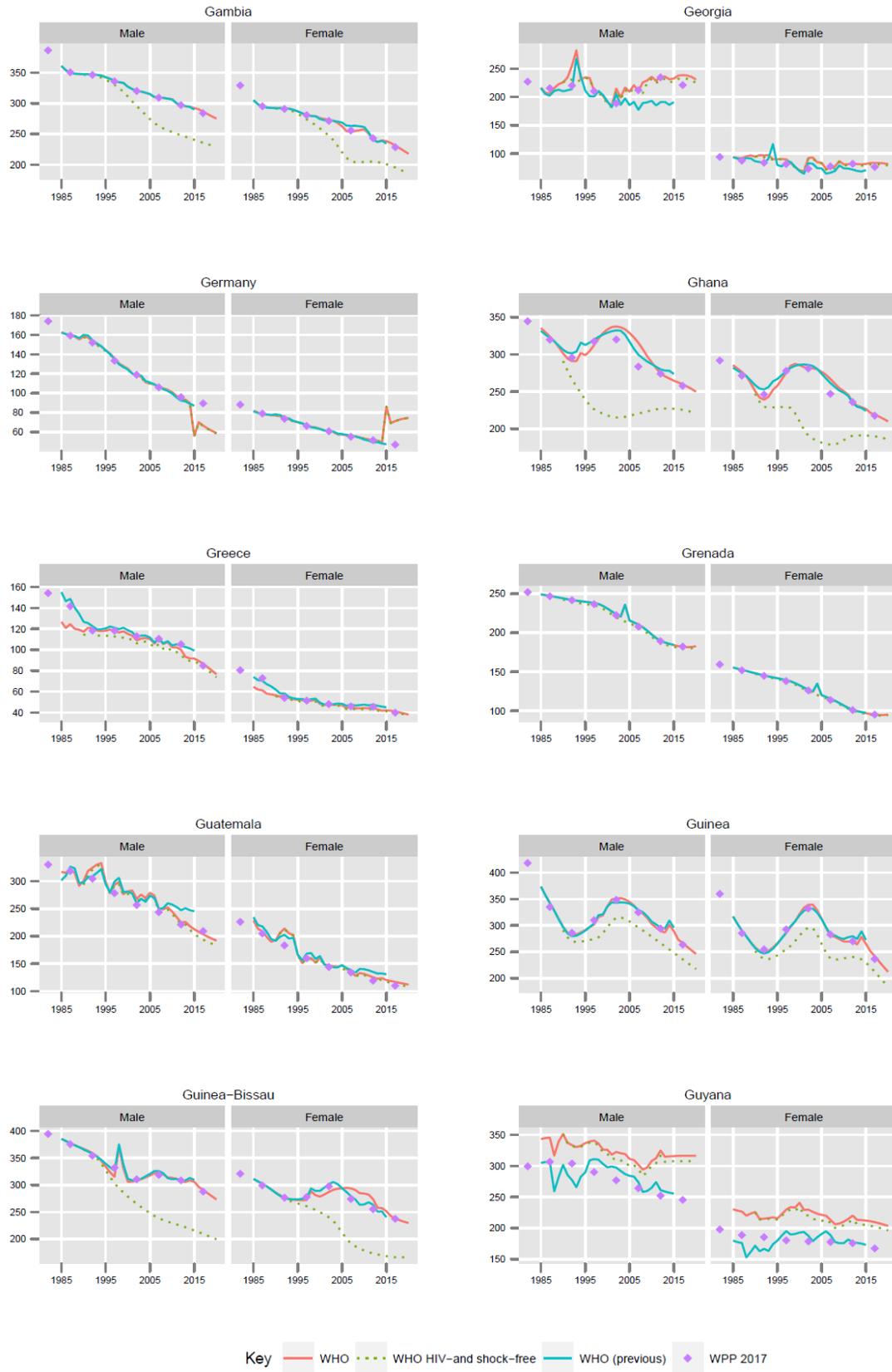
Annex Table D (continued): GHE2017, GHE2015, WPP2017 estimates of 45q15, by country, sex and year, 1985-2020.



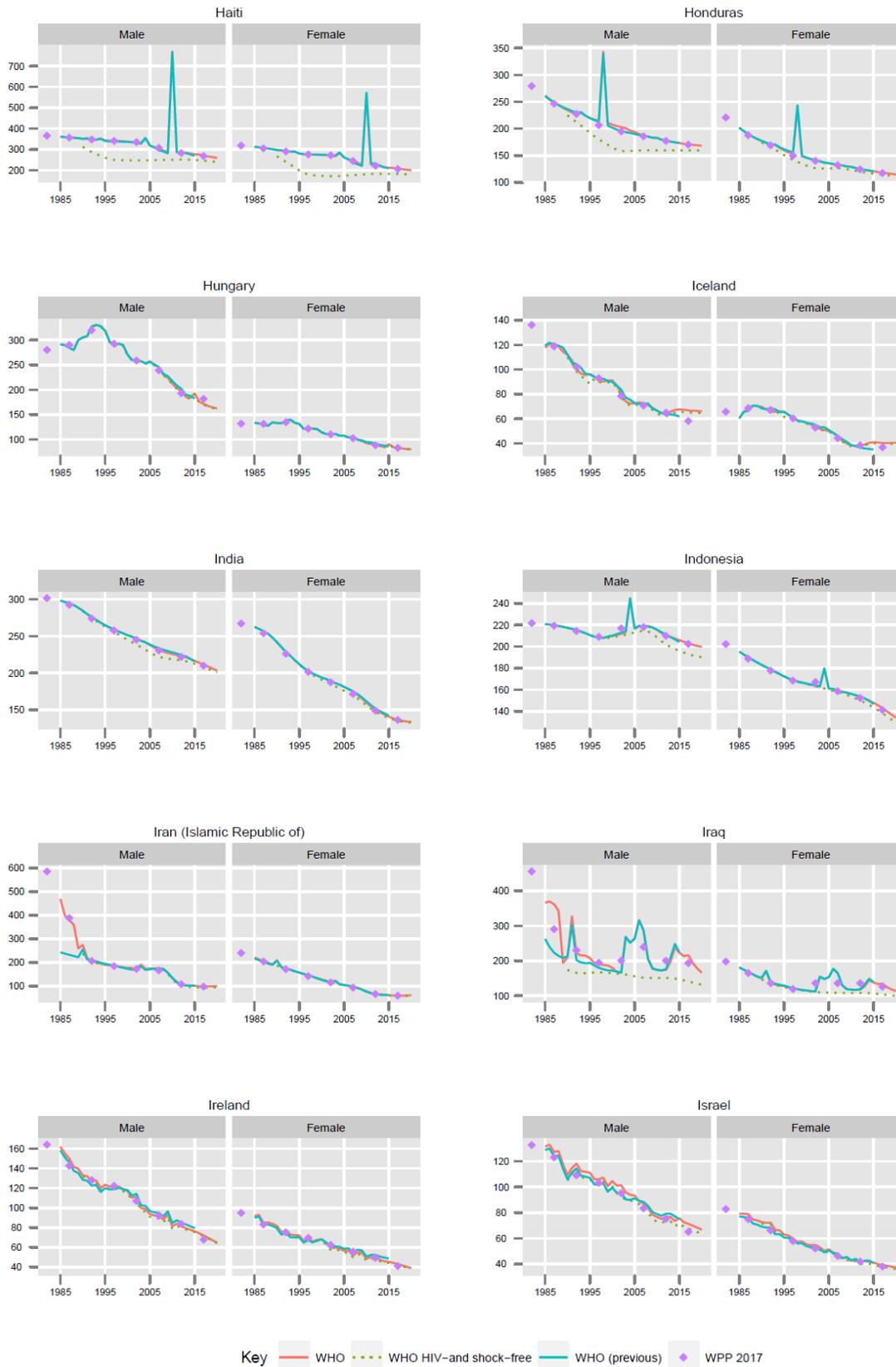
Annex Table B (continued): CHE2017, CHE2015, WPR2017 estimates of $45-15$, by country, sex and year, 1985-2020.



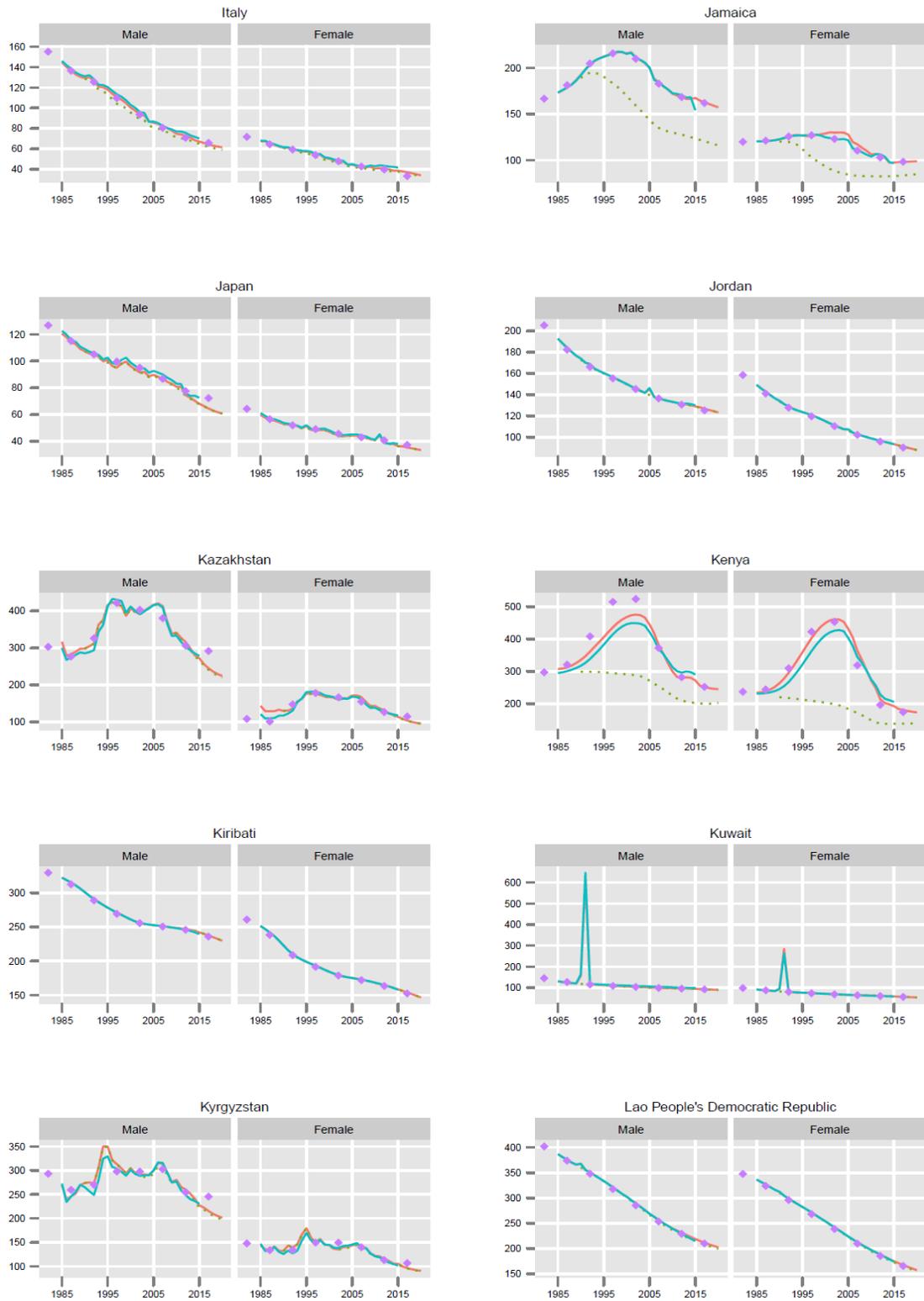
Annex Table D (continued): GHE2017, GHE2015, WPP2017 estimates of 45q15, by country, sex and year, 1985-2020.



Annex Table D (continued): GHE2017, GHE2015, WPP2017 estimates of 45q15, by country, sex and year, 1985-2020.

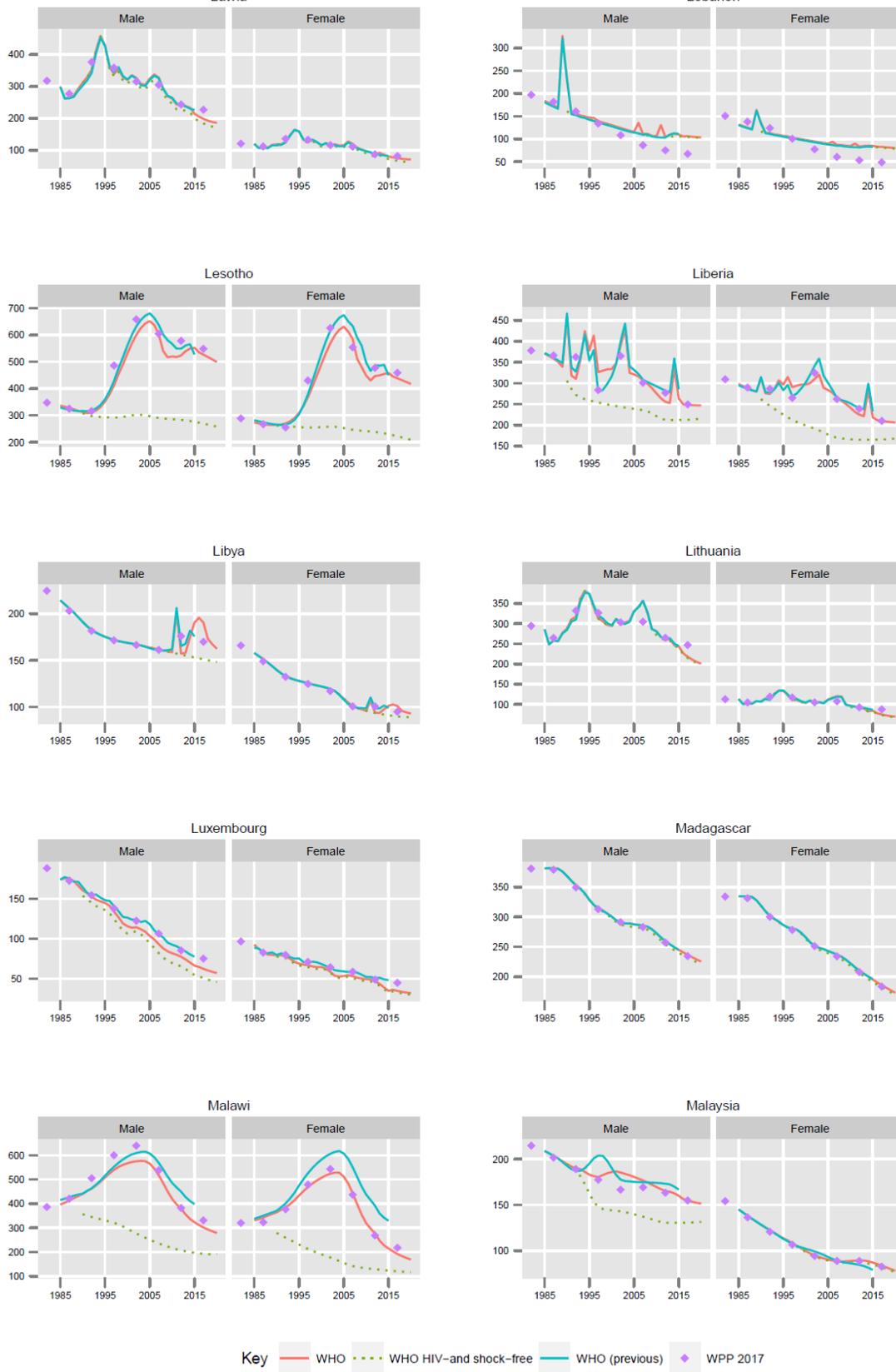


Annex Table D (continued): GHE2017, GHE2015, WPP2017 estimates of 45q15, by country, sex and year, 1985-2020.

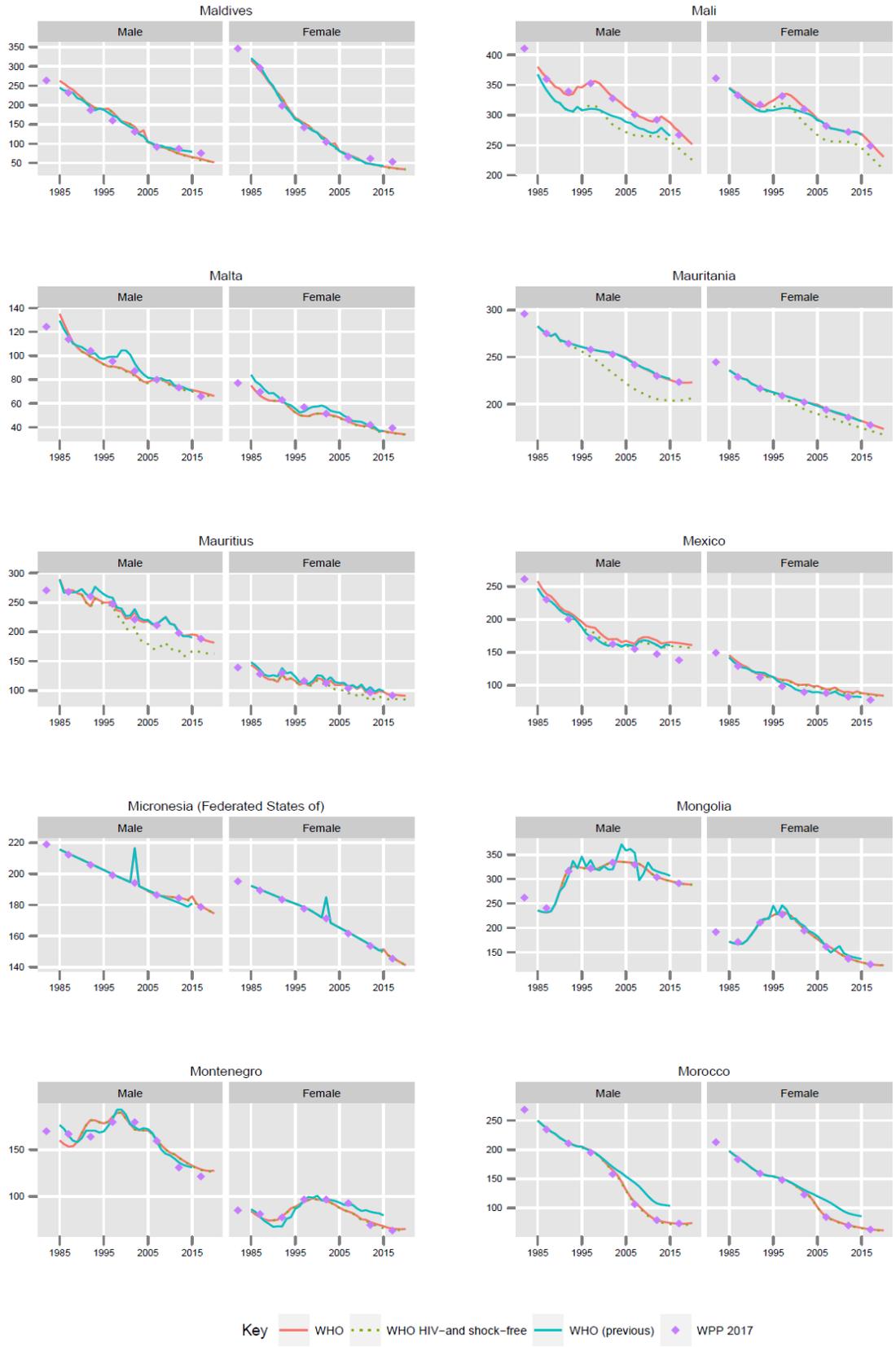


Key WHO WHO HIV-and shock-free WHO (previous) WPP 2017

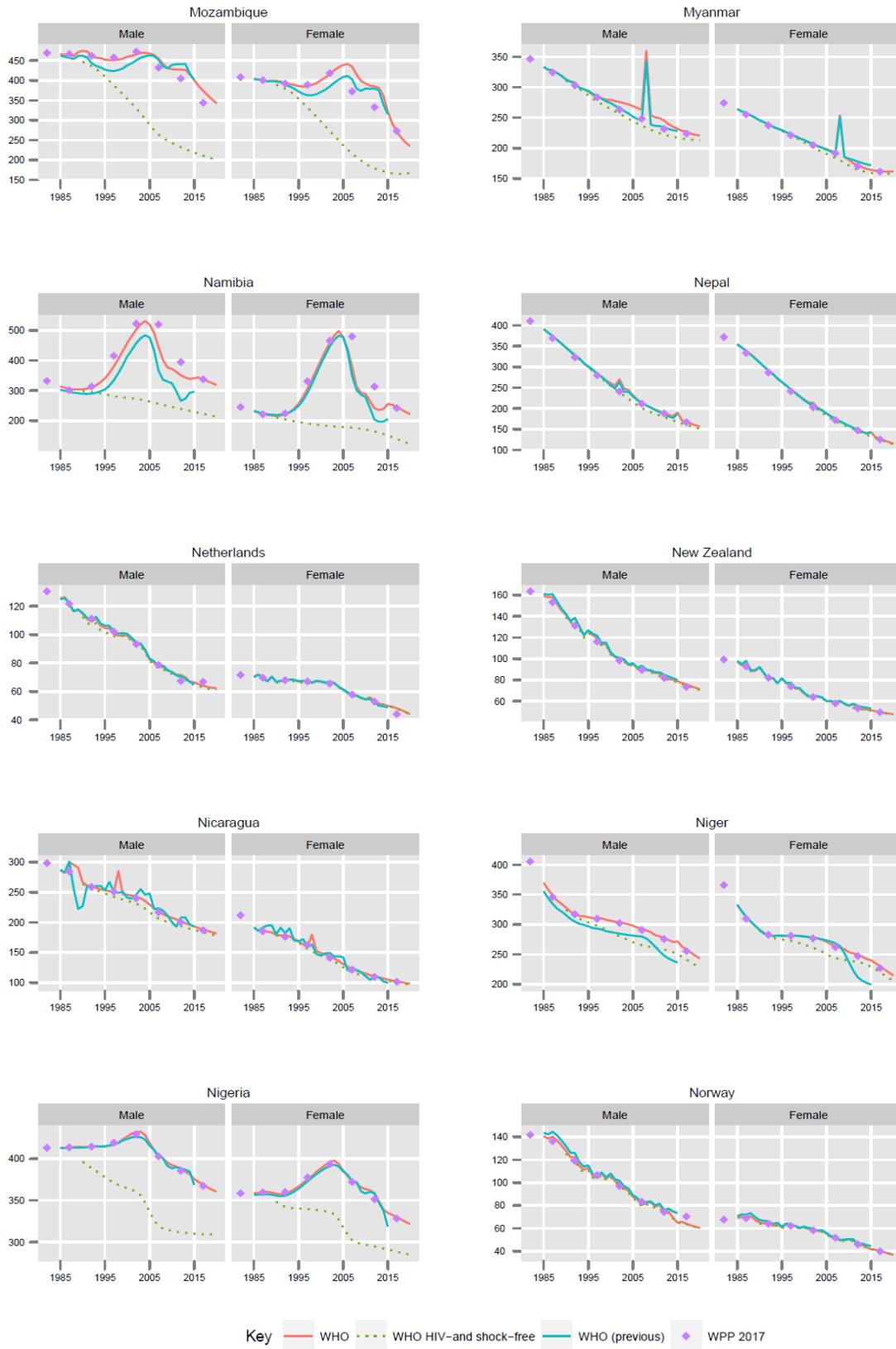
Annex Table D (continued): GHE2017, GHE2015, WPP2017 estimates of 15a15, by country, sex and year, 1985-2020.



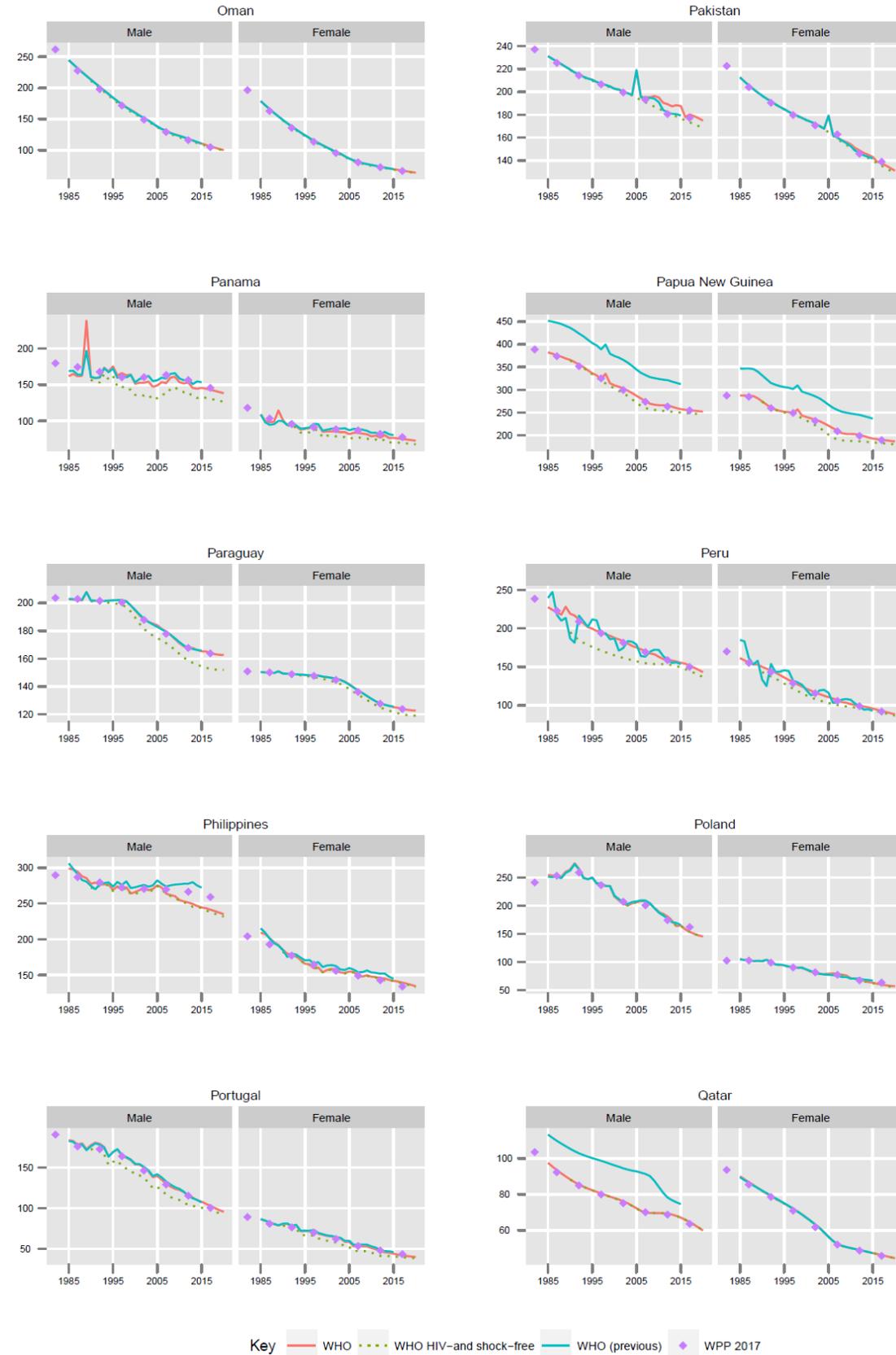
Annex Table D (continued): GHE2017, GHE2015, WPP2017 estimates of 45q15, by country, sex and year, 1985-2020.



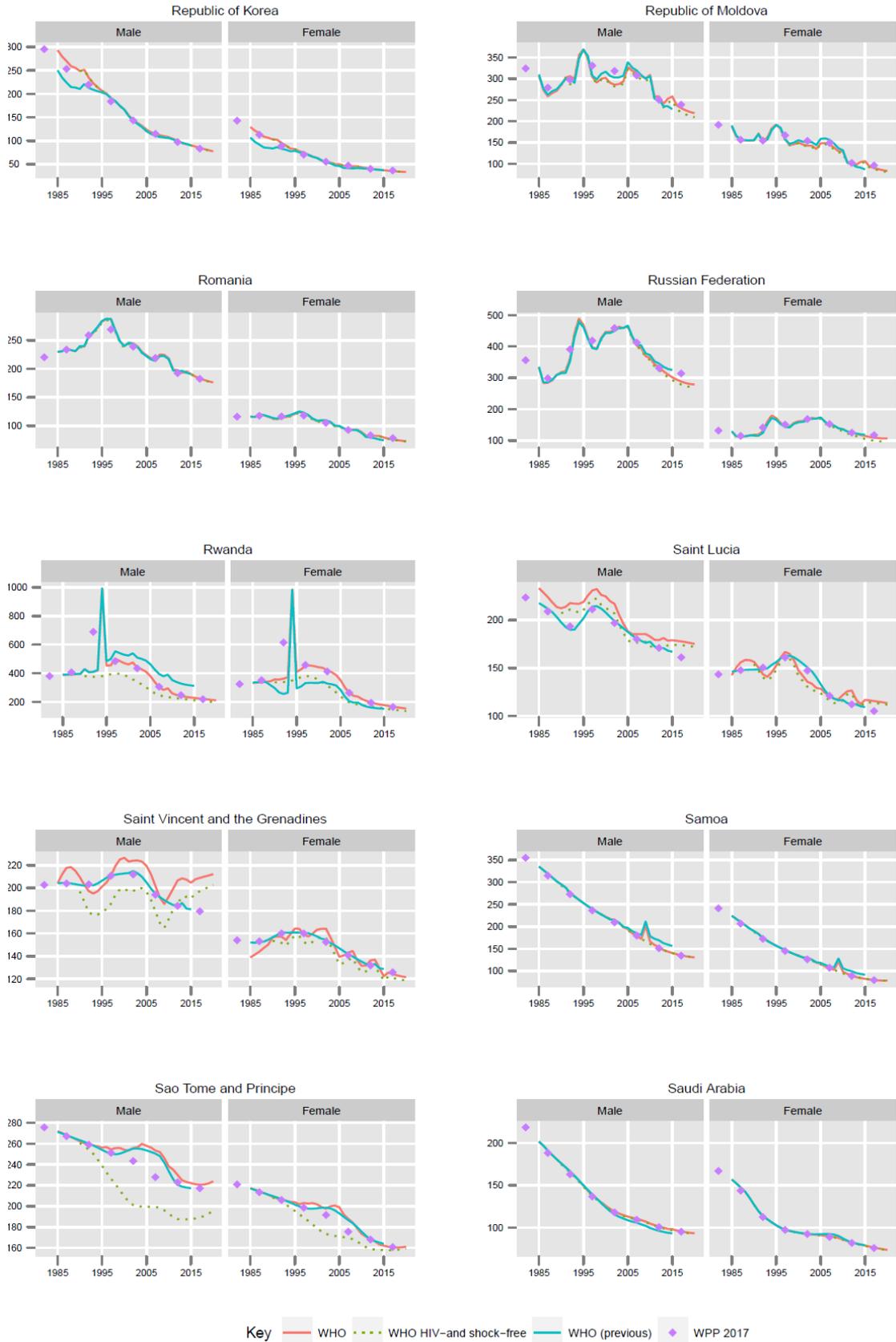
Annex Table D (continued): GHE2017, GHE2015, WPP2017 estimates of 45q15, by country, sex and year, 1985-2020.



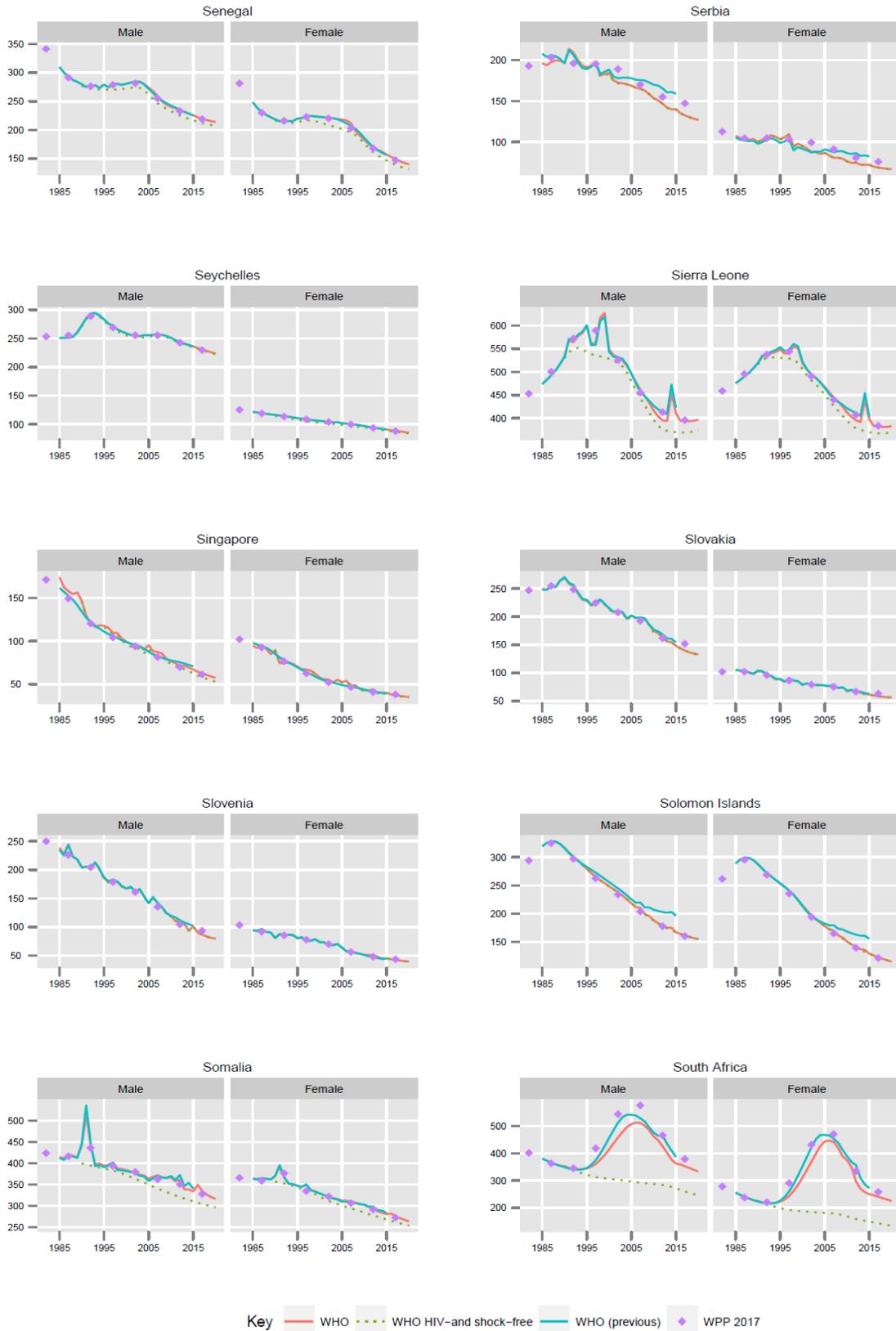
Annex Table D (continued): GHE2017, GHE2015, WDD2017 estimates of 15a15, by country, sex and year, 1985-2020.



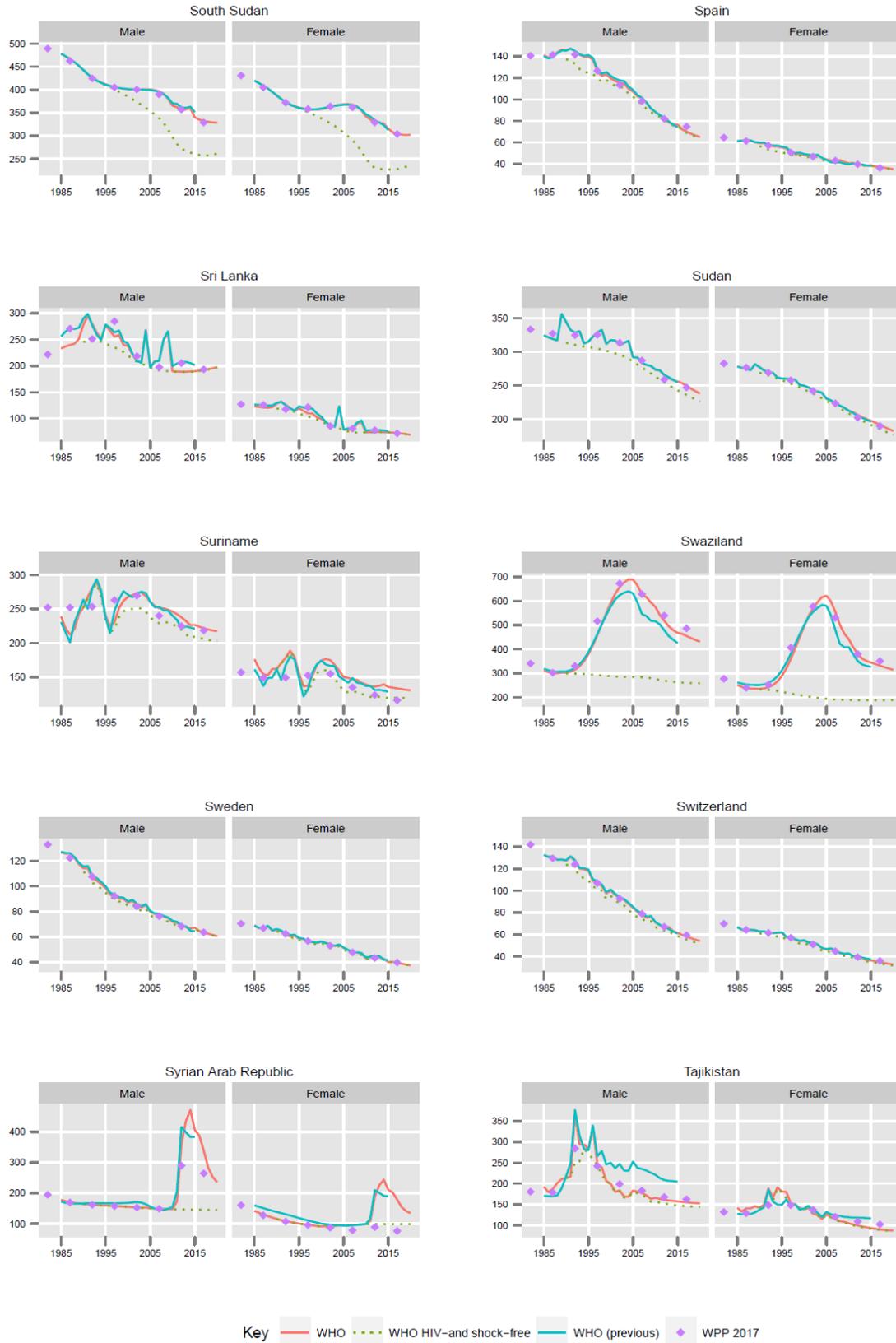
Annex Table D (continued): GHE2017, GHE2015, WDD2017 estimates of *15a15* by country, sex and year 1985-2020.



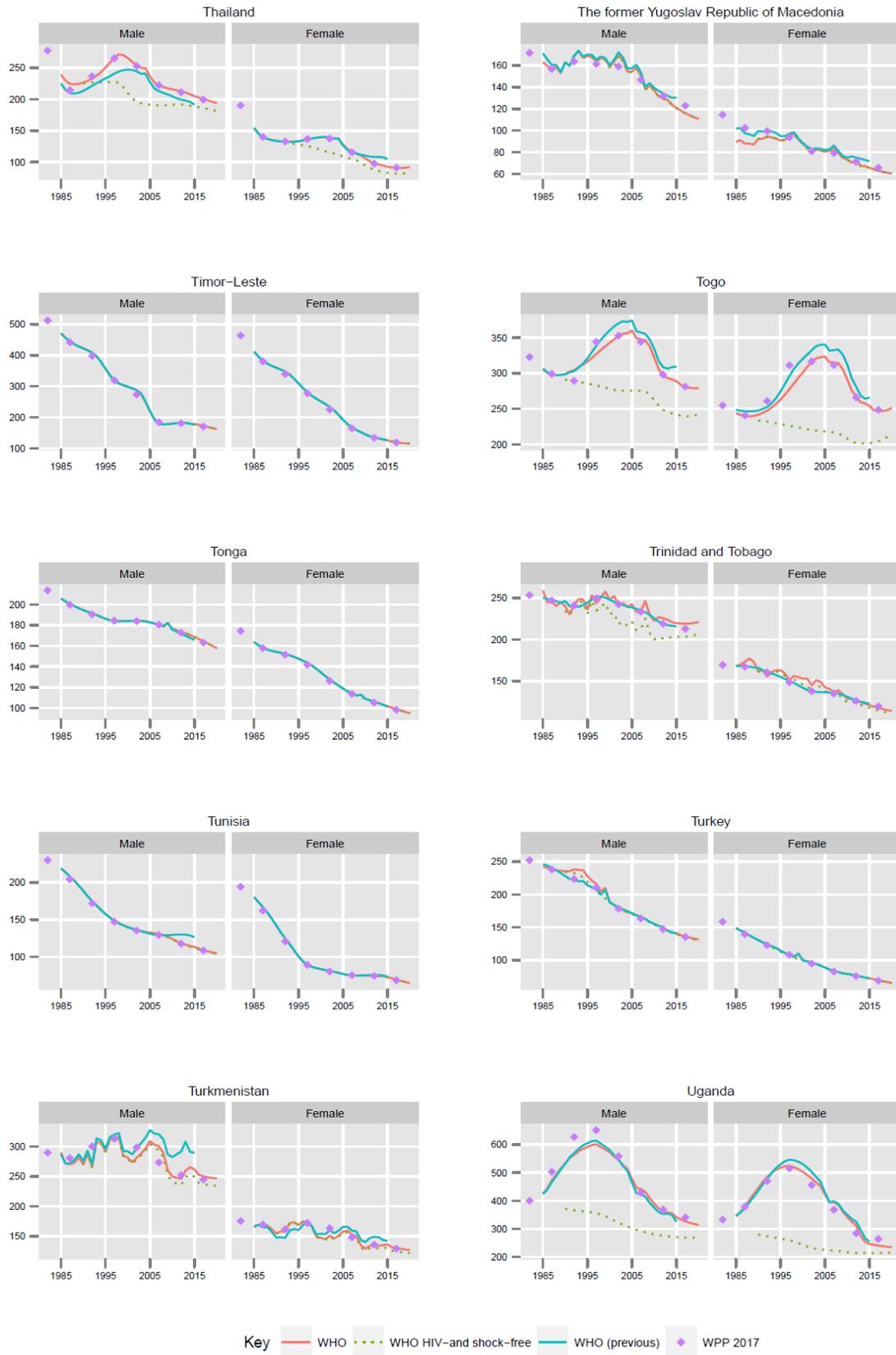
Annex Table D (continued): GHE2017, GHE2015, WPP2017 estimates of 45q15, by country, sex and year, 1985-2020.



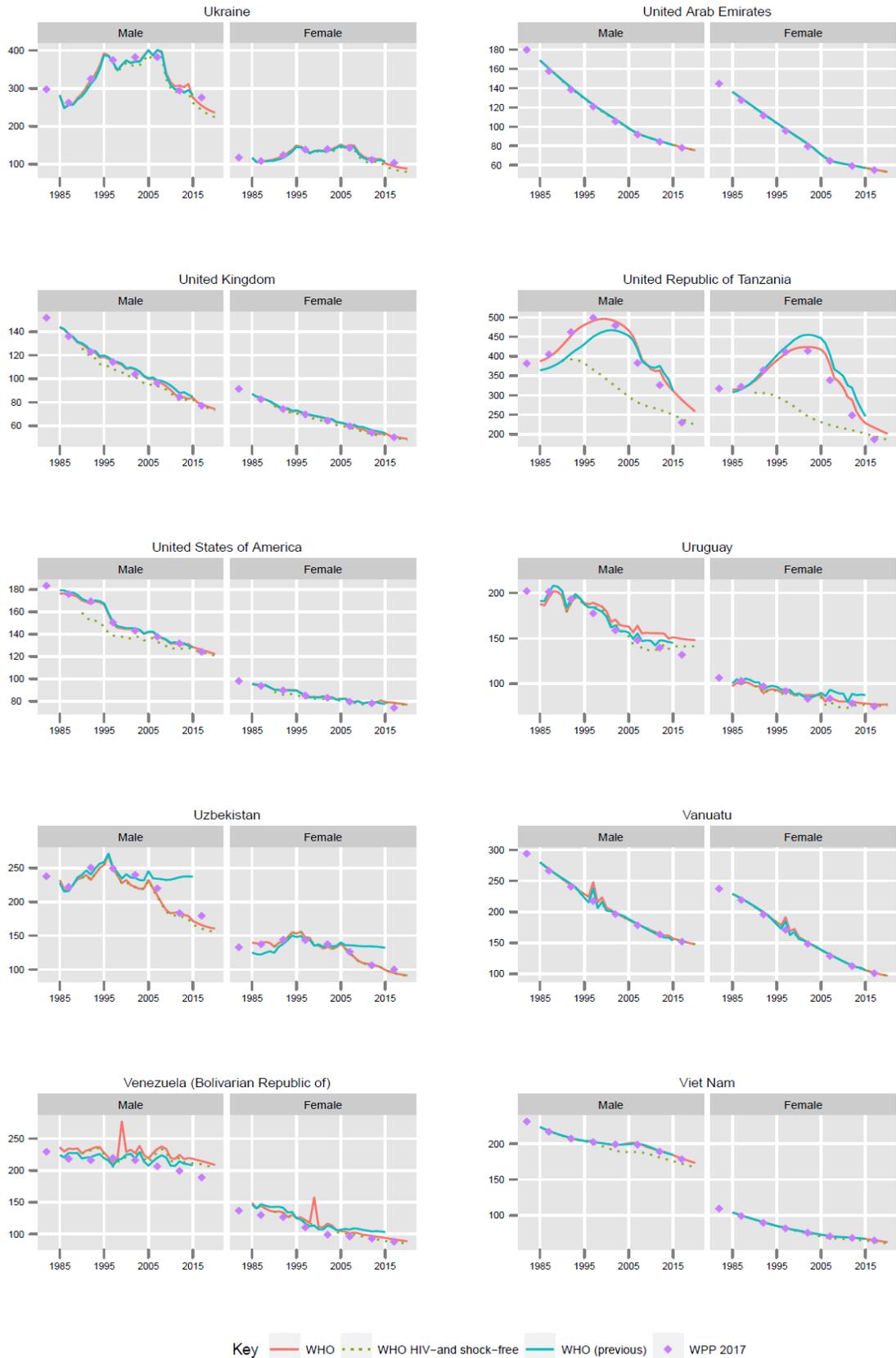
Annex Table D (continued): GHE2017, GHE2015, WPP2017 estimates of 45q15, by country, sex and year, 1985-2020.



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Annex Table D (continued): GHE2017, GHE2015, WPP2017 estimates of 45q15, by country, sex and year, 1985-2020.

