

July 7, 2018; page 1

WHO and UNICEF estimates of national immunization coverage - next revision available July  $15,\,2019$ 

BACKGROUND NOTE: Each year WHO and UNICEF jointly review reports submitted by Member States regarding national immunization coverage, finalized survey reports as well as data from the published and grey literature. Based on these data, with due consideration to potential biases and the views of local experts, WHO and UNICEF attempt to distinguish between situations where the available empirical data accurately reflect immunization system performance and those where the data are likely to be compromised and present a misleading view of immunization coverage while jointly estimating the most likely coverage levels for each country.

WHO and UNICEF estimates are country-specific; that is to say, each country's data are reviewed individually, and data are not borrowed from other countries in the absence of data. Estimates are not based on ad hoc adjustments to reported data; in some instances empirical data are available from a single source, usually the nationally reported coverage data. In cases where no data are available for a given country/vaccine/year combination, data are considered from earlier and later years and interpolated to estimate coverage for the missing year(s). In cases where data sources are mixed and show large variation, an attempt is made to identify the most likely estimate with consideration of the possible biases in available data. For methods see:

- \*Burton et al. 2009. WHO and UNICEF estimates of national infant immunization coverage: methods and processes.
- \*Burton et al. 2012. A formal representation of the WHO and UNICEF estimates of national immunization coverage: a computational logic approach.
- \*Brown et al. 2013. An introduction to the grade of confidence used to characterize uncertainty around the WHO and UNICEF estimates of national immunization coverage.

#### DATA SOURCES.

- ADMINISTRATIVE coverage: Reported by national authorities and based on aggregated administrative reports from health service providers on the number of vaccinations administered during a given period (numerator data) and reported target population data (denominator data). May be biased by inaccurate numerator and/or denominator data.
- **OFFICIAL coverage:** Estimated coverage reported by national authorities that reflects their assessment of the most likely coverage based on any combination of administrative coverage, survey-based estimates or other data sources or adjustments. Approaches to determine OFFICIAL coverage may differ across countries.
- SURVEY coverage: Based on estimated coverage from population-based household surveys among children aged 12-23 months or 24-35 months following a review of survey methods and results. Information is based on the combination of vaccination history from documented evidence or caregiver recall. Survey results are considered for the appropriate birth cohort based on the period of data collection.

#### ABBREVIATIONS

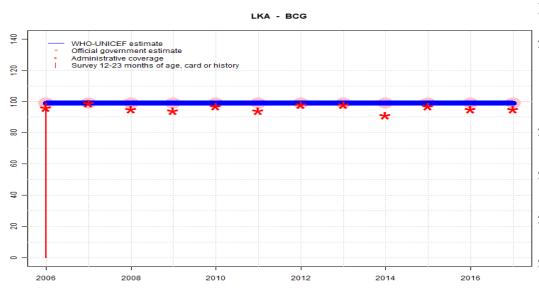
- $\mathbf{BCG:}\,$  percentage of births who received one dose of Bacillus Calmette Guerin vaccine.
- DTP1 / DTP3: percentage of surviving infants who received the 1st / 3rd dose, respectively, of diphtheria and tetanus toxoid with pertussis containing vaccine.
- Pol3: percentage of surviving infants who received the 3rd dose of polio containing vaccine. May be either oral or inactivated polio vaccine.
- IPV1: percentage of surviving infants who received at least one dose of inactivated polio vaccine. In countries utilizing an immunization schedule recommending either (i) a primary series of three doses of oral polio vaccine (OPV) plus at least one dose of IPV where OPV is included in routine

immunization and/or campaign or (ii) a sequential schedule of IPV followed by OPV, WHO and UNICEF estimates for IPV1 reflect coverage with at least one routine dose of IPV among infants <1 year of age among countries. For countries utilizing IPV containing vaccine use only, i.e., no recommended dose of OPV, the WHO and UNICEF estimate for IPV1 corresponds to coverage for the 1st dose of IPV.

Production of IPV coverage estimates, which begins in 2015, results in no change of the estimated coverage levels for the 3rd dose of polio (Pol3). For countries recommending routine immunization with a primary series of three doses of IPV alone, WHO and UNICEF estimated Pol3 coverage is equivalent to estimated coverage with three doses of IPV. For countries with a sequential schedule, estimated Pol3 coverage is based on that for the 3rd dose of polio vaccine regardless of vaccine type.

- MCV1: percentage of surviving infants who received the 1st dose of measles containing vaccine. In countries where the national schedule recommends the 1st dose of MCV at 12 months or later based on the epidemiology of disease in the country, coverage estimates reflect the percentage of children who received the 1st dose of MCV as recommended.
- MCV2: percentage of children who received the 2nd dose of measles containing vaccine according to the nationally recommended schedule.
- RCV1: percentage of surviving infants who received the 1st dose of rubella containing vaccine. Co verage estimates are based on WHO and UNICEF estimates of coverage for the dose of measles containing vaccine that corresponds to the first measles-rubella combination vaccine. Nationally reported coverage of RCV is not taken into consideration nor are the data represented in the accompanying graph and data table.
- HepBB: percentage of births which received a dose of hepatitis B vaccine within 24 hours of delivery. Estimates of hepatitis B birth dose coverage are produced only for countries with a universal birth dose policy. Estimates are not produced for countries that recommend a birth dose to infants born to HepB virus-infected mothers only or where there is insufficient information to determine whether vaccination is within 24 hours of birth.
- **HepB3:** percentage of surviving infants who received the 3rd dose of hepatitis B containing vaccine following the birth dose.
- **Hib3:** percentage of surviving infants who received the 3rd dose of Haemophilus influenzae type b containing vaccine.
- RotaC: percentage of surviving infants who received the final recommended dose of rotavirus vaccine, which can be either the 2nd or the 3rd dose depending on the vaccine.
- PcV3: percentage of surviving infants who received the 3rd dose of pneumococcal conjugate vaccine. In countries where the national schedule recommends two doses during infancy and a booster dose at 12 months or later based on the epidemiology of disease in the country, coverage estimates may reflect the percentage of surviving infants who received two doses of PcV prior to the 1st birthday.
- **YFV:** percentage of surviving infants who received one dose of yellow fever vaccine in countries where YFV is part of the national immunization schedule for children or is recommended in at risk areas; coverage estimates are annualized for the entire cohort of surviving infants.

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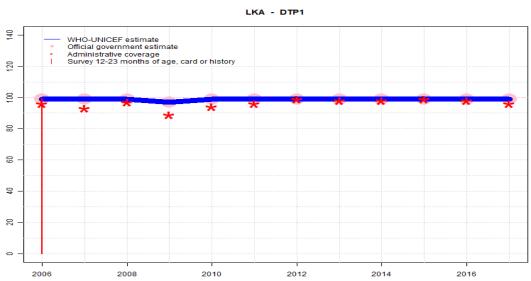


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Estimate	99	99	99	99	99	99	99	99	99	99	99	99
Estimate GoC	•••	•••	•••	••	••	••	••	••	••	••	••	••
Official	99	99	99	99	99	99	99	99	99	99	99	99
Administrative	96	99	95	94	97	94	98	98	91	97	95	95
Survey	100	NA										

- ••• Estimate is supported by reported data [R+], coverage recalculated with an independent denominator from the World Population Prospects: 2017 revision from the UN Population Division (D+), and at least one supporting survey within 2 years [S+]. While well supported, the estimate still carries a risk of being wrong.
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In all cases these estimates should be used with caution and should be assessed in light of the objective for which they are being used.

- 2017: Estimate based on coverage reported by national government. Programme reports that differences between official and administrative coverage levels reflect the contribution of services delivered through the private sector. WHO and UNICEF are aware of rolling district level coverage assessments in the country; nonetheless, the programme is encouraged to conduct a nationally representative independent assessment to validate the programme's continued high performance levels. GoC=R+D+
- 2016: Estimate based on coverage reported by national government. Programme reports that differences between official and administrative coverage levels reflect the contribution of services delivered through the private sector. GoC=R+D+
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- 2008: Estimate based on coverage reported by national government. GoC=R+S+D+
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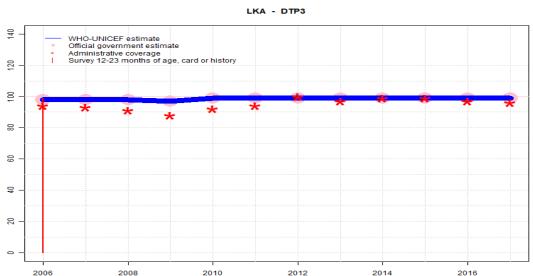


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Estimate	99	99	99	97	99	99	99	99	99	99	99	99
Estimate GoC	•••	•••	•••	••	••	••	••	••	••	••	••	••
Official	99	99	99	97	99	99	99	99	99	99	99	99
Administrative	96	93	97	89	94	96	99	98	98	99	98	96
Survey	100	NA										

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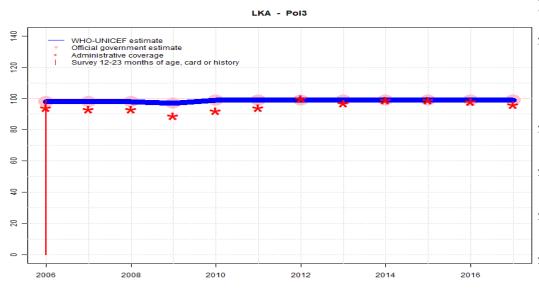


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Estimate	98	98	98	97	99	99	99	99	99	99	99	99
Estimate GoC	•••	•••	•••	••	••	••	••	••	••	••	••	••
Official	98	98	98	97	99	99	99	99	99	99	99	99
Administrative	94	93	91	88	92	94	100	97	99	99	97	96
Survey	99	NA										

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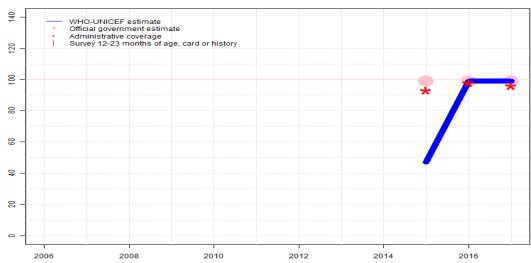
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Estimate	98	98	98	97	99	99	99	99	99	99	99	99
Estimate GoC	•••	•••	•••	••	••	••	••	••	••	••	••	••
Official	98	98	98	97	99	99	99	99	99	99	99	99
Administrative	94	93	93	89	92	94	100	97	99	99	98	96
Survey	99	NA										

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	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Estimate	NA	47	99	99								
Estimate GoC	NA	•	••	••								
Official	NA	99	99	99								
Administrative	NA	93	98	96								
Survey	NA											

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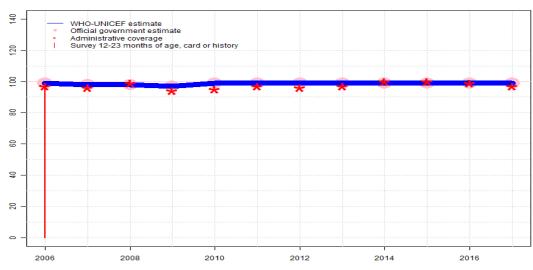
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### Description:

Estimates for a dose of IPV begin in 2015 following the Global Polio Eradication Initiative's Polio Eradication and Endgame Strategic Plan: 2013-2018 which recommended at least one dose of inactivated polio vaccine (IPV) into routine immunization schedules as a strategy to mitigate the potential consequences should any re-emergence of type 2 poliovirus occur following the planned withdrawal of Sabin type 2 strains from oral polio vaccine (OPV).

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- 2016: Estimate based on coverage reported by national government. Programme reports that differences between official and administrative coverage levels reflect the contribution of services delivered through the private sector. GoC=R+ D+
- 2015: IPV introduced during 2015. Programme reports 93 percent coverage among 50 percent of the target population. Estimate reflects coverage achieved among the total annual national birth cohort. Programme reports that differences between official and administrative coverage levels reflect the contribution of services delivered through the private sector. Estimate challenged by: R-





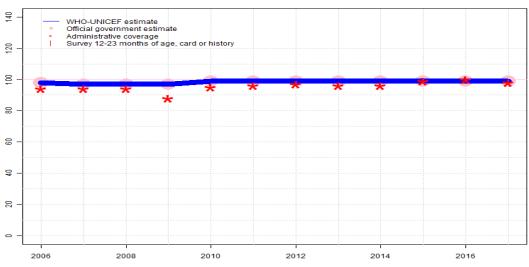
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Estimate	99	98	98	97	99	99	99	99	99	99	99	99
Estimate GoC	•••	•••	•••	••	••	•	••	••	••	••	••	••
Official	99	98	98	97	99	99	99	99	99	99	99	99
Administrative	97	96	99	94	95	97	96	97	100	100	99	97
Survey	97	NA										

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	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Estimate	98	97	97	97	99	99	99	99	99	99	99	99
Estimate GoC	••	••	••	••	••	••	••	••	••	••	•	•
Official	98	97	97	97	99	99	99	99	99	99	99	99
Administrative	94	94	94	88	95	96	97	96	96	99	100	98
Survey	NA											

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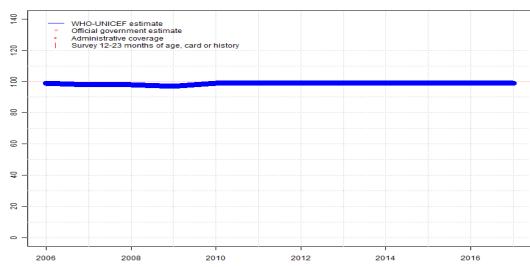
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### Description:

Coverage estimates for the second dose of measles containing vaccine are for children by the nationally recommended age.

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- 2009: Estimate based on coverage reported by national government. In April 2008 Sri Lanka withdrew DTP-HepB-Hib pentavalent vaccine as a precautionary measure following reports of serious adverse events. Subsequent investigation of the reported adverse events and a review of the vaccine quality by WHO concluded that there was no evidence of increased safety risk associated with the vaccine. The suspension of the vaccine led to a high proportion of parents seeking Hib immunization for their children in the private sector. Reporting by the private sector is not complete. Nationally reported estimates have been adjusted to levels of measles coverage provided in the public sector. GoC=R+ D+
- 2008: Estimate based on coverage reported by national government. GoC=R+ D+
- 2007: Estimate based on coverage reported by national government. GoC=R+ D+
- 2006: Estimate based on coverage reported by national government. GoC=R+ D+





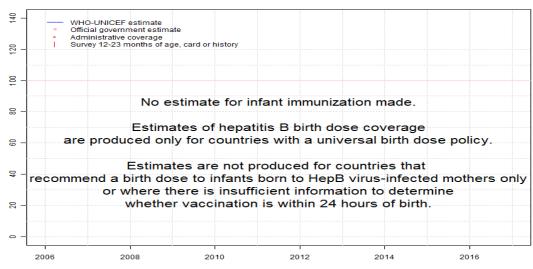
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Estimate	99	98	98	97	99	99	99	99	99	99	99	99
Estimate GoC	•••	•••	•••	••	••	•	••	••	••	••	••	••
Official	NA											
Administrative	NA											
Survey	NA											

- ••• Estimate is supported by reported data [R+], coverage recalculated with an independent denominator from the World Population Prospects: 2017 revision from the UN Population Division (D+), and at least one supporting survey within 2 years [S+]. While well supported, the estimate still carries a risk of being wrong.
- •• Estimate is supported by at least one data source; [R+], [S+], or [D+]; and no data source, [R-], [D-], or [S-], challenges the estimate.
- There are no directly supporting data; or data from at least one source; [R-], [D-], [S-]; challenge the estimate.

In all cases these estimates should be used with caution and should be assessed in light of the objective for which they are being used.

- For this revision, coverage estimates for the first dose of rubella containing vaccine are based on WHO and UNICEF estimates of coverage of measles containing vaccine. Nationally reported coverage of rubella containing vaccine is not taken into consideration nor are they represented in the the accompanying graph and data table.
- 2017: Estimate based on estimated MCV1. Programme reports that differences between official and administrative coverage levels reflect the contribution of services delivered through the private sector. WHO and UNICEF are aware of rolling district level coverage assessments in the country; nonetheless, the programme is encouraged to conduct a nationally representative independent assessment to validate the programme's continued high performance levels. GoC=R+ D+
- 2016: Estimate based on estimated MCV1. Programme reports that differences between official and administrative coverage levels reflect the contribution of services delivered through the private sector. GoC=R+D+
- 2015: Estimate based on estimated MCV1. Programme reports that differences between official and administrative coverage levels reflect the contribution of services delivered through the private sector. GoC=R+D+
- 2014: Estimate based on estimated MCV1. Programme reports that differences between official and administrative coverage levels reflect the contribution of services delivered through the private sector. GoC=R+D+
- 2013: Estimate based on estimated MCV1. Programme reports that differences between official and administrative coverage levels reflect the contribution of services delivered through the private sector. GoC=R+ D+  $^{\circ}$
- 2012: Estimate based on estimated MCV1. GoC=R+ D+
- 2011: Estimate based on estimated MCV1. Estimate challenged by: D-
- 2010: Estimate based on estimated MCV1. EPI coverage survey conducted in 2010 in Western Province Sri Lanka which consist of 60 percent of the Sri Lankan population confirms that parents continue to seek immunization services from the private sector. GoC=R+D+
- 2009: Estimate based on estimated MCV1. In April 2008 Sri Lanka withdrew DTP-HepB-Hib pentavalent vaccine as a precautionary measure following reports of serious adverse events. Subsequent investigation of the reported adverse events and a review of the vaccine quality by WHO concluded that there was no evidence of increased safety risk associated with the vaccine. The suspension of the vaccine led to a high proportion of parents seeking Hib immunization for their children in the private sector. Reporting by the private sector is not complete. Nationally reported estimates have been adjusted to levels of measles coverage provided in the public sector. GoC=R+ D+
- 2008: Estimate based on estimated MCV1. GoC=R+S+D+
- 2007: Estimate based on estimated MCV1. GoC=R+S+D+
- 2006: Estimate based on estimated MCV1. GoC=R+S+D+



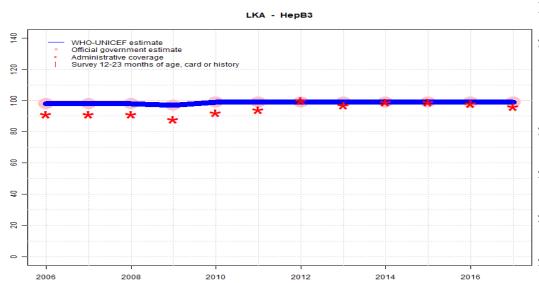


	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Estimate	NA											
Estimate GoC	NA											
Official	NA											
Administrative	NA											
Survey	NA											

- ••• Estimate is supported by reported data [R+], coverage recalculated with an independent denominator from the World Population Prospects: 2017 revision from the UN Population Division (D+), and at least one supporting survey within 2 years [S+]. While well supported, the estimate still carries a risk of being wrong.
- •• Estimate is supported by at least one data source; [R+], [S+], or [D+]; and no data source, [R-], [D-], or [S-], challenges the estimate.
- There are no directly supporting data; or data from at least one source; [R-], [D-], [S-]; challenge the estimate.

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## Sri Lanka - HepB3



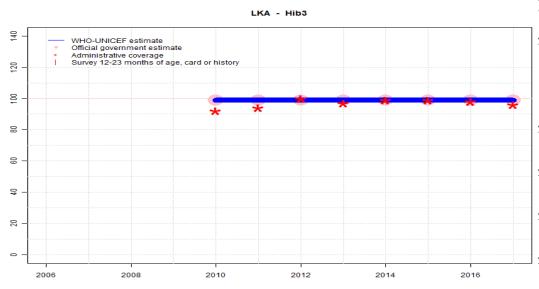
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Estimate	98	98	98	97	99	99	99	99	99	99	99	99
Estimate GoC	••	••	••	••	••	••	••	••	••	••	••	••
Official	98	98	98	97	99	99	99	99	99	99	99	99
Administrative	91	91	91	88	92	94	100	97	99	99	98	96
Survey	NA											

The WHO and UNICEF estimates of national immunization coverage (wuenic) are based on data and information that are of varying, and, in some instances, unknown quality. Beginning with the 2011 revision we describe the grade of confidence (GoC) we have in these estimates. As there is no underlying probability model upon which the estimates are based, we are unable to present classical measures of uncertainty, e.g., confidence intervals. Moreover, we have chosen not to make subjective estimates of plausibility/certainty ranges around the coverage. The GoC reflects the degree of empirical support upon which the estimates are based. It is not a judgment of the quality of data reported by national authorities.

- ••• Estimate is supported by reported data [R+], coverage recalculated with an independent denominator from the World Population Prospects: 2017 revision from the UN Population Division (D+), and at least one supporting survey within 2 years [S+]. While well supported, the estimate still carries a risk of being wrong.
- •• Estimate is supported by at least one data source; [R+], [S+], or [D+]; and no data source, [R-], [D-], or [S-], challenges the estimate.
- There are no directly supporting data; or data from at least one source; [R-], [D-], [S-]; challenge the estimate.

In all cases these estimates should be used with caution and should be assessed in light of the objective for which they are being used.

- 2017: Estimate based on coverage reported by national government. Programme reports that differences between official and administrative coverage levels reflect the contribution of services delivered through the private sector. WHO and UNICEF are aware of rolling district level coverage assessments in the country; nonetheless, the programme is encouraged to conduct a nationally representative independent assessment to validate the programme's continued high performance levels. GoC=R+D+
- 2016: Estimate based on coverage reported by national government. Programme reports that differences between official and administrative coverage levels reflect the contribution of services delivered through the private sector. GoC=R+D+
- 2015: Estimate based on coverage reported by national government. Programme reports that differences between official and administrative coverage levels reflect the contribution of services delivered through the private sector. GoC=R+D+
- 2014: Estimate based on coverage reported by national government. Programme reports that differences between official and administrative coverage levels reflect the contribution of services delivered through the private sector. GoC=R+ D+
- 2013: Estimate based on coverage reported by national government. Programme reports that differences between official and administrative coverage levels reflect the contribution of services delivered through the private sector. GoC=R+D+
- 2012: Estimate based on coverage reported by national government. GoC=R+ D+
- 2011: Estimate based on coverage reported by national government. GoC=R+ D+
- 2010: Estimate based on coverage reported by national government. EPI coverage survey conducted in 2010 in Western Province Sri Lanka which consist of 60 percent of the Sri Lankan population confirms that parents continue to seek immunization services from the private sector. DTP-HepB-Hib combination vaccine introduced in 2008 and suspended four months later due to adverse events. Hib containing pentavalent vaccine was re-introduced in February 2010. GoC=R+ D+
- 2009: Estimate based on coverage reported by national government. In April 2008 Sri Lanka withdrew DTP-HepB-Hib pentavalent vaccine as a precautionary measure following reports of serious adverse events. Subsequent investigation of the reported adverse events and a review of the vaccine quality by WHO concluded that there was no evidence of increased safety risk associated with the vaccine. The suspension of the vaccine led to a high proportion of parents seeking Hib immunization for their children in the private sector. Reporting by the private sector is not complete. Nationally reported estimates have been adjusted to levels of measles coverage provided in the public sector. GoC=R+D+
- 2008: Estimate based on coverage reported by national government. GoC=R+ D+
- 2007: Estimate based on coverage reported by national government. GoC=R+D+
- 2006: Estimate based on coverage reported by national government. GoC=R+ D+



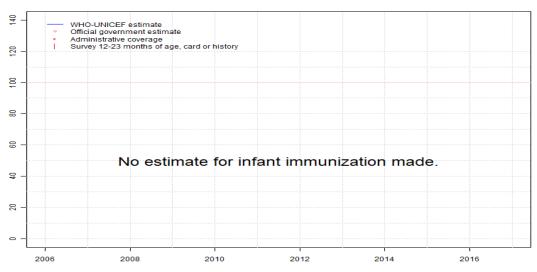
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Estimate	NA	NA	NA	NA	99	99	99	99	99	99	99	99
Estimate GoC	NA	NA	NA	NA	••	••	••	••	••	••	••	••
Official	NA	NA	NA	NA	99	99	99	99	99	99	99	99
Administrative	NA	NA	NA	NA	92	94	100	97	99	99	98	96
Survey	NA											

- ••• Estimate is supported by reported data [R+], coverage recalculated with an independent denominator from the World Population Prospects: 2017 revision from the UN Population Division (D+), and at least one supporting survey within 2 years [S+]. While well supported, the estimate still carries a risk of being wrong.
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- 2012: Estimate based on coverage reported by national government. GoC=R+ D+
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#### LKA - RotaC



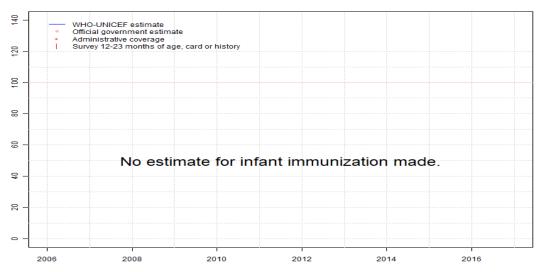
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Estimate	NA											
Estimate GoC	NA											
Official	NA											
Administrative	NA											
Survey	NA											

The WHO and UNICEF estimates of national immunization coverage (wuenic) are based on data and information that are of varying, and, in some instances, unknown quality. Beginning with the 2011 revision we describe the grade of confidence (GoC) we have in these estimates. As there is no underlying probability model upon which the estimates are based, we are unable to present classical measures of uncertainty, e.g., confidence intervals. Moreover, we have chosen not to make subjective estimates of plausibility/certainty ranges around the coverage. The GoC reflects the degree of empirical support upon which the estimates are based. It is not a judgment of the quality of data reported by national authorities.

- ••• Estimate is supported by reported data [R+], coverage recalculated with an independent denominator from the World Population Prospects: 2017 revision from the UN Population Division (D+), and at least one supporting survey within 2 years [S+]. While well supported, the estimate still carries a risk of being wrong.
- •• Estimate is supported by at least one data source; [R+], [S+], or [D+]; and no data source, [R-], [D-], or [S-], challenges the estimate.
- There are no directly supporting data; or data from at least one source; [R-], [D-], [S-]; challenge the estimate.

In all cases these estimates should be used with caution and should be assessed in light of the objective for which they are being used.





	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Estimate	NA											
Estimate GoC	NA											
Official	NA											
Administrative	NA											
Survey	NA											

- ••• Estimate is supported by reported data [R+], coverage recalculated with an independent denominator from the World Population Prospects: 2017 revision from the UN Population Division (D+), and at least one supporting survey within 2 years [S+]. While well supported, the estimate still carries a risk of being wrong.
- •• Estimate is supported by at least one data source; [R+], [S+], or [D+]; and no data source, [R-], [D-], or [S-], challenges the estimate.
- There are no directly supporting data; or data from at least one source; [R-], [D-], [S-]; challenge the estimate.

In all cases these estimates should be used with caution and should be assessed in light of the objective for which they are being used.

# Sri Lanka - survey details

2006 Sri Lanka Demographic and Health Survey, 2006-07						BCG	Card	91.3	12-23 m	172	91			
	-					DTP3	Card	86	$12\text{-}23~\mathrm{m}$	172	91			
Vaccina	Confirmation mathed	Corroma ma	-			MCV1	Card	84.8	12-23  m	172	91			
	Confirmation method	_				Pol3	Card	86	12-23 m	172	91			
BCG	Card or History	99.5	12-23  m	1448	93									
DTP1	Card or History	99.7	$12\text{-}23~\mathrm{m}$	1448	93		i Lanka Demographic and Health Survey 2000							
DTP3	Card or History	99.4	$12\text{-}23 \mathrm{\ m}$	1448	93	1999 Sri								
MCV1	Card or History	97.1	$12\text{-}23~\mathrm{m}$	1448	93	1333 511	1 Danka Demographic and Health Burvey 2000							
Pol1	Card or History	99.6	$12\text{-}23~\mathrm{m}$	1448	93									
Pol3	Card or History	99.3	$12\text{-}23~\mathrm{m}$	1448	93	Vaccine	Confirmation method	Coverage	Age cohort	Sample	Cards seen			
						BCG	Card	88.4	$12\text{-}23 \mathrm{\ m}$	569	89			
2000 Sri Lanka Demographic and Health Survey 2001						DTP3	Card	86.8	$12\text{-}23~\mathrm{m}$	569	89			
						MCV1	Card	83.4	$12\text{-}23~\mathrm{m}$	569	89			
						Pol3	Card	87	12-23  m	569	89			

Vaccine Confirmation method Coverage Age cohort Sample Cards seen

Further information and estimates for previous years are available at:

http://www.data.unicef.org/child-health/immunization

http://www.who.int/immunization/monitoring\_surveillance/routine/coverage/en/index4.html