KINGDOM OF CAMBODIA
Nation Religion King

Further Data Analysis Report
From the Cambodia Demographic and Health Survey 2021-2022

Mortality in Cambodia

JANUARY
2024

National Institute of Statistics
Ministry of Planning
CAMBODIA

Bloomberg Philanthropies
DATA FOR HEALTH INITIATIVE
Vital Strategies

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FREFACE

This report delves into the dynamics of the "Mortality Situation in Cambodia" leveraging secondary data from five rounds of the Cambodia Demographic and Health Survey (CDHS) spanning from 2000 to2021. The primary objective of this analysis is to study the trends in adult, maternal, infant and child mortality in Cambodia, while concurrently assessing their alignment with Cambodia's Millennium Development Goals (CMDG) and Cambodia Sustainable Development Goals (CSDG) trajectory. This secondary analysis was undertaken by the National Institute of Statistics (NIS) in collaboration with the Ministry of Health (MOH) and the support from Vital Strategies.

I would like to extend special thanks to **His Excellency Kitti Settha Pandita Chhay Than**, former Honorable Senior Minister and Minister of Planning, whose keen interest to support the CDHS series has always been a source of inspiration and encouragement, both to the national and international project teams, as well as to its users. We also express our sincere appreciation to all of the members of the Executive Committee and the Technical Committee for their contributions and valuable guidance. I also would like thanks **His Excellency Bin Troachhey**, Minister, Ministry of Planning, whose keen interest and support this for successful.

I sincerely thank the United Nations Population Fund (UNFPA) whose support in terms of resources and technical expertise has been instrumental in the development of the survey.I would also like to take this opportunity to express our gratitude to the United States Agency for International Development (USAID), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Australian Aid, the United Nations Children's Fund (UNICEF), World Food Programme (WFP) and Development Partners (DPs) for their contribution to the survey. Deepest thanks to the Royal Government of Cambodia who, through the Ministry of Economy and Finance, provided most of the financial support.

On behalf of the National Institute of Statistics, Ministry of Planning, I wish to express my gratitude and appreciation to the Vital Strategies team, notably **Mr. Luis Armando Ocaranza-Ordaz**, Senior Technical Advisor, and **Dr. Mean Rathanak Sambath**, Country Coordinator, for their technical and financial support to produce this report which stands as a reference for various stakeholders. It is appreciated the effort from the principal writer, **H.E Mr. THEY Kheam**, Advisor of Ministry and Director of Demographic Statistics Census and Survey Department of the National Institute of Statistics, Ministry of Planning and the entire team whose efforts were instrumental in bringing together organizations and individuals.

It is anticipated that the findings from this report will enhance the information available to line-ministries, international agencies, non-government organization, policy makers, program implementers, development planners, and researchers, and support their decision-making.

We trust this report will provide useful information to addresses the interventions and concerns and future planning in health sectors.

Director General
National Institute of Statistics

Try Ritthea

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ACRONYMS

ANC	Antenatal Care
CDB	Commune Database
CDHS	Cambodia Demographic and Health Survey
CMDGs	Cambodia Millennium Development Goals
COVID	Corona Virus Disease 2019
CSDGs	Cambodia Sustainable Development Goals
EmONC	Emergency Obstetric and Newborn Care
IMR	Infant Mortality Rate
MOH	Ministry of Health
MOP	Ministry of Planning
NIS	National Institute of Statistics
ORT	Oral Rehydration Therapy
PNC	Postnatal Care
RGC	Royal Government of Cambodia
TFR	Total Fertility Rate
UNFPA	United Nations Population Fund (United Nations Fund for Population Activities)
U5MR	Under-5 Mortality Rate
WHO	World Health Organization

SUMMARY

The United Nations' Sustainable Goals (SDG), SDG 3.1, aims to reduce the global maternal mortality ratio (MMR) to less than 70 per 100,000 live births by 2030. In Cambodia, according to the CDHS 2021-2022, the MMR was 154 per 100,000 live births. This shows little progress compared to the CDHS 2014 value of 170 and remains above the expected intermediate results for the Cambodia (SDG) of 130 in 2014. According to the result of a provisional moving average prediction model, by 2030 MMR will not meet the CSDG target of less than 70 maternal deaths per 100,000 live births.

Regarding infant mortality and under-5 mortality rates, the decline in both indicators has improved significantly, exceeding the targets set by the Cambodia Millenium Development Goals (CMDG) for 2015. Furthermore, these rates have shown a consistent downward trend, aligned with CSDG expectations.

1 INTRODUCTION

Due to the absence of registration of vital events representative of the population of Cambodia (Table 1), the General Population Census, and the Demographic and Health Survey have played an important role in guiding health policy in the country since 1998. They have been instrumental in assessing the mortality situation in Cambodia, including number, rate and ratio on adult, maternal, infant and child mortality, and trends over time. This information is needed for crucial health indicators outlined in healthcare policies, monitoring and evaluation of health sector performance, as well as for aligning progress with the targets laid out in the Cambodia Millennium Development Goals 1997-2015 (CMDG 1997-2015), and the Sustainable Development Goals 2016-2030 (SDG 2016-2030).

The CDHS 2000 is the first population-based national representative survey to incorporate questions on mortality in general, and it was continued in 2005, 2010, 2014 and 2021-22. These surveys have shown that Cambodia has progressed in improving the health of the population, including maternal and child health, and that the reproductive health outcomes in Cambodia have improved dramatically since 2000. By the end of 2022, Cambodia had achieved several of the health-related Sustainable Development Goals (SDGs).

Over the past two decades, Cambodia has experienced rapid economic growth. This progress has been made possible through dedicated government resources investment, as well as government and international donor funding. As a result, access to good-quality health care has improved with the implementation of initiatives like the health equity funds, vouchers, and community-based health insurance schemes. Much of the improvement in childhood and maternal morbidity and mortality may be attributed to the general increase in provision and use of maternal and child health services. Moreover, other socioeconomic indicators such as universal primary education and eradication of extreme poverty have also shown substantial improvement.

Information on infant and child mortality is not only relevant for a demographic assessment of the country's population but also serves as an important indicator of the country's socioeconomic development and quality of life. These measures can also help identify children who may be at higher risk of death and inform strategies to reduce this risk, such as promoting birth spacing, and addressing biodemographic factors and fertility behaviors that increase mortality risks for infants and children.

The estimates presented in this report will play a vital role in addressing the lack of reliable measures that are needed to produce national estimates of mortality. Nevertheless, it is important to note there are limitations associated with ascertaining mortality trends from analyses of cross-sectional surveys. Accordingly, the NIS is actively working closely with the Ministry of Interior and the Ministry of Health to strengthen systems and processes for producing vital statistics prospectively through a national civil registration system. This ongoing effort aims to further enhance the accuracy and comprehensiveness of mortality assessments in Cambodia.

2 DATA AND METHODS

2.1 Data

This analysis used data from the five rounds of the CDHS surveys conducted in 2000, 2005, 2010, 2014 and 2021-22. The CDHS surveys -maintained uniformity in sampling design, model questionnaires, data collection techniques, measures, and methods of analysis making them comparable over time. The surveys conducted in 2000, 2010, 2014 and 2021-22 were implemented by the Cambodian National Institute of Statistics (NIS) of the Ministry of Planning and the Directorate General for Health (DGH) of the Ministry of Health. Meanwhile, the 2005 survey was jointly conducted by the NIS and the National Institute of Public Health and Research (NIPH) of the Ministry of Health. Table 1 presents information on dates of fieldwork and sample sizes for the households and women interviewed in the CDHS rounds.

Table 1. Description of the Cambodia Demographic and Health Surveys (CDHS) by rounds

Year	Data of fieldwork	Implementing organization	Number of households interviewed	Number of women aged 15-49 interviewed
2000	February-July 2000	NIS[1] & DGH[2]	12,236	15,351
2005	Sept 2005-March 2006	NIS & NIPH[3]	14,243	16,823
2010	July 2010-January 2011	NIS & DGH	15,667	18,754
2014	June-December 2014	NIS & DGH	15,825	17,578
2021-22	Sep 15, 2021, to Feb 15, 2022	NIS & DGH	20,806	19,496

[1] NIS: National Institute of Statistics (Ministry of Planning); [2] DGH: Directorate General for Health (Ministry of Health); [3] NIPH: National Institute of Public Health and Research (Ministry of Health)

For each survey in Cambodia, the DHS used a complex, two-stage sample design. First to select clusters and subsequently households, resulting in a national and sub-national representative sample including both urban-rural domains. The interviewers collected data from members of the selected households, including women age 15-49, focusing on their health attitudes, behavior, and outcomes. For women who had given birth within five years preceding the survey, additional questions were asked about the care she and her baby received during pregnancy, birth, and in the postnatal period. Moreover, questions about the health of and care for her children during each five-year period were included. This report examined data for women with a live birth in the 5 years preceding each survey and the children born during the same periods. This includes 5,714 women and 8,715 children in the 2000 CDHS, 5,865 women and 7,789 children in 2005, 6,472 women and 8,200 children in 2010, and 5,973 women and 7,253 children in 2014. The CDHS 2021-2022 is an exception, data for this survey included only the 3,254 women and 3,322 children with live birth in the 2 years preceding the survey.

2.2 Methods and Analysis

This report assesses various indicators providing a snapshot of the number of deaths for both adult men and women over the 7 years preceding the survey. Data were analyzed categorizing in 5-year age-groups. Additionally, the analysis included indicators on health care received by mothers during and after pregnancy and birth, and for their children up to age 5. Table 2 presents a list of the maternal health indicators, the standard definition used to calculate the indicators across each survey, and the sample size for each. Table 3 shows the respective information for the child health indicators.

Neonatal mortality: The probability of dying within the first month of life.
Post neonatal mortality: The probability of dying between the first month of life and the first birthday (computed as the difference between infant and neonatal mortality).
Infant mortality: The probability of dying between birth and the first birthday.
Child mortality: The probability of dying between the first and the fifth birthday.
Under-5 mortality: The probability of dying between birth and the fifth birthday.

Table 2. Maternal health indicators included in the analysis

Indicator	Definition	Population Base	Sample Size[1]				
			2000	2005	2010	2014	2021-22
Four or more antenatal care visits (ANC)	Percentage of women with four or more antenatal care visits for their most recent pregnancy	Women age 15-49 with a live birth in the 5 years preceding the survey	5,714	5,865	6,472	5,973	3,254
Timing of first ANC	Percentage of women who received ANC in the first 4 months of pregnancy	Women age 15-49 with a live birth in the 5 years preceding the survey	5,714	5,865	6,472	5,973	3,254
Mother took iron syrup/tablets during pregnancy	Percentage of women who were given iron syrup/tablets during their most recent pregnancy	Women age 15-49 with a live birth in the 5 years preceding the survey	5,714	5,865	6,472	5,973	3,254
Mother took deworming medication during pregnancy	Percentage of women who consumed deworming medication during their most recent pregnancy	Women age 15-49 with a live birth in the 5 years preceding the survey	5,714	5,865	6,472	5,973	3,254
Blood pressure checked during ANC	Percentage of women who had their blood pressure checked during an ANC visit during their most recent pregnancy	Women age 15-49 with a live birth in the 5 years preceding the survey who had at least one ANC visit	2,543	4,213	5,804	5,704	3,216
Informed of pregnancy complications during ANC	Percentage of women who were informed of pregnancy complications during an ANC visit during their most recent pregnancy	Women age 15-49 with a live birth in the 5 years preceding the survey who had at least one ANC visit	2,543	4,213	5,804	5,704	3,216
Birth delivered in a facility	Percentage of births that were delivered in a facility	Children born in the 5 years preceding the survey	8,715	7,789	8,200	7,253	3,322
Births assisted by a skilled birth attendant (SBA)	Percentage of births that were assisted by an SBA	Children born in the 5 years preceding the survey	8,715	7,789	8,200	7,253	3,322
Births delivered by Caesarean section	Percentage of births that were delivered by caesarean section	Children born in the 5 years preceding the survey	8,715	7,789	8,200	7,253	3,322
Postnatal care for the mother	Percentage of women who received a postnatal check-up within 2 days of delivering their most recent birth	Women age 15-49 with a live birth in the 2 years preceding the survey	n/a	3,083	3,187	2,944	3,254
Continuum of care	Percentage of women who received any combination of ANC (4 or more visits), skilled birth attendant, and postnatal care	Women age 15-49 with a live birth in the 2 years preceding the survey	n/a	3,083	3,187	2,944	3,254

[1] Sample Size CDHS 2000 up to 2014 for live birth last 5 years proceeding survey to; 2021-22 for live birth and still birth last 2 years proceeding survey

Table 3. Child health indicators included in the analysis

Indicator	Definition	Population Base	Sample size				
			2000	2005	2010	2014	2021-22
Mother's estimate of baby's size at birth	Percent distribution of live births in the 5 years preceding the survey by mother's estimate of baby's size at birth	Children under age 5[1]	8,715	7,789	8,200	7,253	3,322
Early initiation of breastfeeding	Among last-born children who were born in the 2 years preceding the survey, the percentage who started breastfeeding within 1 hour	Most recent birth in the 2 years preceding the survey	7,825	5,711	3,187	2,944	3,322
Full immunization	Percentage of children age 12-23 months who received specific vaccines at any time before the survey (according to a vaccination card or the mother's report)	Children age 12-23 months	1,253	1,517	1,614	1,460	1,641
Care seeking for diarrhea from a facility or health provider	Among children under age 5 who had diarrhea in the 2 weeks preceding the survey, the percentage for whom advice or treatment was sought from a health facility or provider	Children under age 5 with diarrhea in the 2 weeks preceding the survey	1,385	1,420	1,161	902	477
ORT or increased fluids as part of treatment in children who had diarrhea	Among children under age 5 who had diarrhea in the 2 weeks preceding the survey, the percentage given ORT or increased fluids	Children under age 5 with diarrhea in the 2 weeks preceding the survey	1,385	1,420	1,161	902	477
Nutritional status: stunting	Percentage of children under age 5 who are at least 2 standard deviations below the median for the reference population for height-for-age	Children under age 5 with anthropometric assessments	3,372	3,587	3,975	4,893	4,234

[1] Children under age 5 definition for CDHS 2021-22 is live births in the 2 years preceding the survey by mother's estimate of baby's size at birth

The definitions of some of these key indicators changed over the different surveys. To ensure comparability across surveys, the definitions of some variables were standardized:

- The 2000 survey only assessed post-natal care (PNC) among women who delivered at home, versus all women in the following surveys. Additionally, in more recent surveys this indicator was only asked for women with a birth in the 2 years preceding the survey. Therefore, we did not analyze PNC for women interviewed in the 2000 CDHS, and for the rest we present results only among women with a birth in the most recent 2 years preceding the survey.
- Among the child health indicators, we examine trends in oral rehydration therapy (ORT) given to children with diarrhea symptoms in the 2 weeks preceding the survey. In the earliest survey, this definition included oral rehydration solution (ORS), recommended home fluids (RHF), rice water, or increased fluids. For the following four surveys, in order to compare them over time, we defined ORT as receiving ORS or increased fluids.
- For initial breastfeeding, the indicator was calculated for the last-born child in the 2 years preceding the survey to ensure comparability. In 2000, the survey included all children born in the 5 years preceding the survey, and in 2005 it included only last-born children in the 5 years preceding the survey. For 2021-22, the base population for health indicators was on the 2 years preceding of the survey.

Interviewers during the CDHS surveys from 2000 to 2021-22 were asked to gather data on siblings born to the natural mother of female respondents. This information was compiled in chronological order starting with the eldest and encompassed the survivorship of each of the

siblings, the current ages of surviving siblings, the year of death or years since death of deceased siblings, and the age at death of deceased siblings.

Direct estimates of maternal mortality use data on the age of surviving sisters of survey respondents, the age at death of sisters who have died, and the number of years since the death of sisters. For each sister who died at age 12 or over, responders were asked supplementary questions meant determine whether the death was related to maternity, that is, whether the sister was pregnant when she died, and if so, whether the sister died during childbirth, and if not, whether the sister died within two months of the termination of a pregnancy or childbirth. Listing all siblings in chronological order of their birth is believed to result in better reporting of events, as opposed to seeking only information on sisters.

This analysis includes comparing trends over time. We examined trends in infant and child mortality from 2000 to 2021-22. Assessing the trajectory towards the CMDGs and CSDGs and comparisons by economic groups (wealth quintiles), by regions, urban vs. rural, and by mother's education and age.

We conducted tests of association to identify significant changes between each survey, as well as between the first survey (2000 CDHS) and the most recent survey (2021-22 CDHS).

3 RESULTS

3.1 Adult and Maternal Mortality

3.1.1 Adult Mortality

Direct estimates of adult mortality for both males and females were obtained from data collected through the sibling history. Age-specific death rates were computed by dividing the number of deaths in each age group by the total person-years of exposure in that age group during a specified reference period. Table 4 presents these direct estimates, encompassing male and female whose sibling of respondents who had seven years of exposure preceding the survey. To minimize the impact of possible heaping on years since death ending in zero and five, direct estimates are presented for the period 0-6 years before the survey, which roughly corresponds[1] from 1994-2000 for CHDS 2000, from January 1999 through December 2005 for CDHS 2005, from July 2004 to January 2011, from June 2008 to December 2014 and late 2014 and early 2015 to late 2021 and early 2022. We aggregated the data over the age range 15-49, there are more male than female number of deaths and rates in the period 0-6 years preceding the all-survey rounds.

Because maternal mortality is a subset of adult mortality, estimates of overall adult mortality are calculated before estimates of maternal mortality. If estimates for overall adult mortality during the preceding seven years of the survey display a general, stable, and plausible pattern, then credence is given to the maternal mortality estimates derived thereafter.

The evaluation of the plausibility and stability of overall adult mortality is one way to assess the quality of the data used to estimate maternal mortality. Implausible rates of overall adult mortality, suggests the rates based on a subset of deaths (maternal deaths in particular) may have serious problems.

The reported ages at death and years since death of the respondents' siblings are used to make direct estimates of adult mortality. To account for variations in the risk of death based on age and gender this report presents age- and sex-specific death rates.

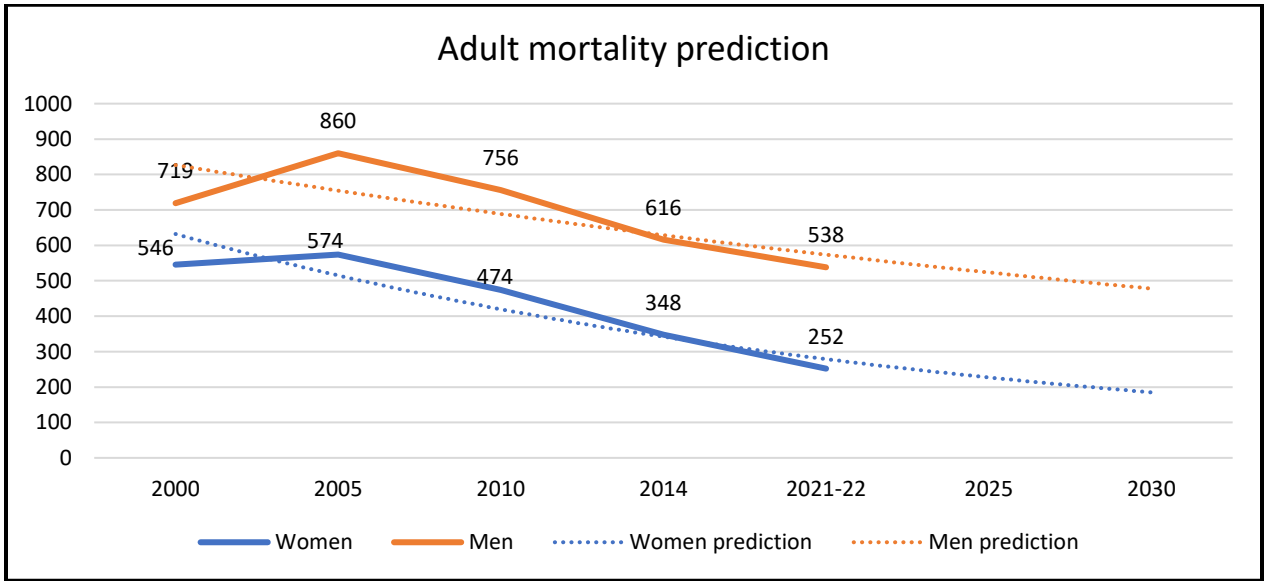
[1] The time period is not exact because, as with all DHS calculations of exposure time, exposure is calculated separately for each respondent, counting back in time from the date of the interview, and dates of interview in the CDHS spanned a period of six months.

Table 4. Men and female adult mortality number and rate

CDHS	2000			2005			2010			2014			2021-22		
Age	Deaths	Exposure years	Mortality rate[1]	Deaths	Exposure years	Mortality rate[1]	Deaths	Exposure years	Mortality rate[1]	Deaths	Exposure years	Mortality rate[1]	Deaths	Exposure years	Mortality rate[1]
Female															
15-19	51	26,204	1.95	38	37,770	1.02	41	38,695	1.1	31	33,159	0.93	11	22,512	0.47
20-24	73	27,925	2.63	60	34,633	1.73	41	44,460	0.9	32	40,909	0.78	23	33,117	0.70
25-29	94	30,916	3.04	78	28,428	2.76	57	38,242	1.5	40	40,900	0.98	28	40,426	0.69
30-34	80	28,792	2.78	121	29,904	4.05	53	28,690	1.9	46	30,606	1.50	45	41,147	1.09
35-39	103	23,388	4.43	102	26,420	3.86	79	26,991	2.9	47	23,590	1.99	52	33,741	1.54
40-44	85	15,784	5.41	99	19,508	5.06	101	21,069	4.8	76	19,321	3.93	52	20,685	2.50
45-49	58	9,385	6.20	76	12,588	6.01	101	14,998	6.7	76	14,071	5.43	41	14,429	2.87
15-49	**546**	**162,394**	**3.47[a]**	**574**	**189,252**	**3.12[a]**	**474**	**213,143**	**2.5[a]**	**348**	**202,557**	**1.96[a]**	**252**	**206,057**	**1.30[a]**
Male															
15-19	70	28,268	2.49	62	37,687	1.63	64	40,585	1.6	46	34,258	1.36	41	24,089	1.71
20-24	137	28,903	4.75	92	36,570	2.51	86	46,694	1.8	82	41,628	1.98	48	35,569	1.35
25-29	122	30,983	3.93	120	29,017	4.14	110	39,587	2.8	71	40,586	1.75	60	42,992	1.40
30-34	148	27,835	5.33	201	28,953	6.93	124	29,145	4.3	88	31,515	2.80	79	42,179	1.87
35-39	133	18,670	7.15	151	24,165	6.25	130	25,521	5.1	115	22,709	5.05	122	33,820	3.60
40-44	66	10,939	6.08	141	15,881	8.90	155	18,828	8.2	125	17,418	7.15	92	20,384	4.51
45-49	42	7,116	5.88	93	8,847	10.52	86	10,840	8.0	88	11,866	7.45	96	13,549	7.08
15-49	**719**	**152,714**	**4.79[a]**	**860**	**181,121**	**5.18[a]**	**756**	**211,199**	**4.1[a]**	**616**	**199,979**	**3.50[a]**	**538**	**212,579**	**2.81[a]**

[1] Expressed per 1,000 population, [a] Age-adjusted rated

Figure 1. Number of men and women adult mortality and prediction by years



In Figure 1 we observe the overall decreasing trend of adult mortality for both men and women. from 2005 to 2021-22. Despite the overall trend we can also see there was an increase in the number of deaths from 2000 to 2005. It is also noteworthy that male adult mortality is higher than females, and this may be the consequence of the higher male mortality during the Khmer Rouge period.

Fighting in the post Khmer Rouge period continued until the signing of the Paris Peace Accord in 1993; this fighting would have also contributed to the high sex ratio of dead siblings. The number of adult deaths continually decreased since CDHS 2005 to 2021-22 for both men and women, the situation is expected to continue through 2030.

Figure 2. Number of deaths in men by age-groups and rounds

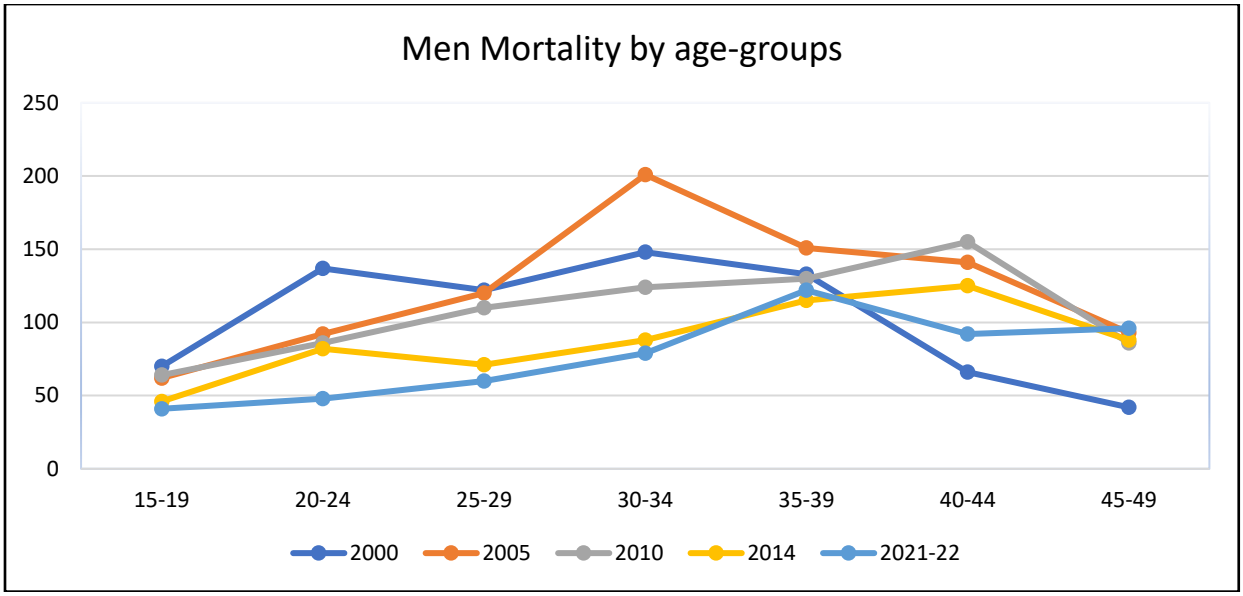


Figure 3. Number of deaths in women by age-groups and rounds

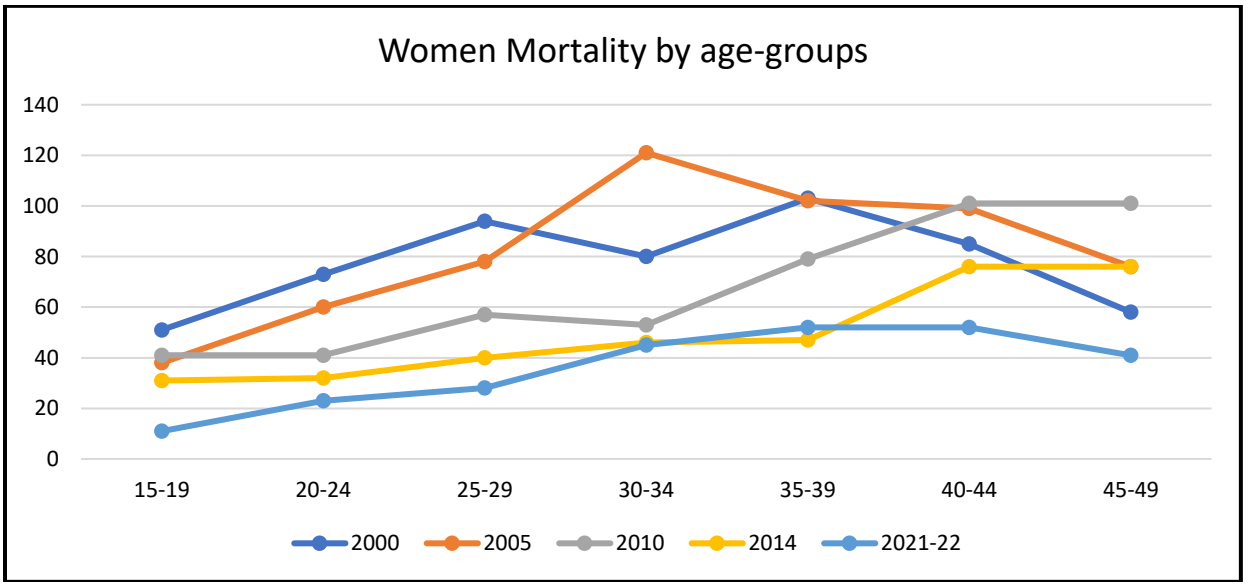


Figure 2 and 3 shown the number of mortalities for both men and women in age group of 30-34 it was higher than others age group in 2005. For female in year 2005 and 2010 the number of mortalities were dropped down at the same age group of 30-34. In generally, the number of

mortalities slightly drop down and constant at 40-49 for both men and female in all yeas survey rounds.

3.1.2 Maternal Mortality

Table 5. Distribution of women age 15-49 with a live birth in the 5 years preceding the survey, according to background characteristics, Cambodia 2000, 2005, 2010, 2014 and 2021-22 DHS

Background characteristics	2000		2005		2010		2014		2021-22	
	%	N	%	N	%	N	%	N	%	N[1]
Place of residence										
Urban	13.6	779	14.1	827	16.2	1,050	14.7	876	38.5	1,252
Rural	86.4	4,935	85.9	5,039	83.8	5,421	85.3	5,096	61.5	2,003
Region										
Phnom Penh	5.9	336	8.1	476	8.3	538	9	535	14.2	462
Plain	41.9	2,393	39.7	2,329	40	2,587	36.7	2,193	34.4	1,120
Great Lake	31.8	1,819	31	1,816	30.3	1,958	29.9	1,785	29.6	963
Coastal	7.9	451	7.4	437	6.8	440	6.3	378	6.5	211
Plateau	12.5	715	13.8	807	14.7	948	18.1	1,081	15.3	498
Wealth quintile										
Lowest	25.1	1,436	25.2	1,477	24.5	1,585	22.8	1,359	20.6	670
Second	22.2	1,269	22.5	1,320	21.3	1,380	20.3	1,215	19.6	639
Middle	20.2	1,152	18.4	1,077	19	1,229	19	1,133	19.7	641
Fourth	18.3	1,043	17.1	1,003	17.9	1,155	17.9	1,069	21.5	699
Highest	14.3	814	16.9	988	17.4	1,123	20	1,196	18.6	605
Education										
None	32	1,827	23.1	1,356	17.5	1,133	13.5	805	10.6	346
Primary	53.7	3,069	59.4	3,482	56.2	3,635	51.9	3,100	39.3	1,280
Secondary+	14.3	818	17.5	1,028	26.3	1,703	34.6	2,068	50.0	1,628
Mother's age at birth										
<20	8.1	465	9.2	540	8.6	555	10.4	620	0.08	268
20-34	68.6	3,921	70.2	4,118	76	4,917	79.5	4,749	0.77	2,491
35-49	23.3	1,329	20.6	1,206	15.4	999	10.1	603	0.15	495
Parity										
1	17.1	975	24.4	1,430	30.6	1,980	35.3	2,109	33.6	1,093
2-3	35.9	2,053	40.5	2,378	45.3	2,931	47.4	2,828	56.7	1,846
4-5	22.7	1,296	20.5	1,200	15.5	1,001	12.7	760	8.3	269
6+	24.3	1,391	14.6	857	8.7	560	4.6	276	1.4	47
Total	100	5,714	100	5,865	100	6,472	100	5,973	100	3,254

[1] Women age 15-49 with a live birth in the 2 years preceding the survey for 2021-22 CDHS

Recently, the World Health Organization explained the problem of maternal mortality using a delay model. This model considers delays in seeking health care, delays in reaching health

facilities, and poor health services in facilities that are associated with human, health system, and socioeconomic factors such as poverty, poor emergency obstetric services, and fatalistic beliefs. These challenges are known to correlate with incidence of infectious diseases, postpartum hemorrhage, hypertensive disorders, unsafe abortions, and prolonged labor, complications that have led to elevated adult and maternal mortality.

The maternal mortality rate per 1,000 women age 15–49 and maternal mortality rates by 5-year age groups are calculated by dividing the number of maternal deaths of female siblings of respondents in each age group by the total person-years of exposure of the sisters to the risk of dying in that age group during the 7 years preceding the survey.

The count of maternal deaths is the number of sisters reported as having died in the 7 years preceding the survey during either pregnancy or delivery, or in the 42 days following the delivery or termination of a pregnancy, by their age group at the time of death; deaths due to accidents or violence are excluded. The person-years of exposure in each age group are calculated for both surviving sisters (based on their reported current age) and dead deceased sisters (based on the age at death and years since death). The sample population is comprised by sisters both living and dead, who were aged 15 to 49 in the seven years preceding the survey. Individuals are categorized into by 5-year age groups.

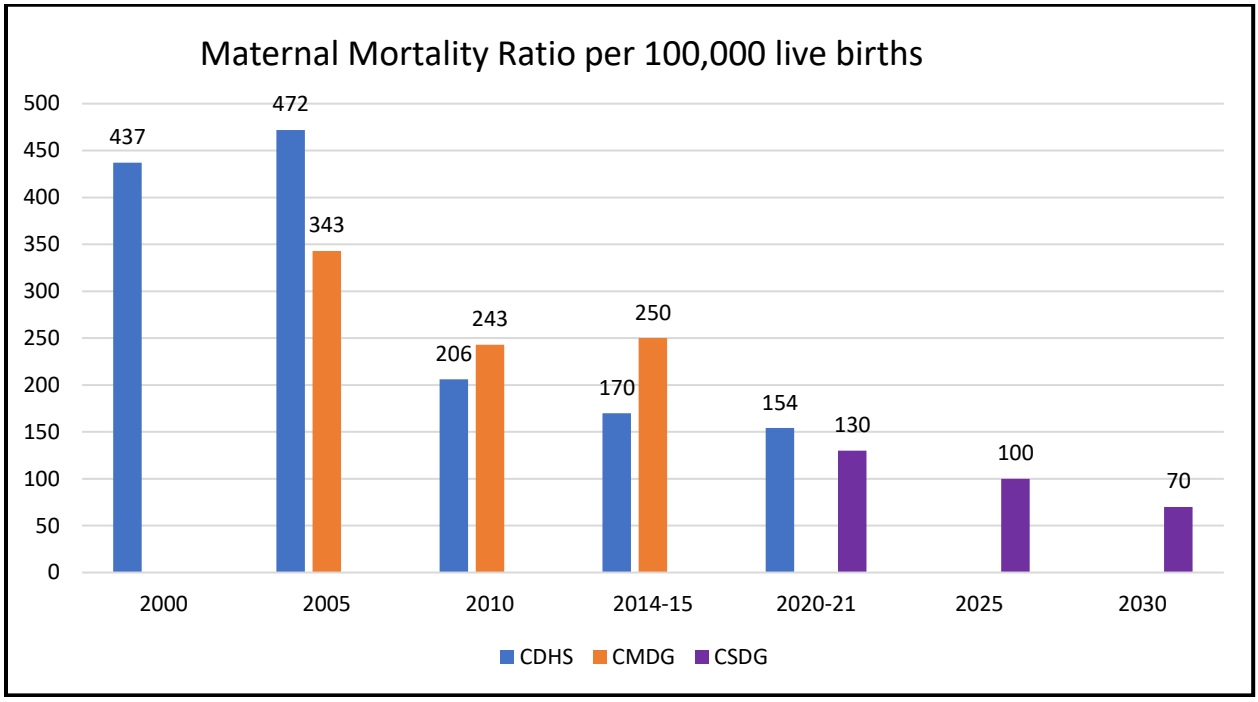
Table 6. Number of maternal deaths by year and age group

Woman	Number of Maternal Deaths				
Age Groups	**2000**	**2005**	**2010**	**2014**	**2021-2022**
15-19	3	5	3	0	0
20-24	11	9	3	4	3
25-29	26	14	9	11	1
30-34	23	28	8	5	10
35-39	28	22	4	8	12
40-44	7	16	11	2	0
45-49	2	5	2	2	2
15-49	**100**	**99**	**40**	**32**	**28**

Maternal mortality ratios

The maternal mortality ratio is the number of maternal deaths per 100,000 live births in a specific time period. The maternal mortality ratio is calculated by dividing the age-standardized maternal mortality rate for women age 15–49 in the 7 years preceding the survey by the general fertility rate (GFR) for the same time period.

Figure 4. Maternal Mortality Ratios compared to CMDG and CSDG Targets



As shown in Figure 4 the Demographic and Health Survey of Cambodia demonstrates significant progress in reducing MMR from 2000 to 2021, with 2010 and 2014 figures outperforming the CMDG targets. However, Cambodia, while showing progress, only had 6 more years until it should reach the target set for MMR of 70 per 100,000 live births by 2030, the deadline set by CDHS 2021-22and the SDG 2030.

Figure 5. Trend in maternal mortality ratios by 95% confidence interval

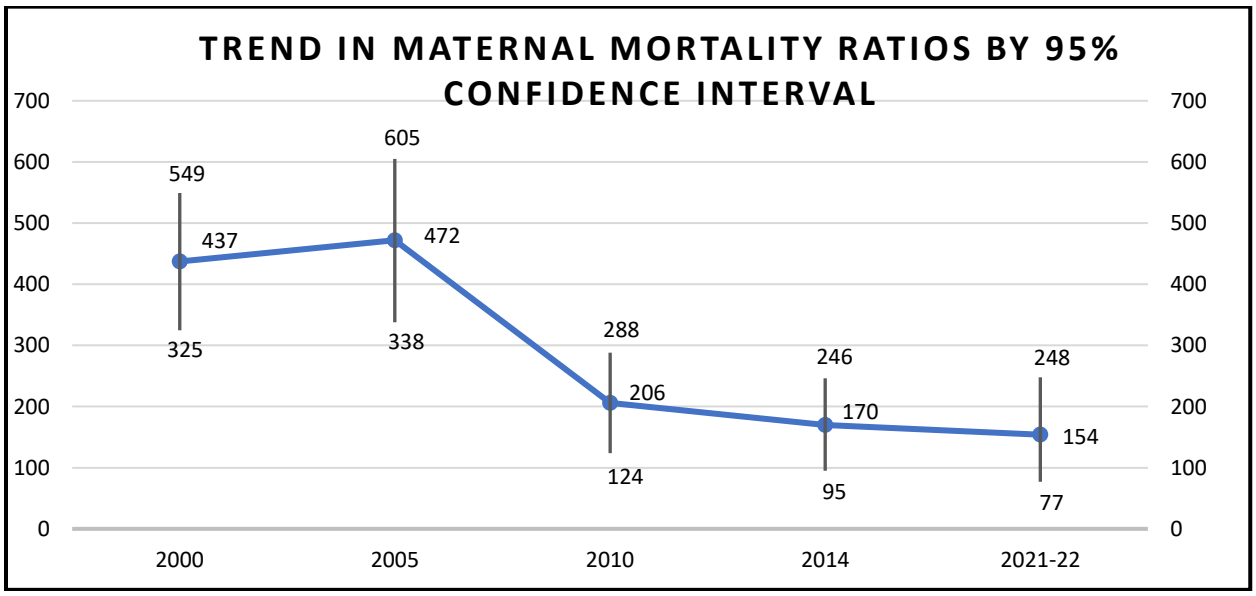


Figure 6. Trend and Prediction of maternal mortality ratios up to 2030 by using moving average

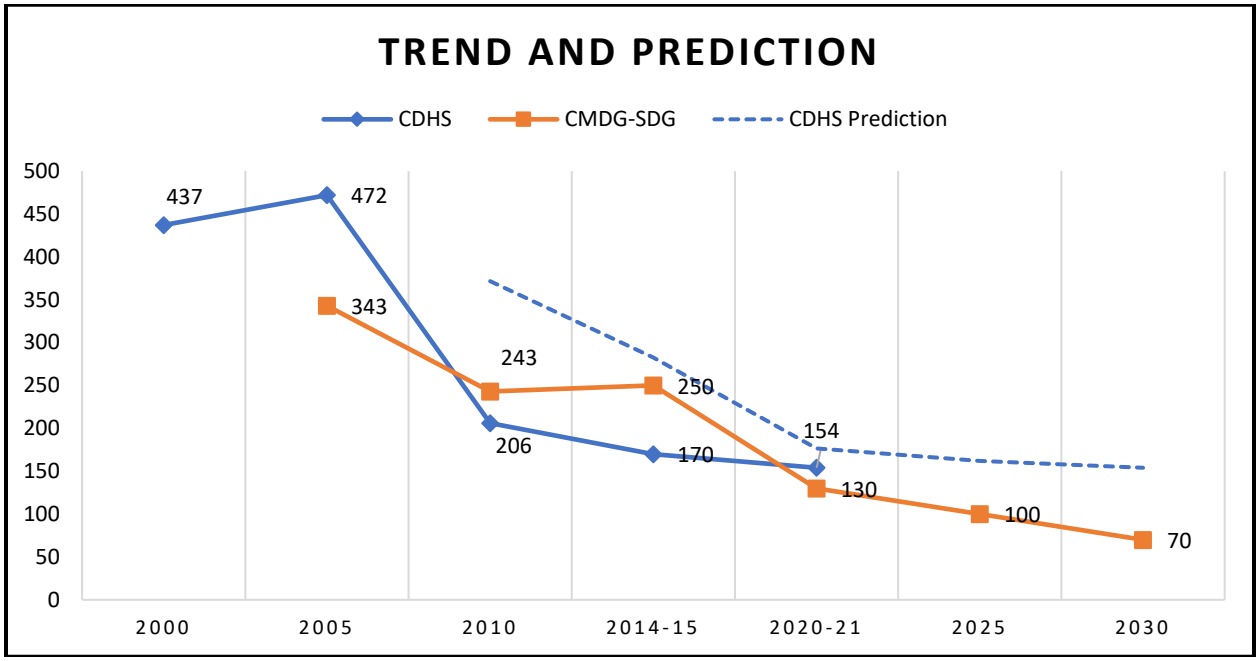


Figure 5 illustrates the trend in MMR from 2000 to 2021-22. During this period, notable fluctuations occurred. The increase between 2000 to 2005 was not a relevant finding due to the fact that the 95 percent confidence interval analysis shows overlap suggesting that MMR remained relatively stable between these two survey periods.

However, when examining the CDHS 2005 to 2010, consistent decline in MMR becomes evident and depicts a significant decrease. Conversely, the figures from 2010, 2014 and 2021-22 remained relatively stable and did not demonstrate significant decrease, as the 95 percent confident intervals overlap.

Several indicators suggest improvements in maternal health. For instance, the trend of birth delivery 2017-2021 showed that nearly 90 percent of all births in Cambodia now take place under the care of a skilled birth attendants according to the CDHS data.
Figure 6 reveals the decline in MMR and reflects the expansion of Cambodia's healthcare system with several factors potentially contributing to the progress such as:

1) Both proportion of births assisted by trained health staff and deliveries in public health facilities rose dramatically during 2005-2010.
2) There has been improvement in the provision of comprehensive and basic Emergency Obstetric and New-born Care (EmONC), which can actually save mothers' lives.
3) Midwifery incentives for attended live births, introduced by MoH in 2006 4) Improvements in mothers' educational status

The government has implemented a 10-point programme to address maternal health issues reiterating, the enhancement of the quality and effectiveness of reproductive, maternal and

infant/children healthcare services including nutritional interventions through expanded coverage of child delivery by professional mid-wives and physicians and emergency obstetric and neonatal care (EmONC), and consultation services on birth spacing options.

Nonetheless, specific remote and lagging areas, despite being prioritized by the Royal Government, like Stung Treng, Koh Kong, Rattanakiri and Mondolkiri continue to experience a much higher MMR than the national average according to the CDB

Further analysis of MMR is limited as data are not available on either sub-national levels or by wealth/standard of living groups.

Other indirect factors positively influencing the MMR included poverty levels, GDP growth, increased average of household income, female life expectancy, and. For instance, if we look over the poverty rate which decreased from 47.8% in early 2007 to 13.5% in 2014, with a temporary rise to 17.8% in 2019 due to the changing poverty baseline GDP 13% growth between 2004 to 2008 corresponded to a decrease in MMR. However, the GDP growth averaged 8.44% between 2014 to 2019, a period in which MMR remained relatively stable. On the other hand, female life expectancy in general trended upward every single year from 1998 to 2020 slightly increased from 63.1 years in 1998 to 76.9 years in 2020, respectively. A more direct impact to MMR is lifetime risk maternal death by CDHS from 2000 to 2021-22 which slowly decreased from 2000 (0.02), to 2005 (0.017), to 2010 (0.006) to 2021-22 (0.004) showing a parallel trend with MMR.

In addition, figure 6 displays a moving average prediction for MMR based on actual data from CDHS to be able to compare with the 2030 CSDG target MMR of less than 70 women dying per every 100,000 live births. The prediction indicated that Cambodia will not meet to CSDGs by 2030. Several factors will influence the validity of this prediction from now until 2030, including the long-term impact of COVID-19, improvements in healthcare facilities and performance, socioeconomic variables, maternal education, teenage pregnancies, geographical factors, traditional lifestyles, and economic performance.

3.2 Child Mortality

Infant and child mortality rates are regarded as indicators of the prevailing health conditions in a society; they measure the success of health programs and policies aimed at their education. Cambodia has made progress in reducing neonatal, infant and under-5 mortality rates. The neonatal mortality rate has come down substantially from 37 deaths per 1,000 live births in 2000 to 8 deaths per 1,000 live births in 2021, the infant mortality rate (IMR) from 95 deaths per 1,000 live births in 2000 to 12 deaths per 1,000 live births in 2021, and the under-5 mortality (U5MR) from 124 deaths per 1,000 live births to 16 deaths per 1,000 live births in 2021-22 (Table.8). This means Cambodia's IMR target of 12 has been met ten years in advance of the target. Reduction in U5MR has been equally impressive and again, the CMDG target has been reached ten years in advance of the target (Figure 7, Figure 8). There has been an all-around improvement in pre-natal and post-natal care, which is an important reason for the fall in IMR and U5MR

Table 7. Early childhood mortality rates by CDHS 2000 to 2021-22

Years preceding the survey	2000				2005				2010				2014				2021-22			
	Neonatal Mortality	Infant Mortality	Child Mortality	Under-5 Mortality	Neonatal Mortality	Infant Mortality	Child Mortality	Under-5 Mortality	Neonatal Mortality	Infant Mortality	Child Mortality	Under-5 Mortality	Neonatal Mortality	Infant Mortality	Child Mortality	Under-5 Mortality	Neonatal Mortality	Infant Mortality	Child Mortality	Under-5 Mortality
0-4	37.3	95	32.5	124.4	28	66	19	83	38	45	9	54	18	28	7	35	8	12	4	16
5-9	40.5	91	31.3	119.4	43	109	21	127	28	71	13	83	24	49	12	60	10	18	4	22
10-14	44.2	78.8	39.1	114.7	44	93	34	124	43	95	23	116	24	63	17	79	15	25	5	30

Figure 7. Under-5 mortality rates compared to CMDG and CSDG Targets

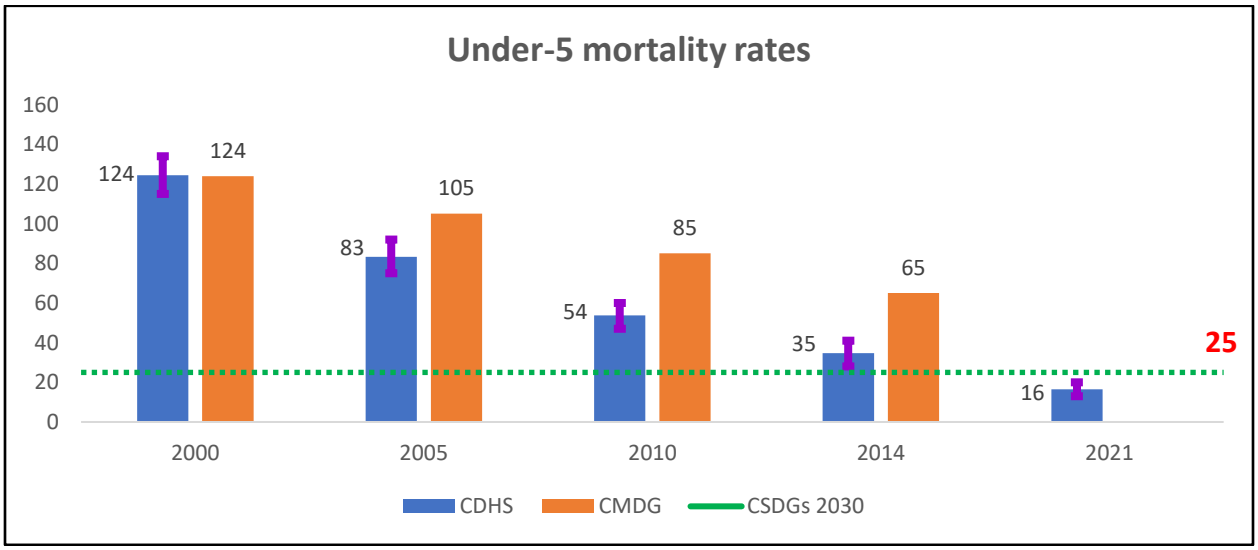
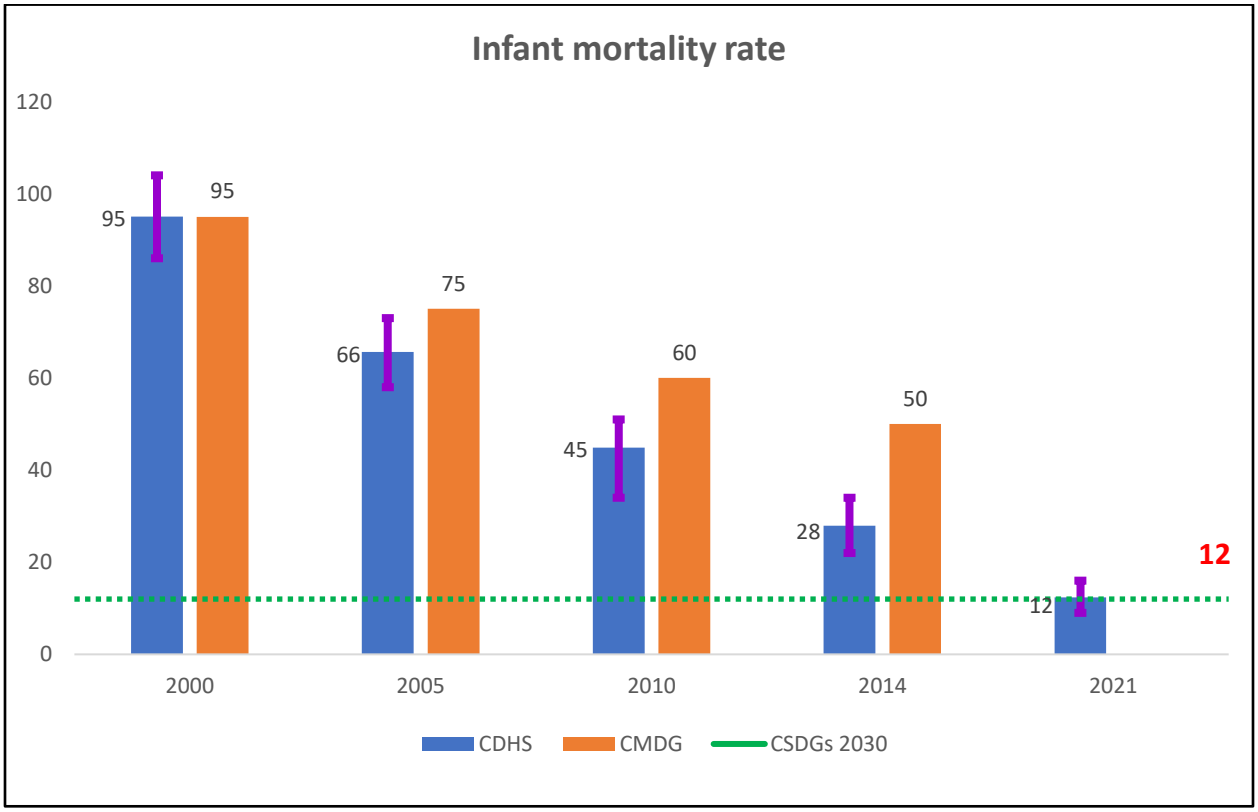


Figure 8. Infant mortality rates compared to CMDG and CSDG Targets



Child health in Cambodia has seen remarkable improvements since 2000. The objective of the National Population Policy 2016-2023 of Cambodia is to facilitate the integration of population dynamics into social and economic developmental planning. In addition, the National Population

Policy is aligned with the SDGs to accelerate further reduction in the maternal mortality ratio and infant and child mortality rates by 2030. Cambodia has not only made exceptional progress on these goals, but has also achieved the two primary targets ahead of schedule –infant and the under 5 mortality reduction. Equally, the secondary targets - for child vaccinations and the proportion of mothers' breast feeding - show strong performance. It is likely that success has been influenced by both service improvements (increased pre-natal and post-natal health care services in facilities), and broader socioeconomic change (reductions in poverty and improved nutrition).

In the analysis including 95% confidence intervals from 2000 to 2021-22 shown in figures 7 and 8, the confidence intervals for the point estimates of the different surveys do not overlap, both for infant and under-5 mortality, meaning a statistically significant decrease in mortality within two decades and from previous surveys. This reflects the expansion of Cambodia's healthcare system, particularly in remote and lagging areas, which has been prioritized by the Royal Government in coverage of measles, vaccination, and the continuing series of vaccinations against polio (Series 2 and 3) and diphtheria-tetanus pertussis (Series 3). Cambodia has had success and focused efforts on effective immunization, which reduces levels of child mortality and decreases the number of reportable infectious disease cases. Connecting with the Rectangular Strategy correlation with the seven strategies plan of Ministry of health, the Ministry of Health maintains implementation throughout those the strategies mention above, it will be reflected for 2030 in the trend of infant and under-5 mortality.

Table 8 presents the background characteristics of infant and child mortality among women interviewed in the Women's Questionnaire. Across all five surveys, most children died in rural areas. The majority of children that died were born to mothers with no education, women ages 30-39, and women with three children or fewer. This table also shows the rate of under-5 mortality by wealth quintile.

Notably, the most significant change occurred over time, with childhood mortality showing a consistent decline over the last ten-year period accompanied with an increase in maternal education over the same time period.

Turning to a provincial analysis, Table 9 combines infant and under-5 mortality rates for some provinces into domain-level data for CDHS 2021-22. This approach ensures consistency across survey years, from 2005 to 2014. Over time, there has been a gradual decline in under-5 mortality rates since 2005. Remarkably, in the most recent CDHS rounds, particularly from 2005 to 2021-22, under-5 deaths per 1,000 live births have seen a significant decrease across both the lowest and highest ranges. However, it is essential to note that when examining mortality rates by domain, there is a persistent lack of change, with some domains, such as Phnom Penh, consistently exhibiting the lowest under-5 mortality rates, while others like Ratanak Kiri and Mondul Kiri continue to have the highest mortality rates

Table 8. Childhood mortality rates according to background characteristics of mother's education and wealth quintile by survey rounds

		Neonatal	Post neonatal	Infant	Child	Under-5
		mortality	mortality	mortality	mortality	mortality
CDHS years	Characteristic	(NN)	(PNN)1	(1q0)	(4q1)	(5q0)
2021-22	**Mothers' age at birth**					
	<20	12	4	16	2	18
	20-29	8	4	12	4	17
	30-39	11	8	19	5	24
	40-49	(9)	(16)	(25)	*	*
	Child's sex					
	Male	10	6	15	4	20
	Female	7	3	9	4	13
	Residence					
	Urban	6	2	8	3	11
	Rural	10	5	15	5	20
	Morther's education					
	No education	17	16	33	7	40
	Primary	8	5	13	4	17
	Secondary	9	4	13	3	16
	More than Secondary	0	2	2	2	5
	Wealth Quintile					
	lowest	12	10	22	5	28
	Second	8	6	14	3	17
	Middle	12	8	19	6	25
	Fourth	10	4	14	5	18
	Highest	5	1	6	1	7
2014	**Marther 's age at birth**					
	<20	20	10	31	13	44
	20-29	17	14	31	7	38
	30-39	27	23	50	14	64
	40-49	60	68	128	*	*
	Child's sex					
	Male	22	22	44	10	54
	Female	20	13	33	9	41
	Residence					
	Urban	10	4	13	5	18
	Rural	23	20	42	10	52
	Morther's education					
	No education	22	41	63	18	79
	Primary	22	15	37	9	46

	Secondary	19	6	26	5	30
	More than Secondary					
	Wealth Quintile					
	lowest	27	35	62	15	76
	Second	23	22	44	13	56
	Middle	24	9	33	8	41
	Fourth	18	9	27	6	33
	Highest	12	4	16	3	19
2010	**Marther's age at birth**					
	<20	50	19	69	8	77
	20-29	23	21	44	9	53
	30-39	38	36	74	14	87
	40-49	61	64	126	21	144
	Child's sex					
	Male	36	31	66	11	76
	Female	27	22	49	11	59
	Residence					
	Urban	11	11	22	7	29
	Rural	35	29	64	12	75
	Morther's education					
	No education	35	32	72	16	87
	Primary	34	28	62	11	73
	Secondary	20	11	31	4	35
	More than Secondary					
	Wealth Quintile					
	lowest	39	38	77	15	90
	Second	34	37	71	13	83
	Middle	35	27	62	7	68
	Fourth	26	13	39	10	49
	Highest	16	6	23	8	30
2005	**Marther's age at birth**					
	<20	48	37	85	13	98
	20-29	34	45	79	16	94
	30-39	33	62	95	25	118
	40-49	53	85	138	40	172
	Child's sex					
	Male	42	55	97	20	115
	Female	30	49	79	20	97
	Residence					
	Urban	29	36	65	12	76
	Rural	37	54	92	21	111

	Morther's education					
	No education	41	69	111	28	136
	Primary	37	52	90	19	107
	Secondary	23	21	45	9	53
	More than Secondary					
	Wealth Quintile					
	lowest	34	66	101	29	127
	Second	45	64	109	23	129
	Middle	38	60	98	18	114
	Fourth	38	39	78	15	92
	Highest	32	12	34	9	43
2000	**Marther's age at birth**					
	<20	45.2	56.0	101.1	28.0	126.3
	20-29	36.3	52.0	88.3	30.4	116.0
	30-39	41.5	52.8	94.3	34.4	125.5
	40-49	40.8	76.5	117.3	43.4	155.6
	Child's sex					
	Male	44	58.8	102.8	33.5	132.8
	Female	34.1	48.1	82.2	30.4	110.1
	Residence					
	Urban	27	72.3	21.8	21.8	92.6
	Rural	40.9	95.7	33.5	33.5	126
	Morther's education					
	No education	42.2	60.2	102.5	36.8	135.5
	Primary	39.9	53.7	93.6	31.6	122.2
	Secondary	26.7	33.5	60.3	16.7	75.9
	More than Secondary	**NA**	**NA**	**NA**	**NA**	**NA**
	Wealth Quintile					
	lowest	**NA**	**NA**	**NA**	**NA**	**NA**
	Second	**NA**	**NA**	**NA**	**NA**	**NA**
	Middle	**NA**	**NA**	**NA**	**NA**	**NA**
	Fourth	**NA**	**NA**	**NA**	**NA**	**NA**
	Highest	**NA**	**NA**	**NA**	**NA**	**NA**

** The estimation not applicable.*

Table 9. Infant and child mortality rate by provinces

	Infant mortality				Child mortality				Under-5 mortality			
Province/Years	**2005**	**2010**	**2014**	**2021-22**	**2005**	**2010**	**2014**	**2021-22**	**2005**	**2010**	**2014**	**2021-22**
Banteay Meanchey	75.9	60.9	29	9.5	22	15.6	2.9	8.1	96.3	75.5	31.8	17.5
Battambong+Pailin	97.1	44.7	28	25.9	21	9.6	9.2	1	116	53.9	37	27.7
Kampong Cham	94.4	53.9	39.3	22.2	18.2	3.9	8.7	6.1	110.9	57.5	47.7	28.2
Kampong Chhang	87.1	77.6	49.7	30.2	15.3	20.5	6	6.5	101	96.5	55.4	36.5
Kampong Speu	107	65.2	26.2	15.2	16.7	8.8	4.5	4.5	122	73.4	30.6	19.6
Kampong Thom	87.1	56.6	40.7	9.9	20.4	11.3	20.2	0	105.7	67.3	60.1	9.9
Kampot+Kep	67.5	60.1	37.7	16.3	16.9	13.8	0	12.3	83.3	73	43.5	30.1
Kandal	84.7	60.9	30.2	10.4	17.8	8.2	10.1	1.7	101	68.6	40	12.1
Kok Kong+Preah Sihanouk	87.6	50	35	13.8	17.7	13.9	7.4	1.4	103.7	63.2	42.1	15.1
Kratie	84.3	76.5	60.8	12.2	34	10.4	20.3	1.8	115.5	86.1	79.9	14
Mondol Kiri+Ratanak Kiri	121.7	82.2	72.2	36.9	49.7	26	8.9	4.9	165.4	106.1	81	42.3
Phnom Penh	42	12.9	17	5.2	10.3	5.5	6.3	0	51.9	18.3	23.2	5.2
Preah Vihear+StungTreang	113.4	94.5	70	42	38.7	25.7	9.5	3.5	145.8	117.8	78.8	27.5
Prey Veng	121	63.8	64.4	12.5	25	10.4	11.3	13.5	143	73.6	75	25.8
Sieam Reap	66.8	50	40.5	10.3	28.6	10.4	16.5	1.3	93.5	59.9	56.2	11.6
Svay Rieng	92.3	77.7	46.1	27.5	19.8	16.4	17.6	7.1	110.2	92.9	62.9	34.4
Takeo	95.6	67.7	27.8	10.1	7.2	17.3	3.7	3.7	102.1	83.8	31.3	13.8
Otdar Meanchey	89.7	42.1	32.2	20.3	22.6	4.9	9.3	1.8	110.3	46.8	41.2	22

CONCLUSIONS/POLICY RECOMMENDATIONS

There are gaps in the information related to adult mortality in terms that the results of the CDHS do not provide a full picture of the detailed cause of deaths classified by ICD-10 as recommended by the World Health Organization. The Ministry of Health shall have full coverage of the facilities to comply with MCCD for both public and private heath sectors as well as next CDHS should add more detail on cause of deaths rather than only for maternal, violence and accident.

The absence of Vital Statistics in Cambodia makes difficult the monitoring and evaluation of mortality. Thus, the trilateral ministries MOI, MOH and MOP as body of Government of Cambodia shall continue strengthening and improving CRVS system, because the data collected through it such as number of births, number of deaths, number of fetal deaths, and cause of death; and the level of detail it can contain, down to low level of geographical areas administrative of the government, are powerful for informing and taking action on program intervention from national to the sub-national level, national and international comparability, and also for evaluation of the census and survey results.

In remote areas, language barriers, traditional practices, and low education among many indigenous groups, reinforces the practice of traditional lifestyles including early unions and home births are still an obstacle for reducing maternal deaths. On the other hand, for the inter-provincial differences in child health indicators, which reflects unequal standard of living and unequal distribution of public services. As evidenced by CDHS data, from 2000 to 2021-22, childhood mortality in Mondokiri and Ratanak Kiri is still higher than other provinces, these may point to interventions not working well or being unappropriated to the living conditions in those provinces. It may also highlight the larger challenges in those locations, including more minority ethnic groups with different cultures and beliefs. The health policies and government program intervention require greater consideration to the remote geographical areas as well as the CDHS survey design shall consider a reliable number of sample areas to be enough for estimating metrics for of ethnic and vulnerable groups.

The MMR target has been shown so far from the beginning of CMDG up to CSDG mandated. On the other hand, the CMDG progress report analysis has made a lot of revisions to the MMR target, for example in 2015 they set up 140 per 100,000 live births based on one of assumption and once again they revised to 250 per 100,000 live births based on another assumption. Health policymakers need to improve their understanding of all root causes of maternal deaths such as hemorrhage, pre & eclampsia, other direct causes, infection, heart disease, abortion, uterine rupture, anemia to better target coping strategies in order to make improvement as well as to better calculate MMR and make better assumptions for their estimation.

The future estimation by 2030 MMR will not meet its target since the results of the last 3 surveys (CDHS 2010 to 2021-22) over the past ten years show the situation remains with minor changes and the MMR is still far from its target. Also, the moving average prediction shown that at the current ratios, that target will be unmet in 2030. To achieve the 2030 MMR target of less than 70

maternal deaths per 100,000 live births, health policymakers shall be reviewing and conducting report analysis on the existing health policy and program intervention that relate to root causes of maternal deaths as well as funded investment be enough to address MMR to reach the intended target. Otherwise, revision shall be made to those policies and programs accordingly and revise the target to a reasonable and achievable value.

APPENDIX

Appendix Table 1. Direct estimates of maternal mortality, CDHS 2000

Direct estimates of maternal mortality for the period 0-6 years prior to the survey, Cambodia Demographic and Health Survey 2000

Age Groups	Maternal deaths	Exposure years	Maternal mortality rates[1]	Proportion of maternal deaths to all women deaths
15-19	3	26,204	0.12	6.1
20-24	11	27,925	0.41	15.6
25-29	26	30,916	0.86	28.1
30-34	23	28,792	0.80	28.7
35-39	28	23,388	1.18	26.7
40-44	7	15,784	0.43	7.9
45-49	2	9,385	0.24	3.9
15-49	**100**	**162,394**	**0.55[a]**	**18.4**

General fertility rate (GFR)	127[a]
Maternal mortality ratio (MMR)[2]	437
Lifetime risk of maternal death[3]	0.02

[1] Expressed per 1,000 woman-years of exposure
[2] Expressed per 100,000 live births; calculated as the maternal mortality rate divided by the general fertility rate
[3] Lifetime risk of maternal death = 1-(1-(MMR/100,000)^{TFR}), where TFR represents the total fertility rate for the period 0-6 years prior to the survey (=4.5)
[a] Age-adjusted rate

Appendix Table 2. Direct estimates of maternal mortality, CDHS 2005

Direct estimates of maternal mortality for the period 0-6 years prior to the survey, Cambodia Demographic and Health Survey 2005

Age Groups	Maternal deaths	Exposure years	Maternal mortality rates[1]	Proportion of maternal deaths to all women deaths
15-19	5	37,770	0.13	12.8
20-24	9	34,633	0.27	15.6
25-29	14	28,428	0.48	17.5
30-34	28	29,904	0.94	23.3
35-39	22	26,420	0.81	21.1

40-44	16	19,508	0.81	16.0
45-49	5	12,588	0.38	6.3
15-49	**99**	**189,251**	**0.50[a]**	**17.1**

General fertility rate (GFR)	106[a]
Maternal mortality ratio (MMR)[2]	472
Lifetime risk of maternal death[3]	0.017

[1] Expressed per 1,000 woman-years of exposure
[2] Expressed per 100,000 live births; calculated as the maternal mortality rate divided by the general fertility rate
[3] Lifetime risk of maternal death = 1-(1-(MMR/100,000)^{TFR}), where TFR represents the total fertility rate for the period 0-6 years prior to the survey (=3.6)
[a] Age-adjusted rate

Appendix Table 3. Direct estimates of maternal mortality, CDHS 2010

Direct estimates of maternal mortality for the period 0-6 years prior to the survey, Cambodia Demographic and Health Survey 2010

Age Groups	Maternal deaths	Exposure years	Maternal mortality rates[1]	Proportion of maternal deaths to all women deaths
15-19	3	38,695	0.1	7.3
20-24	3	44,460	0.1	7.6
25-29	9	38,242	0.2	15.5
30-34	8	28,690	0.3	14.2
35-39	4	26,991	0.2	5.5
40-44	11	21,069	0.5	11.1
45-49	2	14,998	0.1	2.2
15-49	**40**	**213,145**	**0.2[a]**	**8.5**

General fertility rate (GFR)	95[a]
Maternal mortality ratio (MMR)[2]	206
Lifetime risk of maternal death[3]	0.006

[1] Expressed per 1,000 woman-years of exposure
[2] Expressed per 100,000 live births; calculated as the maternal mortality rate divided by the general fertility rate
[3] Lifetime risk of maternal death = 1-(1-(MMR/100,000)^{TFR}), where TFR represents the total fertility rate for the period 0-6 years prior to the survey (=3.1)

[a] Age-adjusted rate

Appendix Table 4. Direct estimates of maternal mortality, CDHS 2014

Direct estimates of maternal mortality for the period 0-6 years preceding the survey, by five-year age groups, Cambodia Demographic and Health Survey 2014

Age Groups	Percentage of female deaths that are maternal	Maternal deaths	Exposure years	Maternal mortality rates[1]
15-19	0.0	0	33,159	0.00
20-24	13.2	4	40,909	0.10
25-29	27.1	11	40,901	0.27
30-34	10.5	5	30,606	0.16
35-39	16.1	8	23,590	0.32
40-44	2.8	2	19,321	0.11
45-49	3.0	2	14,071	0.16
15-49	**9.1**	**32**	**202,557**	**0.15[a]**

General fertility rate (GFR)[2]	89
Maternal mortality ratio (MMR)[3]	170 (±2 SE; CI = 95, 246)
Lifetime risk of maternal death[4]	0.005

CI = Confidence interval
[1] Expressed per 1,000 woman-years of exposure
[2] Expressed per 1,000 women age 15-49
[3] Expressed per 100,000 live births; calculated as the age-adjusted maternal mortality rate times 100 divided by the age-adjusted general fertility rate
[4] Calculated as $1-(1-MMR)^{TFR}$, where TFR represents the total fertility rate for the seven years preceding the survey
[a] Age-adjusted rate

Appendix Table 5. Direct estimates of maternal mortality, CDHS 2021-22

Direct estimates of maternal mortality rates for the 7 years preceding the survey, by 5-year age groups, Cambodia Demographic and Health Survey 2021-22

Age Groups	Percentage of female deaths that are maternal	Maternal Deaths[1]	Exposure years	Maternal mortality Rates[2]
15-19	0.0	0	22,512	0.00
20-24	12.2	3	33,117	0.09
25-29	2.5	1	40,426	0.02

30-34	21.3	10	41,147	0.23
35-39	23.0	12	33,741	0.36
40-44	0.0	0	20,685	0.00
45-49	4.2	2	14,429	0.12
15-49	**10.7**	**28**	**206,057**	**0.12[a]**

General fertility rate (GFR)[3]	81
Maternal mortality ratio (MMR)[4]	154 (CI: 69–239)
Lifetime risk of maternal death[5]	0.004

CI = Confidence interval

[1] A maternal death is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, from any cause except accidents or violence.
[2] Expressed per 1,000 woman-years of exposure
[3] Age-adjusted rate, expressed per 1,000 women age 15–49
[4] Expressed per 100,000 live births; calculated as the age-adjusted maternal mortality rate times 100 divided by the age-adjusted general fertility rate
[5] Calculated as $1-(1-MMR)^{TFR}$, where TFR represents the total fertility rate for the seven years preceding the survey
[a] Age-adjusted rate

Appendix Table 6. Socio-economic

Years	Annual Growth Rate of Gross Domestic Product (GDP)	Annual Average Household Income in USD	Poverty Rate
1994	8.11	1,374.11	39
1995	20.01	-	-
1996	-0.80	-	-
1997	-4.71	-	36.1
1998	-9.23	-	-
1999	11.96	1,739.11	35.9
2000	3.16	-	-
2001	8.24	-	-
2002	6.50	-	-
2003	8.02	-	-
2004	13.52	-	34.68
2005	16.87	-	-
2006	14.61	-	-
2007	17.63	-	47.8
2008	15.80	-	29.9
2009	-0.92	2,104.11	22.9
2010	10.18	2,469.11	21.1

2011	9.85	2,834.11	19.8
2012	6.71	3,199.11	18.9
2013	7.13	3,564.11	16
2014	8.56	3,929.11	13.5
2015	7.70	4,294.11	-
2016	9.18	4,659.11	-
2017	7.47	5,024.11	-
2018	8.83	-	-
2019	8.90	-	17.8
2020	-5.20	5,389.11	-

Appendix Table 7. Demographics

Appendix Table 7. Demographics		
Year	**Female Life Expectancy**	**Lifetime risk of maternal deaths**
1998	63.1	-
1999	63.6	-
2000	64.3	0.02
2001	64.9	-
2002	65.6	-
2003	66.2	-
2004	66.8	-
2005	67.5	0.017
2006	68.1	-
2007	68.7	-
2008	69.4	-
2009	70	-
2010	70.6	0.006
2011	71.2	-
2012	71.9	-
2013	72.5	-
2014	73.1	0.005
2015	73.7	-
2016	74.4	-
2017	75	-
2018	75.6	-
2019	76.2	-
2020	76.9	-
2021	-	0.004

Appendix Table 8. Trend of deliveries from year 2003 to 2021

Years	Percentage of births assisted by health staff	Percentage of deliveries in public health facilities
2003	22.00	
2004	33.00	16.30
2005	41.00	24.10
2006	39.00	19.30
2007	46.00	25.50
2008	58.00	39.00
2009	63.00	44.00
2010	69.20	52.10
2011	71.66	61.39
2012	74.68	66.33
2013	84.00	80.00
2014	85.00	80.00
2015	85.52	80.35
2016	85.02	80.52
2017	88.99	85.37
2018	87.29	84.05
2019	89.48	86.75
2020	91.81	89.16
2021	84.36	81.39

Appendix Table 9. Vaccinations by source of information percentage of children age 12-23 months, who received specific vaccines at any time before the survey, by source of information (vaccination card or mother's report), and percentage vaccinated by 12 months of age, Cambodia 2000-2021

Years	Source of information		Percentage of children who received											
			DPT			Polio[1]				Measles	All[2]	None	Number
		BGC	1	2	3	0	1	2	3				
2000	**Vaccinated at any time**												
	before the survey												
	Vaccination card	45.9	45.6	40.0	35.8	25.3	45.6	40.1	35.8	36.4	31.6	0.0	596
	Mothers' report	25.5	22.4	18.2	12.7	4.5	29.1	24.0	15.6	18.9	8.3	21.7	657
	Either source	71.4	68.0	58.2	48.5	29.8	74.7	64.1	51.5	55.4	39.9	21.7	1,253
	Vaccinated by												
	12monthsof age[3]	66.1	63.4	53.1	42.7	28.6	69.1	58.6	45.3	41.4	31.3	29.0	1,253
2005	**Vaccinated at any time**												
	before the survey												
	Vaccination card	65.9	66.3	64.4	61.3	5.0	66.2	64.5	59.8	56.3	52.7	0.2	1,012

	Mothers' report	25.5	24.3	20.7	17.0	3.2	24.4	21.2	17.1	20.6	13.9	6.8	505
	Either source	91.4	90.6	85.1	78.3	8.2	90.6	85.7	76.9	76.9	66.6	7.0	1,517
	Vaccinated by												
	12monthsof age[3]	91.0	89.7	83.7	75.5	8.2	89.8	84.4	74.2	70.2	59.9	7.6	1,517
2010	**Vaccinated at any time**												
	before the survey					HB0							
	Vaccination card	77.1	75.6	74.1	70.9	60.9	75.6	74.3	70.8	66.8	66.1	0.0	1,249
	Mothers' report	17.3	17.6	16.1	14.0	12.0	17.9	16.4	14.2	15.0	12.7	3.9	364
	Either source	94.3	93.1	90.2	84.8	73.0	93.6	90.6	85.0	81.9	78.8	3.9	1,614
	Vaccinated by												
	12monthsof age[3]	94.2	92.6	89.2	83.6	73.0	93	89.6	83.8	77.0	73.6	3.9	1,614
2014	**Vaccinated at any time**												
	before the survey					HB0							
	Vaccination card	76.4	75.4	72.8	68.6	65.1	75.9	72.0	67.2	63.4	60.0	0.0	1,129
	Mothers' report	19.7	18.6	17.6	15.1	17.7	18.9	17.6	15.1	15.2	13.5	2.4	332
	Either source	96.1	94.0	90.4	83.7	82.8	94.8	89.5	82.3	78.6	73.4	2.4	1,460
	Vaccinated by												
	12monthsof age[3]	95.9	93.6	89.7	81.9	82.6	94.5	88.8	80.2	70.3	65.3	2.6	1,460
2021 -22	**Vaccinated at any time**												
	before the survey					IPV							
	Vaccination card	79.6	78.5	76.7	73.8	64.5	80.0	77.9	75.1	70.2			
	Mothers' report	14.8	13.8	12.5	10.3	13.7	14.5	13.2	10.9	12.9			
	Either source	94.4	92.3	89.2	84.1	78.1	94.5	91.1	86.0	83.1			
	Vaccinated by												
	12monthsof age[3]	94.0	92.0	88.7	83.6	77.8	94.3	90.7	87.6	80.4			

[1] Polio 0 is the polio vaccination given at birth.

[2] Children who are fully vaccinated, i.e., those who have received BCG, measles, and three doses of DPT and polio vaccine (excluding polio vaccine given at birth)

[3] For children whose information was based on the mother's report, the proportion of vaccinations given in the first year of life was assumed to be the same as for children with a written record of vaccination.

Appendix Table 10. Initial breastfeeding percentage of children born in the five years preceding the survey who were ever breastfed, and among children ever breastfed the percentage who started breastfeeding within one hour and within one day of birth, and who received a prelacteal feed, by background characteristics, Cambodia 2000-2021

Years	Background characteristic	Percentage ever breastfed	Number of all children	Number of all children ever breastfed
2000	Sex			
	Male	95.1	4161	3957

	Female	96.4	4014	3868
2005	Sex			
	Male	96.6	3901	2868
	Female	97.1	3887	2844
2010	Sex			
	Male	96.4	1633	1574
	Female	96.2	1554	1495
2014	Sex			
	Male	96.8	1471	1425
	Female	95.6	1473	1409
2021-22	Sex			
	Male	82.7	1731	*
	Female	80.9	1599	*

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