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Sri Lanka is on the Verge of Entering Ultra-Low Fertility: Estimating Total Fertility Rate Through an Alternative Method Validation with South Korea

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Original Article

Abstract

Introduction: The Total Fertility Rate (TFR) of Sri Lanka has been unavailable since 2016, when the Demographic and Health Survey (DHS) reported a TFR of 2.2 live births per woman. Estimating TFR for the period 2016–2024 is crucial, particularly from a sexual and reproductive health (SRH) perspective, given the possible impacts of the COVID-19 pandemic and economic crisis on fertility behaviour.

Objectives: First, it aims to assess the validity of an alternative method by comparing its TFR estimates for South Korea with those obtained through the standard technique. Second, based on the demonstrated validity of the two sets of estimates for South Korea, the alternative method is applied to estimate the TFR of Sri Lanka. Further the analysis explores the broader demographic and socio-economic implications of fertility change.

Methods: Initially, the alternative method is applied to estimate the TFR for South Korea, a country with up-to-date statistics. These estimates are then compared with standard TFR figures to assess the method's validity. Upon confirming a high degree of validity between the two sets of estimates, the alternative method is used to estimate the TFR for Sri Lanka.

Results: Sri Lanka's TFR fell below replacement level by 2016 and has continued to decline, reaching an estimated 1.4 in 2023 and 1.3 in 2024. These figures indicate that the country is on the verge of entering an ultra-low fertility regime, typically defined as a TFR below 1.3. Sri Lanka began experiencing population decline from 2022, when the total population peaked at 22.1 million. This demographic shift is primarily driven by a sharp decline in natural increase and a substantial net out-migration rate between 2022 and 2024.

Conclusion: Sri Lanka's transition toward ultra-low fertility has significant macro-level implications, including a rapidly ageing population, a shrinking labour force, and mounting pressure on healthcare and social protection. These trends underscore the urgent need for evidence-based policy interventions to stabilize/reverse fertility levels.

Key Words: Ultra-low fertility, Alternative methods, TFR estimates, Sri Lanka and South Korea

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Introduction

Fertility is a key demographic component shaping population size, structure, and growth, with broad implications for labour supply, economic stability, and social support systems. Fertility is influenced by trends in marriage, the practice of contraception and abortion. However, these three subcomponents are influenced by economic conditions, social norms, access to education, gender equality, and government policies such as maternal and parental leave and financial incentives. While there are many measures to estimate the fertility level of a country, the Total Fertility Rate (TFR), the average number of children a woman is expected to have based on current age-specific fertility rates, is the most widely used measure. The standard approach to calculating the TFR is to sum Age-Specific Fertility Rates (ASFR) across five-year age groups and multiply by the class width.

In Sri Lanka, the official TFR from 1953 to 2016 has been estimated using the standard method, drawing on data from population censuses, the World Fertility Survey (WFS), and Demographic and Health Surveys (DHS) (Table 1). The most recent available estimate reported in the 2016 DHS indicates a TFR of 2.20 children per woman for the period 2013–2016. However, this figure reflects fertility conditions from approximately a decade ago and may not represent the current demographic situation in the country.

Although the World Fertility Survey and Demographic and Health Surveys (DHS) include a number of questions on fertility, the 2012 population census contains a few questions on fertility, which helps to calculate TFR directly [4]. Nevertheless, previous censuses used two sets of data to calculate TFR on the standard method: female population of reproductive age from the population census and data of births per woman across five-year age groups (age 15-19 to 45-49 years) from the Registrar General's Department. The total fertility rate has shown a continuous decline from 5.3 births per woman in 1953 to 2.3 for the period

Table 1. Total fertility rate (live births per woman) in Sri Lanka, 1953 to 2016

Source	Year/Period	TFR
Census of Ceylon, 1953	1953	5.30
Census of Population, Ceylon 1963	1963	5.30
Census of Population and Housing, 1971	1971	4.28
World Fertility Survey, 1975	1974	3.60
Census of Population and Housing, 1981	1981	3.45
Demographic & Health Survey, 1987	1982-1987	2.82
Demographic & Health Survey, 1993	1988-1993	2.26
Demographic & Health Survey, 2000	1995-2000	1.96
Demographic & Health Survey, 2006-07	2003-2006	2.33
Census of Population and Housing, 2012	2011	2.40
Demographic & Health Survey, 2016	2013-2016	2.20

Source: Department of Census and Statistics [1-3].

1988-93, and it further declined to 1.96 was measured in DHS for the period 1995-2000, which was ever below the replacement level. But the next 2006-07 DHS and 2012 Census reported a sudden jump in fertility level and again a drop in the latest 2016 DHS; 2.2 births per woman (Table 1).

Alongside, total live births in Sri Lanka are showing a rapid decline over the past 10 years: Births dropped from 335K in 2015 to 319K by 2019 – the decline was only 4.7%. However, from 2019 to 2023, the decline was 22.3% meaning the decline is more than 71,000 births. With the significant drop in births, net negative international migration and rising deaths suppressed the growth of the Sri Lankan population. The estimated mid-year population in 2022 was 22.181 million, dropping to 22.027 million in 2023 and further dropping to 21.763 million in 2024 [5].

Along with a massive drop in births, one would assume a significant drop in the TFR of Sri Lanka. However, the most recent TFR value is available only from the DHS 2016. Thus, beyond 2016, no reliable measure is available to assess the fertility behaviour of the Sri Lankan population.

Against this backdrop, the paper estimates the TFR of Sri Lanka through 2024 using an alternative estimation method, as proposed by Huang in 2020, with recently available data [6]. We benchmark the estimation error from using the alternative method with South Korean fertility data. The method also allows us to assess annual changes in the natural growth rate (the difference between annual births and deaths) and its impact on population growth in Sri Lanka. Finally, we discuss the macro-level implications of the estimated TFR trend.

Approaches to Calculating TFR

As per the standard definition of the Total Fertility Rate, age-specific fertility data is typically needed to calculate the measure. To estimate age-specific fertility rates, data on the number of live births according to the age of the mother, along with age-sex disaggregated population data for a given period, are required. Due to the unavailability of such data on many occasions, researchers have explored several alternative methods to estimate TFR with available data.

Recently, new approaches for estimating TFR over time from multiple data sources of varying quality have been proposed and applied for seven West African countries [7]. In their article, the United Nations published period TFRs for many years. A regression model is used to estimate TFR on the data quality covariates and subtracted from the observation while estimating the measurement of error variance and assessing the uncertainty of TFR estimates [7].

Two regression models were carried out by ordinary least squares assumptions to estimate TFR for 13 sub-regions of Nepal using Nepal Demographic Health Survey data [8]. In the model one, the relationship between TFR and Contraceptive Prevalence Rate (CPR) was established. Again, a similar type of regression model was established using a relation between TFR and a new predictor variable, which is an additive combination of CPR and the proportion of currently married females having an open birth interval. The model with new predictor gives higher R2 value compare to the first model with only CPR as a predictor which explains data better in Model 2 than Model 1 [8].

An indirect method to estimate TFR on the basis of the movements of age distribution of women in reproductive age was proposed by Singh and others in India in 2021 using the fourth round of the National Family Health Survey conducted during 2015-16. The model conceptualizes the relationship between TFR

and the age distribution of currently married women of reproductive age, and it provides a fairly reliable estimate of TFR [9].

More recently, Huang introduced a new method in 2020 to estimate TFR using the number of births and the population of women at childbearing age. The relative difference in TFR estimates between standard method and the proposed method was found to be less than 5 percent. The approach further showed that the TFR is proportional to the crude birth rate and proposed a method to estimate the scaling coefficient to calculate the TFR from the crude birth rate. Our paper applies Huang's method to Sri Lankan data to estimate the TFR for Sri Lanka [6].

Data and Methods

The Standard and Alternative Approaches to Deriving TFR

TFR is derived by cumulating the age-specific fertility rates (per woman) of women in age 15-19 to 45-49 years. When rates are calculated for the seven conventional 5-year age groups, the TFR is the sum of the rates for each age group, multiplied by five (the width of the age-group interval) [10].

$TFR = n * \sum nFx$ where:

${}_nW_x$ = Mid-year number of women aged x to x + n

${}_nB_x$ = Number of births to women aged x to x + n during the year

${}_nF_x = {}_nBx / {}_nW_x$ = Age-specific fertility rate for age interval x to x +n

This approach is referred to as the "standard" method for calculating TFR [11].

In 2020, Huang proposed an alternative method to calculate TFR. His computation argues if the women of childbearing age range in age from 15 to 49 years, for a total of 35 years, then the standard method for calculating TFR can be reduced to [6]:

$TFR = 35 * {}_{35}F_x = 35 * B/W$

Where B is the total number of births in the year, and W is the total number of women at childbearing age (15-49 years) in the same year. The data requirement for calculating the total fertility rate reduces to the number of births and the number of women at childbearing age for each year. We refer to this approach as the "total birth number" method and apply it to our estimation of TFR for Sri Lanka.

Data

Three main data sources are used for our estimation. Data from the Department of Census and Statistics of Sri Lanka, Registrar General's Department of Sri Lanka, and Department of Immigration and Emigration of Sri Lanka were used to obtain estimated mid-year population, the estimated female population in 5-year age groups, the estimated total female population between the ages of 15-49, the number of live births by age of the mother in 5-year age groups, and migration flows. Published TFR values were taken from past Demographic Health Surveys and Population Census reports.

As an initial exercise to validate the total birth number method, the TFRs for South Korea are calculated and compared with reported TFRs, which were calculated using the standard method. KOSIS (Korean Statistical Information Service), the national statistical database, is used to fetch relevant data for South Korea [12].

The same exercise will then be conducted to calculate Sri Lankan TFRs and to compare these estimates with reported TFRs in particular years. Specifically, TFR estimates will also be calculated for the 2019-2024

period based on the alternative method using available provisional data.

Results

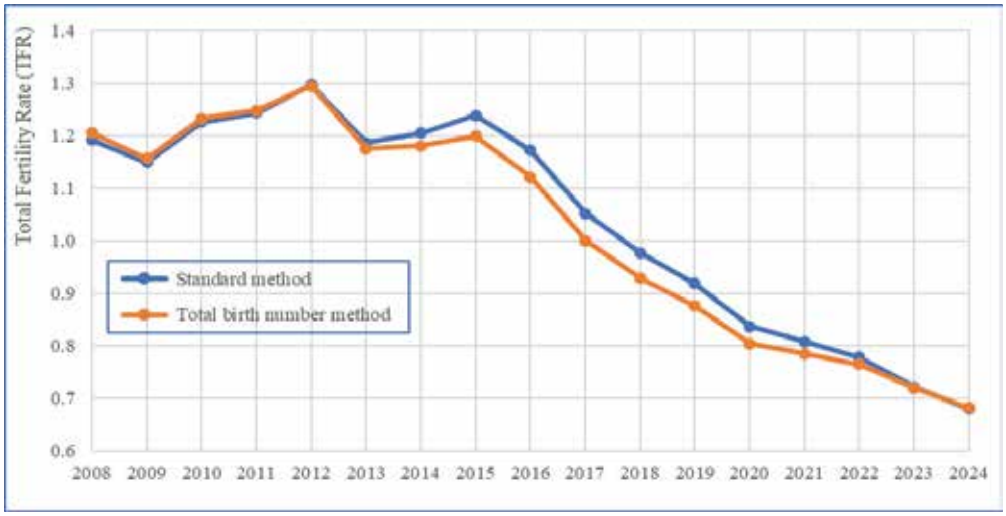
Calculated TFRs for South Korea on the total birth number method, TFRs on the standard method and percentage deviation are given in Table 2.

TFRs on the total birth method were calculated using the above equation, and figures on the standard method are published data (Table 2). Five TFR values on the total birth method are higher than the standard method (years 2008-11 and 2024). The rest of the values for the total birth method are lower than the standard method. The absolute difference between the two fertility rates (TFR on the standard method and total birth method) is minimal, all less than 0.05. The relative difference (percentage deviation) ranges from -1.09% to 4.93% with a mean of 1.81% and a standard deviation of 2.18.

Table 2. South Korean TFRs on standard and total birth methods 2008-24

Year	Number of live births	Number of women (15-49)	Total Fertility Rate		Deviation (%)
			Standard method	Total birth method	
2008	465,892	13,531,767	1.192	1.205	-1.09%
2009	444,849	13,460,877	1.149	1.157	-0.67%
2010	470,171	13,346,797	1.226	1.233	-0.57%
2011	471,265	13,215,175	1.244	1.248	-0.33%
2012	484,550	13,095,781	1.297	1.295	0.15%
2013	436,455	13,001,757	1.187	1.175	1.02%
2014	435,4351	12,909,337	1.205	1.181	2.03%
2015	438,420	12,796,169	1.239	1.199	3.22%
2016	406,243	12,677,816	1.172	1.122	4.31%
2017	357,771	12,520,068	1.052	1.000	4.93%
2018	326,822	12,311,964	0.977	0.929	4.91%
2019	302,676	12,088,187	0.918	0.876	4.54%
2020	272,337	11,857,169	0.837	0.804	3.96%
2021	260,562	11,620,204	0.808	0.785	2.87%
2022	249,186	11,403,123	0.778	0.765	1.69%
2023	230,028	11,198,424	0.721	0.719	0.29%
2024	218,000	11,186,913	0.680	0.682	-0.30%

Source: KOSIS KOrean Statistical Information Service [12].



Source: KOSIS KOrean Statistical Information Service [12].

Figure 1. South Korean TFRs on standard and total birth methods 2008-24.

Trends of TFRs on the standard and total birth number method follow a similar pattern with an overall downward trend from 2008-24 (Figure 1). In the beginning 6 years (2008-13), both the figures are almost the same, and subsequently, it shows an increase in TFR figures on the standard method compared to the birth number method from 2014 to 2022, widening the difference. Again, in the last 2 years (2023-24), both the figures are coincident.

TFR estimates of Sri Lanka up to 2024

Calculated TFRs for Sri Lanka using the total birth method are presented in Table 3 along with the number of live births, the 15-49 aged women population, TFRs on standard method and the percentage deviation from standard to total birth method for the period 1971-2024. Provisional data of number of live births for 2016-2018 was taken from the Registrar General's Department (RGD).

The absolute difference between the TFRs calculated under the two different methods is less than 0.47 for all 23 years, less than 0.09 for 1 years, 0.10 for 3 years, and between 0.11-.21 for 6 years. The percentage deviation ranges from -20.35% to 8.70% with the mean of -4.54% and standard deviation 6.49. There are seven data points with a percentage deviation of above 5% absolute value in 1981, 2001, and 2011 Census years and years 1987, 1993, 2000, and 2016 refer DHS. Graphical presentation of TFRs on 2 methods and the replacement level is shown in the Figure 2.

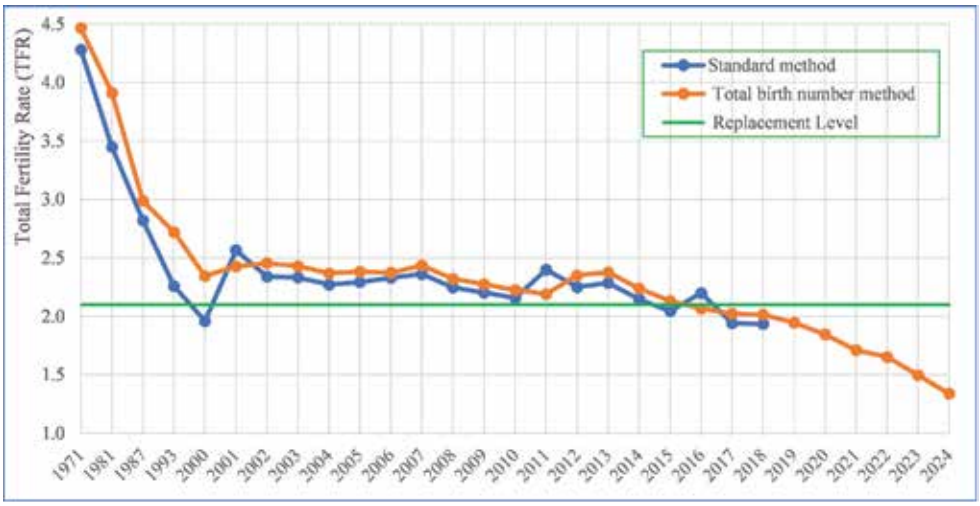
Table 3. Sri Lankan TFRs on standard and total birth methods 1971-2024

Year	Number of live births	Number of women (15-49)	Total Fertility Rate		Deviation (%)
			Standard method	Total birth method	
1971	385,678	3,023,155	4.280	4.465	-4.33%
1981	423,684	3,792,251	3.450	3.910	-13.34%
1987	357,628	4,191,000	2.820	2.987	-5.91%
1993	350,572	4,511,000	2.260	2.720	-20.35%
2000	347,622	5,187,000	1.960	2.346	-19.67%
2001	358,463	5,168,600	2.565	2.427	5.36%
2002	367,534	5,238,000	2.341*	2.456	-4.91%
2003	370,482	5,334,000	2.334*	2.431	-4.16%
2004	364,587	5,386,000	2.273*	2.369	-4.23%
2005	370,630	5,442,000	2.293*	2.384	-3.96%
2006	373,425	5,504,000	2.330	2.375	-1.91%
2007	386,466	5,551,000	2.362*	2.437	-3.16%
2008	373,501	5,629,000	2.248*	2.322	-3.31%
2009	368,172	5,666,000	2.204*	2.274	-3.19%
2010	363,815	5,722,000	2.157*	2.225	-3.17%
2011	361,935	5,781,000	2.400	2.191	8.70%
2012	359,787	5,355,092	2.251*	2.352	-4.47%
2013	365,668	5,382,000	2.287*	2.378	-3.98%
2014	349,685	5,465,000	2.147*	2.240	-4.31%
2015	336,059	5,516,000	2.045*	2.132	-4.27%
2016	329,465	5,579,000	2.200	2.067	6.05%
2017	326,263	5,643,000	1.942*	2.024	-4.20%
2018	328,156	5,701,000	1.936*	2.015	-4.06%
2019	319,010	5,736,000	NA	1.947	-
2020	301,706	5,722,000	NA	1.845	-
2021	284,848	5,829,000	NA	1.710	-
2022	275,321	5,835,000	NA	1.651	-
2023	247,900	5,797,000	NA	1.497	-
2024	220,761	5,766,000	NA	1.340	-

NA: Not Available (Data on live births by mother's age is not available).

* Calculated based on ASFRs (Births per mother's age from RGD and estimated women's population in reproductive age (15-49) in 7 age groups by DCS).

Source: [1]Registrar General's Department of Sri Lanka [13-14] and Department of Census and Statistics, [15-16].
[2]Department of Census and Statistics [15, 17, 18, 19-29, 2] and Registrar General's Department of Sri Lanka [30].
[3]Department of Census and Statistics [15, 17, 31, 32-34, 1-3].



Source: Registrar General's Department of Sri Lanka [13, 30, 14].
Department of Census and Statistics, [15, 17, 31, 18, 32-34, 1-3].

Figure 2. Sri Lankan TFRs on standard and total birth methods 1971-2024.

Patterns of 2-line graphs seem to follow the same trend with a few deviation points. TFRs on the standard method crossing replacement level on two occasions in 2000 and 2015, where the total birth method crosses the replacement level in 2016 and has not reached it since. The standard TFR dropped sharply to 1.96 (below the replacement level) in 2000 and picked up to a comparable high value of 2.565 in 2001, disrupting its overall trend. Again, standard TFR values in 2011 and 2016 highlight 2 peaks compared to the total birth method. However, beyond the year 2000, TFR figures of both methods demonstrate a significant compatibility.

Although during the past 10 years, TFR values are not available for Sri Lanka, that gap has been filled by the total birth method. This alternative method is able to estimate the current TFR for Sri Lanka as 1.497 births per woman in the year 2023, and it further dropped to 1.340 births per woman in 2024. The TFR crossed the replacement level in 2016 (2.067 births per woman), and further followed a downward trend.

Change of the Sri Lankan population: impact of demographic components

The mid-year population from 2000-2024, total births and deaths for each year, and net migration of Sri Lankans are presented in Table 4 below. Mid-year population for 2001 is an extrapolated figure as the 2001 census covered only 18 of the total 24 districts of the country. Mid-year population for 2012 and 2024 are observed values, while estimated mid-year populations are presented for other years. Birth, death, and net migration rates are calculated per 1,000 persons, while the natural increase in population is calculated as the difference between the birth rate and death rate. Since data on arrivals and departures for 2024 is available only for the first 6 months, total arrivals and departures for 2024 are estimated based on the bi-annual pattern of the years 2022 and 23.

Table 4. Sri Lankan population, key demographic rates and natural increase 2000-24

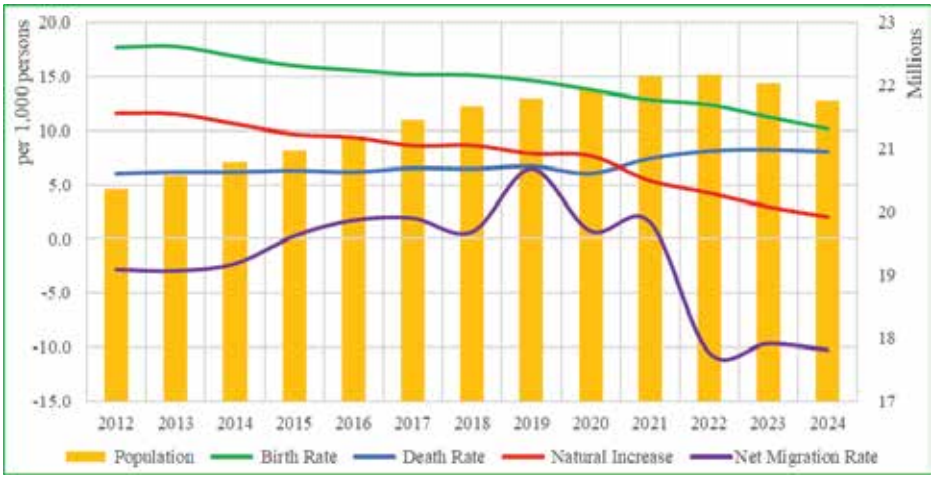
Year	Mid-year population[1]	Total births[2]	Total deaths[3]	Net migration[4]	Birth rate	Death rate	Natural increase	Net migration
2000	18,776,300	347,749	116,200	-9,764	18.5	6.2	12.3	-0.52
2001	18,797,257	358,583	112,858	-17,985	19.1	6.0	13.1	-0.96
2002	19,007,000	367,709	111,863	-39,618	19.3	5.9	13.5	-2.08
2003	19,252,000	370,643	115,495	-30,524	19.3	6.0	13.3	-1.59
2004	19,462,000	364,711	114,915	-33,258	18.7	5.9	12.8	-1.71
2005	19,668,000	370,731	132,097	-44,132	18.8	6.7	12.1	-2.24
2006	19,886,000	373,538	117,467	-22,314	18.8	5.9	12.9	-1.12
2007	20,010,000	386,573	118,992	-44,487	19.3	5.9	13.4	-2.22
2008	20,246,000	373,575	123,814	-65,522	18.5	6.1	12.3	-3.24
2009	20,476,000	368,304	127,776	-48,202	18.0	6.2	11.7	-2.35
2010	20,675,000	363,881	130,337	-40,795	17.6	6.3	11.3	-1.97
2011	20,892,000	362,044	123,183	-28,339	17.3	5.9	11.4	-1.36
2012	20,359,439	359,959	122,741	-57,878	17.7	6.0	11.7	-2.84
2013	20,585,000	365,762	127,183	-60,923	17.8	6.2	11.6	-2.96
2014	20,778,000	349,744	128,185	-47,579	16.8	6.2	10.7	-2.29
2015	20,970,000	336,097	132,011	5,657	16.0	6.3	9.7	0.27
2016	21,209,000	331,073	130,765	37,218	15.6	6.2	9.4	1.75
2017	21,453,000	326,052	139,822	41,796	15.2	6.5	8.7	1.95
2018	21,670,000	328,112	139,498	13,768	15.1	6.4	8.7	0.64
2019	21,803,000	319,010	146,053	142,411	14.6	6.7	7.9	6.53
2020	21,919,000	301,706	132,431	15,905	13.8	6.0	7.7	0.73
2021	22,156,000	284,848	163,936	35,501	12.9	7.4	5.5	1.60
2022	22,181,000	275,321	179,792	-232,758	12.4	8.1	4.3	-10.49
2023	22,037,000	247,900	181,239	-213,109	11.2	8.2	3.0	-9.67
2024	21,763,170	220,761	171,194	-222,655	10.1	8.1	2.0	-10.23

Source: [1]Department of Census and Statistics [19-29, 16, 35, 5].
[2,3]Department of Census and Statistics [16].
[4]Department of Immigration & Emigration [36-45] and Sri Lanka Tourism Development Authority [46].

The birth rate has reduced over the period of 24 years from 18.5 per 1,000 persons in 2000 to 10.1 in 2024, which is almost a drop by half. A gradual declining birth rate is disturbed by two sudden peaks in 2007 (19.3 per 1,000 persons) and 2013 (17.8 per 1,000 persons). Comparatively, the death rate has a stable pattern with an average of 6.2 per 1,000 persons over the period of 20 years from 2000-20. It has shown 2 slight peaks in 2005 and 2019 (6.7 per 1,000 persons each). The death rate began increasing from 2021 onwards, largely due to COVID-19-related deaths, reaching 8.1 per 1,000 persons in 2024. Due to the behaviour of birth and death rates, the natural increase is showing a decline from 12.3 per 1,000 persons in 2000 to 7.9 in 2019, and it further declines sharply from 2020 to 2024. The ever-recorded lowest natural increase of 2.0 per 1,000 persons in Sri Lanka was recorded in 2024.

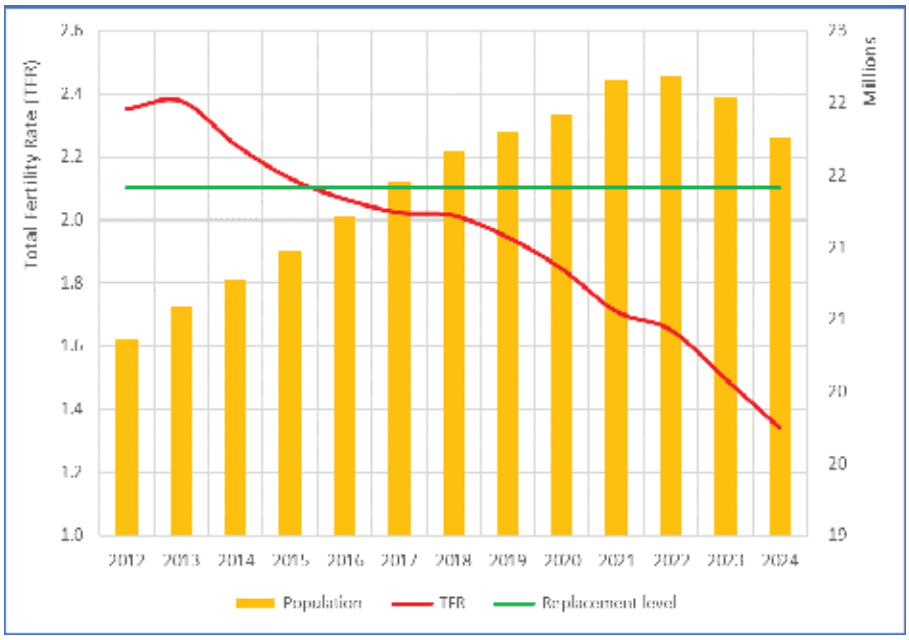
Negative net migration rate is reported from 2000 to 2014, with an average of -1.96 per 1,000 persons and it is not widely spread. It started taking positive values from 2015 (0.27 per 1,000 persons) till 2021 (1.60 per 1,000 persons) with an uneven distribution. Net migration rate has drastically declined to -10.49 per 1,000 persons due to the ever-highest number of negative net migration and then the subsequent figures for 2023-24 are also not much deviated. The latest pattern of international migration indicates massive outbound migration from Sri Lanka than inbound migration. Consequent to the massive decline in natural increase and large net negative international migration contributed to the decline of Sri Lanka population since 2022. Mid-year population follows an increasing trend reaching the highest population in 2022 (22.18 million) and starts declining for the next 2 years with a negative growth rate.

The mid-year population of Sri Lanka and the estimated TFRs using the total birth method for the 2012-24 period are graphically presented in Figure 4. TFR has shown a declining trend from 2013 (2.38 births per woman) and reached below replacement level in 2016 (2.07 births per woman). It has never picked up again and maintains a further declining trend till 2024 (1.34 births per woman). The Sri Lankan population starts negative growth from 2023, while the highest population is recorded in 2022.



Source: Department of Census and Statistics [19-29, 16, 35, 5].
Department of Immigration & Emigration [36-45] and Sri Lanka Tourism Development Authority [46].

Figure 3. Population, birth, death, natural increase and net migration rates 2012-24.



Source: Department of Census and Statistics [19-29, 16, 35, 5] and Table 3 above.

Figure 4. Mid-year population and estimated TFRs for Sri Lanka 2012-24

Discussion

The method used to calculate the Total Fertility Rate requires only the number of births and the total number of women in childbearing age. The equation for calculating TFR is deterministic, and it is not necessary to determine any empirical parameters. Method validation exhibits less than 5% of the relative error for all the points with South Korean data, while Huang (2020) has found the same relative error in most cases for data from China and the United States [6]. Though the DHS survey of 2000 has measured (reported) Sri Lankan TFR of 1.9 live births per woman, which is below the replacement level, fertility followed an upward trend, showing 2.33 live births per woman in DHS 2006. This method calculated TFR for 2006 as 2.375 per woman only with a -1.91% deviation. Calculated TFRs on the standard method using available data (number of live births per mother's age and estimated women population in 7 age groups from 15-49) after 2005, 2011 Census and 2016 DHS closely coincide with TFRs estimated by the total birth number method. Reaching replacement level occurred in consecutive years 2015 and 2016 for the standard and total birth number method. Our estimation proves that Sri Lankan fertility is demonstrating a rapid decline after reaching below replacement level in 2016.

GBD 2021 Fertility and Forecasting collaborators assess current and future fertility for 204 countries and territories, and they estimate TFR for Sri Lanka in 2021 is 1.85 (1.64-2.08) births per woman [47]. Our estimation of 1.71 births per woman is close and within their confidence interval. Sri Lanka's current Total Fertility Rate (TFR) of 1.3 places the country on the verge of entering the ultra-low fertility regime. This threshold – defined

as a TFR below 1.3 births per woman – has been highlighted by Gavin W. Jones in 2019 as markedly lower than the replacement level of 2.1 [48]. Given the prevailing demographic and socioeconomic trends, it is likely that Sri Lanka's fertility rate will decline even further in the near future.

Sri Lanka has demonstrated below replacement level fertility since 2016 with steadily declining TFR values. Important macro-level effects due to below replacement level fertility are increasing the older age population and declining population size [49]. The Sri Lankan population has experienced a rapid increase in the ageing population (60+ population) and the proportion of the aged population to the total population. During the past six-and-a-half decades, the Sri Lankan population has grown 3 times, while the 60+ population has grown 7 times from 1946 to 2012. Eventually, the percentage contribution of the 60+ population to the total population has increased from 5.4 to 12.4 per cent [50-51]. The proportion of 12.4 per cent is the highest among South Asian countries, where all other countries demonstrate below 9 per cent, and Afghanistan has the lowest of 3.8 per cent. Undoubtedly, the 60+ population will show a rapid increase in Sri Lanka, with estimates of almost one fourth (24.7 per cent) of the total population in 2042, while Afghanistan is expected to remain at 5.5 per cent [52].

Sri Lanka will inevitably have to face the challenge of providing proper health systems, including caring for elderly people. Subsequently, their social, economic, health and psychological requirements needed to be addressed. Due to higher life expectancy for females than males, the sex ratio for the population aged over 80 will be female-biased, resulting in more widowed women in older age groups. This will create resource allocation challenges, as a large sum of money will need to be dedicated to social security, particularly pensions and elderly support activities.

With the changing of the age structure, the shrinking of the labour force would be another consequence. Labour force participation rate of the Sri Lankan population of age 15+ has dropped by 6.1 per cent from 2016 (53.8 per cent) to 2024 (47.7 per cent), which indicates a gradual decline in the future [53]. A shrinking labour force will result in slower economic growth, as a smaller labour force can reduce productivity. With decreasing live births and increasing elderly population, significant changes could be expected in dependency ratios, especially Child dependency (<15 years) and Old age dependency (60+ years). Child dependency has decreased from 71.3 to 40.4 from 1971 to 2012, while old-age dependency has increased from 11.6 to 19.8 for the same period [54].

Another important area which will be impacted following the rapid decline of fertility is school education in Sri Lanka. According to the Annual School Census 2023 for Sri Lanka, 10,096 government schools are functioning. Of 10,096 schools, 9,106 are eligible for Grade 1 admission. 3,144 schools have fewer than 100 students [55]. Assuming there is no Grade 1 admission to the private schools, 220,761 students (live births) in 2024 will be eligible for Grade 1 admission in 2029, need 6,307 classrooms (35 students per class), which is less than the number of schools. Operating schools with fewer students and smaller class sizes will lead to imbalances in the student-teacher ratio and result in inefficient use of government resources.

Conclusion

The method employed in this paper to estimate the Total Fertility Rate (TFR) is simple yet effective, requiring only two key data inputs: the number of registered live births and the estimated number of women of reproductive age. In Sri Lanka, vital statistics are collected through a well-established civil registration

system, which maintains a high-coverage, regularly updated birth registry. As population censuses are conducted every ten years, mid-year population estimates are used to approximate the number of women aged 15–49. Estimating TFR for the period 2016–2024 is particularly critical from an SRH perspective, as it provides essential insights into recent fertility dynamics, including the potential effects of the COVID-19 pandemic and the ongoing economic crisis on reproductive behaviour, access to family planning, and maternal health services.

Using the alternative estimation method, Sri Lanka's Total Fertility Rate (TFR) has been found to have declined to an ultra-low level of 1.34 live births per woman by 2024. This unanticipated drop in fertility, combined with sustained high levels of outbound migration, is expected to accelerate the decline of both the total population and the labour force in the coming years. From an SRH perspective, such a sharp fertility decline raises serious concerns about heavy utilization of induced abortion, changing fertility intentions, and the broader socio-demographic context influencing reproductive decision-making. Policymakers must urgently recognize the implications of ultra-low fertility and take proactive steps to design and implement evidence-based policies aimed at stabilising fertility levels. Failure to act could lead to a rapid intensification of population ageing, placing increased strain on health systems, social protection, and intergenerational support mechanisms.

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Conflicts of Interest

Authors declare that there are no conflicts of interest.

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