

Sri Lanka at the Threshold of Ultra-Low Fertility: Evaluating the Predictive Validity of Indirect TFR Estimates by de Silva and De Silva against 2024 Census Findings and Its Implications for Policy and Programmes

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Commentary

Abstract

Sri Lanka's recent sharp fertility decline has raised important questions about the timeliness of official demographic evidence and the usefulness of alternative estimation methods for identifying emerging population changes. This commentary assesses the concordance between the total-birth-number method employed by de Silva and De Silva, published in June 2025, and the Total Fertility Rate subsequently reported from the 2024 Census of Population and Housing in March 2026. The assessment was based on published aggregate secondary data. The independently estimated TFR for 2024 was 1.340, while the TFR calculated from the census age-specific fertility rates was 1.325, representing an absolute difference of 0.015 and a relative difference of approximately 1.1 per cent. This close agreement indicates that the total birth number method provided a useful early signal that Sri Lanka had reached the threshold of ultra-low fertility. Nevertheless, the comparison does not establish equivalence across all years or population groups, and the method remains dependent on the completeness and timing of birth registration and population estimates. The findings demonstrate the potential value of transparent indirect demographic methods when official fertility data and estimates are delayed. Policy responses should safeguard reproductive autonomy and promote a comprehensive, rights-based approach to family planning and sexual and reproductive health. Such responses should also address the broader conditions that influence reproductive decisions by strengthening access to subfertility and infertility services, affordable health and maternity insurance schemes, quality childcare facilities, marital and family counselling, and other forms of social and economic support for couples and families.

Key Words: ultra-low fertility, total fertility rate, indirect estimation, census-based fertility, Sri Lanka

Introduction

The timely identification, rigorous assessment, and effective dissemination of critical issues at global, regional, and national levels are essential for societal well-being and effective policy formulation. This commentary underscores the responsibility of researchers to proactively identify and analyse emerging challenges, often before they are formally recognised by the state and international agencies. Such early scholarly engagement enables governments and international organisations to anticipate potential implications and to design and implement timely, evidence-based policies and programmes to mitigate their effects.

The total fertility rate (TFR), defined as the average number of children a woman would bear over her reproductive lifespan, is a key summary indicator widely used in demography to analyse fertility change within a population [1, 2]. Its principal advantage lies in the ability to condense

age-specific fertility rates into a single, standardised measure that approximates average family size [2]. In Sri Lanka, the TFR declined from 5.3 births per woman in 1963 to 3.4 in 1981, followed by a more rapid reduction to 2.8 during 1982–1987 and further to 2.3 in 1988–1993 (Table 1) [1]. The average annual decline was relatively modest –approximately 1.4 per cent between 1963 and 1981 but accelerated markedly to over 6 per cent during the period from 1981 to 1982–1987 [1].

However, evidence from the 2006–2007 Demographic and Health Survey and the 2012 Census of Population and Housing, referring to the calendar year 2011, indicated a subsequent rebound above replacement level [3, 4]. The census-based TFR of 2.4 for 2011 confirmed this upward shift. Such a rebound is unusual in the Asian context, where countries that have reached below-replacement fertility have rarely experienced a sustained return above replacement level [1, 5]. The 2016 DHS subsequently reported a TFR of 2.2

Table 1. Total fertility rates in Sri Lanka, 1953 to 2024

Source	Year/Period (Reference)	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	1982–87	2.82
Demographic & Health Survey, 1993	1988–93	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	2013–16	2.20
Census of Population and Housing, 2024	2024	1.32

Source: Adapted from [1, 3, 4, and 9].

for the period 2013–2016, indicating that the fertility decline may have resumed [3]. Over the past 10–15 years, Sri Lanka has exhibited an unexpected reversal in its fertility transition, moving from below- to above-replacement levels [1]. Notably, the TFR recorded in 2011 (2.4) exceeds the level observed in 1993 estimated from the Demographic and Health Survey (DHS) for the period 1988–1993 [1, 3]. However, more recent evidence from the DHS 2016 (based on births in the preceding 36 months) reports a lower TFR of 2.2, suggesting a possible resumption of the fertility decline [3].

The global population experienced significant disruption during 2020–2022 due to the COVID-19 pandemic [6], followed by a period of economic contraction [7]. As a developing country with a relatively fragile macroeconomic base, Sri Lanka faced acute challenges across socio-economic and political domains [7]. These constraints had notable implications for demographic dynamics, particularly fertility [1, 6]. A pronounced decline in live births was observed during this period [8]. For instance, whereas the reduction in live births between 2014 and 2019 was relatively modest, approximately 5 per cent, the decline between 2019 and 2024 was substantially larger, at around 25 per cent [8]. This unprecedented drop in births has drawn considerable attention among demographers, prompting efforts to assess the trend using more robust and standardised indicators, particularly the TFR [1].

Purpose and Analytical Approach

This commentary has two purposes. First, it assesses the agreement between the 2024 TFR estimated by de Silva and De Silva using an indirect estimation method and

the TFR subsequently calculated from the age-specific fertility rates published in the 2024 Census of Population and Housing. Second, it considers the implications of Sri Lanka's movement towards ultra-low fertility for population policy, family planning and broader sexual and reproductive health programmes.

De Silva and De Silva applied the “total number of births method”, an alternative originally proposed by Huang, to estimate Sri Lanka's annual TFR. The method estimates TFR as $35 \times B/W$, where B is the total number of live births registered during the year and W is the mid-year population of women aged 15–49 years. Unlike the standard method, it does not require births and female population data to be disaggregated by five-year age group. De Silva and De Silva first assessed the method using South Korean data by comparing its estimates with TFRs calculated through the standard age-specific fertility-rate method. They subsequently applied it to Sri Lanka to produce annual estimates through 2024 [1].

This work was undertaken by two researchers, de Silva and De Silva, who have extensively published articles and monographs on fertility trends in Sri Lanka [1]. Their findings were published in June 2025 by The Family Planning Association of Sri Lanka in *ReproSex: International Journal on Sexual and Reproductive Health* [1]. The study provides annual TFR estimates for the period 2012–2024 (Figure 1) [1]. Notably, the estimated TFR declines to as low as 1.34 births per woman - substantially below replacement level and comparable to, or even lower than, levels observed in many developed countries such as the United States, the United Kingdom, Germany, and Australia [1, 5].

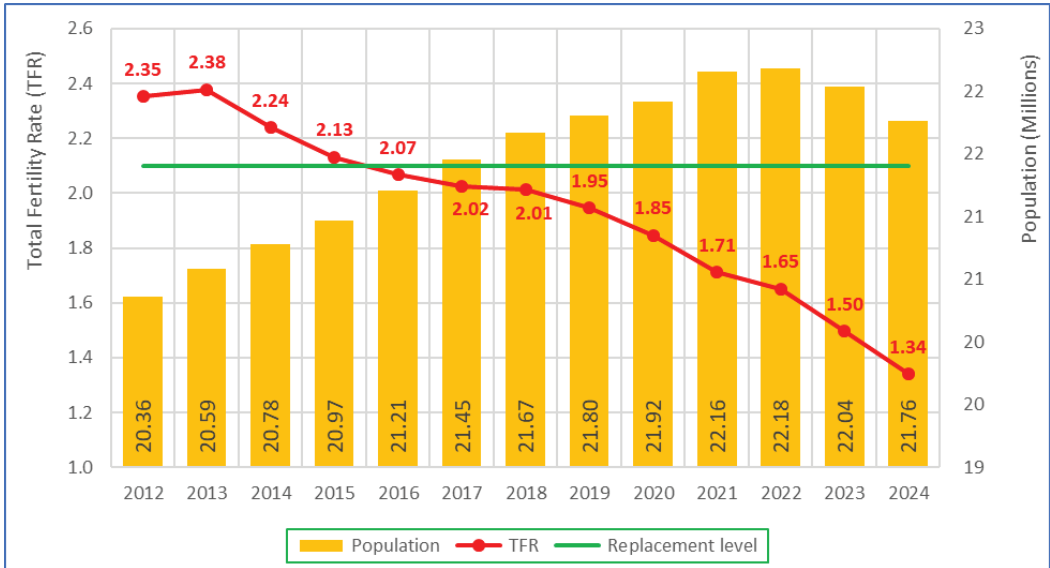


Figure 1. Mid-year population and estimated TFRs for Sri Lanka 2012-24.

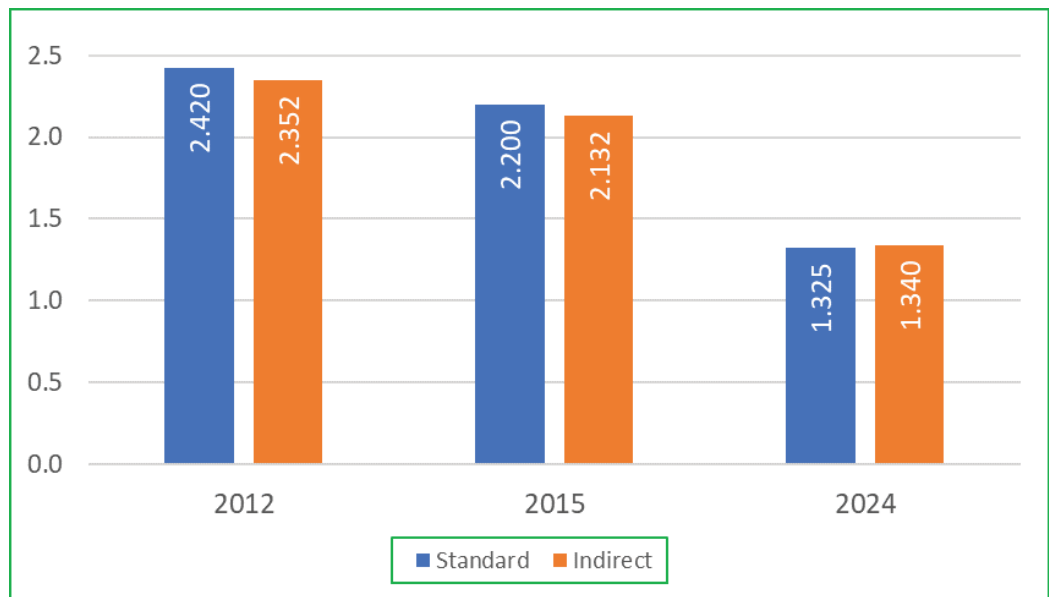
The present commentary did not reproduce the complete estimation exercise. Instead, it compared the published indirect estimate for 2024 with the subsequently released census-based estimate. Historical comparisons for 2012 and 2015 were also based on published census, survey and indirect estimates. No individual-level records were accessed or reanalysed.

Agreement between the Indirect and Census-Based TFR Estimates

At the time the indirect estimate was published, no official TFR estimate had been released after the 2016 DHS. Consequently, the estimate of 1.340 for 2024 could not be assessed immediately against a contemporary official benchmark [1, 3]. The release of age-specific fertility rates from the 2024 Census subsequently provided an opportunity to examine the agreement between the indirect estimate and a standard census-based calculation [9].

The age-specific fertility rates published from the 2024 Census yield a TFR of 1.325 [9]. This is closely aligned with the indirect estimate of 1.340 published by de Silva and De Silva one year before the official census-based estimate became available [1]. The absolute difference is $|1.340 - 1.325| = 0.015$ births per woman, equivalent to approximately 1.1 per cent of the census-based estimate. The close correspondence supports the usefulness of the total birth number method as an early indicator of rapid fertility change when standard official estimates are delayed. However, agreement at this time point should not be interpreted as complete validation of the method across all periods, population groups or geographical areas.

Furthermore, comparisons of the estimated TFR for 2012 with census-based data, and 2015 with estimate derived from the 2016 Demographic and Health Survey, also revealed only marginal differences of approximately 0.068 on both occasions



Note: The standard TFRs for 2012 and 2024 were calculated from published age-specific fertility rates. The standard estimate for 2015 is based on the 2016 Demographic and Health Survey.
Source: Authors' compilation based on [1, 3, 4, 9]

Figure 2. Comparison of TFR estimates obtained using the standard and total birth number methods.

(Figure 2) [1, 3, 4, 9]. This close alignment underscores the robustness and reliability of the methodology employed by de Silva and De Silva, while also highlighting the value of rigorous and anticipatory demographic analysis in contexts where official data are delayed [1, 9].

This underscores the importance of rigorous, evidence-based research. Scholars should play a proactive role in the accurate identification and analysis of emerging demographic and socio-economic challenges, while disseminating their findings through reputable international publications [1, 5].

Taken together, the census-based and indirect estimates place Sri Lanka at, or very close to, the conventional threshold of ultra-low fertility, generally described as a TFR of approximately 1.3 births per

woman [1, 9]. Since 2022, Sri Lanka's population has declined as a result of the combined effects of a sharply reduced natural increase and substantial net out-migration. Sustained sub-replacement fertility is an important longer-term component of this demographic trajectory [1, 8, 9]. This development raises a critical policy question: should further fertility decline be actively mitigated through appropriate demographic and social policy interventions [1, 5, 9]? Policymakers in Sri Lanka should rigorously assess the demographic, economic, and social implications of this trajectory and consider appropriate, evidence-based interventions [1, 5, 9]. Such efforts should enable researchers, policymakers, and national and international agencies to better anticipate emerging challenges and to design and implement timely and well-informed policy responses [5].

Further research at national and sub-national levels is necessary to establish and validate fertility changes in the population, the causes of the observed trends, and the potential impacts on labour force trends, economic development and growth patterns in the country, changing welfare needs and the care deficit in the population. For instance, if the observed pattern continues for some time, the demand for maternal and child health services and school enrolment is likely to decline, with corresponding impacts on health and educational services in the country.

On the other hand, ultra-low fertility should not be interpreted as reducing the relevance of the national family planning programme. Instead, it calls for a reorientation of family planning from a fertility-reduction model towards a comprehensive, rights-based reproductive health education and service programme that enables individuals and couples to decide freely and responsibly the number, timing and spacing of their children, without coercion, discrimination or restriction [10,11]. When fertility intentions decline, the need for voluntary contraception may increase, particularly among couples and individuals who wish to postpone, space or avoid pregnancy; in legally restrictive abortion settings, failure to meet this need may contribute to unintended pregnancies and unsafe abortions [11,12]. The 2024 Census also indicates delayed marriage, with the Singulate Mean Age at Marriage increasing to 29.2 years among males and 25.6 years among females, compared with 27.2 and 23.4 years, respectively, in 2012 [9]. This postponement of marriage and childbearing may compress reproductive decision-making into later reproductive ages and increase demand for fertility counselling, preconception care, subfertility and infertility services, while maintaining

access to voluntary contraception for those who wish to delay pregnancy [11,14].

As for factors contributing to this marked fertility decline, economic hardships faced by low-income households, particularly after the 2022 economic downturn, may be an important issue requiring further attention. The long-term impact of the civil war on the country's population dynamics is another factor to consider in the overall assessment. International labour migration of both men and women in reproductive age brackets, often leaving behind their marital partners in the home country, may also account for the notable decline in the average number of children per woman in childbearing ages below the replacement fertility level. The changing fertility trends in the country may therefore call for additional interventions within family planning services, not through coercive pronatalist measures, but by strengthening enabling conditions for reproductive choice, including economic security, gender-equitable family policies, childcare support, fertility services and accessible, high-quality sexual and reproductive health services [10,13]. In any case, this reported fertility decline in Sri Lanka calls for rigorous research on population dynamics and a serious policy dialogue among key policymakers and experts in relevant fields.

Limitations

This commentary has several limitations. First, it is based entirely on published aggregate secondary data and could not independently assess the completeness, timeliness or internal consistency of registered births, census information or mid-year population estimates. Delays in birth registration, international migration and population-estimation uncertainties may have affected the numerator or

denominator used in the indirect estimates, particularly during the COVID-19 pandemic and the economic crisis. Second, the total birth number method uses the total number of births and the total population of women aged 15–49 years and therefore does not directly account for changes in the age pattern of childbearing. Third, the close agreement between the indirect and census-based estimates for 2024, together with selected historical comparisons, does not establish equivalence across all years, districts or population groups. The findings should therefore be interpreted as evidence of strong concordance and useful early signalling rather than definitive validation of the method under all demographic conditions.

Data availability statement

No new primary data were generated or analysed for this commentary. The discussion and analysis are based entirely on publicly available secondary sources, including the original presentation, the original peer-reviewed journal article by de Silva and De Silva, and other published demographic, statistical and policy resources cited in the manuscript. The original presentation is publicly available at: <https://www.youtube.com/watch?v=nS5zAfFWX9Y>. The original journal article, "Sri Lanka is on the verge of entering ultra-low fertility: estimating total fertility rate through an alternative method validation with South Korea," published in *ReproSex: International Journal on Sexual and Reproductive Health*, is available at: <https://reprosex.sljol.info/articles/10.4038/rsijsrh.v1i1.4>. Other published resources used to support the commentary are listed in the reference section of the manuscript and are accessible through the cited URLs, DOIs or institutional websites.

Ethical approval

Ethical approval was not required because this commentary used only publicly available, aggregate and non-identifiable data and published literature. No individual-level records, identifiable personal information or biological materials were accessed, linked or reanalysed. Therefore, no additional participant consent was required for the present commentary.

Author Contributions

KTS and MSS jointly conceptualised the commentary and developed its overall analytical and policy framework. MSS led the literature review, compilation and synthesis of secondary data, comparison of the fertility estimates, preparation of tables and figures, and drafting of the manuscript. KTS contributed demographic expertise, interpretation of the findings, development of the policy implications, and critical revision of the manuscript for important intellectual content. Both authors reviewed and approved the final manuscript and accept responsibility for its content.

Acknowledgements

The authors gratefully acknowledge Ms. Asinsala Wijeratne, Mr. Duminda Rajakaruna, Mr. Janaranga Dewasurendra and Mr. Amal Bandara for their valuable support, constructive inputs and assistance during the preparation and review of this commentary.

External Funding Statement

This commentary received no external funding.

Conflict of interest

The authors declare no conflicts of interest.

Statement on the Use of Artificial Intelligence Tools

Generative artificial intelligence tools, including ChatGPT by OpenAI, were used to support language editing and improve the clarity and organisation of the manuscript. Artificial intelligence was not used to generate data, conduct statistical analyses, verify references, or determine the scientific interpretations and conclusions. All AI-assisted content was critically reviewed,

revised and verified by the authors, who take full responsibility for the accuracy, integrity and final content of the manuscript.

Disclaimer

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