

Trends in Home and Caesarean Deliveries Across Districts of Kerala (2019–2024): A Secondary Analysis

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How to cite this article: Rajat Anilkumar. Trends in Home and Caesarean Deliveries Across Districts of Kerala (2019–2024): A Secondary Analysis Indian Journal of Public Health Research and Development / Vol. 17 No. 2, April-June 2026.

Abstract

Background: Kerala is recognised for its strong maternal and newborn health outcomes, characterised by low maternal and neonatal mortality rates and high coverage of antenatal care. However, recent trends suggest persistent challenges related to delivery practices, including rising caesarean section rates and home births. While existing studies examine these emerging trends at a broader level, there is limited evidence at the district level over the years.

Objective: This study analyses district-level patterns in home births and caesarean deliveries across Kerala between 2019 and 2024.

Method: The study used annual administrative data reported by Kerala’s Directorate of Health Services. The indicators included the number of home deliveries and caesarean sections. Descriptive analysis and district-wise visualisations were employed to highlight patterns.

Results: The findings consistently show high rates of caesarean sections in most districts, with Malappuram recording over 25,000 caesarean deliveries annually from 2019 to 2024. Other districts such as Kozhikode, Kollam, and Ernakulam also reported higher figures, each exceeding 10,000 in most years. In comparison, Idukki and Wayanad reported lower figures in the state; however, they still account for a significant number, with over 3,000 in most years. Although home deliveries remained low overall, districts like Malappuram and Wayanad showed relatively higher figures, with Malappuram reporting notable numbers ranging from 198 in 2019–20 to 252 in 2023–24.

Conclusion: The findings highlight persistently high caesarean section rates. Home births remained relatively low across most districts in the state, except for a few. Improving maternal health delivery services by promoting safe, evidence-based practices, monitoring the use of unnecessary medical interventions, and training healthcare professionals is essential for enhancing maternal outcomes throughout the state.

Keywords: Maternal health, District, Kerala, Home deliveries, Caesarean section

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Submission date: August 4, 2025

Revision date: September 26, 2025

Published date: April 14, 2026

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Introduction

Kerala, a southern state in India, has made significant progress in maternal and newborn health outcomes. The maternal mortality rate in the state is 19 per 100,000 live births, compared to 97 at the national level (2018-2020). Under-five mortality is also low, at 8 per 1,000 live births.¹ Furthermore, 98% of all mothers in Kerala received antenatal care from skilled providers, with 94% receiving it within the first trimester of pregnancy.²

Despite these achievements, ongoing challenges remain, including an increase in caesarean deliveries. In 2023-24, 44% of all deliveries were by caesarean section, markedly higher than the WHO's recommended rate of 10-15%.^{3,4} Caesarean section is associated with increased risk of postpartum haemorrhage, uterine rupture and long-term implications, including increased risk for future placental complications and higher maternal mortality rates.^{5,6} Additionally, over 500 home deliveries were recorded annually between 2020 and 2024.⁴ Home deliveries also pose an elevated risk to mothers, particularly in settings lacking accessible emergency care or trained attendants.⁷

Although previous studies have examined Kerala's maternal health performance at the state level, limited efforts have been made to analyse district-wise trends over the years.⁸⁻¹⁰ This gap highlights the need for district-level evidence that can guide allocation of resource, identify vulnerable populations, and inform more grounded and context-specific health strategies.

This study aims to analyse recent district-level trends in home births and caesarean deliveries across Kerala from 2019 to 2024, using publicly accessible data. By identifying these patterns, the study offers valuable insights for policymakers seeking to enhance maternal health.

Materials and methods

Study Design

The study employed a descriptive secondary data analysis with publicly available district-level data to examine trends in home births and caesarean deliveries across Kerala. In this study, annual data

from five consecutive years (2019-20 to 2023-24) were collected and analysed to observe changes in the selected indicators and to highlight variations across the state in recent years.

Study Setting

Kerala comprises 14 districts, ranging from densely populated urban areas, such as Thiruvananthapuram and Ernakulam, to rural and hilly regions like Idukki and Wayanad.¹⁰ Maternal and child health indicators also display notable variations across districts. For example, Kasaragod, Kozhikode, and Malappuram reported high antenatal care coverage, ranging from 83.9% to 94.2%, whereas Alappuzha, Idukki, and Thiruvananthapuram reported coverage from 55.3% to 74.3%.⁸ Additionally, Kasaragod experienced an increase in the maternal mortality rate from 40 per 100,000 live births in 2017-18 to 108 in 2023-24, while Thiruvananthapuram saw a decrease from 38 to 26 during the same period.⁴ These differences further underscore the importance of district-level analysis in understanding local patterns and informing targeted strategies.

This study examined the trend across all 14 districts of Kerala. These districts include: Thiruvananthapuram (TVM), Kollam (KLM), Pathanamthitta (PTA), Alappuzha (ALP), Kottayam (KTM), Idukki (IDK), Ernakulam (EKM), Thrissur (TSR), Palakkad (PKD), Malappuram (MLP), Kozhikode (KKD), Wayanad (WND), Kannur (KNR), and Kasaragod (KSD).

Data Source and Collection

The data used in the study were extracted from the Kerala: Health at a Glance annual report for the selected years. These annual reports, compiled by the Directorate of Health Services, Kerala, Government of Kerala, present a comprehensive collection of data on key health indicators and services in the state.⁴ The report draws on various sources, including the Health Management Information System, the Reproductive and Child Health Portal, monthly reports submitted from districts, and other relevant administrative databases.

Study Variables

The study focused on two key maternal health indicators:

1. Home Deliveries:

Refers to childbirth that took place at home, outside of institutional settings. This variable can offer insights into access, preferences, or gaps in the health system’s coverage in the state.

2. Caesarean Section Deliveries (C-sections):

Refers to the total number of caesarean section deliveries reported from both public and private institutions. This variable can offer insights into whether there is potential overuse of caesarean sections in the state.

Data analysis

The data from the report were extracted, cleaned, compiled, and analysed using R(version 2024.12.0). Faceted line plots were utilised to compare district-wise performance over time.

Ethical Considerations

This study used publicly available secondary data, and therefore, no formal ethical approval was

necessary. All data were used solely for academic and policy research purposes.

Results

Home Deliveries by Districts (2019-2024)

Figure 1 depicts the number of home deliveries reported across districts from 2019 to 2024. Overall, the number of home deliveries remained consistently low in most districts of the state, indicating strong institutional delivery coverage. However, Malappuram (MLP) consistently reported a high number of home deliveries over five years, ranging from 198 in 2019–20 to 252 in 2023–24. Wayanad (WYD) also showed relatively higher figures compared to most districts, with home deliveries ranging from 62 to 42 during the same period. In comparison, many districts such as Ernakulam (EKM), Pathanamthitta (PTA), and Alappuzha (ALP) consistently reported fewer than 20 home deliveries each year, reflecting greater access to institutional care.

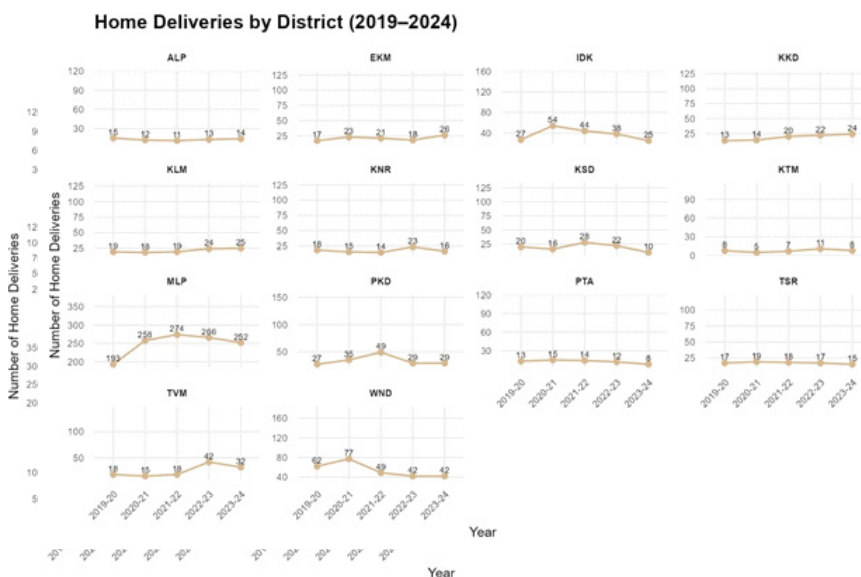


Figure 1: Distribution of home deliveries across districts in Kerala from 2019 to 2024. Districts: Thiruvananthapuram (TVM), Kollam (KLM), Pathanamthitta (PTA), Alappuzha (ALP), Kottayam (KTM), Idukki (IDK), Ernakulam (EKM), Thrissur (TSR), Palakkad (PKD), Malappuram (MLP), Kozhikode (KKD), Wayanad (WND), Kannur (KNR), Kasaragod (KSD).

Caesarean Deliveries by Districts (2019-2024)

As shown in Figure 2, the number of caesarean sections remained high in several districts, with some showing an upward trend. In contrast, others experienced a gradual decline over the five years. Malappuram (MLP) consistently recorded the highest numbers in the state, with over 25,000 caesarean

deliveries annually from 2019 to 2024. Ernakulam (EKM) and Kozhikode (KKD) also reported high figures during this period, each exceeding 18,000 caesarean deliveries in multiple years. Conversely, Idukki (IDK) and Wayanad (WND) reported the lowest numbers, mostly below 5,500 per year, although still notably high.

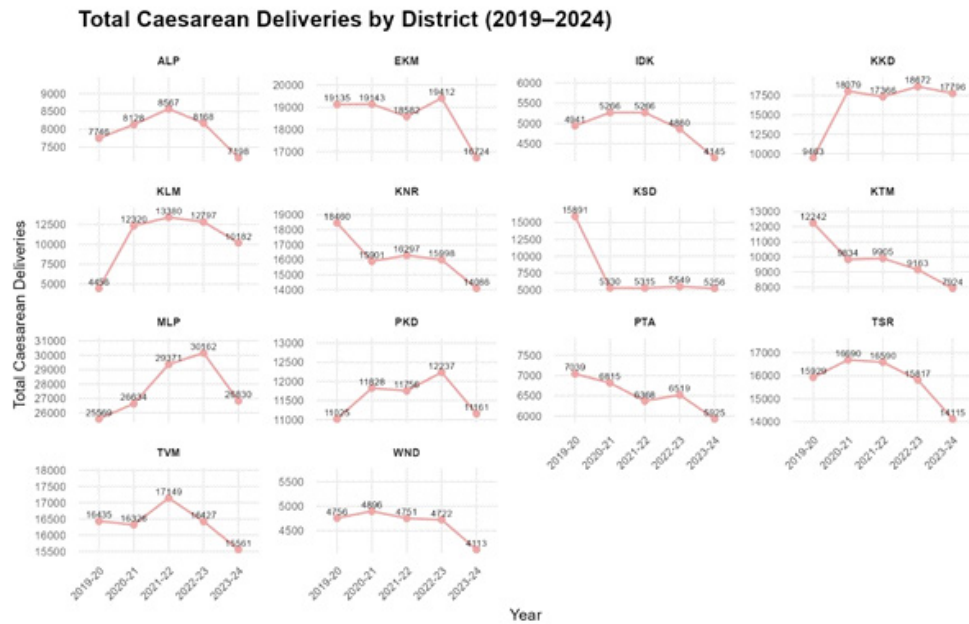


Figure 2: Trends in Caesarean deliveries across districts in Kerala (2019–2024). Districts: Thiruvananthapuram (TVM), Kollam (KLM), Pathanamthitta (PTA), Alappuzha (ALP), Kottayam (KTM), Idukki (IDK), Ernakulam (EKM), Thrissur (TSR), Palakkad (PKD), Malappuram (MLP), Kozhikode (KKD), Wayanad (WND), Kannur (KNR), Kasaragod (KSD).

Discussion

This study analysed trends in home deliveries and caesarean sections over five consecutive years (2019-2024) using publicly available data. The findings highlight a high caesarean section across most districts. While most districts maintained low numbers of home births, two districts stood out with a higher figure.

A key observation from this study is the higher occurrence of home births in Malappuram compared to other districts. Studies have documented various factors influencing the preference for home births, including traditional beliefs, fear of caesarean delivery, lack of female doctors, limited autonomy, and low community-level literacy.¹³⁻¹⁶ Additionally, some families may opt for home births due to cultural norms, personal comfort, or a preference for familiar surroundings.¹⁷ However, it is essential to recognise, as studies have pointed out, that access to skilled birth attendants and proper referral support is critical in ensuring safer births in any setting.^{18,19} In Kerala, only 24.4% of home deliveries in 2019–20 were attended by a skilled birth attendant, and this figure was even lower in Malappuram (17.1%), which remains a concern.⁸

Furthermore, the findings indicate a rise in deliveries by caesarean section. This trend aligns with other studies that have reported a steady increase in caesarean sections in India, particularly in southern states. A study using HMIS data from 2015 to 2020 found that districts in the South, including those in Kerala, reported significantly higher rates of C-sections compared to other regions.²⁰ Similarly, a clinical audit conducted at Travancore Medical College in Kerala reported a C-section prevalence of 45.8%, with previous caesarean and failure of induction being the most common indications.²²

Overall, this study highlights an unexpected pattern in Kerala’s maternal health landscape: the coexistence of very high caesarean section rates alongside the persistence of home births in certain districts. These findings are significant as they reveal a dual burden within a state that is otherwise known for its strong maternal health indicators. Another notable finding is the wide variation between districts, with some districts showing poorer performance in the indicators than others, reinforcing the need for local monitoring and district-specific strategies.

These findings carry implications for both policymakers and public health professionals. To

address the persistence of caesarean sections, there is a need for stricter oversight of facilities, improved monitoring and enforcing evidence-based clinical guidelines. At the same time, the occurrence of home birthspoints to the need for policymakers to improve access to safe and respectful institutional care. For public health professionals, these findings underline the importance of increased awareness among the providers of the risk associated with unnecessary surgical deliveries, encouraging safe institutional births. Training frontline workers to identify and respond to maternal complications promptly, while also addressing women's cultural preferences and concerns, can be a key to reducing the persistence of home births.

Limitations

While this study provides valuable insights into delivery patterns in Kerala, it has certain limitations. The analysis is limited to a five-year period (2019–2024), which may not reflect longer-term shifts in maternal health indicators. A broader timeframe could offer a deeper perspective. The study relies on secondary, district-level data, which may be affected by missing values or variations in data quality. Moreover, it focuses on quantitative trends and does not incorporate perspectives from women or providers that could explain underlying factors. Future research could integrate these to offer a more comprehensive understanding.

Conclusion

This study provides new evidence by analysing district-level trends in both home deliveries and caesarean sections across Kerala over a five-year period from 2019 to 2024. The findings show a dual challenge: the persistently high caesarean sections and districts with high home births, which are emerging as key issues in the state. To address these trends, targeted efforts are necessary, including strengthening monitoring systems, enforcing evidence-based clinical guidelines, and training healthcare professionals to promote safe and respectful maternity care without unnecessary medical interventions. By documenting district-level variations, this study provides actionable insights to improve maternal health outcomes and advance safe delivery care across Kerala.

Acknowledgment

I want to thank the Directorate of Health Services, Kerala, for making administrative data publicly accessible. I am also grateful to peers who shared helpful feedback during this study.

Source of funding: None

Conflict of interest: None

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