

Original Research Article

Status and trends of medical certification of cause of death in India: insights from the 2020 annual report

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ABSTRACT

Background: Accurate cause-of-death data are essential for public health planning and disease surveillance. In India, the Medical Certification of Cause of Death (MCCD) system faces persistent challenges, including low coverage, regional disparities, and data quality issues. We aimed to assess the extent of medical certification, demographic patterns, and cause-specific mortality using data from the 2020 national MCCD report.

Methods: We conducted a descriptive secondary data analysis using the 2020 MCCD report published by the Office of the Registrar General, India. We examined medically certified deaths by state, sex, age group, and place of occurrence. We also evaluated cause-of-death patterns and compared findings with previous years and related national datasets. We used descriptive statistics to analyse certification coverage, demographic patterns, and cause-specific mortality.

Results: In 2020, India registered 8.1 million deaths, of which only 1.81 million (22.5%) were medically certified. Certification rates ranged widely, from 100% in Goa and Manipur to below 7% in Bihar, Jharkhand and Madhya Pradesh. Urban and institutional deaths accounted for over 85% of certified cases, and 64% of certified deaths occurred among males. Circulatory diseases were the leading cause (32.1%), followed by respiratory diseases (10%) and COVID-19 (8.9%). Ill-defined causes comprised 10.6% of certified deaths, highlighting diagnostic and reporting gaps.

Conclusions: MCCD system remains skewed toward urban, institutional, and male-dominated reporting, limiting its effectiveness. Strengthening the system through digitization, standardized physician training, and rural outreach is essential to improve the coverage and accuracy of mortality data in India.

Keywords: Medical certification of cause of death, Mortality data, India, Public health surveillance, ICD-10, Health disparities

INTRODUCTION

Reliable mortality statistics are essential for monitoring population health, informing evidence-based policies, and addressing health inequities. The Medical Certification of Cause of Death (MCCD) scheme, mandated under the Registration of Births and Deaths Act, 1969, serves to

generate standardized cause-of-death data in India. This system is aligned with the International Classification of Diseases, 10th Revision (ICD-10), ensuring global comparability and continuity in mortality surveillance.¹ However, MCCD implementation across Indian states remains uneven due to infrastructural constraints, limited training among certifiers, and wide disparities in

healthcare delivery.² These gaps are particularly severe in rural regions, where a large share of deaths remains uncertified, thereby weakening public health data quality and decision-making.

MCCD data are crucial not only for monitoring disease trends but also for shaping national health strategies, estimating disease burdens, and aligning investments with priority health conditions. Programs such as the National Health Mission (NHM), Ayushman Bharat, and the NPCDCS rely on such data to effectively plan interventions.³ For example, mapping cardiovascular mortality by region helps allocate targeted resources and reduce health inequities across states.

Beyond domestic planning, high-quality mortality data enable India to contribute to global health estimates and comply with international surveillance frameworks. Countries like Brazil and Thailand have successfully enhanced their MCCD systems through decentralized certification mechanisms, integration with digital health platforms, and capacity-building programs.^{4,5}

The COVID-19 pandemic emphasized the urgent need for accurate cause-of-death data. Lack of reliable certification complicated efforts to assess true mortality, forecast case surges, and distribute healthcare resources equitably. In India, the underreporting of COVID-19 deaths due to insufficient MCCD coverage hindered timely policy responses and public trust.⁶

Despite the importance of mortality data, progress in MCCD implementation has been inconsistent. Barriers such as relying on manual reporting, shortage of trained staff, fragmented data systems, and absence of accountability continue to impede nationwide adoption. While institutional deaths dominate the MCCD records, deaths occurring at home or in rural communities often escape documentation.²

To address these challenges, a multi-sectoral approach is essential one that involves civil registration offices, health departments, medical colleges, and local community health workers. MCCD should be viewed as a public health imperative instead of an administrative formality. Institutionalizing training in medical curricula, deploying mobile certification tools, and linking hospital records with registration systems can help improve both coverage and data integrity.⁷

Globally, successful models offer practical pathways for reform. Thailand enhanced MCCD by empowering district-level medical officers and automating health data flows. Brazil implemented mobile applications with real-time cause-of-death validation features to improve accuracy. India must adapt such innovations to its diverse demographic and infrastructural context to ensure MCCD meets its full potential as a tool for health equity and accountability.^{4,5}

Therefore, this study aims to analyze the coverage and quality of medically certified death reporting in India using the 2020 MCCD annual report. By examining cause-specific mortality trends, demographic disparities, and state-wise variations, the study seeks to highlight key implementation gaps in the current system. Ultimately, it offers evidence-based recommendations to strengthen mortality surveillance and support the development of a more equitable and responsive public health infrastructure.

METHODS

In this study, we conducted a descriptive, secondary data analysis approach based on the publicly available 2020 Annual Report on Medical Certification of Cause of Death (MCCD), published by the Office of the Registrar General, India. The report consolidates cause-of-death data submitted by medically certified institutions across all 34 States and Union Territories. MCCD data are collected using Form 4 for institutional deaths and Form 4A for non-institutional deaths, as mandated under the Registration of Births and Deaths Act, 1969.

The data were cleaned and compiled using Microsoft Excel, and descriptive statistical analysis was conducted to assess the coverage, demographic distribution, and cause-specific mortality patterns of certified deaths. Stratified analyses were conducted by state, sex, age group, and place of death (urban/rural). Comparative assessments were made against earlier annual reports to examine longitudinal trends. Additional triangulation with data from the National Family Health Survey (NFHS-5), the Global Burden of Disease Study 2019, and the Sample Registration System (SRS) was used to evaluate completeness and contextual reliability of MCCD reporting. Data analysis was carried out between January and March 2025.

No human subjects were directly involved in this study, and all data used were from open-access government sources. As such, institutional ethical clearance was not required.

RESULTS

In 2020, a total of 81,15,882 deaths were registered across India. Among these, 18,11,688 deaths (22.5%) were medically certified under the Medical Certification of Cause of Death (MCCD) scheme. When limiting the analysis to deaths that received medical attention during the terminal illness, the certification coverage increased to 54.6%. This gap suggests that a large proportion of deaths, particularly those occurring outside health facilities, remain uncertified.

Certification rates varied widely across states. Goa and Manipur achieved full certification coverage (100%), and Delhi reported 56.6%. In contrast, several large states underperformed significantly, with Bihar (3.4%),

Jharkhand (6.1%), and Madhya Pradesh (6.7%) showing the lowest certification levels. Notable trends included Manipur's dramatic improvement from 51.4% in 2018 to 100% in 2020 while Bihar's certification dropped from 13.6% in 2018 to 3.4% in 2020, and Madhya Pradesh declined from 10.5% in 2018 to 6.7% in 2020 (Figure 1).

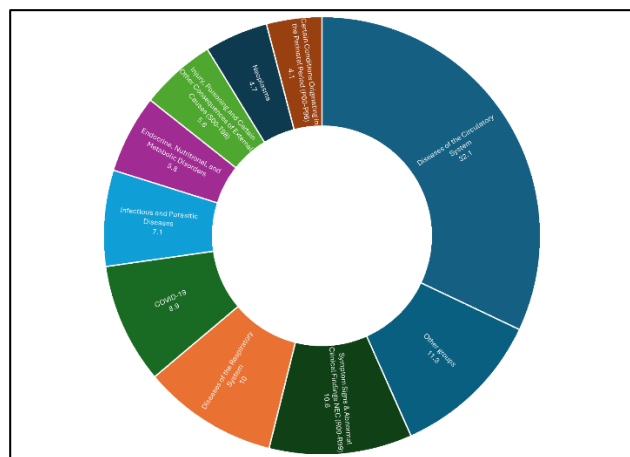


Figure 1: Distribution of cause-specific mortality, India 2020.

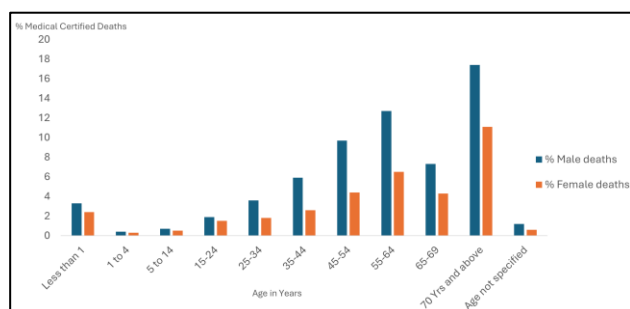


Figure 2: Age and sex distribution of medical certified deaths, India 2020.

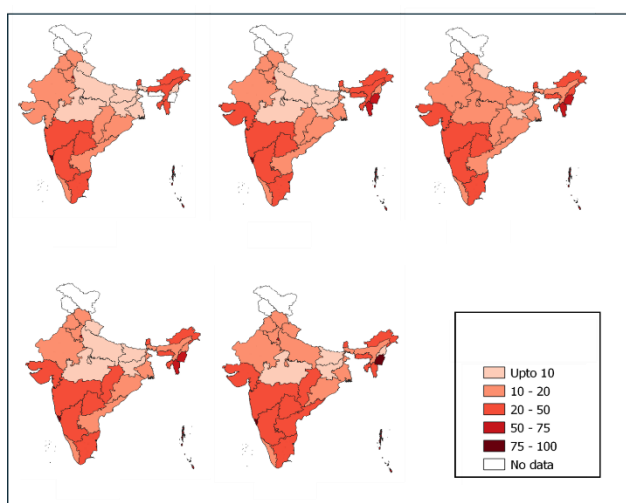


Figure 3: Distribution of medical certified deaths by states of India, 2016-2020.

Institutional deaths overwhelmingly dominated the certified data. Of the 1,811,688 medically certified deaths in 2020, approximately 1.54 million deaths (85%) occurred in hospitals or other healthcare institutions. Urban regions accounted for over 1.54 million certified deaths, representing more than 85% of the total certified cases, while rural areas contributed only about 270,000 deaths (15%). This pronounced disparity highlights limited penetration of MCCD in non-urban settings. Furthermore, states with higher urbanization rates consistently reported greater certification coverage, while rural-dominated states such as Bihar and Uttar Pradesh exhibited certification rates below 7%, further emphasizing systemic gaps in mortality data coverage across geographic zones.

Demographically, males accounted for 64% of certified deaths, while females constituted 36%. Age-wise, individuals aged 70 years and above represented the highest share at 28.6%, followed by the 55–64 age group (19.1%). Infant deaths (<1 year) comprised 5.7% of certified deaths. Among these, conditions originating in the perinatal period accounted for 4.1% (Figure 2).

Cause-specific mortality data revealed that diseases of the circulatory system were the leading cause of death, contributing to 32.1% of medically certified deaths. Within this group, ischemic heart diseases accounted for 7.5%, while pulmonary circulation and other heart-related conditions contributed 15.3%. Respiratory diseases ranked second, accounting for 10.0% of deaths. COVID-19 was the third leading cause, with 160,618 certified deaths, representing 8.9% of the total. This figure surpassed the 149,000 deaths separately reported by the Union Ministry of Health, suggesting better attribution under the MCCD framework (Figure 3).

Further notable causes included infectious and parasitic diseases (7.1%), endocrine, nutritional, and metabolic disorders (5.8%), injuries (5.6%), and neoplasms (4.7%). Ill-defined and unspecified causes remained substantial, accounting for 10.6% of certified deaths, indicating persistent deficiencies in diagnostic specificity and reporting quality.

Age-disaggregated data within specific causes showed that individuals aged 45 years and above comprised 82.7% of all deaths due to respiratory illnesses. Specifically, 29.4% of respiratory-related deaths were among persons aged 70 and above, while 23.9% occurred in the 55–64 age group.

Longitudinal trend analysis revealed a steady increase in MCCD coverage over five years. In 2016, 6.3 million deaths were registered, with only 1.2 million certified (19%). By 2020, registered deaths had increased to 8.1 million, with 1.8 million certified, improving national coverage to 22.5%. States such as Kerala, Tamil Nadu, and Maharashtra showed marked progress in certification

compliance, while many northern and northeastern states exhibited inconsistent performance (Figure 1).

Despite improvements in overall registration and certification, quality-related challenges remain prominent. In 2020, 10.6% of all medically certified deaths were classified under “ill-defined and unspecified causes,” highlighting ongoing diagnostic limitations—even within health institutions. Additionally, the gender imbalance was evident, with 64% of certified deaths attributed to males and only 36% to females, indicating underrepresentation of female mortality. Urban regions accounted for over 85% of all medically certified deaths, compared to less than 15% from rural areas, underscoring a substantial urban bias. Institutional deaths constituted more than 85% of all certified deaths, further emphasizing the low inclusion of home or community-based fatalities. These disparities collectively point to systemic gaps in equitable and comprehensive mortality surveillance across geographic, gender, and care-setting dimensions.

DISCUSSION

The 2020 MCCD data reveal persistent underperformance in national death certification.² Wide disparities between states reflect unequal infrastructure and prioritization.³ Dominant causes circulatory, respiratory, and COVID-19 underscore India's ongoing epidemiological transition and gaps in emergency preparedness.⁶ The high percentage of ill-defined causes further demonstrates the need for diagnostic strengthening and improved physician training in ICD-10 coding.^{1,4}

Gender bias and rural underrepresentation continue to undermine the representativeness of mortality statistics, with institutional deaths predominating and community-level deaths frequently unrecorded.² Addressing these issues requires stronger digital infrastructure, mandatory certification across all sectors, and performance-linked incentives. Countries like Brazil and Thailand have implemented mobile tools, decentralized models, and standardized reporting to improve cause-of-death documentation.^{4,5}

The disparity between institutional and non-institutional deaths reflects entrenched inequalities in healthcare access. Rural areas suffer from limited medical infrastructure and personnel, making death certification difficult.³ Mobile certification teams, community engagement, and policy incentives could bridge this divide.

Integrating MCCD with electronic health records (EHRs) would enhance the timeliness and accuracy of reporting. Real-time dashboards and automated data quality checks, as piloted in Kerala, can serve as scalable models.⁷ These systems must be linked with civil registration and vital statistics (CRVS) databases to ensure completeness and prevent data silos.

Improving the quality of cause attribution is equally essential. The continued use of “ill-defined” categories suggests inadequate documentation skills among certifiers. Structured training in MCCD and ICD-10 coding, supported by decision-support tools and standardized checklists, can enhance diagnostic precision.^{1,4}

From a policy standpoint, cross-ministerial collaboration is necessary to institutionalize MCCD reforms. Enforcement of mandatory certification, benchmarking states based on performance, and tying compliance to health system funding could motivate improvement.³ The private healthcare sector, which accounts for a large volume of care and deaths, must also be brought into the formal certification framework through enforceable mandates and supportive engagement.

Public trust and compliance can be increased by launching civil society campaigns that raise awareness of the significance of cause-of-death certification. Such initiatives can counter misinformation, destigmatize certain conditions, and promote community ownership of health data.

Ultimately, enhancing MCCD coverage and quality goes beyond just a technical task but a governance imperative. It is foundational to tracking the Sustainable Development Goals particularly SDG 3 on good health and well-being and to building a resilient, equitable, and transparent health surveillance system in India.⁴

Summary of key findings

This study highlights the systemic challenges embedded within India's Medical Certification of Cause of Death (MCCD) framework. Despite its legal mandate under the Registration of Births and Deaths Act, the system continues to suffer from inadequate coverage, poor diagnostic quality, and vast regional disparities.² Certification practices remain predominantly institutional and urban, leaving large swathes of the rural population and home-based deaths outside the purview of formal mortality surveillance. Gender-based disparities further highlight underreporting of female deaths, suggesting that certification is as much a social challenge as a procedural one.³

Comparison with existing literature

The persistent underperformance of MCCD in India echoes findings from previous national assessments and global comparisons. Past studies have repeatedly noted low certification rates and a high proportion of ill-defined causes, especially in rural and underserved regions.² International literature shows that countries like Brazil and Thailand have addressed similar gaps using decentralized, technology-enabled certification models and intensive training programs for certifying personnel.^{4,5} Brazil's implementation of mobile apps and

real-time validation checks improved both the completeness and accuracy of certified causes of death.⁴ Similarly, Thailand's success with localized certification responsibility demonstrates how contextually tailored models can enhance mortality data collection.⁵ These examples underline that reform is both necessary and feasible if supported by political will and system redesign.

Strengths and limitations

A major strength of this study is its use of nationally representative and publicly available data from the Office of the Registrar General, which enhances the generalizability of findings.² The analysis captures both temporal trends and geographic variation, providing a comprehensive overview of the MCCD system's current status. However, limitations include reliance on secondary data, which may carry intrinsic reporting and classification biases. The study also does not incorporate verbal autopsy data or cross-verify diagnostic codes, which restricts insight into the quality of documentation in community and non-institutional settings. Furthermore, underreporting or misclassification of emerging causes, such as COVID-19, is a documented concern.⁶

Implications for policy, practice, and future research

Reforming the MCCD system in India demands a multi-pronged strategy that blends policy enforcement, technological infrastructure, and capacity-building. Legal mandates must be reinforced with performance-linked incentives to ensure compliance across both public and private sectors.³ Integration of MCCD into electronic health records, supported by real-time dashboards and automated quality checks, as piloted in Kerala, can significantly improve timeliness and data integrity.⁷

Standardized training in ICD-10 documentation should be mandated for all physicians, and capacity-building modules should be embedded in medical education curricula.¹ Task-sharing approaches, such as authorizing trained non-physician staff to certify in primary health centers, may be necessary to scale rural coverage. Mobile certification units and community health workers can also enhance reporting in non-institutional deaths, as suggested by successful models in low- and middle-income countries.⁸

Future research should adopt mixed-method approaches to explore certification barriers at operational and societal levels. Region-specific studies and pilot interventions could assess the feasibility of decentralized or AI-supported certification tools. Ultimately, enhancing the MCCD system is essential not only for accurate mortality surveillance but also for fulfilling India's commitment to Sustainable Development Goal 3 on health and well-being.³

CONCLUSION

The Medical Certification of Cause of Death (MCCD) system is central to India's efforts in mortality surveillance and public health planning, yet it remains constrained by low coverage, poor data quality, and significant rural-urban and gender disparities. These gaps weaken the reliability of national health data and hinder effective disease monitoring and resource allocation.

Strengthening MCCD requires a combination of digital integration, expanded training in ICD-10 documentation, and institutional reforms across both public and private sectors. Community engagement, mobile certification strategies, and inter-ministerial collaboration are critical for improving coverage and equity. Investing in a robust MCCD system is essential to support evidence-based health governance and meet the targets of Sustainable Development Goal 3.

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