

INEQUALITIES IN GLOBAL HEALTH OUTCOMES: EVIDENCE FROM MORTALITY- RELATED SUSTAINABLE DEVELOPMENT INDICATORS

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ABSTRACT

PURPOSE: This chapter aims to identify disparities in mortality patterns across countries and evaluate how these differences reflect challenges in achieving healthcare sustainability.

DESIGN/METHODOLOGY/APPROACH: The study employs a descriptive quantitative design based on secondary data from the World Health Organisation (WHO), the World Bank, and the United Nations (UN) Sustainable Development Goals (SDGs). A purposive sample of 50 countries was analysed from 2015 to the latest available year (2019-2024) for four key mortality-related SDG 3 indicators: maternal mortality ratio (MMR), under-five mortality rate (U5MR), neonatal mortality rate (NMR), and premature non-communicable diseases (NCDs) mortality. Comparative analytical techniques, including absolute change, percentage change, distance-to-target (DTT) assessment and the income-vulnerability ratio, were used to examine distributional patterns and changes over time.

FINDINGS: The results reveal substantial variation in all four selected indicators across WHO regions. However, premature NCD mortality indicates persistent gaps in early diagnosis and treatment of chronic diseases. Income-related vulnerability remains one of the major challenges for healthcare sustainability.

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ORIGINALITY/VALUE: The study contributes to SDG 3 research by identifying whether a decline in mortality corresponds to advancement towards the 2030 SDG 3 target. By proposing a comprehensive mortality-sustainability risk framework, the study contributes by translating descriptive mortality trends into context-specific policy interventions, thus providing an analytical approach that can be incorporated into future global SDG research.

KEYWORDS: *Mortality Patterns; Healthcare Sustainability; Sustainable Development Goals; Maternal Mortality Ratio; Under-five Mortality Rate; Neonatal Mortality Rate; Non- Communicable Disease Mortality.*

INTRODUCTION

In an era of evolving medical and technological advancements, institutions, organisations, businesses and governments are progressively accentuating sustainability as a fundamental priority for development. As shown in World Health Organisation (WHO) statistics, global health has progressed substantially, showing a significant increase in global life expectancy from 66.8 years to 73.1 years between 2000 and 2019 and an improvement in healthy life expectancy during the same period by 5.4 years, i.e., from 58.1 years to 63.5 years (WHO, 2025). However, mortality remains a pressing challenge to sustainable health advancement. Of the estimated 68 million deaths worldwide in 2021, 57% were attributed to communicable and non-communicable diseases (NCDs) (WHO, 2024). A year later, the United Nations International Children's Emergency Fund (UNICEF) reported around 4.9 million deaths among children under the age of five, mostly in Southern Asia and Sub-Saharan Africa (UNICEF, 2023).

The mortality patterns differ sharply across geographic regions and income groups: lower-income countries recorded a surge in death rates due to maternal, perinatal and nutritional risk factors; lower-middle-income countries experienced higher mortality both from infectious and non-communicable burdens; and high-income countries exhibited mortality patterns related to demographic ageing (WHO, 2024). Likewise, a cross-country report published by the Organisation for Economic Co-operation and Development (OECD) indicated a profound inequality in mortality trends, ranging from 700 deaths per 100,000 population in countries such as Switzerland, Australia and Japan, to 1,400 per 100,000 population in Colombia in 2023 (OECD, 2025). These patterns reveal substantial challenges with healthcare access and maternal mortality ratio (MMR) (WHO, 2025).

The growing challenges draw the attention of many international organisations such as the World Bank, the United Nations (UN), and the WHO to closely examine health system capacities alongside other developmental components such as education, urbanisation, poverty, sanitation, nutrition, immunisation, maternal and child health, clean water, gender equality and environmental standards. In view of this, Sustainable Development Goal 3 (SDG 3) becomes crucial, as it emphasises promoting well-being and inclusive development of both humans and the planet by 2030. SDG 3 prioritises

addressing maternal, neonatal and child fatalities under Targets 3.1 and 3.2, which call for lowering the MMR to below 70 per 100,000 live births, neonatal mortality rate (NMR) to fewer than 12 per 1,000 live births and under-five mortality rate (U5MR) to 25 or fewer per 1,000 live births by 2030 (Raina *et al.*, 2023).

Although the mortality index recorded substantial progress, prior SDG studies have either examined a single mortality indicator, a single region or a single dimension of inequality. Existing healthcare resilience literature shows a strong connection between healthcare system capability and lower mortality, but these insights have not yet been well integrated into analyses of SDG 3 mortality inequalities across income groups and WHO regions. This study addresses these limitations by analysing four mortality-related SDG 3 indicators across six WHO regions and provides a regional mortality-sustainability lens to assess and accelerate progress towards achieving SDG 3 by 2030. The study attempts to answer three research questions (RQs):

RQ1: What differences are observed in the four selected mortality-related SDG 3 indicators across countries, WHO regions and income groups?

RQ2: To what extent have WHO regions progressed towards the SDG 3 target threshold since 2015, and which mortality indicator remains furthest from the threshold?

RQ3: How do income vulnerability and mortality gaps jointly contribute to shaping mortality-sustainability risk profiles and region-specific policy interventions?

Theoretical Foundation

This study integrates insights from two complementary theories.

Fundamental Cause Theory, proposed by Link and Phelan (1995), argues that knowledge, power, money, status, connections and other socio-economic factors persist as fundamental causes of diseases. The theory suggests that regions and countries with greater socio-economic vulnerability are expected to demonstrate higher mortality rates and gaps in achieving SDG 3 targets.

Health System Resilience Theory, proposed by Kruk *et al.* (2015), emphasises awareness, integration, continuity and adaptiveness of the healthcare system during a crisis. This study suggests that regions with stronger healthcare services and financing may advance more swiftly towards the SDG 3 threshold as compared with conflict-affected areas that may show gaps despite an improvement in indicators.

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Together, these perspectives offer a stronger analytical lens for exploring mortality inequality outcomes, the distance-to-target (DTT) and the development of a region-specific mortality-sustainability risk framework.

Contribution of the Current Study

By relying on data from the WHO, the UN SDG database and World Bank repositories, this study contributes distinctively by integrating four mortality-related SDG 3 indicators into a healthcare sustainability framework. While prior studies have mainly recorded changes in multiple mortality outcomes, the present study extends this evidence by assessing whether the identified reductions correspond to progress towards 2030 SDG 3 targets. Guided by the complementary theoretical perspectives, this study further translates the patterns identified through comparative analytical techniques into a region-specific mortality-sustainability risk framework. By assessing mortality gaps in relation to healthcare capacity and socio-economic vulnerability, the framework provides a basis for guiding well-informed policy interventions to achieve SDG 3 targets.

LITERATURE REVIEW

Prior studies consistently demonstrate a synergistic impact of lifestyle behaviours on survival disparities, alongside socio-economic, institutional and health-related conditions (Ding *et al.*, 2015; Faruk *et al.*, 2025). Decoster *et al.* (2021) demonstrated that educational inequities among the population under 65 years of age persisted during the COVID-19 pandemic, reaffirming the role of socio-economic inequalities in driving mortality patterns and trends globally (Pujari *et al.*, 2021).

Similarly, the Office for Health Improvement and Disparities (OHID) reported over 13,000 deaths in 2020 that were strongly associated with health imbalances, emphasising the impact of socio-economic determinants on life expectancy (OHID, 2022). Income levels have historically been well acknowledged as a key determinant of illness and premature deaths across countries (Otavova *et al.*, 2024).

A research study on the global burden of disease in 2021 indicated that many lower-middle-income countries faced an estimated 73% of deaths from NCDs, of which 82% were premature (Jamison *et al.*, 2024). Evidence from cohort studies showed that conflict-affected and low-income regions faced heightened death risks due to poverty, limited healthcare access, high costs and escalating population pressures (Akseer *et al.*, 2020; Sibanda *et al.*, 2024; World Bank, 2025a, 2025b; UN, 2025). Furthermore, Lozano *et al.*

(2018) reported gaps and progress in health-related SDG indicators across 195 countries and territories; they concluded that many regions and countries improved their survival outcomes, but the rate of advancement varied substantially. Hosseinpour *et al.* (2018) underscore the need for disaggregated data to identify inequalities across socio-economic and demographic subgroups. Sanhueza *et al.* (2021) reinforce this perspective by emphasising the SDG principle of “leaving no one behind”, indicating the methodological rationale for examining the distributional patterns in mortality outcomes across regions and socio-economic strata. SDG research further indicates that the survival inequalities follow specific patterns, persist and are spatially distributed (Espoir, 2026; Giancotti *et al.*, 2026). The progress towards universal health coverage has stagnated since 2015 (WHO, 2023).

Conversely, Silveira *et al.* (2024) argue that the COVID-19 pandemic has adversely impacted health inequalities, particularly in low- and middle-income countries. Eozenou *et al.* (2021) propose the necessity for equity policy interventions addressing wider social determinants affecting health risks and equitable healthcare service delivery. Therefore, the present research emphasises the need to analyse mortality-related outcomes between different countries, regions and income groups to understand not only the areas where deaths are most pronounced, but also to quantify progress towards SDG 3 thresholds since 2015 and to propose targeted policy interventions vital for achieving healthcare sustainability by combining income vulnerability and mortality gaps for specific regions. The conceptual relationships used in the study are presented in Figure 1.

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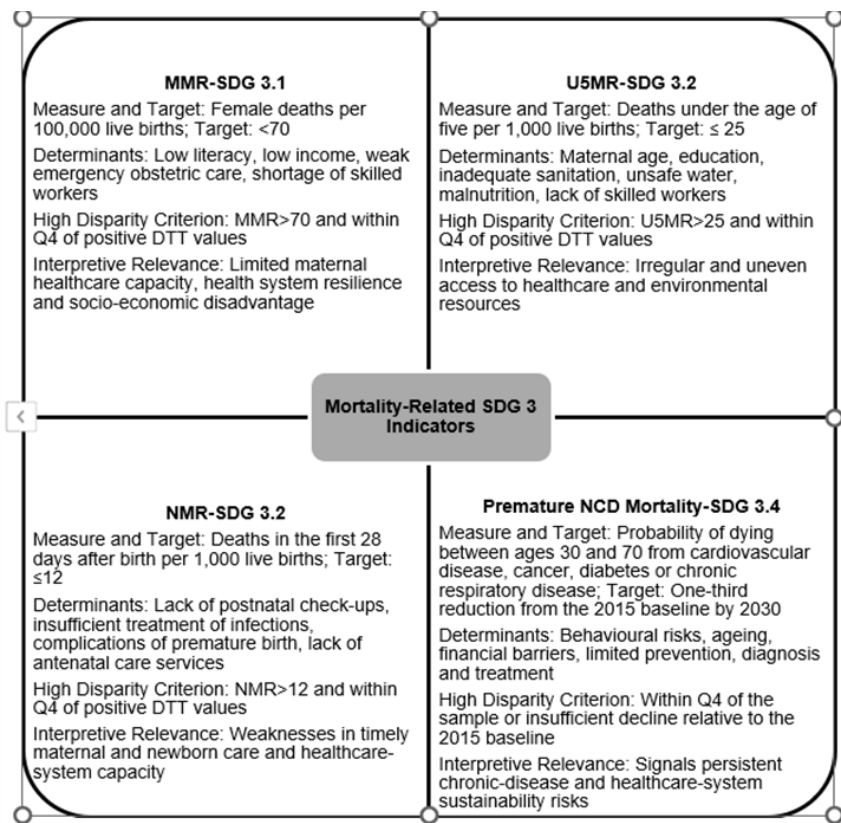


Figure 1: Conceptual Framework of Mortality-Related SDG 3 Indicators

Note: Determinants are conceptually mapped to mortality-related SDG 3 indicators; DTT = distance-to-target; Q4 = highest quartile; the High Disparity Criterion applies to a 50-country sample.

Source: Compiled by the authors.

RESEARCH METHODS

The study employs a quantitative secondary data design using comparable mortality outcomes from international health databases, including the WHO Global Health Observatory (GHO), the World Bank and the UN SDG database to assess global inequalities and progress in SDG 3 mortality-related outcomes across countries, WHO regions and World Bank income classification groups. As shown in Table 1, 50 countries were selected through purposive sampling based on three criteria to ensure (i) geographical representation across 6 WHO regions; (ii) representation of all 4 World Bank income categories; and (iii) differences in mortality patterns across the selected 4 indicators. Each country was

assigned to one of the six WHO regions based on the WHO regional classification system, to enable region-specific mortality comparisons. Four SDG 3-related mortality indicators representing the key facets of preventable mortality across the life cycle were purposively chosen for the study.

The study adopts a descriptive and comparative analysis in which 2015 was considered the baseline year because it corresponds to the implementation of the SDGs, while the years 2019, 2023 and 2024 were used as the latest reference years depending on the last recorded observation for each reported indicator in the WHO SDG/GHO database. Countries with missing data for any of the four mortality indicators for either the 2015 baseline or the latest available year for the relevant indicator were excluded. Disparity patterns and advancement across regions and income groups were summarised using absolute change, percentage change, and DTT (Table 2), while the income vulnerability ratio was computed to interpret mortality gaps (Table 3). Finally, the vulnerability levels were integrated with DTT gaps to establish a region-specific mortality-sustainability risk framework and targeted policy actions (see Table 4).

RESULTS

Table 1: Sampling Framework of Countries by WHO Region, World Bank Income Classification and Mortality Profiles

S. No.	Countries	WHO Region	World Bank Income Classification	Gross National Income (GNI) Per Capita Range, 2024 United States dollars (US\$)	Mortality-Related Outcomes
1	France	Europe	High income	\$13,936 or more	Low NCD mortality, ageing-related maternal-child mortality
2	Ukraine	Europe	Upper-middle income	\$4,496-\$13,935	High conflict-related healthcare disruption, adult mortality
3	Germany	Europe	High income	\$13,936 or more	Low mortality cases, NCD mortality
4	Norway	Europe	High income	\$13,936 or more	Low neonatal and under-five mortality cases
5	Russia	Europe	High income	\$13,936 or more	Moderate NCD mortality, ageing-related maternal and child mortality

The list of the remaining 45 countries can be found in the given link:
<https://docs.google.com/document/d/1-LN9g1Ho1ar7r6qLsYGNBIfpOQKOLUp/edit?usp=sharing&oid=115625145301160455887&rtpof=true&sd=true>

Note: Countries were illustratively selected to represent six WHO regions and four World Bank income groups; GNI per capita ranges follow the World Bank’s 2024 Atlas method classification.

Source: WHO (2025); World Bank (2025a); UN (2025) and the authors’ compilation.





Table 1 examines different mortality patterns at varying levels of economic capacity. High-income countries exhibit low maternal, neonatal and under-five mortality burdens, whereas upper-middle-income countries show concerns associated with premature NCD mortality and ageing demographics. The lower-middle-income group illustrates a transitional phase where maternal and child mortality is lower, but neonatal and NCD mortality continues to rise. In contrast, low-income countries exhibit high mortality outcomes. Overall, the framework reinforces an analytical orientation for assessing the link between income-based disparities and diverse mortality risk factors in healthcare sustainability.

Table 2 reveals notable variations in the pattern, magnitude and rate of improvement in mortality-related SDG 3 outcomes across indicators and WHO regions, aligned with the uneven progress reported by Lozano *et al.* (2018). Africa shows the highest absolute decline of 144 deaths per 100,000 live births, equivalent to an average annual reduction of 18 deaths per 100,000 live births between 2015 and 2023. Nevertheless, MMR in Africa showed an absolute decline from 586 to 442 deaths per 100,000 live births, representing a DTT gap of 372 deaths, which is highly off-track from the SDG 3.1 threshold.

South-East Asia indicates considerable improvement in the reduction of MMR, U5MR and NMR by 34.2%, 38.6% and 37%, respectively. However, there has been an increase in premature NCD mortality of 2.3%. The region of the Americas highlights uneven mortality outcomes, with declines in NMR, U5MR and premature NCD death rates alongside an increase in the MMR trajectory by 3.5%, suggesting that regions approaching or achieving SDG 3 thresholds remain vulnerable to healthcare sustainability risks if momentum is not maintained. Thus, these trends address RQ1 by illustrating the changes in mortality patterns over time across regions and indicators.

The DTT measurement provides a sharper analytical perspective for the study by differentiating reductions in observed mortality and significant progress towards the SDG target threshold. The European region recorded a comparatively smaller percentage change in MMR (i.e., -15.4%), yet the latest value is below the SDG target by 59 deaths per 100,000 live births. The U5MR reflects a relative decline across all the WHO regions. The region of the Americas, European and Western Pacific regions were below the SDG 3.2 target, and South-East Asia was close to the threshold. NMR declined by 37% in the South-East Asia region, followed by the Western Pacific at 28.6% and the Eastern Mediterranean at 17.9%; however, the South-East Asia and the Eastern Mediterranean remain above the target, whereas the Western Pacific is below it.

Table 2: Assessment of WHO Region-wise Patterns and Progress Towards SDG 3 Targets

WHO Region	Indicators	Baseline (2015)	Latest Value	Latest Year	Absolute Change	Percentage Change	Average Annual Change	SDG Target	DTT	Mortality Target Status
Europe	MMR	13	11	2023	-2	-15.4%	-0.25	70	-59	Achieved
	USMR	7	6	2024	-1	-14.3%	-0.11	25	-19	Achieved
	NMR	4	4	2024	0	0.0%	0	12	-8	Sustained (low mortality)
	Premature NCD	17.2	16.2	2019	-1	-5.8%	-0.25	11.5	4.7	Not achieved but improving
Region of the Americas	MMR	57	59	2023	2	3.5%	0.25	70	-11	Achieved but worsened
	USMR	16	12	2024	-4	-25.0%	-0.44	25	-13	Achieved
	NMR	8	7	2024	-1	-12.5%	-0.11	12	-5	Achieved
	Premature NCD	14.5	13.9	2019	-0.6	-4.1%	-0.15	9.7	4.2	Not achieved but improving
Eastern Mediterranean	MMR	198	167	2023	-31	-15.7%	-3.88	70	97	Highly off track but improving
	USMR	55	43	2024	-12	-21.8%	-1.33	25	18	Not achieved but improving
	NMR	29	23.8	2024	-5.2	-17.9%	-0.58	12	11.8	Not achieved but improving
	Premature NCD	23.8	22.7	2019	-1.1	-4.6%	-0.28	15.9	6.8	Not achieved but improving
Africa	MMR	586	442	2023	-144	-24.6%	-18	70	372	Highly off track but improving
	USMR	86	72	2024	-14	-16.3%	-1.56	25	47	Highly off track but improving
	NMR	28	26.3	2024	-1.7	-6.1%	-0.19	12	14.3	Not achieved (slow progress)
	Premature NCD	21.5	21	2019	-0.5	-2.3%	-0.13	14.3	6.7	Not achieved (slow progress)
South-East Asia	MMR	146	96	2023	-50	-34.2%	-6.25	70	26	Not achieved but improving
	USMR	44	27	2024	-17	-38.6%	-1.89	25	2	Near target
	NMR	27	17	2024	-10	-37.0%	-1.11	12	5	Not achieved but improving
	Premature NCD	22	22.5	2019	0.5	2.3%	0.13	14.7	7.8	Not achieved (worsening)

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Western Pacific	MMR	40	35	2023	-5	-12.5%	-0.63	70	-35	Achieved
	USMR	14	9	2024	-5	-35.7%	-0.56	25	-16	Achieved
	NMR	7	5	2024	-2	-28.6%	-0.22	12	-7	Achieved
	Premature NCD	17.2	16.5	2019	-0.7	-4.1%	-0.18	11.5	5	Not achieved but improving

Calculations applied: Absolute change = Latest value – 2015 Baseline value; Percentage change = [(Latest value-2015 Baseline value)/2015 baseline value] *100; Average annual change = Absolute change/number of years between 2015 and the latest year; DTT = Latest value-SDG target value; Negative values indicate SDG achievement; Positive values indicate remaining reduction gap.

Source: Compiled by authors from WHO (2025)

Africa recorded the slowest decline at 6.1% and was 14.3 deaths per 1,000 live births above the SDG 3.2 target. Premature NCD mortality showed the slowest improvement across all indicators, with an average regional decline of 3.1%, thereby addressing RQ2 by demonstrating that reductions in deaths do not necessarily indicate that the regions are advancing towards the 2030 SDG 3 targets and hence contextualising the health-related dimension of the theoretical framework.

Table 3 highlights how regional mortality gaps are associated with economic vulnerability. Africa recorded a severe income-vulnerability ratio, with low- and lower-middle-income countries representing nine times the number of higher-income countries. This finding shows that mortality disparities are not only associated with healthcare system advancement but also with regional economic burden, thereby operationalising the economic context of the theoretical framework. The findings are compatible with the international evidence that inadequate financing, shortages of skilled workers and limited healthcare services continue to affect developing countries (WHO, 2023).

The South-East Asian and the Eastern Mediterranean regions indicate high income-vulnerability ratios, i.e., 2.50 and 1.50, respectively, showing that lower-income countries constitute a larger share of the regional sample than higher-income countries, thereby illustrating that fragile health systems and income-related limitations may contribute to mortality-related sustainability gaps. The Western Pacific region represents a mixed vulnerability status. By contrast, the European and the region of the Americas represent ratios of 0 and 0.14, reflecting that their samples comprise high- and upper-middle-income countries.

Overall, Tables 2 and 3 support the theoretical foundation of the study by relating income vulnerability to mortality outcomes and underpinning the structural development of the mortality-sustainability risk framework.

The policy action framework emphasises the importance of adopting and implementing differentiated regional strategies rather than a standard global response for achieving SDG 3 targets. Policy interventions should reflect the combination of mortality burdens, income vulnerability and distance to the SDG 3 target in each WHO region. For instance, in a higher vulnerability context, policies should be implemented to expand the healthcare financing options for the public, such as strengthening health insurance and reducing overwhelming financial burdens; encouraging female education, expanding rural health outreach, strengthening provisions for sanitation and clean drinking water; improving primary healthcare, including emergency obstetric care and childcare.

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Regions with persistent premature NCD mortality require the integration of early diagnosis and regular clinical assessment of NCD risk factors. Furthermore, the health system could be strengthened by building resilient medical supplies, mobile clinics, and emergency health financing.

The African region shows a high degree of overlap between severe income vulnerability and large gaps in mortality indicators, experiencing an intensified mortality-sustainability risk. This aligns with Fundamental Cause Theory by demonstrating how economic and structural changes constrain maternal and child care and preventable healthcare outcomes. Simultaneously, this validates the Health Systems Resilience Theory, as these prolonged mortality gaps limit health systems’ capacity and impede progress towards achieving the SDG 3 threshold.

Table 3: Income Vulnerability across WHO Regions

WHO region	High-income	Upper-middle income	Lower-middle income	Low income	Total countries	Lower-income countries	Higher-income countries	Income-vulnerability ratio	Vulnerability Status
South-East Asia	0	2	5	0	7	5	2	2.5	High
Region of the Americas	2	5	1	0	8	1	7	0.14	Low
Africa	0	1	3	6	10	9	1	9	Severe
Western Pacific	3	1	4	0	8	4	4	1	Mixed
Europe	6	1	0	0	7	0	7	0	Low
Eastern Mediterranean	0	4	3	3	10	6	4	1.5	High

Calculation used: Income Vulnerability Ratio = (Low-income + lower-middle-income countries)/ (high-income + upper-middle-income countries); Low vulnerability: ratio < 0.5, mixed vulnerability = ratio between 0.5 and 1.49, High vulnerability = ratio between 1.50 and 2.99, Severe vulnerability = ratio equal to or above 3.00; Lower income countries include low and lower-middle income countries; Higher income countries include high and upper-middle-income countries.

Source: Analysed by the authors based on World Bank income classification from Table 1.

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Table 4: Proposed Policy Intervention Framework for SDG 3 Mortality-Sustainability Risk

<i>WHO Region</i>	<i>Income Vulnerability Status</i>	<i>SDG 3 Target Gap</i>	<i>Key Mortality Burden</i>	<i>Descriptive Sustainability Risk</i>	<i>Policy Action</i>
South-East Asia	High	Maternal and child mortality gaps, Worsening NCDs, Near SDG 3.2 target	Dual burden of maternal and child risk and increasing NCD risk	Dual burden mortality outcomes	Scaling up interventions to reduce MMR, U5MR, and NMR while integrating regular clinical assessment of NCD risk factors
Western Pacific	Mixed	SDG 3.1 and 3.2 targets achieved, NCD gaps persist	Ageing and NCD-related mortality	Transitional sustainability risk	Integrating regular clinical assessment of NCD risk factors and protecting lower-income subgroups
Eastern Mediterranean	High	NMR, U5MR and NCD mortality are above the SDG 3 threshold	Maternal, NCD and conflict-related mortality	Overlapping mortality risk	Strengthen healthcare resilience and emergency maternal and child care
Africa	Severe	Highly above SDG 3.1, 3.2 and 3.4 targets	MMR, U5MR, NMR and NCD mortality	Intensified mortality-sustainability risk	Scaling up primary healthcare, emergency obstetric care and childcare
Europe	Low	SDG 3 targets achieved, NCD gap persists	NCD and ageing-related mortality	NCD sustainability threat	Strengthen chronic disease management, prevention and ageing care
Region of the Americas	Low	SDG 3 targets achieved, adverse transition in maternal risk	Maternal and NCD mortality	Progress at risk	Sustain maternal health progress and enhance NCD prevention

Source: Constructed by authors from the findings in Tables 2 and 3

South-East Asia represents a dual transition mortality outcome, with substantial advancement in maternal and child mortality but worsening premature NCD outcomes, indicating a shift in sustainability challenges, while the region of the Americas, Western Pacific, Eastern Mediterranean and Europe experience lower maternal and child survival risk in contrast to stubborn ageing and NCD burdens. Together, Tables 3 and 4 justify RQ3 by illustrating how the income-vulnerability ratio and mortality target gaps together may exacerbate sustainability risks and shape region-specific policy actions.

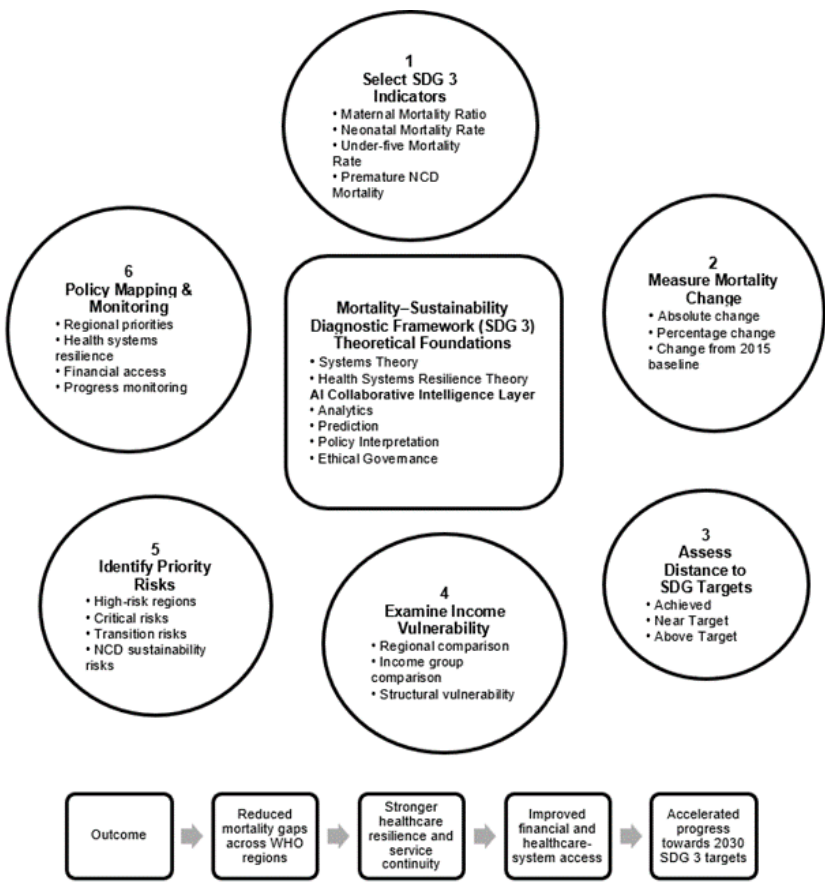


Figure 2: Circular Mortality-Sustainability Policy Framework for Selected SDG 3 Indicators

Source: Constructed by the authors.

The framework shown in Figure 2 consolidates the evidence from the study into an iterative policy-reflection cycle that starts with the selection of mortality-related SDG 3 indicators, and connects this selection to monitoring pattern assessment, SDG gap analysis, income vulnerability, mortality-sustainability risk, and targeted policy intervention.





Artificial Intelligence (AI) collaborative intelligence layer reinforces the need to evolve and integrate data to achieve SDG targets (Kumar and Banerjee, 2025). The circularity indicates the need for regular surveillance and re-evaluation of mortality outcomes, aligning economic structure disparities with healthcare system readiness to strengthen mortality reduction and bridge SDG 3 gaps, thereby supporting RQ3.

Challenges Identified

- Mortality patterns are found to be profoundly uneven across regions and income groups, with multiple indicators still above the SDG 3 targets.
- MMR and NMR remain sensitive to health system resilience, indicating substantial gaps in education, income, access to emergency obstetric and newborn care, as well as shortages of skilled staff.
- Premature NCD mortality continues to be a long-term sustainable development challenge. Table 2 highlights a worsening pattern of premature NCD in the South-East Asian region; this pattern requires timely and regular clinical assessments, prevention, and treatment of chronic diseases.
- Limited access to healthcare and income vulnerability constitutes structural barriers to reducing mortality inequalities, particularly in African, South-East Asian and Eastern Mediterranean regions; these barriers therefore require stronger financial protection and better access to primary healthcare for disadvantaged households. In 2021, approximately 4.5 billion people were not fully covered by essential health services (WHO, 2023).

CONCLUSIONS

The study demonstrates that the improvements in mortality indicators do not represent substantial progress towards achieving the SDG 3 threshold. The African and the Eastern Mediterranean regions continued to exhibit wide maternal and child mortality gaps, while South-East Asia showed a decline in MMR, U5MR and NMR, but premature NCD mortality continued to deteriorate, thereby demonstrating multidimensional regional differences in progress.

The DTT provides an important distinction between the rate of advancement and the level of target achievement, illustrating that absolute or percentage change may provide an incomplete measurement of SDG 3 progress unless the target gap and baseline level are

also incorporated. The income-vulnerability ratio further provides a supplementary socio-economic context for mortality trends. The findings are consistent with the propositions of the theoretical framework indicating that survival outcomes are inherently shaped by socio-economic, political, ecological, and structural disadvantage. The proposed SDG 3 mortality-sustainability risk framework contributes to the development of policy interventions for future sustainability-driven research. The study is limited to selected mortality-related SDG 3 indicators for which data are available. The findings provide valuable insights into the mortality patterns and inequalities across regions, countries and income strata through a purposively selected cross-country sample, rather than an holistic analysis of all countries. The study is comparative and descriptive in nature and does not establish any causality between mortality gaps, income vulnerability and healthcare capacity. Future research should empirically and longitudinally examine the relationship between these factors.

ETHICAL STATEMENT

This study uses publicly available secondary data from international health databases: WHO consolidated SDG indicator reports, the World Bank, and UN SDG database; therefore, no data privacy or ethical concerns are involved.

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