Non-Communicable Diseases: A Global and Indian Perspective

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ABSTRACT

Non-Communicable Diseases (NCDs), such as cardiovascular diseases, diabetes mellitus, chronic respiratory diseases, and cancers, have emerged as the foremost global health challenge. Unlike infectious diseases, NCDs are not transmitted from person to person but arise through complex interactions among genetic, environmental, behavioral, and physiological determinants. Modifiable lifestyle-related factorssuch as unhealthy diets, physical inactivity, tobacco use, and harmful alcohol consumptionplay a pivotal role in their increasing prevalence. The global burden is particularly alarming in low- and middle-income countries, where demographic shifts, urbanization, and health inequities exacerbate the problem. India, undergoing a significant epidemiological transition, vividly reflects this trend. States such as Andhra Pradesh report high diabetes prevalence, rising cardiovascular mortality, and tobacco-related cancers. This paper critically reviews the epidemiology, risk factors, health system challenges, and policy responses to NCDs at global and national levels, with a case study from Andhra Pradesh, and underscores the need for integrated prevention and control strategies.

Keywords: Non-Communicable Diseases, Diabetes, Cardiovascular Diseases, Chronic Respiratory Diseases, Cancer, Epidemiology

INTRODUCTION

Non-Communicable Diseases (NCDs) have emerged as the leading global health concern, surpassing communicable diseases in both mortality and morbidity. These chronic illnesses including cardiovascular diseases (CVDs), diabetes mellitus, cancers, and chronic respiratory diseases (CRDs) are not contagious but result from a complex interaction of biological predispositions, lifestyle factors, and environmental influences **(World Health Organization [WHO], 2023)**. Unlike acute conditions, they develop gradually and require long-term management, creating unique challenges for healthcare systems.

NCDs account for nearly three out of every four global deaths, equating to approximately 41 million lives lost annually. Cardiovascular conditions remain the most significant contributor, followed by cancers, respiratory illnesses, and diabetes **(GLOBOCAN, 2022; International Diabetes Federation [IDF], 2023; WHO, 2023**). Once considered problems of affluent societies, NCDs now disproportionately affect low- and middle-income countries (LMICs), where they cause more than 75% of premature deaths. This shift is closely tied to rapid urbanization, sedentary behaviors, and nutritional transitions. Economic impacts are equally substantial, with estimated productivity and healthcare losses projected at over US, $ 47 trillion between 2011 and 2030 **(NCD Risk Factor Collaboration, 2017)**.

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India reflects this epidemiological transition vividly. While infectious diseases persist, chronic illnesses now account for more than 62% of deaths nationwide **(Indian Council of Medical Research [ICMR], Public Health Foundation of India [PHFI], & Institute for Health Metrics and Evaluation [IHME], 2017**). National surveys, such as NFHS-5 (2021), report concerning increases in obesity, diabetes, and hypertension, particularly in urbanized states. Andhra Pradesh, for instance, has documented high diabetes prevalence, rising cardiovascular mortality, and tobacco-related cancers, underscoring the need for targeted interventions **(Ministry of Health and Family Welfare [MoHFW], 2020)**.

Epidemiology And Global Burden

NCDs are now the foremost contributors to both death and disability worldwide. Each year, cardiovascular diseases claim an estimated 17.9 million lives, cancers nearly 10 million, chronic respiratory conditions about 4.1 million, and diabetes 1.5 million **(WHO, 2023; GLOBOCAN, 2022; IDF, 2023)**. In addition to mortality, these diseases account for a large share of years lived with disability, creating a dual health and economic burden.

Although once concentrated in wealthier nations, LMICs now bear the greatest share, accounting for more than three-quarters of global NCD related mortality. This trend reflects broader demographic and lifestyle shifts: urbanization, greater reliance on processed diets, declining physical activity, and increased tobacco and alcohol use. Coupled with limited healthcare access, these factors accelerate disease onset at younger ages and exacerbate inequities in survival outcomes. NCDs, therefore, not only represent a clinical problem but also a barrier to sustainable development and poverty reduction **(WHO, 2023)**.

Major Ncd Categories

Diabetes Mellitus

Diabetes mellitus is a long-term metabolic disorder marked by persistent hyperglycemia arising from impaired insulin secretion, resistance to insulin action, or both. Current estimates suggest that around 537 million adults live with diabetes worldwide, with projections indicating a rise to over 640 million by 2030 **(IDF, 2023)**. India carries the second-largest number of diabetic individuals, largely due to dietary transitions, increasing obesity, and genetic predisposition. The disease significantly heightens the risk of cardiovascular complications and is also a major cause of kidney failure, blindness, and lower-limb amputations.

Cardio-vascularDiseases (CVDs)

CVDs including ischemic heart disease, stroke, and hypertension remain the world's top cause of mortality, responsible for nearly one-third of all deaths (**WHO, 2023**). Key contributors include high blood pressure, tobacco consumption, obesity, and diets rich in salt and fats. In addition to high mortality, CVDs impose severe economic burdens through premature deaths and long-term disability.

Chronic Respiratory Diseases (CRDs)

Chronic respiratory conditions such as asthma and chronic obstructive pulmonary disease (COPD) together claim more than 4 million lives annually (**GINA, 2023**). These illnesses are often aggravated by smoking, air pollution, and occupational exposures. In LMICs, diagnosis remains inadequate, with COPD frequently under-recognized. Asthma, meanwhile, is a major cause of disability among children and young adults.

Cancers

Cancer encompasses a broad set of diseases involving abnormal and uncontrolled cell division and growth, leading to nearly 10 million global deaths each year **(GLOBOCAN, 2022)**. In India, tobacco use contributes substantially to oral, lung, and oesophageal cancers, while breast and cervical cancers are significant among women. Early screening programs are critical for improving survival outcomes but remain underutilized in many regions.

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Risk Factors And Determinants

The onset and spread of NCDs are largely shaped by behavioral and social determinants. The four most prominent modifiable risks include tobacco use, harmful alcohol intake, poor diet, and physical inactivity **(WHO, 2023)**. Tobacco use alone causes over 8 million deaths annually, including those exposed to second-hand smoke. Excessive alcohol consumption has been associated with more than 200 health conditions ranging from liver disease to cardiovascular disorders (**WHO, 2022**).

Nutritional transitions marked by diets high in salt, processed sugars, and unhealthy fats have been strongly linked to obesity, hypertension, and diabetes **(NCD Risk Factor Collaboration, 2017)**. Equally, reduced physical activity, often associated with sedentary lifestyles in urban settings, has become a global concern. Beyond behavioral drivers, structural inequalities such as education, income, and healthcare access are powerful determinants of NCD vulnerability. Populations in LMICs are particularly disadvantaged, as poor access to preventive services exacerbates both disease prevalence and outcomes **(ICMR, PHFI, & IHME, 2017)**.

Health System Challenges

Health systems face considerable hurdles in responding to NCDs. Early detection remains insufficient, with many patients presenting late when complications have already developed **(WHO, 2023)**. A shortage of trained professionals especially in rural and underserved areas further weakens the capacity to manage chronic care **(MoHFW, 2020)**.

Financial costs are another critical barrier. Because NCDs require ongoing treatment, households frequently face catastrophic healthcare spending, which can drive families deeper into poverty **(ICMR, PHFI, & IHME, 2017)**. Limited access to affordable diagnostics and medicines compounds these challenges. Service fragmentation also impedes effective care. While programs such as India's NPCDCS attempt to integrate NCD management into primary care, gaps in infrastructure, workforce distribution, and monitoring reduce their effectiveness **(MoHFW, 2020)**. Building resilient primary healthcare systems and ensuring equitable access are vital for reducing long-term NCD impacts.

Policy Responses And Interventions

The international community has recognized NCDs as a major development issue, prompting frameworks such as the WHO's Global Action Plan for the Prevention and Control of NCDs (2013–2030). This plan outlines nine voluntary global targets, including at 25% reduction in premature NCD deaths by 2025, curbing tobacco and alcohol consumption, and ensuring access to essential medicines **(WHO, 2023**). Crucially, it emphasizes multisectoral action, engaging areas such as agriculture, transport, and education alongside health systems.

In India, policy responses are anchored in the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS). This initiative strengthens NCD prevention through population-based screening, public education, and integration of chronic disease management into primary care **(MoHFW, 2020)**. Complementary measures such as the Ayushman Bharat scheme seek to broaden financial protection and upgrade health and wellness centers. Despite these efforts, challenges in funding, rural outreach, and evaluation mechanisms persist. Sustained political commitment and intersectoral collaboration are essential to ensure progress.

Government Health Initiatives Across Indian States

To achieve universal health coverage and ensure equitable access to quality healthcare, the Government of India launched Ayushman Bharat in 2018, a transformative national programme aimed at strengthening both preventive and curative care. The scheme has two major components such as Health and Wellness Centres (HWCs), which deliver comprehensive primary healthcare services namely maternal and child health, immunization, and screening for non-communicable diseases (NCDs); and the Pradhan Mantri Jan Arogya Yojana (PM-JAY), which provides secondary and tertiary healthcare coverage of up to ₹5 lakh per family per year for hospitalization (**Ministry of Health and Family Welfare [MoHFW], 2018**). Besides, several states

have introduced innovative and inclusive health schemes tailored to regional needs. Tamil Nadu, for instance, operates the Chief Minister's Comprehensive Health Insurance Scheme (CMCHIS), Makkalai Thedi Maruthuvam, and Amma Master Health Check-up Scheme to promote preventive care and early diagnosis of major illnesses (**Government of Tamil Nadu, 2021).** Maharashtra implements the Mahatma Jyotiba Phule Jan Arogya Yojana and the Balasaheb Thackeray Aapla Dawakhana for free urban primary healthcare (**Government of Maharashtra, 2022**). Similarly, Kerala has rolled out the Karunya Health Scheme and the Comprehensive Health Insurance Agency of Kerala (CHIAK), both aligned with Ayushman Bharat, ensuring accessible and patient-friendly services across citizens of the state (**Government of Kerala, 2020).**

Health Care Initiatives In Andhra Pradesh

In Andhra Pradesh, the Dr. YSR Aarogya Sri Health Care Trust serves as the flagship health insurance initiative, providing financial protection and access to quality treatment for economically weaker sections (**Government of Andhra Pradesh, 2021**). The scheme covers a wide range of critical ailments requiring secondary and tertiary care and operates in convergence with the national PM-JAY framework to enable cashless treatment in government and empanelled private hospitals. In recent years, the state has also emphasized the establishment of Health and Wellness Centres to strengthen preventive healthcare, maternal and child welfare, and the management of chronic diseases such as diabetes, hypertension, and cardiovascular disorders (**NITI Aayog, 2022**). In addition to that all the employees of the state are facilitated for health-carethroughEmployment Health Scheme (EHS). Citizens are encouraged to undergo regular health check-ups every six to eight months to facilitate early detection and control of NCDs, thereby reducing long-term healthcare costs and improving community well-being. Collectively, these initiatives demonstrate Andhra Pradesh's proactive approach toward achieving equitable, affordable, and inclusive healthcare services for all citizens, in line with the goals of Ayushman Bharat and the Sustainable Development Goals (**World Health Organization [WHO], 2023**).

Case Study – Andhra Pradesh

Andhra Pradesh exemplifies the rising state-level burden of NCDs within India. Diabetes prevalence among adults aged 45 years and older has steadily increased, reaching approximately 9.2% in 2022 **(IDF, 2023)**. Underdiagnosis remains a significant problem, delaying care and worsening outcomes.

Cardiovascular disease (CVD) mortality rates in the state have also climbed, from 210 per 100,000 in 2018 to 230 per 100,000 by 2022 (**MoHFW, 2020**). Tobacco-linked cancers including oral and lung cancer remain widespread, particularly in rural and economically disadvantaged groups. Chronic respiratory diseases (CRDs), driven by environmental and occupational factors, increased from 4.5% prevalence in 2018 to nearly 5% by 2022. These upward trends underscore the urgency of tailored state interventions. Strengthened screening, greater health literacy, and affordable access to treatment will be essential. Localized strategies, supported by effective implementation of national programs such as NPCDCS, are critical to reversing these patterns.

A Data-set for the states around the AP, has been curated for illustrative purposes based on patterns reported by authoritative sources, including World Health Organization, **WHO (2023)**, **IDF (2023), GLOBOCAN (2022), GINA (2023), MoHFW (2020), ICMR-PHFI-IHME (2017), NFHS-5 (2021),** and **NCD Risk Factor Collaboration (2017).**

Table 1: Data-set illustrating trends in key Non-Communicable Disease (NCD) indicators across selected (around AP) Indian states (2018–2022).

Year	State	Diabetes (%)	CVD Mortality Rate (per 100k)	CRD Prevalence (%)	Cancer Incidence (per 100k)	Reference
2018	Andhra Pradesh	8.1	210	4.5	120	
2019	Andhra Pradesh	8.4	215	4.6	123	
2020	Andhra Pradesh	8.7	220	4.7	126	
2021	Andhra Pradesh	9.0	225	4.8	129	
2022	Andhra Pradesh	9.2	230	4.9	131	

2018	Maharashtra	7.5	200	3.8	110	WHO, 2023; IDF, 2023; GLOBOCAN, 2022; GINA, 2023
2019	Maharashtra	7.8	205	3.9	112	
2020	Maharashtra	8.0	210	4.0	114	
2021	Maharashtra	8.3	215	4.1	117	
2022	Maharashtra	8.6	218	4.2	119	
2018	Kerala	9.0	195	5.0	140	
2019	Kerala	9.3	198	5.1	142	
2020	Kerala	9.5	202	5.2	144	
2021	Kerala	9.8	205	5.3	146	
2022	Kerala	10.1	207	5.4	148	
2018	Tamil Nadu	8.7	220	4.2	130	
2019	Tamil Nadu	9.0	225	4.3	132	
2020	Tamil Nadu	9.2	230	4.4	134	
2021	Tamil Nadu	9.5	235	4.5	136	
2022	Tamil Nadu	9.7	240	4.6	138	

Table 2: Andhra Pradesh NCD Indicators - 2018 Vs 2022 (% Change)

S.No.	Indicator	2018	**2022**	**% Change (2018-2022)**
1	Diabetes (%)	8.1	9.2	13.58
2	CVD Mortality (per 100k)	210.0	230.0	9.52
3	CRD (%)	4.5	4.9	8.89
4	Cancer Incidence (per 100k)	120.0	131.0	9.17

Diabetes, CVD, CRD and Cancer Trends

(i) Box Plot - analysis

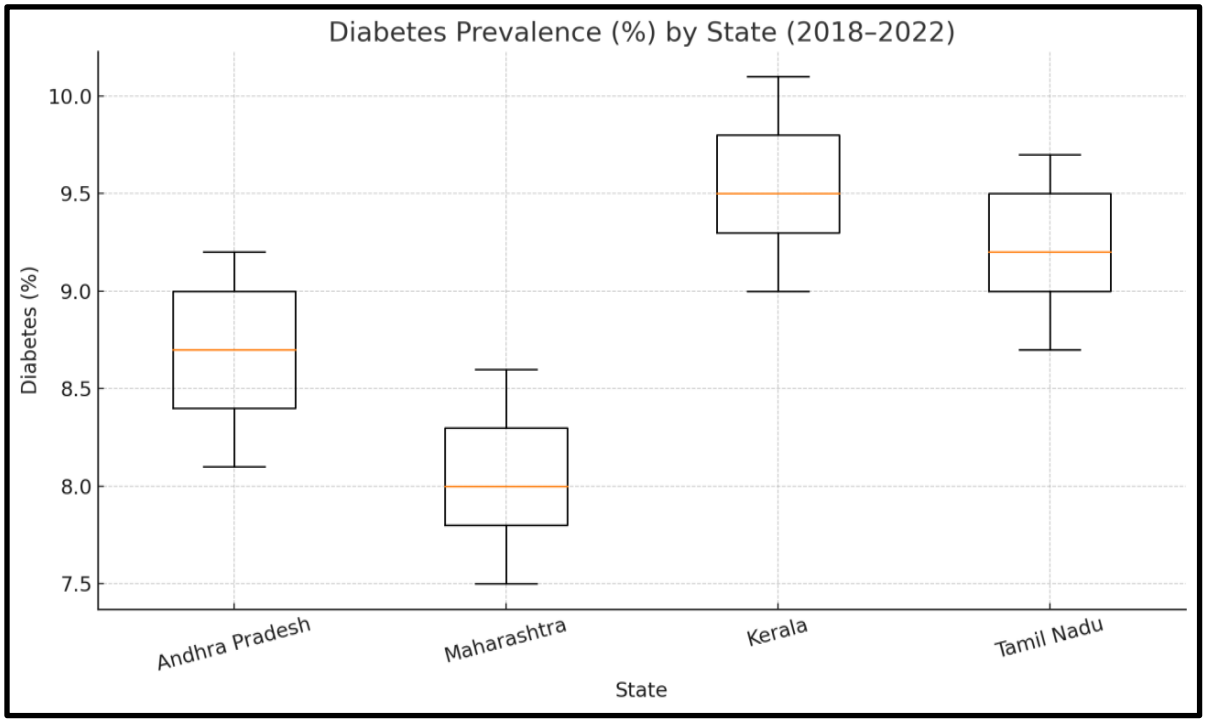

Figure 1.*Box plot of diabetes prevalence (%) across Andhra Pradesh, Maharashtra, Kerala, and Tamil Nadu (2018–2022)* . Andhra Pradesh shows an intermediate range, with values above Maharashtra but consistently below Kerala. The narrow spread highlights a steady upward trend.

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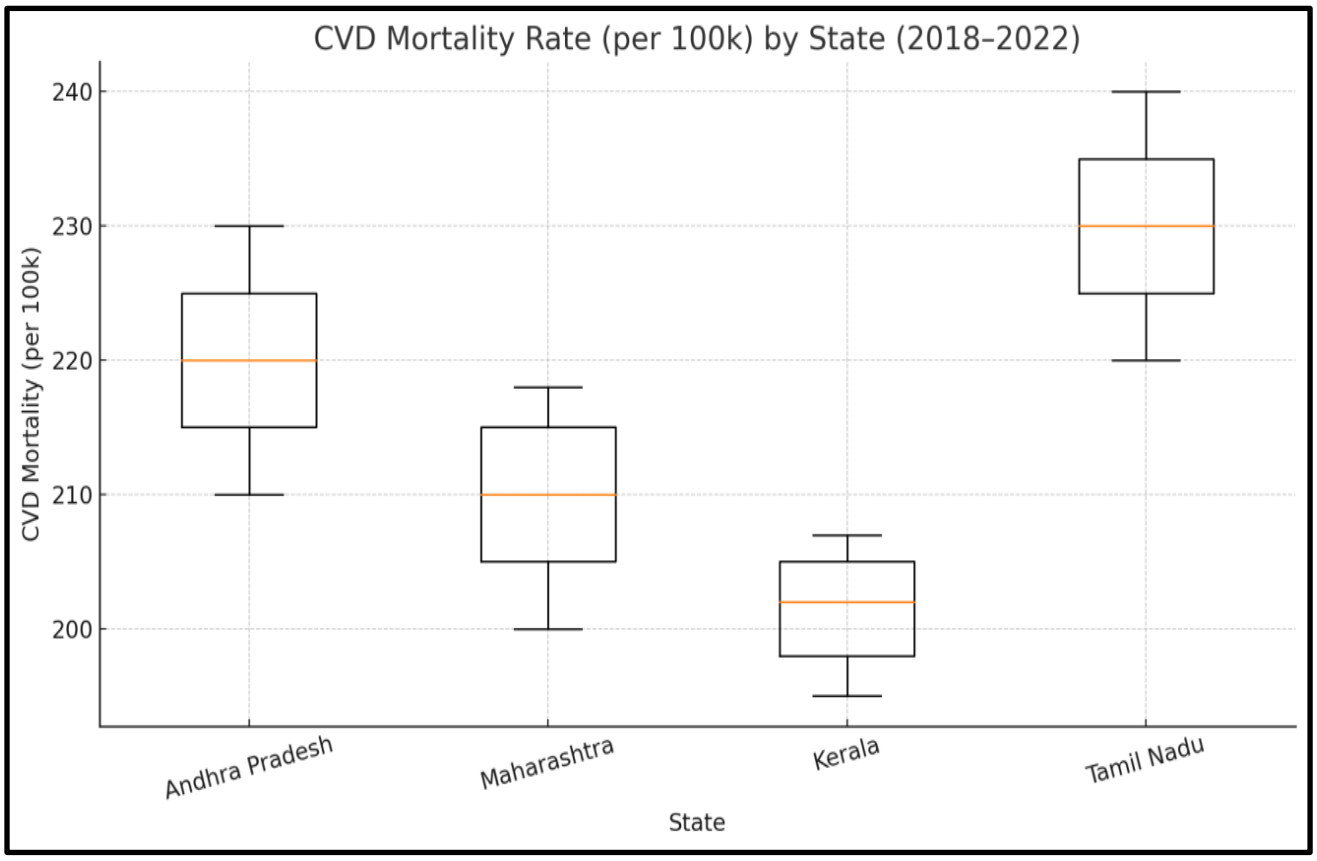

Figure 2.*Box plot of cardiovascular disease (CVD) mortality rates (per 100,000) across Andhra Pradesh, Maharashtra, Kerala, and Tamil Nadu (2018–2022).* Tamil Nadu demonstrates the highest mortality rates, while Kerala reports the lowest. Andhra Pradesh and Maharashtra occupy intermediate positions.

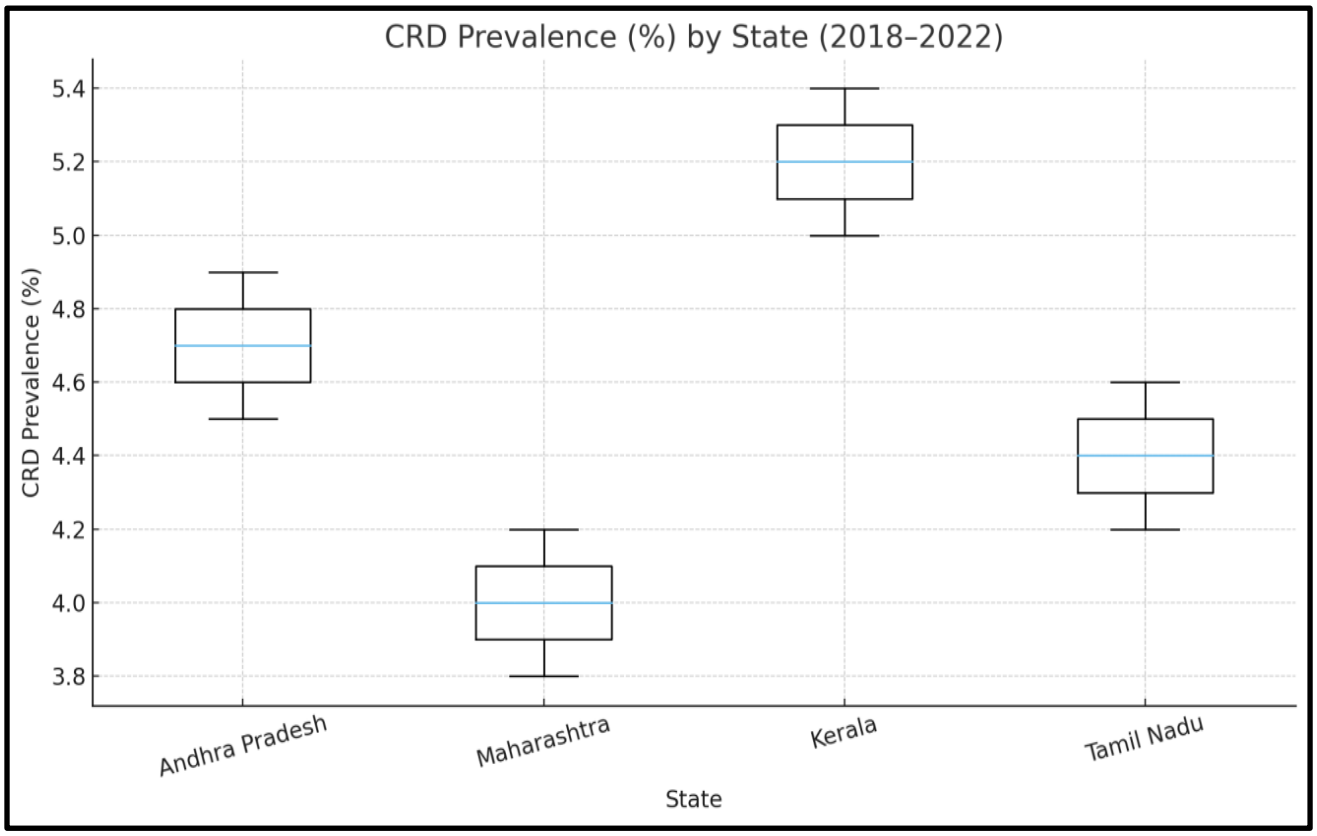

Figure 3.*Box plot of chronic respiratory disease (CRD) prevalence (%) across Andhra Pradesh, Maharashtra, Kerala, and Tamil Nadu (2018–2022).* Kerala consistently reports higher CRD prevalence, whereas Maharashtra shows the lowest. Andhra Pradesh exhibits moderate but steadily rising values.

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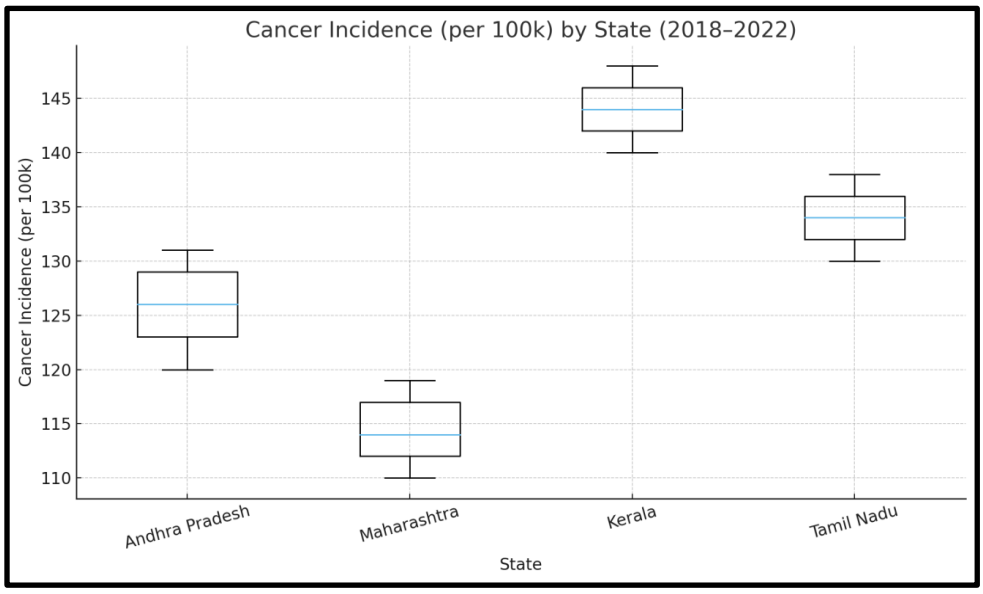

Figure 4.*Box plot of cancer incidence (per 100,000) across Andhra Pradesh, Maharashtra, Kerala, and Tamil Nadu (2018–2022).* Cancer incidence in Andhra Pradesh exceeds that of Maharashtra but remains lower than Kerala and Tamil Nadu.

Box plots comparing states for 2018 - 2022 show Andhra Pradesh consistently occupying an intermediate-to-high range of diabetes prevalence, exceeding Maharashtra but trailing Kerala. Over the five-year period, prevalence rose from 8.1% to 9.2%, a **13.6% increase**. Similarly, CVD mortality increased from 210 to 230 per 100,000, representing a **9.5% rise**.

While CRDs and cancers contribute comparatively smaller shares to the NCD landscape, their steady escalation is noteworthy. CRD prevalence rose from 4.5% in 2018 to 4.9% in 2022, indicating a slow but consistent increase. Cancer incidence grew from 120 to 131 cases per 100,000, marking a **9.2% increase** over the same period. Box plots illustrate that Andhra Pradesh's cancer incidence is slightly higher than Maharashtra's but below Kerala's and Tamil Nadu's. These results emphasize the contribution of environmental exposures, occupational risks, and tobacco use in shaping the state's cancer and respiratory health outcomes.

Proportional and Comparative Insights for NCDs in AP

(ii) **Time-series Plots analysis**

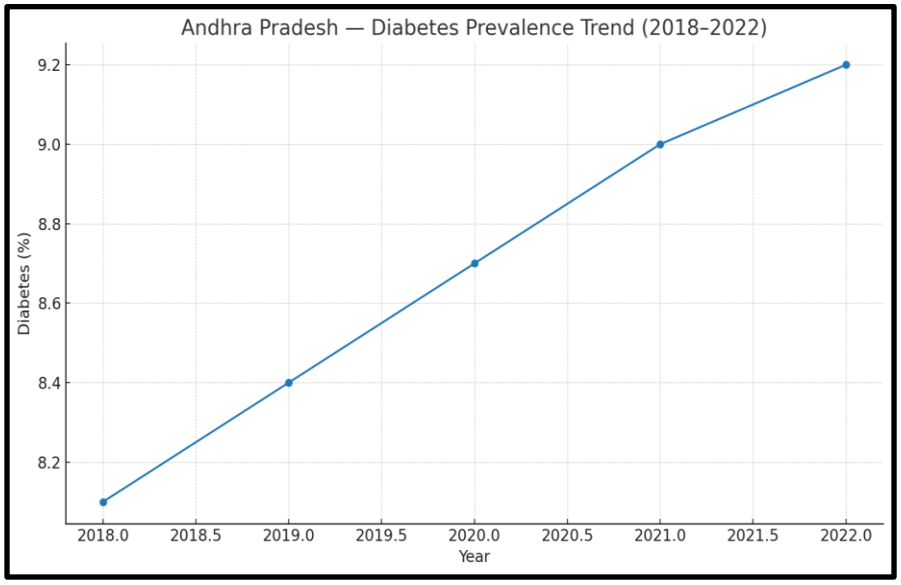

Figure 5.*Trend in diabetes prevalence (%) in Andhra Pradesh from 2018 to 2022* .- Diabetes prevalence increased from 8.1% to 9.2%, reflecting a 13.6% rise over five years.

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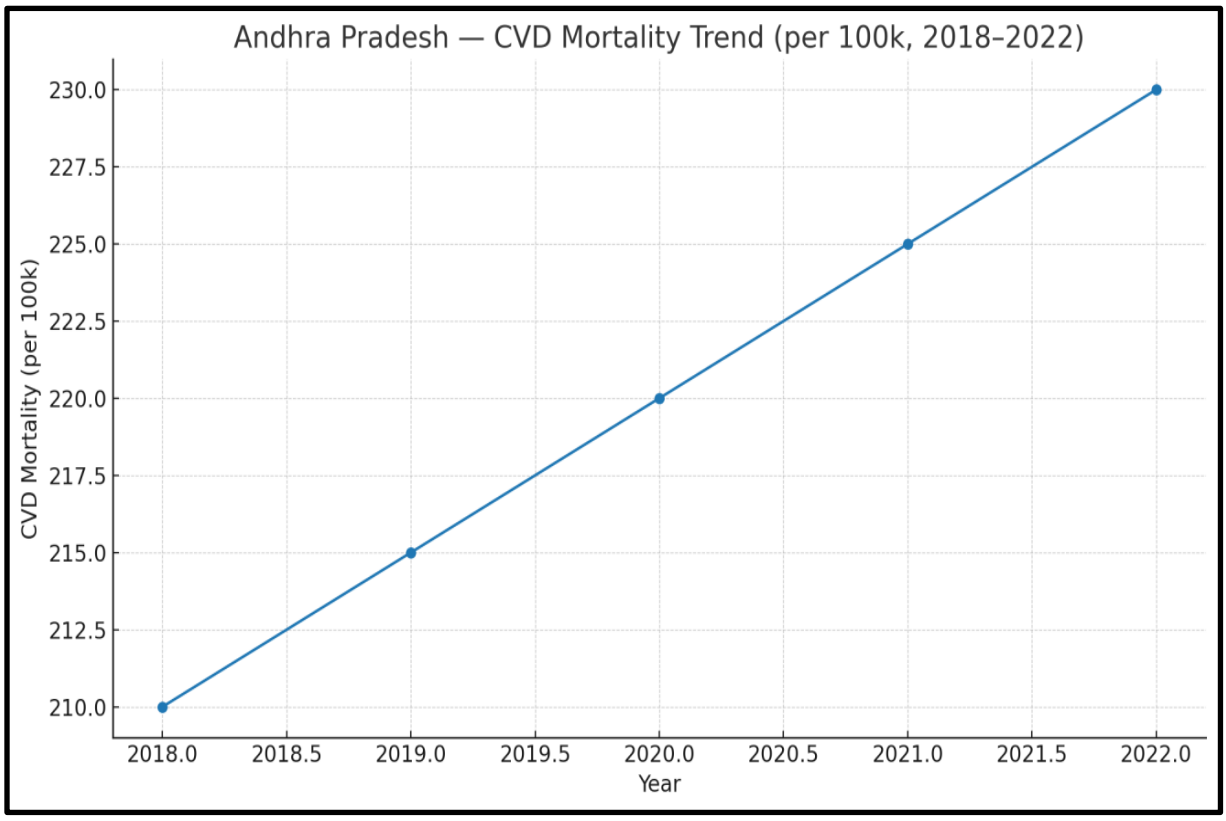

Figure 6.*Trend in cardiovascular disease (CVD) mortality (per 100,000) in Andhra Pradesh from 2018 to 2022.* Mortality increased from 210 to 230 per 100,000, a 9.5% rise, showing a strong correlation with diabetes prevalence.

Time-series plots reveal parallel upward trajectories in both indicators. Statistical analysis confirms a **very strong correlation (r = 0.997)** between diabetes prevalence and CVD mortality in Andhra Pradesh.

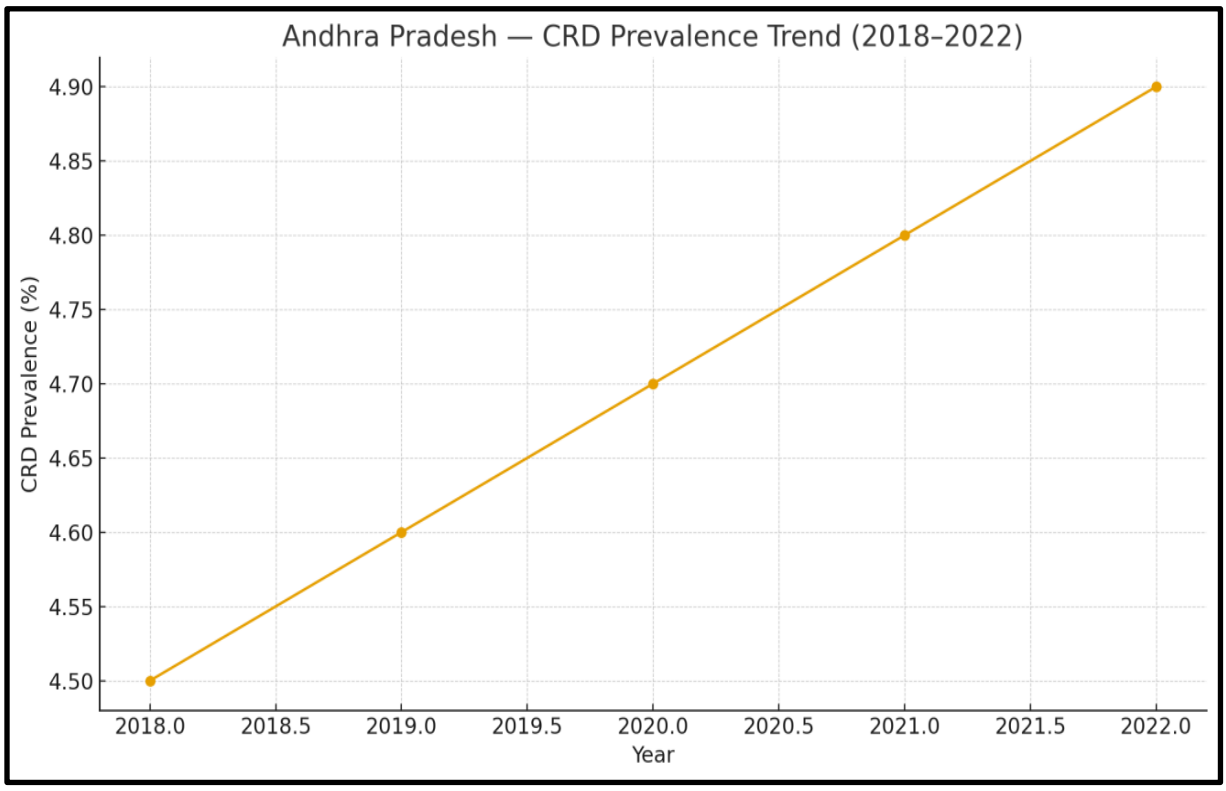

Figure 7.*Trend in chronic respiratory disease (CRD) prevalence (%) in Andhra Pradesh from 2018 to 2022.* CRD prevalence rose gradually from 4.5% to 4.9%, highlighting a slow but persistent increase.

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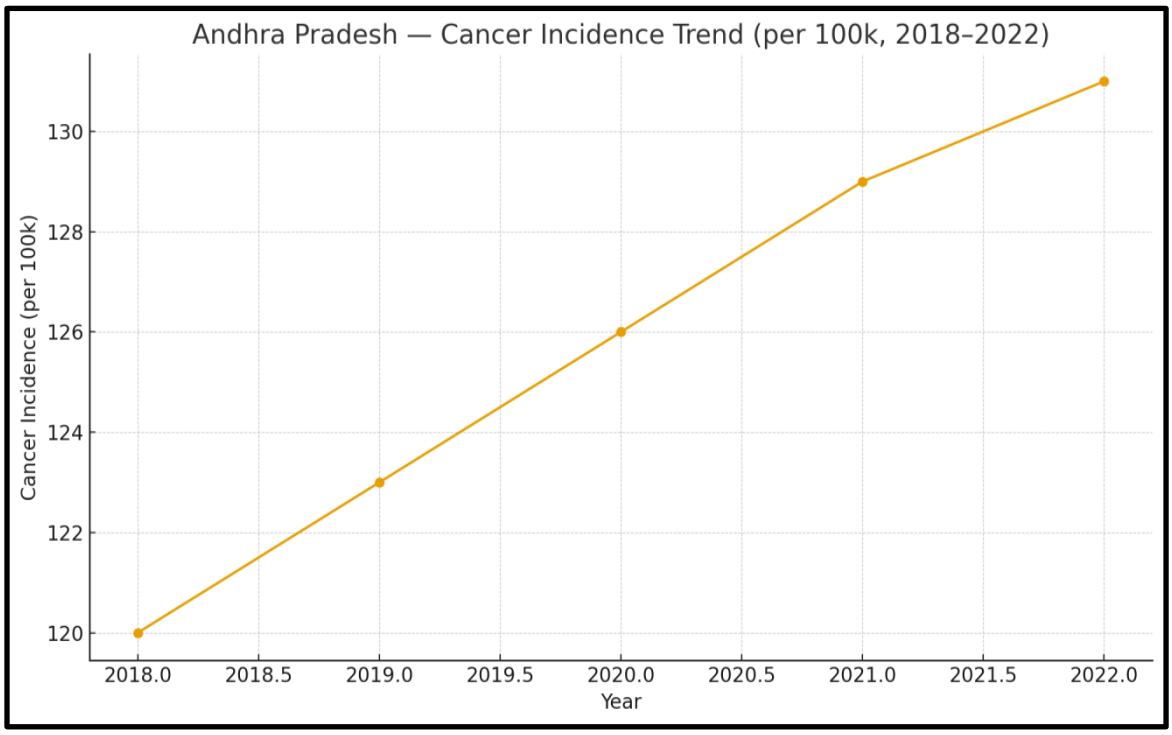

Figure 8.*Trend in cancer incidence (per 100,000) in Andhra Pradesh from 2018 to 2022.* - Cancer incidence increased from 120 to 131 per 100,000, reflecting a 9.2% growth.

Time-series plots for Andhra Pradesh indicate a sustained increase in NCDS between 2018 and 2022. The parallel movement of these indicators is consistent with the established cardiometabolic link and strengthens the case for integrated screening, early glycemic control, and cardiovascular risk reduction.

(iii)Pie Chart analysis

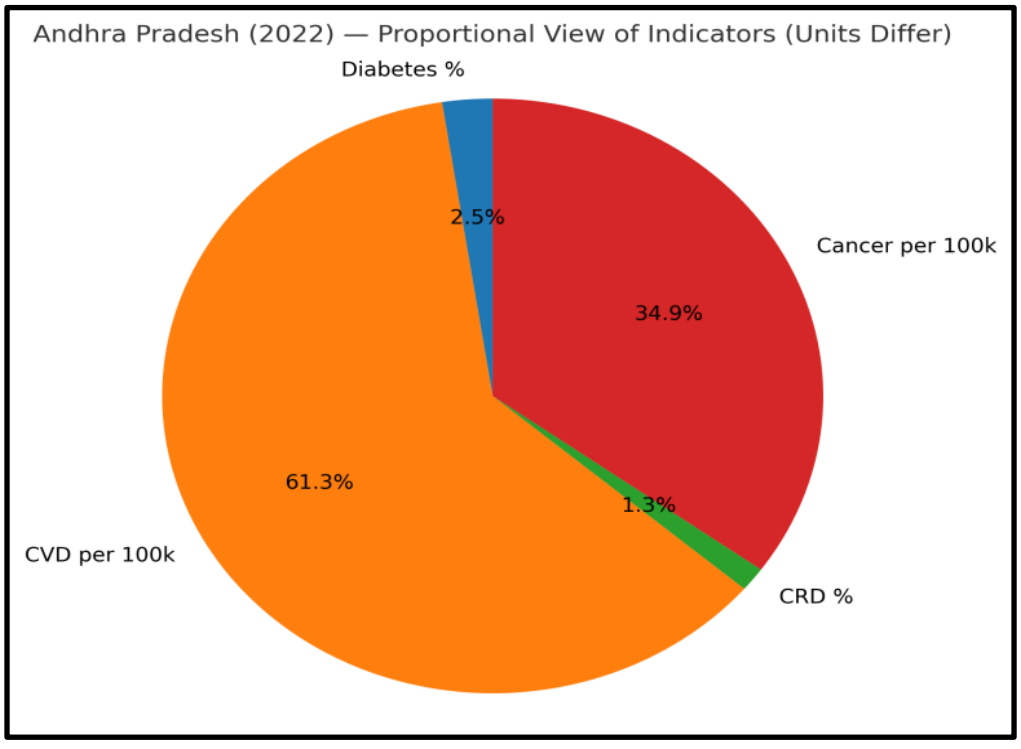

Figure 9: Proportional distribution of NCD indicators in Andhra Pradesh, 2022-Cardiovascular mortality constitutes the largest burden, followed by cancer incidence, with diabetes and CRD prevalence forming smaller proportions. Units differ across indicators; this figure serves as a communication tool for prioritization rather than direct comparison.

A pie chart summarizing the 2022 indicators show cardiovascular mortality dominating the state's NCD burden, followed by cancer incidence, with diabetes and CRDs forming smaller proportions. Although the units differ across indicators, this snapshot communicates relative priority areas for policy action. Comparative rankings across four states reveal that Andhra Pradesh's rate of increase in diabetes is among the highest, while Kerala remains consistently burdened by elevated prevalence. Tamil Nadu, by contrast, reports the sharpest rise in CVD mortality. Such comparisons are valuable for benchmarking Andhra Pradesh's progress against neighboring states.

The upward trends across all indicators demonstrate that Andhra Pradesh is on an accelerating NCD trajectory, mirroring national concerns. Stronger screening programs, integrated management of diabetes and CVD, and targeted cancer prevention strategies particularly against tobacco-related malignancies are urgently required. In addition, policy interventions must address social determinants such as diet, physical inactivity, and healthcare access to reverse these patterns. By combining state-specific insights with national frameworks such as the NPCDCS, Andhra Pradesh can move toward reducing the NCD burden and improving population health outcomes.

CONCLUSION

Non-Communicable Diseases represent a defining challenge for global health, imposing both human and economic costs. With cardiovascular disease, diabetes, cancer, and respiratory conditions driving most of the world's mortality, NCDs threaten sustainable development and social well-being. India, in particular, faces a dual challenge of infectious disease persistence alongside rising NCD prevalence. Andhra Pradesh reflects this transition, with escalating rates of diabetes, CVDs, cancers, and respiratory diseases. Meeting this challenge requires coordinated action at multiple levels. Global and national frameworks such as the WHO Global Action Plan and India's NPCDCS provide critical direction, but their success depends on effective implementation, equitable healthcare delivery, and strong primary care systems. Beyond healthcare, societal investment in preventive measures, healthier living environments, and inclusive policies will be vital to reducing the burden. Addressing NCDs is therefore not only a public health priority but also a cornerstone for broader social and economic development. NCDs awareness programs and objectives of various health schemes are being implemented in various departments including educational institutions.

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