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Clinical Burden of Non-Communicable Diseases in Low- and Middle-Income Countries

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Abstract

Non-communicable diseases (NCDs) have emerged as the leading cause of global morbidity and mortality, accounting for nearly three-quarters of all deaths worldwide. This burden is disproportionately concentrated in low- and middle-income countries (LMICs), where rapid demographic and epidemiological transitions have outpaced the capacity of health systems historically structured to address acute infectious conditions. Once viewed primarily as diseases of affluence, NCDs now dominate routine clinical practice across Africa, South Asia, Latin America, and parts of the Middle East, manifesting in high rates of premature mortality, advanced disease at presentation, and complex multimorbidity. This narrative review synthesizes contemporary global evidence on the clinical burden of NCDs in LMICs, with a focus on mortality and premature death, morbidity and disability, patterns of multimorbidity, health-system strain, and household-level socioeconomic consequences. Beyond population-level prevalence, the review highlights the lived clinical realities faced by patients and providers, including delayed diagnosis, preventable complications, treatment interruptions, and limited continuity of care. We examine the epidemiological transition driving NCD expansion, disease-specific clinical impacts across major NCD categories, shared behavioral and environmental risk factors, persistent gaps in diagnosis and treatment, and feasible system-level responses grounded in real-world LMIC contexts. The review argues that the current NCD burden represents not only a public health challenge but a sustained clinical crisis that threatens health-system sustainability, economic productivity, and social stability in LMICs. Addressing this challenge requires a fundamental shift from fragmented, episodic care toward integrated, longitudinal models centered on strong primary health care, equitable access to essential medicines, and effective population-level prevention strategies.

Keywords: Non-communicable diseases; Low- and middle-income countries; Clinical burden; Premature mortality; Multimorbidity; Health systems; Primary health care; Global health

1. Introduction

Non-communicable diseases, primarily cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes, now account for nearly three-quarters of global deaths [1]. This epidemiological reality marks a profound shift from the infectious-disease dominance that characterized global mortality patterns throughout much of the twentieth century [2]. While NCDs affect all regions, their clinical

consequences are most severe in low- and middle-income countries, where health systems face long-standing structural, financial, and workforce constraints [3]. Approximately, 73 percent of all NCD deaths occur in LMICs, and more than 80 percent of premature NCD deaths, defined as deaths occurring before the age of 70 years, are concentrated in these settings [4]. These figures challenge outdated narratives that frame NCDs as diseases of wealth or aging populations alone. Instead, they reflect a convergence of demographic change, urbanization, economic globalization, and persistent health-system inequities.

The NCD epidemic in LMICs is not simply a story of increasing prevalence. It is defined by greater disease severity at presentation, higher rates of complications, earlier onset, complex multimorbidity, and limited continuity of care [5]. Patients frequently present late in the disease course, often after years of undiagnosed hypertension, uncontrolled diabetes, or progressive respiratory disease [6]. Screening programs are limited, routine monitoring is inconsistent, and access to essential diagnostics and medicines remains uneven. These realities transform conditions that are manageable in well-resourced settings into life-threatening clinical emergencies. A patient with undiagnosed hypertension presents with stroke; untreated diabetes culminates in renal failure or limb amputation; delayed cancer diagnosis leaves palliative care as the only option [7, 8]. In this context, NCDs are not only chronic diseases but drivers of acute clinical crises that overwhelm already stretched health systems.

2. Epidemiological Transition and the Rise of NCDs in LMICs

2.1 From infectious dominance to chronic complexity

Many LMICs are undergoing a protracted and incomplete epidemiological transition, in which infectious diseases, maternal and child mortality, and undernutrition persist alongside rapidly rising NCDs [9]. Unlike high-income countries, where this transition unfolded gradually over several decades, LMICs experience a compressed transition occurring within one or two generations. This compression produces unique clinical challenges [10]. Health systems historically structured around episodic, acute care now face sustained demand for long-term disease management. Clinics designed to treat malaria or diarrheal disease must also manage lifelong hypertension, diabetes, asthma, and cancer survivorship. This shift requires regular follow-up, medication titration, laboratory monitoring, patient education, and multidisciplinary coordination, capacities that are often underdeveloped. The coexistence of infectious diseases and NCDs further complicates care. Tuberculosis, HIV, and hepatitis intersect clinically with diabetes, cardiovascular disease, and chronic lung disease, creating bidirectional risk relationships and complex treatment interactions [11]. For example, diabetes increases tuberculosis risk and worsens treatment outcomes, while HIV and antiretroviral therapy contribute to metabolic disorders and cardiovascular risk [12]. These interactions increase clinical complexity and demand integrated care models that remain scarce in many LMICs.

2.2 Urbanization, globalization, and lifestyle shifts

Rapid urbanization has transformed patterns of exposure across LMICs. Rural-to-urban migration alters diets, physical activity, social networks, and environmental conditions. Traditional diets rich in whole grains and vegetables are increasingly replaced by ultra-processed foods high in salt, sugar, and

unhealthy fats [13]. Physical activity declines as manual labor is replaced by sedentary work and motorized transport [14]. At the same time, tobacco use and harmful alcohol consumption have expanded through aggressive marketing and weak regulatory environments [15]. Air pollution, both household and ambient, remains a major driver of chronic respiratory and cardiovascular disease, particularly in settings reliant on biomass fuels for cooking and heating [16]. Crucially, these exposures occur earlier in life in LMIC populations. Children and young adults accumulate NCD risk over longer periods, leading to earlier disease onset and extended disease duration [17]. Clinically, this results in prolonged treatment needs, earlier complications, and greater cumulative strain on individuals, families, and health systems.

3. Magnitude of the Clinical Burden

3.1 Mortality and premature death

Cardiovascular diseases accounted for the largest share, with roughly 19–20 million deaths, followed by cancers at approximately 10 million deaths, chronic respiratory diseases at around 4 million deaths, and diabetes and diabetes-related kidney disease contributing substantially to overall mortality [18]. Premature mortality is a defining feature of the NCD burden in LMICs. An estimated 18 million NCD deaths occur before the age of 70 each year, with LMICs accounting for approximately 82 percent of these deaths [19]. From a clinical standpoint, premature death reflects cumulative failures across the care continuum, including delayed diagnosis, inconsistent treatment, poor risk-factor control, and inadequate follow-up. Premature NCD mortality has consequences beyond individual loss [19, 20]. It removes adults from the workforce during peak productive years, destabilizes households, and increases dependency ratios. Clinicians frequently encounter families managing advanced disease alongside financial insecurity, amplifying barriers to sustained care.

4. Disease-Specific Clinical Burden

4.1 Cardiovascular diseases

Cardiovascular diseases represent the largest component of the NCD burden in LMICs. Hypertension prevalence is high across regions, yet awareness, treatment, and control rates remain strikingly low [21]. Many individuals live for years with undiagnosed or untreated high blood pressure [22]. Clinically, the first point of contact with the health system is often a catastrophic event such as stroke, myocardial infarction, or heart failure [23]. These events carry high mortality and leave survivors with long-term disability requiring rehabilitation services that are frequently unavailable or unaffordable. The downstream effects include prolonged hospital stays, loss of independence, and increased caregiver burden [24]. In many LMIC settings, families absorb the cost of rehabilitation and long-term care, further entrenching poverty.

4.2 Diabetes and metabolic disorders

Type 2 diabetes is rising rapidly in LMICs, driven by urbanization, dietary change, and physical inactivity [25]. Unlike high-income settings, diabetes in LMICs often affects younger adults, including those in their 30s and 40s [26]. Poor glycemic control is common due to limited access to insulin, glucose

monitoring, and structured diabetes education [27]. As a result, complications such as diabetic nephropathy, retinopathy, neuropathy, and lower-limb amputations occur frequently and at earlier ages. These complications generate substantial clinical and economic costs and contribute to long-term disability.

4.3 Cancers

Cancer outcomes in LMICs are characterized by late-stage presentation, inadequate diagnostic infrastructure, and limited access to treatment [28]. Pathology services are often centralized, under-resourced, or absent, leading to diagnostic delays or uncertainty. Radiotherapy and chemotherapy services are unevenly distributed, with many countries having only a few functional centers [28]. Consequently, survival rates for common cancers remain substantially lower than in high-income countries, even for cancers that are highly treatable when detected early [29].

4.4 Chronic respiratory diseases

Chronic obstructive pulmonary disease and asthma remain major causes of morbidity and mortality in LMICs [30]. Indoor biomass fuel exposure, occupational hazards, and ambient air pollution contribute to disease development and progression [31]. Clinically, patients experience recurrent increases, frequent hospital admissions, and progressive functional decline. Limited access to inhaled medications and pulmonary rehabilitation worsens outcomes and increases the likelihood of premature death [32].

5. Multimorbidity and Clinical Complexity

Multimorbidity is increasingly common in LMIC clinical settings, reflecting both aging populations and shared risk factors [33]. Patients frequently present with combinations of hypertension, diabetes, chronic kidney disease, and cardiovascular complications. Managing multimorbidity requires coordinated, patient-centered care that remains largely unavailable [34]. Fragmented services lead to multiple clinic visits, inconsistent advice, and polypharmacy without adequate monitoring [35]. These factors reduce adherence and increase the risk of adverse outcomes.

6. Health-System Strain and Service Delivery Gaps

6.1 Workforce and infrastructure constraints

LMICs face chronic shortages of physicians, nurses, and allied health professionals trained in long-term NCD management [36]. Primary care providers often lack the time, tools, and training needed to deliver continuous care [37]. Diagnostic capacity is limited, particularly for imaging, laboratory monitoring, and pathology [38]. These gaps delay diagnosis, hinder treatment monitoring, and increase reliance on clinical judgment alone.

6.2 Access to essential medicines

Persistent gaps in the availability and affordability of essential NCD medicines, including antihypertensives, insulin, oral hypoglycemics, and inhaled corticosteroids [38, 40]. Stock-outs and high out-of-pocket costs disrupt treatment continuity and precipitate clinical deterioration.

7. Socioeconomic and Household-Level Clinical Impact

NCDs impose substantial financial burdens on households in LMICs [41]. Long-term treatment costs, transport expenses, and income loss due to disability or caregiving responsibilities frequently result in catastrophic health expenditures [42, 43]. These economic pressures undermine adherence to treatment, delay care-seeking, and accelerate disease progression [44]. Clinicians often encounter patients forced to choose between medication and basic necessities, illustrating how socioeconomic conditions directly shape clinical outcomes [45].

Conclusion

Despite growing recognition of the NCD crisis, substantial gaps remain. These include limited longitudinal care models adapted to LMIC contexts, inadequate guidance for multimorbidity management, and insufficient implementation research linking policy commitments to clinical practice. Future research must prioritize context-specific solutions that align with existing health-system structures and community realities. The clinical burden of non-communicable diseases in LMICs represents one of the most pressing health challenges of the twenty-first century. High premature mortality, advanced disease at presentation, and pervasive multimorbidity reflect systemic failures rather than inevitable outcomes. Evidence clearly demonstrates that strengthening primary care, ensuring access to essential medicines, and integrating prevention with long-term management can substantially reduce avoidable suffering and death. Addressing NCDs in LMICs is not only a public health imperative but a clinical necessity for global health equity.

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