Transforming Child Health Through Hypertension Education

A Call to Action

By

Teisovinuo Semou

Transforming Child Health Through Hypertension Education: A Call to Action

by Teisovinuo Semou

2026

Ethics International Press, UK

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

ISBN (Hardback): 978-1-83711-445-0

ISBN (Ebook): 978-1-83711-446-7

Dedication

To my beloved Mom and Dad,

Everything I am, and everything I will ever become, finds its beginning in your love.
You taught me to walk with faith, to work with honesty, and to dream without fear.
Your sacrifices became the silent foundation on which every milestone of my life was built.
In your strength, I learned resilience; in your kindness, I found purpose.
Every page of this book carries a reflection of your wisdom, your prayers, and your endless belief in me.

This work is — and will always be — for you.

Teisovinuo Semou

Table of Contents

List of Tables

List of Figures

Preface

The journey of this book began with a simple, yet profound question: *Can knowledge truly shape behaviour, and can education serve as a lasting preventive tool against lifestyle diseases?* Over the years, this question has grown increasingly urgent as the world continues to face the rising tide of non-communicable diseases—conditions that are largely preventable, yet steadily advancing even among the younger population. Among them, hypertension stands out not only for its prevalence but also for its silent and insidious nature. What was once considered a condition of adulthood has begun to surface in childhood and adolescence, demanding our immediate attention and action.

This book is an outcome of a sustained academic inquiry into how structured, scientifically informed, and developmentally appropriate health education can influence young minds. It draws from my doctoral research, which examined the effect of a hypertension education intervention on school children and explored how psychosocial and cognitive factors contribute to sustaining knowledge and translating it into healthy lifestyle practices. The findings, while grounded in rigorous empirical analysis, also tell a deeply human story — one of curiosity, understanding, and change. They reveal that when children are provided with meaningful, engaging learning experiences, they not only remember what they learn but also begin to live it.

The motivation to pursue this line of work stemmed from a conviction that preventive health education must start early, well before unhealthy habits and misconceptions take root. Adolescence is a unique developmental stage — a time of rapid growth, heightened

awareness, and the formation of personal values. Interventions during this period can leave an enduring imprint on attitudes and behaviour. This book, therefore, is not merely about hypertension as a clinical condition; it is about how knowledge becomes a bridge between awareness and action, between understanding a disease and choosing a healthier life.

The research that forms the foundation of this book involved collaboration between educators, psychologists, physicians, and school administrators, all of whom shared a common belief — that schools are powerful environments for shaping lifelong habits. The intervention designed for this study was simple yet intentional. It combined scientific content with engaging visuals, realistic examples, and interactive discussion. The emphasis was not on prescribing behaviour but on enabling understanding — creating a sense of personal relevance and self-efficacy among students. The results, which demonstrated significant and sustained gains in both knowledge and lifestyle practices, affirmed that education can indeed become a form of health intervention.

While the study itself was confined to a specific age group and context, its implications extend far beyond. It underscores the need for early preventive education as a national priority, one that can reduce the future burden of chronic diseases. It also highlights the role of psychology — particularly cognitive and social learning principles — in shaping how health information is received, understood, and applied.

Writing this book has been both an academic exercise and a personal reflection. It reaffirmed my belief that knowledge, when meaningfully communicated, has the power to transform not just understanding but behaviour itself.

It is my sincere hope that this book will find relevance not only among scholars and practitioners in psychology and education but also among policymakers, health educators, and anyone committed to promoting preventive health in society. If it encourages even a few educators to view the classroom as a space for nurturing both intellect and wellbeing, and inspires young readers to take charge of their health with awareness and responsibility, then the purpose of this work will be fulfilled.

Teisovinuo Semou

Acknowledgements

First and foremost, I thank God Almighty, whose grace has been my constant guide and strength. Every phase of this journey has unfolded through His divine will. In moments of uncertainty, His presence gave me clarity; in times of difficulty, His peace sustained me. To Him belongs all the glory for making this work possible.

My deepest gratitude goes to my beloved parents, whose love and prayers have been my greatest treasures. Their quiet sacrifices, words of encouragement, and steadfast faith gave me the courage to persevere when the road grew difficult. Every achievement I make is, in truth, an extension of their dreams and blessings.

I owe my heartfelt thanks to my doctoral research guide, Prof. Meena Hariharan, for her guidance, patience, and profound insight throughout the course of this study. Her wisdom and gentle direction not only shaped the academic foundation of this work but also inspired me to pursue knowledge with sincerity and purpose.

I thank the school authorities, teachers, and students of Nagaland, whose generous participation and cooperation made this study possible. Their openness and enthusiasm breathed life into every page of this book.

I also extend my gratitude to my church family, whose prayers and encouragement have been a quiet source of strength. Their faith and kindness reminded me that God's blessings flow through people who believe and uplift one another.

I thank every person who has supported me, directly or silently. Each contribution — big or small — has been a thread in the fabric of this journey, making it one of learning, gratitude, and grace.

Teisovinuo Semou

Chapter 1

Introduction

Background

Hypertension, more commonly referred to as high blood pressure, is a condition that has gained increasing importance in recent decades because of its far-reaching implications for health and wellbeing. It is often described as a silent and insidious disorder. Unlike many illnesses that announce themselves with clear symptoms such as pain, fever, or fatigue, hypertension often progresses unnoticed. A person can live for years without being aware of its presence, even as it quietly exerts pressure on vital organs and slowly increases vulnerability to life-threatening diseases. This "silent killer" aspect makes hypertension particularly dangerous because it is frequently identified only after significant damage has occurred. By the time an individual is diagnosed, conditions such as stroke, kidney damage, or cardiovascular complications may already be present.

In simple terms, blood pressure represents the force exerted by circulating blood against the inner walls of arteries. The pressure is recorded in two numbers: the *systolic pressure*, which is the pressure when the heart contracts and pumps blood outward, and the *diastolic pressure*, which is the pressure when the heart relaxes between beats. A reading of 120/80 mmHg is typically regarded as normal. When blood pressure rises consistently above these levels, particularly readings of 130/80 mmHg or more, a diagnosis of hypertension is made (NHBPEP, 2004).

Hypertension is divided into two types. *Primary* or *essential hypertension*, which accounts for the majority of cases, develops gradually over many years and does not have a single identifiable cause. Instead, it reflects a complex interplay of heredity, lifestyle habits, and environmental exposures. The second type is *secondary hypertension*, which develops as a result of another specific condition such as kidney disease, hormonal imbalance, or the use of certain medications. While their causes differ, both share the common feature of creating serious risks for human health when left unmanaged.

The concern about hypertension does not lie only in its definition or measurement but in the fact that it serves as a critical risk factor for a host of severe health conditions. Elevated blood pressure significantly increases the likelihood of developing diseases such as coronary artery disease, stroke, heart failure, and chronic kidney disease. Hypertension is not simply one condition among many; it acts as a major gateway through which numerous non-communicable diseases emerge and worsen. As a result, it is regarded as one of the leading global contributors to premature death and disability.

The global picture of hypertension has become more alarming with each passing decade. Advances in science and medicine have brought awareness of just how many lives are affected by raised blood pressure, and how much it contributes to the global burden of disease. The World Health Organization (WHO, 2023) reports that hypertension now affects more than one billion people worldwide, with a significant proportion living in low- and middle-income countries where healthcare infrastructure is often inadequate. Many of those affected are unaware of their condition, and even fewer receive adequate treatment or achieve effective control.

This means that millions live with a condition that steadily places them at higher risk of serious health events without knowing how vulnerable they are.

The transition in lifestyles across the world has played a key role in this expansion of hypertension. Diets that were once based on natural and unprocessed foods have increasingly been replaced by diets high in fat, sugar, and salt. Sedentary work has replaced physical labor in both urban and rural communities, while recreational time is now more often spent with television, computers, or mobile devices than with outdoor activity. These changes, together with stress, smoking, and alcohol use, create the perfect background for rising blood pressure levels. Urbanization has intensified these effects, but rural populations are no longer spared. Mechanization of work and changes in food consumption patterns mean that villages and small towns are also experiencing steady rises in hypertension prevalence.

For a long time, hypertension was thought to be a problem restricted to adults. Children and adolescents were not considered at risk, and routine monitoring of their blood pressure was not a common practice. However, recent studies have challenged this assumption by showing that elevated blood pressure is being identified in younger age groups as well. This represents an important shift in understanding because the earlier in life hypertension develops, the greater the cumulative damage it can inflict over time. If a child or adolescent begins life with persistently high blood pressure, the likelihood of developing severe cardiovascular and renal complications in adulthood increases dramatically.

This realization has important consequences. It suggests that preventive strategies can no longer focus only on adults but must

begin much earlier in life. Intervening during childhood and adolescence—through awareness, education, and lifestyle modification—has the potential to reduce the burden of disease across the entire lifespan. Schools, families, and communities play crucial roles in shaping habits during these formative years. Recognizing hypertension as not only a medical issue but also a social and developmental one highlights the importance of targeting younger populations in prevention programs.

Impact of hypertension on physical health

Hypertension is not merely a condition of elevated blood pressure; it is a disorder that profoundly influences overall health and day-to-day quality of life. The higher the blood pressure, the greater the likelihood of developing complications. When left untreated, hypertension progressively undermines the functioning of vital organs and leads to conditions that are disabling and life-threatening.

One of the most critical consequences of hypertension is its strong association with cardiovascular disease. Research has long established that high blood pressure is a major risk factor for heart attacks, strokes, heart failure, and peripheral artery disease. Kannel (1995), drawing on the findings of the Framingham Heart Study, emphasized the central role hypertension plays in the development of cardiovascular disease, identifying it as a key determinant of morbidity and mortality. Persistent high pressure damages the arterial walls, causing them to thicken and lose elasticity. Over time, this damage results in the build up of fatty plaques and narrowing of arteries, processes that reduce blood flow and increase the risk of clot formation. When such clots block blood supply to the heart,

the result is a heart attack; when they block arteries in the brain, the outcome can be a stroke.

Hypertension also exerts a powerful influence on the renal system. The kidneys depend on a finely regulated system of blood vessels to perform their role of filtering waste and maintaining fluid balance. Sustained high blood pressure damages these small vessels, gradually reducing the efficiency of kidney function. He and Whelton (1997) highlighted how hypertension is both a cause and a consequence of renal dysfunction, while Reynolds et al. (2007) documented the progression from vascular damage to chronic kidney disease. As kidney function declines, waste products and fluids build up in the body, producing symptoms such as fatigue, swelling, and impaired concentration. In severe cases, the damage progresses to kidney failure, requiring dialysis or transplantation.

The eyes are another area where hypertension produces damaging effects. The retina, with its network of small and delicate blood vessels, is especially vulnerable to sustained increases in pressure. Fraser-Bell et al. (2017) observed that hypertension can damage these vessels, causing changes known as hypertensive retinopathy. This condition may manifest initially with minor disturbances in vision but can progress to serious impairment or even complete blindness if the underlying hypertension is not controlled.

Hypertension is also closely linked to changes in cognitive function. Naing and Teo (2020) reported that elevated blood pressure is associated with cognitive decline in older adults and with an increased risk of developing dementia. These changes are not always immediate but accumulate gradually, leading to impairments in memory, attention, and decision-making. The progression of such decline places an additional burden on individuals

and families and poses wider challenges for healthcare systems in aging populations.

Beyond physical complications, hypertension affects psychological wellbeing. Shah et al. (2022) demonstrated that individuals living with hypertension are at a higher risk of experiencing emotional difficulties such as anxiety and depression. The stress of living with a chronic condition, along with the physical symptoms that accompany elevated blood pressure, often exacerbates feelings of worry and low mood, creating a cycle that affects both mental and physical health.

Alongside these longer-term outcomes, hypertension can produce immediate symptoms that interfere with daily life. The World Health Organization (2023) highlighted that common symptoms include headaches, dizziness, and shortness of breath. These symptoms, while sometimes dismissed as minor, can disrupt work, limit participation in social activities, and reduce overall capacity to carry out routine tasks.

Hypertension prevalence

Hypertension has emerged as one of the most widespread health conditions of modern times, with prevalence rates rising steadily across nations and populations. The World Health Organization (WHO, 2023) has emphasized that hypertension represents a major global public health concern, affecting an estimated 1.28 billion adults aged between 30 and 79 years. This figure is striking not only for its size but also for the hidden reality it conceals: nearly half of these individuals remain unaware that they are hypertensive, and the majority—approximately two-thirds—reside in low- and middle-income countries. These are regions where healthcare

infrastructure is often insufficient, and resources for screening, prevention, and management of chronic conditions are limited. The disparity between the high global burden of hypertension and the lack of adequate healthcare resources highlights the scale of the challenge facing both local health systems and international health organizations.

The growth of hypertension prevalence over time demonstrates a deeply concerning trend. According to Forouzanfar et al. (2017), the global prevalence of hypertension rose from 17.3% in 1990 to 20.5% in 2015. This increase of 3.2% may appear modest at first glance, but when applied to the global population, it represents millions of additional individuals now at risk of cardiovascular and related diseases. The upward trajectory underscores that hypertension is not only persistent but also expanding, despite decades of medical knowledge about its prevention and control.

Large-scale epidemiological studies have helped to shed light on global blood pressure trends and the differences across regions. Zhou et al. (2017), analyzing data from 19.1 million participants, reported that in 2015, the average age-standardized systolic blood pressure for men worldwide was 127.0 mmHg, while women had a slightly lower mean of 122.3 mmHg. For diastolic pressure, the figures were similarly gendered, with men averaging 78.7 mmHg and women 76.7 mmHg. These numbers conceal striking differences across regions. Populations in sub-Saharan Africa, Central and Eastern Europe, and South Asia displayed higher mean systolic and diastolic pressures compared to individuals in high-income Western and Asia-Pacific regions.

The trends over time also reveal important insights. Between 1975 and 2015, the estimated global mean age-standardized systolic

blood pressure for men remained relatively stable, from 126.6 mmHg to 127.0 mmHg. Women, on the other hand, showed a slight decrease, from 123.9 mmHg in 1975 to 122.3 mmHg in 2015. For diastolic pressure, men again showed only minor changes, while women displayed small decreases. These global averages, however, mask significant regional variation. Zhou et al. (2017) found that while high-income countries experienced substantial decreases in both systolic and diastolic blood pressure during this period, low- and middle-income countries saw marked increases. This divergence demonstrates how socioeconomic factors and healthcare resources play critical roles in shaping population-level outcomes.

Regional and economic differences are also evident when examining urban–rural variations in hypertension prevalence. Chow et al. (2013) investigated the relationship between place of residence and prevalence rates across countries with different income levels. Their findings revealed a striking pattern: in high- and middle-income nations, hypertension was more common among rural populations than urban ones, while in low-income countries, the reverse was true, with urban residents showing higher prevalence rates. This variation suggests that local context, including economic standing, healthcare access, and lifestyle differences, plays a decisive role in shaping hypertension risk.

Beyond regional differences, the role of modifiable risk factors is crucial in explaining global prevalence patterns. Mills et al. (2020) highlighted several key risk factors that are strongly linked to hypertension: high sodium intake, insufficient potassium intake, obesity, excessive alcohol consumption, low levels of physical activity, and unhealthy dietary patterns. These risk factors often cluster together and exacerbate one another. For example, physical inactivity can contribute to weight gain and obesity, both of which

increase the risk of developing hypertension. Similarly, a diet high in sodium but low in potassium not only elevates blood pressure but also contributes to obesity, compounding the risk.

The global spread of hypertension is thus closely tied to lifestyle and dietary transitions. In many parts of the world, traditional diets rich in vegetables, whole grains, and low in processed foods are being replaced by calorie-dense diets dominated by processed, packaged, and fast foods. Urbanization has accelerated these dietary shifts while simultaneously reducing opportunities for physical activity. The consequence is an environment in which hypertension becomes increasingly common, particularly among populations least equipped with resources for prevention and treatment.

Understanding the interplay between risk factors and regional prevalence is vital for designing effective interventions. For example, in regions where sodium intake is disproportionately high, public health strategies focusing on dietary salt reduction could significantly lower hypertension rates. Where obesity is a major driver, interventions promoting physical activity and healthier eating habits may be more effective. Yet, as Mills et al. (2020) emphasized, addressing one factor in isolation is unlikely to produce sufficient results. Because risk factors are interrelated, strategies must take a comprehensive approach, tackling multiple aspects of diet, lifestyle, and healthcare simultaneously.

The global data make one point abundantly clear: hypertension is not confined to a particular region, culture, or economic class. It affects populations across the world, though in differing degrees and patterns. The rising prevalence, particularly in low- and middle-income countries, points to the urgent need for

accessible and sustainable prevention and management strategies. Without such measures, the burden of hypertension is expected to continue climbing, placing millions more at risk of life-threatening complications.

Hypertension prevalence in India

India, with its vast and diverse population, carries one of the world's heaviest burdens of hypertension. Current estimates suggest that nearly 220 million Indians are living with the condition, reflecting the scale of the problem and its implications for public health. Hypertension is now recognized not only as a significant medical issue but also as a major developmental and social concern, as it undermines the wellbeing and productivity of millions of individuals across the country.

Anchala et al. (2014), through a systematic review and meta-analysis, provided one of the most comprehensive assessments of hypertension prevalence in India. Their findings revealed that 29.8% of Indians aged 18 years and older were hypertensive, a figure that highlights the scale of the challenge. More concerning, however, was the variation between urban and rural populations. Prevalence was reported as 33.8% in urban areas and 27.6% in rural areas. While the urban–rural divide may partly be explained by differences in lifestyle, diet, and levels of physical activity, the narrowing gap suggests that hypertension is no longer confined to cities. Rural communities, once thought to be less vulnerable, are now showing substantial prevalence rates as well.

The study also revealed stark differences in awareness, treatment, and control of hypertension between rural and urban residents. Among rural Indians with hypertension, only about 25% were

aware of their condition, and an equally small proportion were receiving treatment. In contrast, the figures were somewhat higher in urban populations, with 42% aware and 37.6% receiving treatment. These numbers, though slightly better in cities, still represent a troubling reality: the majority of Indians living with hypertension remain undiagnosed or untreated.

Even among those who receive treatment, control rates are extremely low. Anchala et al. (2014) found that only one in ten rural patients and one in five urban patients achieved effective blood pressure control. These figures underline a major weakness in the health system's ability to manage chronic conditions. They also demonstrate the urgent need for more consistent screening programs, better access to affordable medication, and greater public awareness of the importance of blood pressure management.

Gender differences in prevalence further complicate the picture. Geldsetzer et al. (2018) reported that 27.4% of men in India live with hypertension compared to 20% of women. Several factors may contribute to this difference, including lifestyle behaviors such as tobacco and alcohol consumption, occupational stress, and lower health-seeking behavior among men. At the same time, women—particularly in rural areas—may face barriers to detection and treatment, as healthcare systems often prioritize maternal and child health over non-communicable diseases in women.

Taken together, these findings paint a picture of a nation grappling with a growing epidemic of hypertension. The prevalence is high in both urban and rural regions, but the real concern lies in the low rates of awareness, treatment, and control. The data make it clear that medical interventions alone are insufficient. What is urgently required is a comprehensive approach—one that combines wide-

spread screening with targeted awareness campaigns, improved healthcare access in rural areas, and culturally appropriate interventions to change dietary and lifestyle behaviors. Unless these steps are taken, the burden of hypertension in India will continue to rise, with severe implications for public health, healthcare systems, and economic productivity.

Hypertension prevalence in children and adolescents

Over the past few decades, the recognition of hypertension as a condition that can manifest in childhood and adolescence has grown considerably. Traditionally considered a health concern of adulthood, hypertension is now being detected among younger populations with increasing frequency. This shift has raised concerns among researchers and health professionals, as it implies that the burden of cardiovascular and related diseases may begin accumulating much earlier in the life course than previously thought.

Song et al. (2019) conducted a pooled analysis that remains one of the most significant contributions to understanding childhood hypertension at a global level. Their findings revealed that the global prevalence of hypertension in children is approximately 4%, with the data showing a steady increase between 1994 and 2018. This upward trajectory indicates that what was once thought to be a rare condition in younger populations is steadily becoming more common, reflecting broader changes in diet, physical activity, and patterns of childhood development across the world.

The study by Song et al. (2019) also highlighted how prevalence rates vary across different age groups. Among six-year-olds, the prevalence was 4.32%, while among nineteen-year-olds it was slightly lower at 3.28%. Interestingly, the highest recorded prev-

alence occurred among fourteen-year-olds, with 7.89% in 2015. This peak coincides with early adolescence, a period marked by rapid physical growth, hormonal changes, and shifts in lifestyle and behavior. The evidence suggests that puberty may play a role in modulating blood pressure levels, particularly when combined with modern lifestyle factors such as sedentary behavior and consumption of calorie-dense foods.

Another crucial finding from the same study is the association between overweight, obesity, and hypertension. Children who were overweight or obese were found to have significantly higher rates of hypertension compared to those within normal weight ranges. This strong link underscores the importance of lifestyle interventions that focus on healthy diet and adequate physical activity. Without corrective measures, the global rise in childhood obesity will continue to fuel the parallel increase in childhood hypertension. Song et al. (2019) also reported that pre-hypertension prevalence was 9.7%, meaning that nearly one in ten children and adolescents were already at risk of progressing to full hypertension if preventive actions were not implemented.

The issue is particularly concerning in the Indian context, where the rising prevalence of hypertension in younger populations has been documented with increasing clarity. Meena et al. (2021) carried out a study of children aged 4 to 19 years and reported a pooled prevalence of 7% for hypertension, 4% for sustained hypertension, and 10% for pre-hypertension. These figures are higher than the global average in several respects and point toward a rapidly growing public health problem in India. The researchers also noted that the prevalence of hypertension among children in India has been steadily increasing since 2005, with urban children displaying higher rates than rural children. Urbanization, with its

accompanying changes in lifestyle and dietary patterns, is likely a major contributor to these findings.

The same study highlighted the powerful role of obesity as a risk factor in India. Obese children were found to have a prevalence of 29%, compared to just 7% among children of normal weight. This stark contrast illustrates the magnitude of the problem and reinforces the argument that childhood obesity and hypertension are deeply intertwined health issues. Additionally, Meena et al. (2021) reported that the prevalence of pre-hypertension among Indian children was 10%, slightly above the global average. This finding suggests that without immediate preventive interventions, a significant proportion of India's younger population is at risk of transitioning to hypertension in the near future.

Supporting this concern, Patel et al. (2019) conducted a large-scale study involving 11,312 Indian children aged between 5 and 15 years. The study revealed that 6.9% of boys and 6.5% of girls had pre-hypertension, while 6.8% of boys and 7.0% of girls had hypertension. The relatively balanced prevalence between boys and girls suggests that both sexes are equally vulnerable, with environmental and lifestyle factors playing a more decisive role than biological differences. These results underscore the widespread nature of the problem and provide further evidence that hypertension in children is not limited to specific subgroups but is a growing concern across the population.

One of the most troubling aspects of hypertension in children is its long-term impact on health. Elevated blood pressure during childhood is closely associated with structural and functional changes in blood vessels and organs. Vasilevska-Ristovska et al. (2018) reported that hypertensive children often exhibit micro-al-

buminuria, an early indicator of kidney disease. This finding reflects damage to the glomeruli and endothelial dysfunction, both of which signal the onset of processes that can eventually lead to chronic kidney disease. The presence of such markers in childhood suggests that hypertension is not merely an early warning sign of future health problems but a condition that begins damaging organs from an early age.

Hypertension during childhood has also been linked to cognitive impairments (Cha et al., 2012). Elevated blood pressure has been shown to affect areas such as attention, memory, and executive functioning. These deficits can have immediate consequences for academic performance, social interaction, and emotional development. Unlike some other conditions that manifest only in later years, hypertension in childhood therefore represents both an immediate and long-term threat to wellbeing.

The broader global demographic context further amplifies these concerns. The World Health Organization (WHO, 2019; n.d.) has reported that there are currently 1.2 billion adolescents worldwide, representing nearly one-sixth of the total global population. This number is expected to rise steadily through 2050, with the largest increases projected in low- and middle-income countries. As the adolescent population grows, so too will the absolute number of children and teenagers living with hypertension. This demographic shift ensures that the condition will not only continue to be a pressing issue but will likely expand its impact on healthcare systems, economies, and societies at large.

Impact of hypertension and future projection

Global and national burden of hypertension: Past, present, and future

Hypertension has emerged as one of the most pressing health challenges of modern times. Once regarded mainly as a condition of middle or older age, it has now become a truly global epidemic. The figures presented by the World Health Organization (WHO, 2023) illustrate the seriousness of the situation: between 1975 and 2015, the number of individuals living with elevated blood pressure doubled, rising from an estimated 594 million in 1975 to 1.13 billion in 2015. This increase is not simply a matter of numbers—it represents millions of individuals, families, and communities facing the long-term consequences of chronic illness, reduced productivity, and premature death.

A striking feature of this expansion is its uneven global distribution. A large majority of those affected live in low- and middle-income countries (LMICs), where healthcare infrastructure is fragile and resources for prevention and treatment are limited (WHO, 2023). These countries are often burdened with what is called the "double load" of disease: on one hand, infectious conditions such as malaria and tuberculosis remain pressing; on the other, non-communicable diseases like hypertension are rising rapidly. The result is overstretched systems in which hypertension is frequently undiagnosed, untreated, and uncontrolled. Preventive services such as regular blood pressure monitoring are rare, treatment programs often lack consistency, and awareness among the general public remains low.

The demographic transition across the world further explains the growing burden. As advances in healthcare, sanitation, and nutrition have extended life expectancy, populations are increasingly living long enough to develop chronic illnesses. Age is one of the strongest risk factors for hypertension, and the growth of the elderly population ensures a steady rise in prevalence. But longevity is only part of the explanation. Urbanization has reshaped lifestyles across the globe. Traditional diets, often rich in fresh produce and low in processed sodium, have been replaced by mass-produced, salt-heavy, calorie-dense foods. At the same time, the shift from manual labor to sedentary jobs, combined with reliance on motorized transport, has reduced daily physical activity. Economic and social pressures in urban life have also contributed to rising levels of stress, another factor influencing blood pressure. These structural transformations provide fertile ground for the continued rise of hypertension prevalence worldwide.

The Global Burden of Disease (GBD) study highlights the magnitude of this crisis. According to the GBD 2016 Risk Factors Collaborators (2017), high systolic blood pressure is now the foremost global risk factor, contributing to more deaths and disability than any other single factor. In 2017, hypertension was responsible for 10.2 million deaths and 208 million disability-adjusted life years (DALYs). This accounted for 8.61% of total DALYs worldwide, surpassing other leading risk factors such as smoking and obesity. Among the consequences of hypertension, stroke and ischemic heart disease stand out, together responsible for more than half of all DALYs. Stroke contributed 56.5%, while ischemic heart disease contributed 55.5% of the hypertension-related DALYs (GBD 2016 Risk Factors Collaborators, 2017). These outcomes represent not

just numbers but catastrophic life events that reduce independence, increase disability, and devastate families.

What makes hypertension particularly dangerous is its "silent" nature. For many individuals, it progresses without noticeable symptoms until the damage becomes severe. People may feel healthy yet live for years with dangerously elevated blood pressure. By the time complications arise—such as heart attack, kidney failure, or blindness—irreversible damage is often already done. This silent course explains why hypertension is often termed the "silent killer."

Progress has been made in some regions. High-income countries, supported by stronger healthcare systems, have developed widespread screening and awareness programs, ensuring earlier detection and better management. Antihypertensive medications are more readily available, and follow-up is consistent. Yet low-and-middle income countries (LMICs) face enduring struggles. Here, structural limitations—including inadequate infrastructure, limited availability of essential drugs, and high costs—make diagnosis and treatment irregular (WHO, 2023). As a result, hypertension outcomes are far worse in these settings.

India provides a striking illustration of this dual burden. The country's vast population, diversity, and socioeconomic disparities make it particularly vulnerable. Between 1969 and 2011, the prevalence of hypertension in India was reported to vary widely: 13.9% to 46.3% in urban areas and 4.5% to 58.8% in rural areas (Devi et al., 2013). Such wide ranges reflect regional differences in diet, activity, and healthcare access. Yet despite these disparities, the overall direction is unmistakable: hypertension is becoming more common in every part of the country.