

# Is it about time to establish economics of hypertension?

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February 27, 2025

## Abstract

There are more and more individuals with hypertension in the globe. How to manage and self-manage hypertension with better cost-effectiveness needs economic principles and theories. Herein, in this article, the author suggests to develop a new discipline on economics and hypertension. The author briefly introduces the current status of hypertension in both China and the globe. Since lifestyle links to economics and hypertension, the author proposes that it's about time to establish the "economics of hypertension" because it contributes to better management and self-management of hypertension not only in China but also in the globe. In fact, many clinical studies and trials have already confirmed the benefits of economic knowledge on management and self-management of hypertension. When people understand and know about related economic principles and theories, they will get more benefits from Economics of Hypertension and better protection of blood pressure with cost-effectiveness. All in all, it's about time to establish the Economics of Hypertension, since it contributes to better management and self-management of hypertension with better cost-effectiveness. Just like Health in All Policies and Health in All Laws, Health in All Economics should be a novel consensus in the new era, particularly the COVID-19 pandemic and post-COVID-19 era.

## Review

Is it about time to establish economics of hypertension?

Running title: Economics of Hypertension

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Word count: 1,912 (Main text) + 200 (Abstract)

References: 51

Table: 1

Figures: 3

Total pages: 15

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## ABSTRACT

There are more and more individuals with hypertension in the globe. How to manage and self-manage hypertension with better cost-effectiveness needs economic principles and theories. Herein, in this article, the author suggests to develop a new discipline on economics and hypertension. The author briefly introduces the current status of hypertension in both China and the globe. Since lifestyle links to economics and hypertension, the author proposes that it's about time to establish the "economics of hypertension" because it contributes to better management and self-management of hypertension not only in China but also in the globe. In fact, many clinical studies and trials have already confirmed the benefits of economic knowledge on management and self-management of hypertension. When people understand and know about related economic principles and theories, they will get more benefits from *Economics of Hypertension* and better protection of blood pressure with cost-effectiveness. All in all, it's about time to establish the *Economics of Hypertension*, since it contributes to better management and self-management of hypertension with better cost-effectiveness. Just like *Health in All Policies* and *Health in All Laws*, *Health in All Economics* should be a novel consensus in the new era, particularly the COVID-19 pandemic and post-COVID-19 era.

### Keywords:

Cardiovascular disease

COVID-19

Economics of Hypertension

Health in All Economics

Hypertension

### Introduction

As is well known, blood pressure (BP) is one of the vital life signs in humans. Maintaining normal and stable BP is the foundation for maintaining health. Currently, hypertension is still one of major non-communicable diseases (mNCDs) and a huge challenge and burden of public health in the globe. As a common condition in cardiovascular system and a leading cause of mortality and morbidity, it seriously endangers human health due to major adverse cardio-cerebrovascular events including acute myocardial infarction, chronic heart failure, arrhythmia, and stroke. Herein, effective management and self-management of hypertension are a crucial topic and need good knowledge of economics for better cost-effective treatment.

### Current status of hypertension in both China and the globe

In China, there are hundreds of millions of hypertensive cases [1], which is a huge public health burden and challenge, and cost every year a large amount of public health and medical resources. At present, the "three rates" (awareness, treatment, and control rates) of hypertension in China are not high enough [2], and hypertension is still the leading cause of mortality and disability among Chinese residents. Although there are a large number of medical staffs, experts, scholars and researchers working tirelessly on the front line, there is still a long way to go for prevention and control of hypertension in China and the globe (Table 1).

**Table 1** Key data of hypertension in adults in both China (aged [?]18 years) and the globe (aged 30–79 years)

Total Cases Aware Diagnosed & Treated Under Control

(or prevalence)

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Globe 1.28 billion 54% 42% 21%

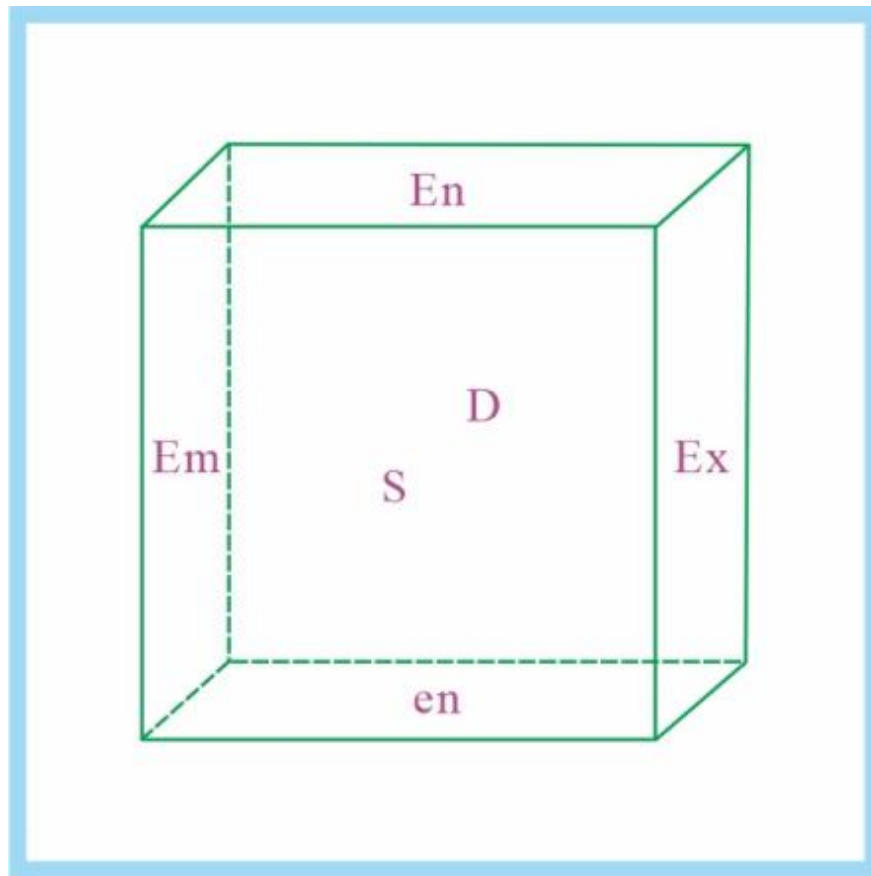
China 27.5% (2018) 51.6% (2015) 45.8% (2015) 16.8% (2015)

Source in the globe: <https://www.who.int/news-room/fact-sheets/detail/hypertension> (16 March 2023).  
Source in China: Hu S. *J Geriatr Cardiol* 2023;20:399-430.

Building a healthy China and achieving common prosperity are important missions in the new era. China has formulated the outline of “the Healthy China 2030 Plan”. Currently, the prevention and control of mNCDs is an important and arduous task. Hypertension is a common “silent killer”, results from both genetic factors and lifestyle, and the latter closely links to the “Health Essential (HE) 5” including “environment-sleep-emotion-exercise-diet” intervention [3]. For example, this new type of hypertension was referred as to “type C hypertension (CtH)” [4]. Therefore, management and/or self-management of hypertension in clinical should not only rely on drugs, surgery and other treatments, but also improve the unhealthy lifestyle and control the “HE 5” related risk factors at source, since prevention is better than treatment, and early prevention is the best cure.

### Lifestyle links to economics and hypertension

Economic activities can affect human survival, production, and way of life. Lifestyle is highly associated with blood pressure. Thus, there is an inherent connection between economics and management of hypertension for a long time. In the 21st century, there are a series of internal and external factors that are harmful to human health, including BP, for example, survival competition, clash of development, work pressure or over burden, environmental pollution, e-noise [5], staying up late for working or studying, anxiety and depression, sedentary behaviour or physical inactivity, heavy smoking and drinking, excessive nutrition and obesity, or unbalancing diet. These “HE 5” related risk factors (Figure 1) highly link to outcomes of cardiovascular health and major adverse events.



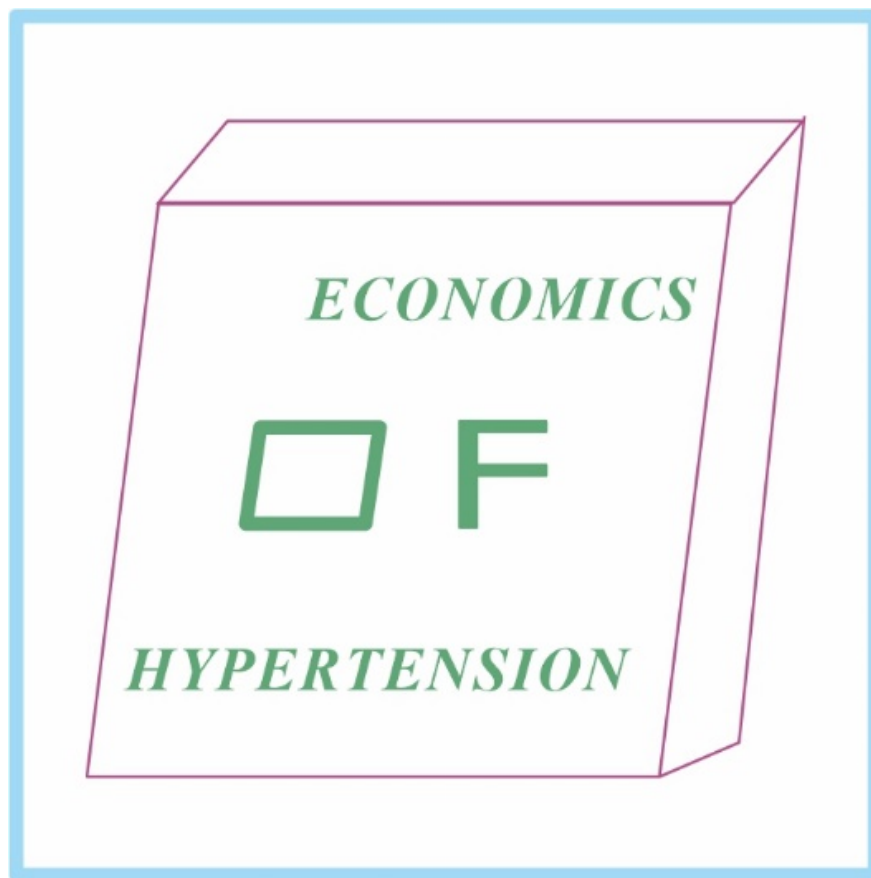
**Figure 1** Here are the “health essential (HE) 5”. The magic “polypill” consisting of healthy core elements “Environment-Sleep-Emotion-Exercise-Diet” interventions [E(e)SEEDi] lifestyle is like a hexahedral magic cube. The scientific and dreamy combination of these “HE 5” can make people healthier and live longer. Cheer up for health and make it smooth, please practice the healthy “E(e)SEEDi” lifestyle. Here, En, external environment; en, internal environment; S, sleep; Em, emotion; Ex, exercise; D, diet. In fact, it contains six parts of risk factors.

Currently, we often emphasize self-management of hypertension in clinical, in particular cases with CtH which links to the unhealthy lifestyle. In fact, good management and/or self-management may improve BP and cardiovascular health due to the control and prevention of the “HE 5” related risk factors. No doubt, economic principles and theories are not only applicable to daily activities, but also very applicable to clinical medicine including management and/or self-management of hypertension, since removing these risk factors will improve BP with less costs.

### **Is it about time to establish economics of hypertension?**

Currently, the management of hypertension based on drug and non-drug (surgery, lifestyle improvement) is very important and popular. All these strategies (agents, surgery and lifestyle) inextricably link to economics. The so-called investment, cost, benefit, cost-efficiency relationship and so on, are common terms in modern economics. In the field of clinical medicine, the management of mNCDs, such as CVD, diabetes, and cancer, also needs these keywords. Pharmaceutical companies pursue economic benefits, Phase I/II/III clinical trials of new agents focus on endpoint events of the outcomes and patients’ benefit, and ultimately, the survival of the fittest. Herein, on the National Hypertension Day in 2023, the author proposed that the establishment of “Economics of Hypertension” (Figure 2) is necessary and critical to innovate and optimize the management of hypertension, since BP is related to everyone’s health and life.

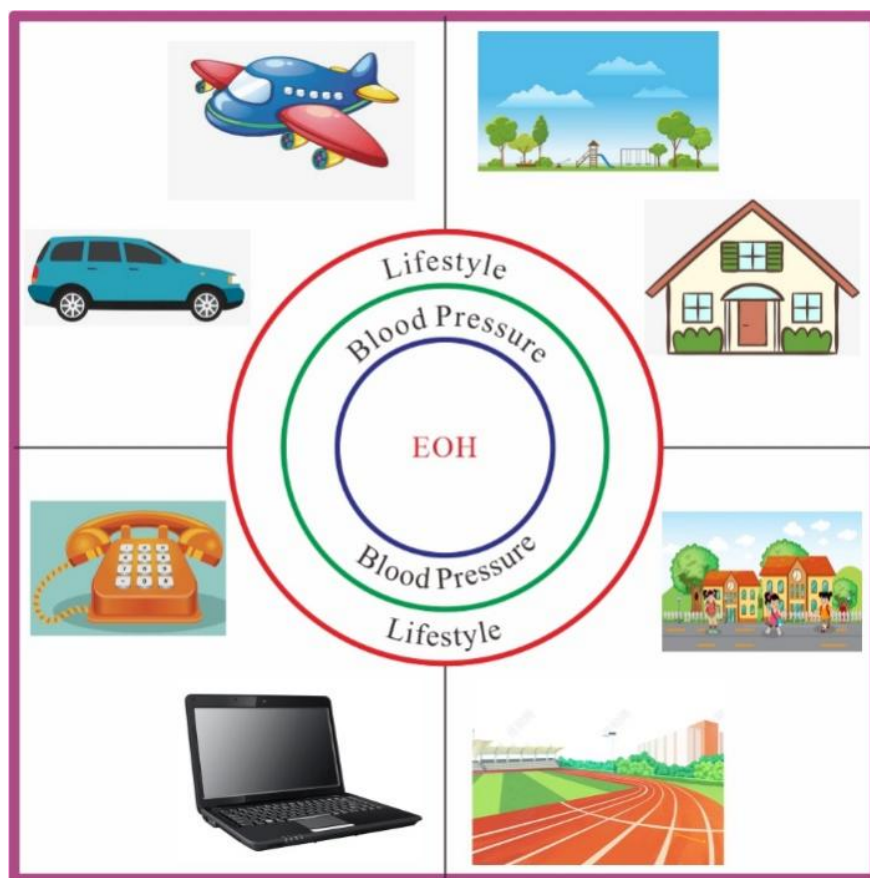
Definitely, establishing the “Economics of Hypertension” aims to improve the management of hypertension. Because we are on the journey of Chinese path to modernization, people want to pursue common prosperity and achieve development of high-quality, therefore, we need to pay more attention to health than ever before. “Shared health is shared prosperity, and shared health is a higher level of shared prosperity”. Health is 1, everything else is 0; “Talents are gross domestic production”; “Health is the first capital” [6]. These new concepts and novel economic theories should be widely known and become a consensus for maintaining health. The prevention and control of mNCDs in the new era requires macroeconomic support, while maintaining cardiovascular health requires microeconomic support from the “Economics of Hypertension”.



**Figure 2** “Economics of Hypertension (EOH)” is a new interdisciplinary field that combines hypertension and economics. It is a very useful and practical knowledge on how to manage and/or self-manage hypertension with a better cost-effective strategy.

### **Clinical studies and trials confirmed the benefits of economic knowledge**

Frankly speaking, hypertension is still the leading modifiable risk factor for death, but few cases achieve target BP control. Major challenges include high prevalence of hypertension, over-consumption of cardiovascular agents, low adherence to drug treatment, and resulting uncontrolled BP. Five modifiable risk factors (body-mass index, systolic BP, non-high-density lipoprotein cholesterol, smoking, and diabetes) highly link to CVD and death from any cause [7]. Previous clinical trials showed that home health education [8], self-monitoring blood pressure [9-12], comprehensive screening [13], healthy lifestyle interventions (e.g. diet of dark chocolate) [14-16], and lowering BP agents (e.g., enalapril-folic acid, -sartan and others) [17-19] are the feasibility and effectiveness, may not only reduce BP and cardiovascular mortality and morbidity, but also represents a cost-effective use of health care resources, and are beneficial in the prevention of hypertension and major adverse cardiovascular events (Figure 3).



**Figure 3** Lifestyle, Blood Pressure (BP), and Economics of Hypertension (EOH). There are a high linkage among these topics. Healthier lifestyle, better BP and cardiovascular health. Herein, EOH is a novel discipline which is very beneficial in cardiovascular system and human health.

Current clinical studies are cost-saving interventions for the prevention of stroke and improvement of quality of life in individuals with hypertension, and provide evidence for the effectiveness and safety of these measures in the management of hypertension. Encouragingly, recent clinical trials found that two aldosterone synthase inhibitors baxdrostat and lorundrostat have good effects on treatment-resistant or uncontrolled hypertension [20, 21], and a RNA interference (RNAi) therapeutic agent Zilebesiran has a prolonged duration of action (up to 24 weeks) on hypertension [22]. In addition, endovascular ultrasound renal denervation is the efficacy and safety for reducing BP in patients with mild to moderate and treatment-resistant hypertension [23].

Generally, these clinical trials confirmed that intensive BP treatment is an effective and cost-effective intervention and has more the lifetime health benefits [24, 25], but implementation of intensive BP control in routine clinical practice is challenging. In fact, a multicomponent intervention of hypertension for multiple risk factors is a viable and cost-effective strategy [26-29] for responding to the growing CVD epidemic in rural communities in low-income and middle-income countries. Moreover, comprehensive and self-management of hypertension [30, 31], including pharmacist care, patient education and prescribing, in particular application of novel technologies, such as mobile health technology (WeChat), and community pharmacists, clinical decision support systems, and a plasma renin activity-guided strategy [32-34], is more effective than standard care in treating hypertension. A systolic BP target of <130 mmHg or lower is cost effective in cases who have had a stroke/transient ischaemic attack [35], and Gu D, et al. reported in 2015 that low-cost essential antihypertensive agents have the potential to prevent about 800,000 CVD events annually [36]. In fact,

comparative studies [37] may tell us which agent is better, and the famous SPRINT study [38, 39] had confirmed the benefits of antihypertensive agents.

Socioeconomic status (such as insurance coverage, health care access, and neighborhood-level socioeconomic disadvantage) [40, 41] links to management of cardiovascular risk factors, long-term outcomes and mortality. Intensive blood pressure management is cost-effective even with substantially higher adverse event rates [42]. In fact, cardiovascular trials on surgical treatment vs medical therapy should assess not only clinical outcomes but also cost-effectiveness and quality of life [43]. Some innovative strategies (such as a digital health intervention using remote monitoring, gamification, and social incentives) may reduce cardiovascular risk by modification of lifestyle [44].

Lastly, since angiotensin-converting enzyme inhibitor (ACEI) but not angiotensin receptor blocker (ARB) can reduce the bacterial killing ability of neutrophils, there is at increased risk of infection among individuals receiving ACEI treatment [45]. In addition, agents from the same class could have very different adverse drug events [46] or ineffective control of hypertension [47] among individuals due to genetic variants, new technology for genetic variant detection (e.g., a cationic conjugated polymer-based multistep fluorescence resonance energy transfer technique) and personalizing therapy is crucial to the safety and efficacy. Hence, when we understand and know about related economic principles and theories, BP in the globe will have more and better protection.

### **Conclusions and future perspectives**

Since we still need financial investment and favourable policies [48] for high-quality and high-value care as well as the basic public health services due to the increase in hypertension and COVID-19 lasting, just like Health in All Policies and Health in All Laws [49-51], Health in All Economics should be a novel consensus in the new era, in particular the pandemic and post-COVID-19 era. All in all, it's about time to establish the "Economics of Hypertension", since it contributes to better management and self-management of hypertension in both China and the globe. When we understand and know about related economic principles and theories, BP of individuals in the globe will have better protection.

### **CRedit authorship contribution statement**

C.H. contributed to the conception and design of the work, the acquisition of data, the analysis and interpretation of the data, drafting and revision of the manuscript, and critical review of the manuscript, and, as guarantor of the article, takes responsibility for the content of the manuscript, including the data and analysis.

### **Declaration of competing interest**

**The author has no conflicts of interest to disclose.**

### **Acknowledgments**

The reviewers and editors are gratefully acknowledged for critical review.

### **Funding**

**No funding for this study was received.**

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