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Introduction

- Cardiovascular disease (CVD) is the leading mortality cause in China. Dyslipidemia is a major risk factor for CVD, characterized by high total cholesterol (TC), high low-density lipoprotein cholesterol (LDL-C), high triglycerides (TG), or low high-density lipoprotein cholesterol (HDL-C). Particularly, elevated LDL-C or TC contributes much to atherosclerotic cardiovascular diseases (ASCVD), which accounts for about 60% of cardiovascular-related deaths in China.¹

Objective

- This targeted literature review (TLR) aimed to understand the epidemiology, disease burden, overall cost of illness, and treatment landscape related to dyslipidemia in China and compared findings with other advanced countries.

Methods

- The TLR was conducted using PubMed, Institute for Health Metrics and Evaluation (IHME), and Chinese literature databases such as WanFang and China National Knowledge Infrastructure (CNKI).
- Relevant publications were identified based on the research questions.
- There were no restrictions on language or time frame in this literature search i.e., both English and Chinese language publications were deemed relevant for this review.

Results

High prevalence

Dyslipidemia

- Recently-published studies showed that the prevalence of dyslipidemia among Chinese adults (aged ≥35 years) is more than one-third. ‘China-PEACE (Patient-centered Evaluative Assessment of Cardiac Events) Million Persons Project (MPP)’ which was recently completed in 2019 reported a prevalence of 33.8% for dyslipidemia.² Moreover, national studies including China Chronic Disease and Risk Factor Surveillance study (2018) and China National Stroke Screening and Prevention Project (2015) showed prevalence of dyslipidemia at 40.4% and 42.7%, respectively.^{3, 4}
- Northern part of China has relatively higher prevalence if compared to Southern China. For the year 2011, prevalence of dyslipidemia was found to be highest in North China (approximately 51.4%), whereas lowest in Southwest China (37.4%).⁵

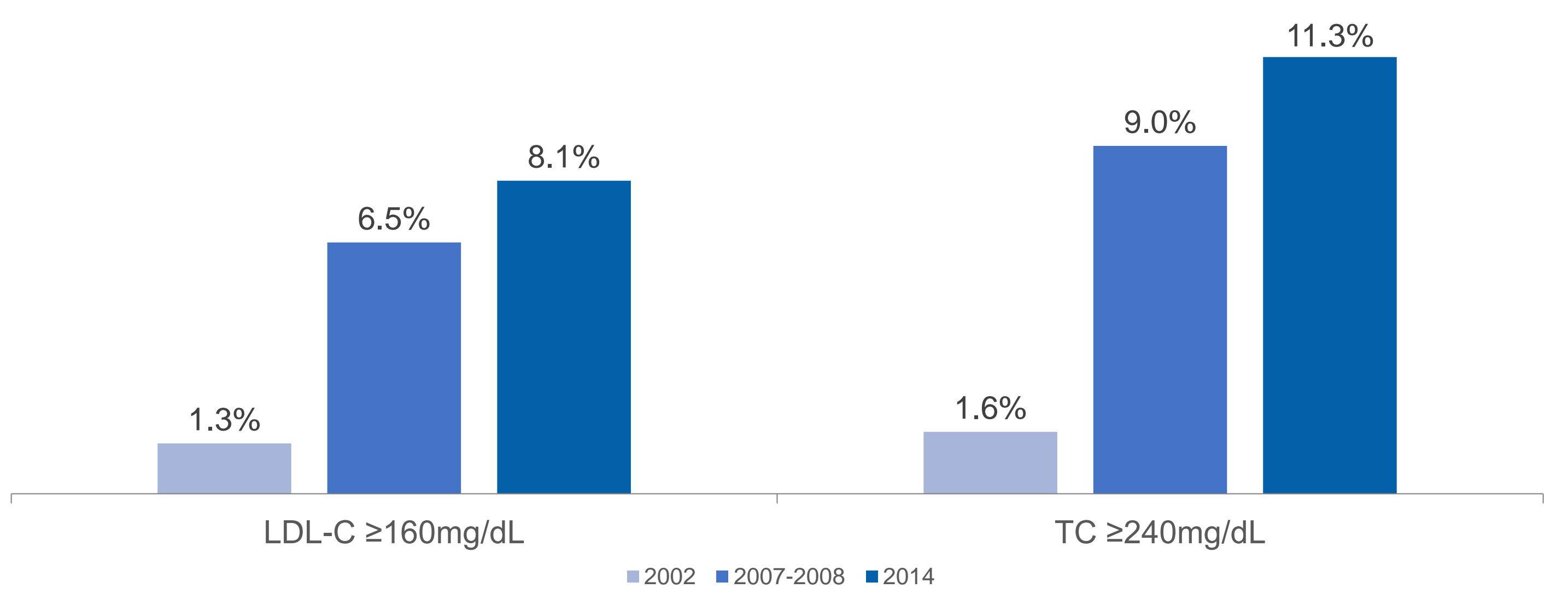
High LDL-C

- The prevalence of high LDL-C (LDL-C ≥160mg/dL) in China has increased by nearly 6 times, from 1.3% (2002) to 8.1% (2014) (**Figure 1**).
 - Chinese Nutrition and Health Survey (2002)⁹:1.3%
 - China National Diabetes and Metabolic Disorders Study (2007-2008)⁷: 6.5%
 - China National Stroke Screening and Prevention Project (2014)⁸:8.1%

High TC (Hypercholesterolemia)

- Historically the prevalence of hypercholesterolemia (TC≥240mg/dL) in China is low but the trend is on the rise for the adult population as reflected by large national-level surveys as **Figure 1**.
 - Chinese Nutrition and Health Survey (2002)⁶:1.6%
 - China National Diabetes and Metabolic Disorders Study (2007-2008)⁷: 9.0%
 - China National Stroke Screening and Prevention Project (2014)⁸:11.3%

Figure 1. Prevalence of high LDL-C and high TC in China from 2002-2014



LDL-C: Low density lipoprotein cholesterol; TC: Total cholesterol

Challenging health and economic burden of disease

Health impacts

- According to IHME Global Burden of Disease 2019¹⁰, adults (aged ≥20 years) in China experience the following health impacts, which are more serious than those in the USA and the UK (**Table 1**).

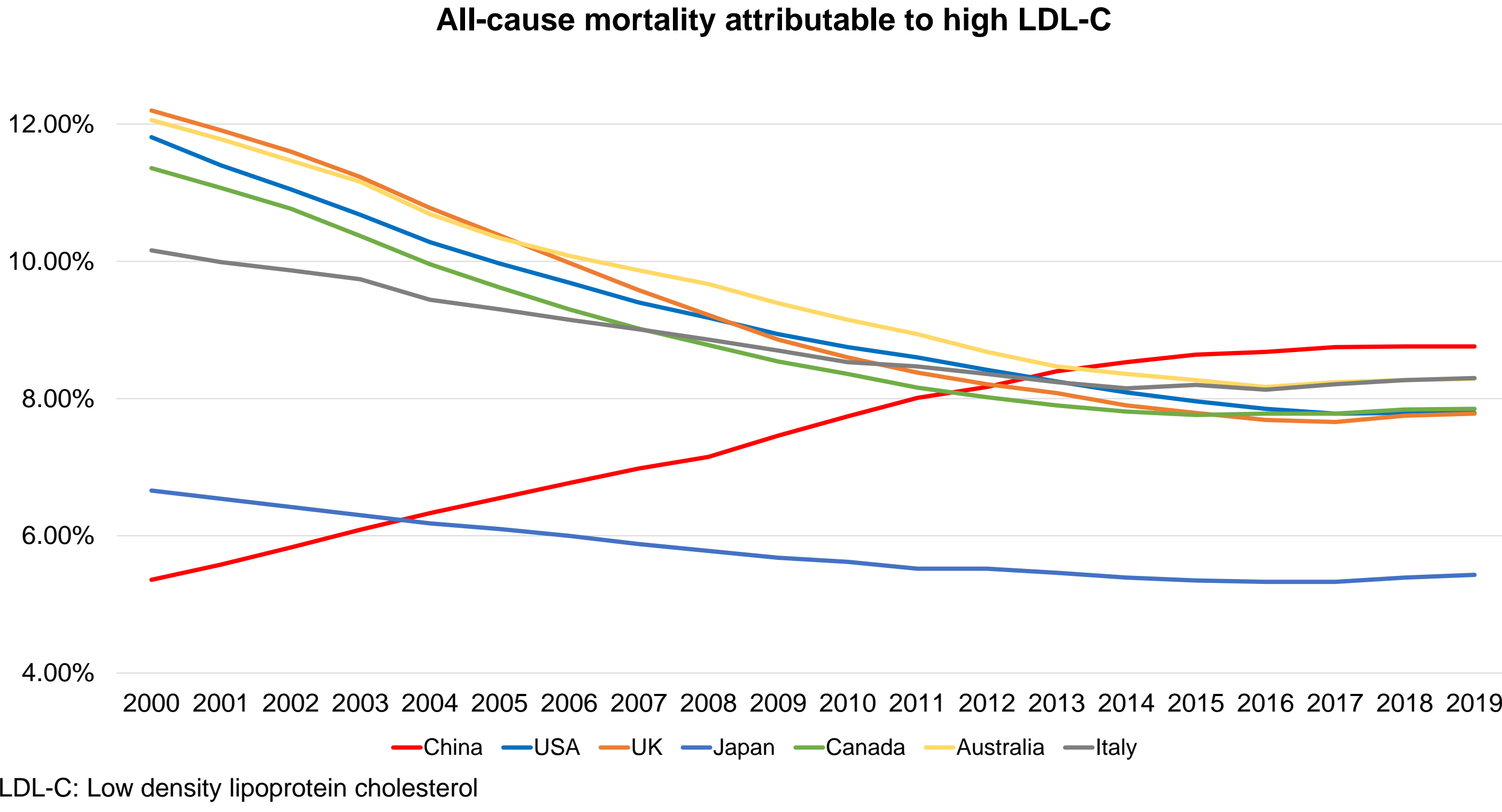
Table 1. DALYs, YLLs and YLDs (per 100,000 population) due to high LDL-C in China, USA, and UK (2000-2019)

	Countries	2000 (M)	2010 (M)	2019 (M)
DALYs	China	11.22	16.39	19.81
	USA	5.03	4.02	4.17
	UK	1.25	0.79	0.78
YLLs	China	10.19	14.96	17.83
	USA	4.78	3.73	3.86
	UK	1.20	0.75	0.73
YLDs	China	1.03	1.43	1.98
	USA	0.25	0.30	0.30
	UK	0.05	0.04	0.05

M: Millions; DALYs: Disability adjusted life-years; YLLs: Years of life lost; YLDs: Years lived with disability LDL-C: Low density lipoprotein cholesterol

The all-cause mortality rate attributable to high LDL-C has gradually increased from 5.36% to 8.76% in China, if compared to other developed nations that showed a downward trend depicted in **Figure 2**.¹⁰

Figure 2. All-cause mortality rate due to high LDL-C in several countries (2000-2019)



Economic costs

- Economist Intelligence Unit (EIU) report (2018) shows that CVDs have an economic burden of USD 21.7 billion in direct and indirect costs on individual, household and public finances annually in China, of which 12.5% and 24.8% are due to high cholesterol (TC ≥ 90mg/dL) and hypertension, respectively.¹¹
- Extensive treatment of hypertension and dyslipidemia would lead to an aversion of:
 - 10 – 20 million cases of acute myocardial infarction (AMI),
 - 8 – 30 million cases of strokes, and
 - 3 – 10 million CVD deaths.Hence, proper management of these risk factors would lead to a net cost savings of USD 563 billion to the Chinese healthcare system in the period between 2016 to 2030.¹²

Insufficient treatment and management

- The Healthy China (HC) 2030 blueprint¹³ announced by the Chinese government prioritizes the prevention and control of CVD and risk factors, but dyslipidemia management including high LDL-C is comparatively neglected.
- In China, routine screening programs for blood lipid levels are still not widely available in primary health care settings, limiting detection and treatment of dyslipidemia.¹⁴
- Opoku et al. 2021 showed that rates of disease awareness, treatment, and control for dyslipidemia are 64.0%, 18.9% and 7.2%, respectively. The low treatment and control rates may imply current gaps and shortcomings such as poor medication adherence, and drug prescription challenges associated with the current strategy for managing dyslipidemia.⁴
- Despite statin being the common treatment option, study showed that they are only available at 49.7% of the 3,041 surveyed primary care institutions.²
- Lu et al. 2021 utilized data from China-PEACE MPP to reflect the poor treatment and control rate of LDL-C among ASCVD patients. With a treatment rate of 14%, nearly three quarter of the patients had uncontrolled LDL-C levels, highlighting huge unmet need in controlling lipid levels.²
- To fulfill the HC 2030 blueprint, new public health strategies, innovative treatments, advanced digital solutions, and family doctor services could be further leveraged to optimize dyslipidemia management.

Conclusions

- The increasing prevalence and disease burden of dyslipidemia in China, especially in comparison with the descending trend in other advanced countries calls for a clear, scientific, and standardized patient journey, which includes screening, diagnosis, treatment, and management of dyslipidemia .
- There is a need to conduct research in this area to contribute to the development of new policies and prevention strategies for a better community.

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Disclosure

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