

Original Article



Dyslipidemia Fact Sheet in South Korea, 2024

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ABSTRACT

Objective: This study aimed to examine the prevalence of dyslipidemia, evaluate management patterns, and explore related health behaviors among South Korean adults through an analysis of the 2024 Dyslipidemia Fact Sheet.

Methods: This study utilized data from the Korea National Health and Nutrition Examination Survey (2007–2022) and the National Health Insurance Service-National Sample Cohort (2002–2019) to assess lipid profiles, trends in prevalence, management indicators, and health behaviors in South Koreans aged 20 and over. The 2005 Korean demographic distribution was applied as the reference for age standardization.

Results: The crude prevalence of dyslipidemia during 2016–2022 was 40.9% under standard criteria, increasing to 47.4% when modified high-density lipoprotein-cholesterol criteria for women were applied. From 2007 to 2022, the age-adjusted prevalence of hypercholesterolemia rose markedly from 8.8% to 22.4%, while the crude prevalence reached 27.4%. Indicators of hypercholesterolemia management showed improvement, with awareness, treatment, and control rates of 68.0%, 61.2%, and 54.1%, respectively. Comorbidity analysis demonstrated a markedly higher prevalence of dyslipidemia in adults with diabetes (87.0%), hypertension (72.4%), and obesity (55.2%). Health behavior evaluation revealed suboptimal adherence to dietary and physical activity recommendations.

Conclusion: Despite advances in detection and treatment, dyslipidemia remains highly prevalent in South Korea, particularly among individuals with metabolic comorbidities. Given the insufficient adherence to dietary and physical activity guidelines, strengthened strategies for prevention and management are warranted, with an emphasis on lifestyle modification and aggressive treatment approaches in high-risk groups.

Keywords: Dyslipidemia; Hypercholesterolemia; Metabolic diseases; Health-related behavior; Republic of Korea

Conflict of Interest

The authors have no conflicts of interest to declare.

Data Availability Statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Author Contributions

Conceptualization: Kwon O, Lee SY, Kim B, Han K, Ahn J; Data curation: Kim B, Han K; Formal analysis: Kim B, Han K; Investigation: Lee SY; Methodology: Lee SY, Han K; Supervision: Ahn J; Validation: Han K; Visualization: Han K, Ahn J; Writing - original draft: Kwon O, Ahn J; Writing - review & editing: Kwon O, Lee SY, Kim B, Han K, Ahn J.

INTRODUCTION

Dyslipidemia is defined as abnormal lipid patterns in the blood, characterized by one or more of the following: elevated low-density lipoprotein cholesterol (LDL-C), increased triglycerides (TGs), reduced high-density lipoprotein cholesterol (HDL-C), or combinations of these irregularities.¹ It remains a major modifiable risk factor for cardiovascular disease, which continues to be one of the leading causes of death worldwide.^{1,2} The World Health Organization estimated that in 2008 approximately 39% of adults aged 25 years and older had hypercholesterolemia, with elevated LDL-C contributing to more than one-third of deaths from ischemic heart disease and stroke.^{3,4} These findings highlight the critical need for improved strategies in cholesterol management and highlight the importance of accurately understanding prevalence, patterns, and trends within specific populations.

Since 2015, the Korean Society of Lipid and Atherosclerosis has published the Dyslipidemia Fact Sheet (DFS) to systematically report on the status of dyslipidemia in South Korea, covering prevalence, awareness, treatment, control, and related lifestyle behaviors.² The most recent data indicate that the prevalence of hypercholesterolemia increased more than 2.5-fold between 2007 and 2022, reinforcing the need for ongoing surveillance and targeted interventions.² To address this concern, the present study analyzed recent data from the Korea National Health and Nutrition Examination Survey (KNHANES, 2007–2022) and the National Health Insurance Service-National Sample Cohort (NHIS-NSC, 2002–2019) to provide an updated overview of lipid profiles, prevalence trends, management outcomes, and health behaviors in Korean adults aged 20 years and older. By evaluating temporal changes, this study offers insight into the evolving epidemiology of dyslipidemia in South Korea and supports the development of future public health strategies.

MATERIALS AND METHODS

1. Data source and study participants

This study analyzed KNHANES datasets spanning 2007–2022, complemented by NHIS-NSC data from 2002–2019.^{5,6} The KNHANES is a nationwide survey that evaluates health status and nutritional patterns in the Korean population. It tracks temporal changes in major health risk factors and monitors the prevalence and management of chronic diseases. The survey uses a complex, stratified sampling method with weighting to represent the demographic distribution of community-dwelling Koreans aged ≥1 year across the country. For this study, participants aged 20 years or older with available fasting lipid measurements and self-reported physician-diagnosed dyslipidemia, including treatment status, were included. The anonymized datasets are publicly available through the Korea Centers for Disease Control and Prevention website.

This study was conducted in accordance with the principles outlined in the Declaration of Helsinki (2024), and all procedures adhered to relevant guidelines and regulations. Because KNHANES data are fully anonymized, the study was approved by the Institutional Review Board (IRB) of The Catholic University of Medicine, Eunpyeong St. Mary's Hospital, which waived the requirement for informed consent (IRB No. PIRB-20240711-001). The manuscript was prepared in compliance with the Strengthening the Reporting of Observational Studies in Epidemiology guidelines to ensure completeness and transparency.

2. Measurements and definitions

Fasting serum lipid profiles—including total cholesterol, TG, LDL-C, and HDL-C—were obtained after at least 8 hours of fasting. When LDL-C values were not directly measured, they were calculated using the Friedewald formula. Non-HDL cholesterol was calculated by subtracting HDL-C from total cholesterol. Hypercholesterolemia was defined as total cholesterol ≥ 240 mg/dL or current use of lipid-lowering medication.⁷⁻⁹ Awareness was defined as the proportion of individuals who reported being diagnosed with hypercholesterolemia by a physician. The treatment rate was defined as the proportion using lipid-lowering medication. Control rates were evaluated in 2 ways: the proportion of all hypercholesterolemia patients with total cholesterol < 200 mg/dL, and the proportion within the subgroup receiving treatment.

Dyslipidemia was classified into 3 categories: hyper-LDL-cholesterolemia, hypertriglyceridemia, and hypo-HDL-cholesterolemia. Hyper-LDL-cholesterolemia was defined as LDL-C ≥ 160 mg/dL or use of lipid-lowering medication. Hypertriglyceridemia was defined as TG ≥ 200 mg/dL. Hypo-HDL-cholesterolemia was defined in 2 ways: type 1, HDL-C < 40 mg/dL in both sexes; and type 2, HDL-C < 40 mg/dL in men or < 50 mg/dL in women. Accordingly, Dyslipidemia 1 was defined as hyper-LDL-cholesterolemia, hypertriglyceridemia, or hypo-HDL-cholesterolemia using the type 1 definition; Dyslipidemia 2 was defined similarly but with the type 2 definition.

3. Specific populations and health behaviors

Data from 2016 to 2022 were analyzed to evaluate dyslipidemia in individuals with chronic conditions. Diabetes was defined as fasting glucose ≥ 126 mg/dL, glycosylated hemoglobin $\geq 6.5\%$, prior physician diagnosis, or current use of glucose-lowering medication. Hypertension was defined as systolic blood pressure ≥ 140 mmHg, diastolic blood pressure ≥ 90 mmHg, or current use of antihypertensive drugs. Obesity was defined as body mass index (BMI) ≥ 25 kg/m², while abdominal obesity was defined as a waist circumference greater than 90 cm for men and 85 cm for women.¹⁰ Health behaviors were assessed using KNHANES 2016–2018 data. Dietary intake was evaluated by single-day dietary recall and adherence to recommended macronutrient distributions. Physical activity was measured using the Global Physical Activity Questionnaire, and participants were classified as physically active or inactive based on weekly activity duration.¹¹ Smoking and alcohol use were also analyzed. Regular alcohol use was defined as drinking more than once per month in the past year. Current smoking was defined as smoking at least 100 cigarettes in a lifetime and currently smoking, while ex-smoking was defined as having smoked at least 100 cigarettes in a lifetime but not smoking in the past 28 days.¹²

4. Statistical analysis

All statistical analyses incorporated sampling weights for the multistage probability design to ensure national representativeness. Both crude and age-standardized estimates of dyslipidemia prevalence and management indicators were calculated. Age-standardized prevalence was based on the projected 2005 Korean population stratified by age and sex. Weighted proportions were used to examine differences in prevalence and management by demographic characteristics and health behaviors. Trend analyses from 2007 to 2022 assessed changes in dyslipidemia prevalence, awareness, treatment, and control. Sex-specific differences in lipid profiles were tested using the independent samples t-test, while prevalence differences were evaluated with the Rao–Scott chi-square test. Statistical significance was set at $p < 0.05$ (2-tailed). Additional analyses examined dyslipidemia patterns

among specific populations, including those with diabetes (using standard and modified LDL-C targets), hypertension (including modified LDL-C thresholds), and obesity. Health behavior analyses focused on dietary intake, physical activity, smoking, and alcohol use in the dyslipidemic population. All analyses were performed using SAS version 9.4 (SAS Institute Inc.).

RESULTS

1. Lipid profile in Korean adults

From 2007 to 2022, temporal analysis of age-standardized lipid parameters, referenced to the 2005 Korean demographic structure, demonstrated distinct trends (**Fig. 1A**). Total cholesterol levels increased steadily from 186.2 mg/dL in 2007 to 192.7 mg/dL in 2022. During the same period, HDL-C showed the greatest improvement, rising from 48.1 mg/dL to 57.7 mg/dL. Non-HDL cholesterol fluctuated but ultimately declined slightly from 138.1 mg/dL to 135.0 mg/dL, while LDL-C rose gradually from 112.1 mg/dL to 118.5 mg/dL, showing an upward trend regardless of whether measured directly or calculated (**Supplementary Table 1**). TG levels remained relatively stable, shifting only slightly from 130.2 mg/dL to 129.3 mg/dL. Sex-specific analysis revealed marked differences in lipid profiles (**Fig. 1B**). Men consistently had higher non-HDL cholesterol concentrations (139±40 mg/dL vs. 135±38 mg/dL) and TG (151±124 mg/dL vs. 112±73 mg/dL) compared with women (both $p<0.001$). In contrast, women maintained higher total cholesterol levels (192±39 mg/dL vs. 188±40 mg/dL in men), LDL-C levels (115±35 mg/dL vs. 113±35 mg/dL in men), and HDL-C levels (57±14 mg/dL vs. 49±12 mg/dL in men (all $p<0.001$), indicating significant sex-based differences in lipid metabolism.

2. Dyslipidemia

Analysis of dyslipidemia prevalence showed divergent patterns depending on classification criteria and demographic variables. In 2022, the age-adjusted prevalence was 37.5% for Dyslipidemia 1 and 41.4% for Dyslipidemia 2 (**Fig. 2A**). The mean crude prevalence from 2016–2022 was notably higher, at 40.9% and 47.4%, respectively (**Fig. 2B**).

Sex-based analysis revealed a higher prevalence of Dyslipidemia 1 among men (47.1%) than among women (34.7%) ($p<0.001$), whereas Dyslipidemia 2 was comparable between men (47.1%) and women (47.7%) ($p=0.47$). The sex-related difference was more pronounced in older populations, with the highest prevalence of Dyslipidemia 2 observed among women in their 70s (74.4%), compared to 51.4% in men of the same age group ($p<0.001$).

Hyper-LDL-cholesterolemia

From 2007 to 2022, the age-adjusted prevalence of hyper-LDL-cholesterolemia rose markedly, increasing from 8.8% to 23.4% (**Supplementary Fig. 1A**). The crude prevalence during 2016–2022 was 24.2%, with notable sex differences (**Supplementary Fig. 1B**). Rates were highest in individuals in their 60s, reaching 33.2% in men and 50.0% in women.

Hypertriglyceridemia

Hypertriglyceridemia prevalence remained relatively stable, with age-standardized rates decreasing slightly from 15.3% in 2007 to 14.1% in 2022 (**Supplementary Fig. 2A**). Sex differences were most evident in middle age, particularly in the 40s, where men had significantly higher prevalence than women (28.9% vs. 7.2%) (**Supplementary Fig. 2B**).

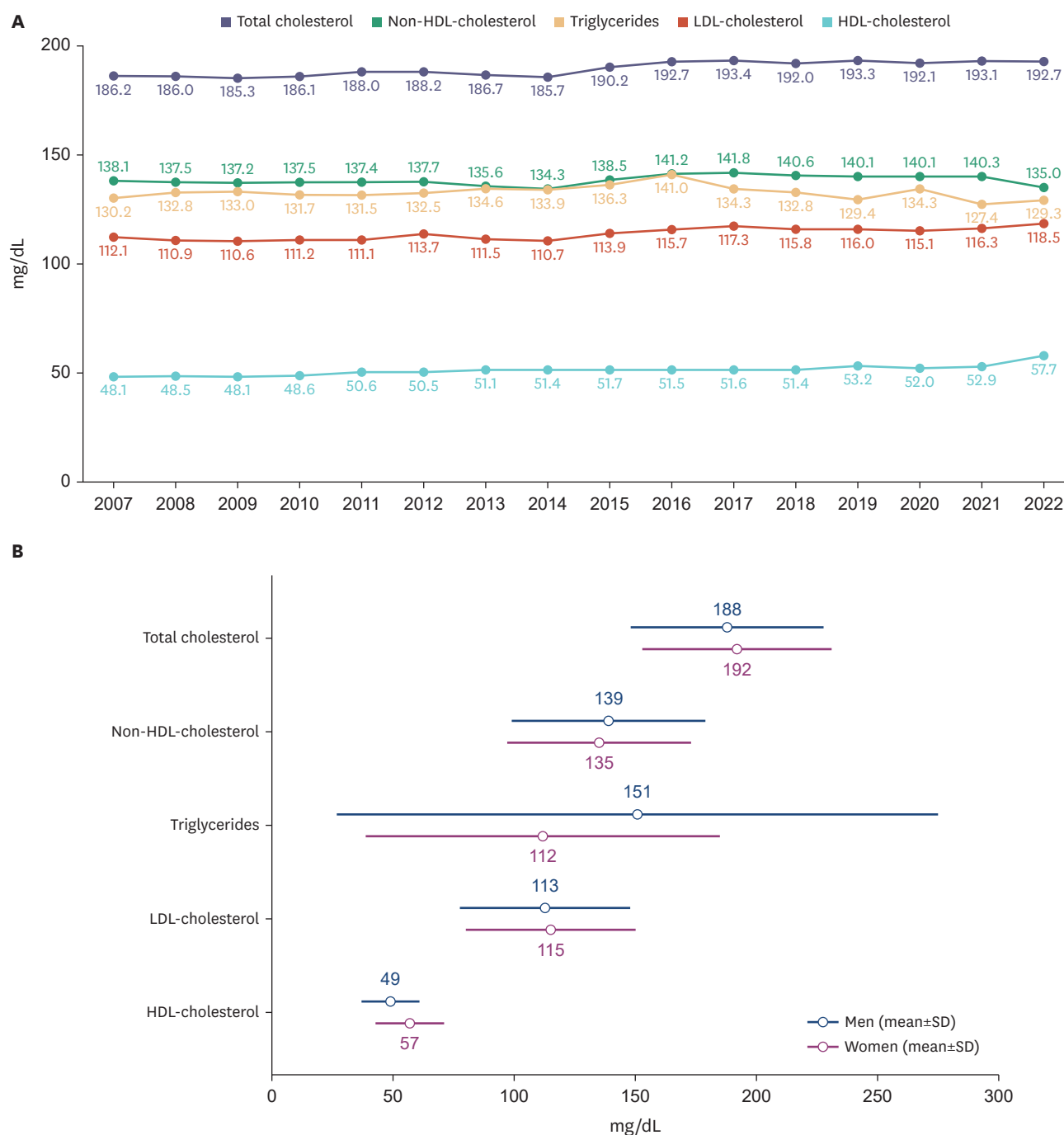


Fig. 1. Lipid profile in Korean adults. (A) Age-standardized mean concentrations of blood lipids in Korean adults from 2007 to 2022. Data standardized to the 2005 population structure. (B) Sex-specific distribution of blood lipid concentrations. Data source: Korea National Health and Nutrition Examination Survey 2007–2022; adults aged ≥ 20 years. HDL, high-density lipoprotein; LDL, low-density lipoprotein; SD, standard deviation.

Hypo-HDL-cholesterolemia

In 2022, the age-standardized prevalence of hypo-HDL-cholesterolemia was 10.5% under Type 1 criteria and 17.5% under Type 2 criteria (**Supplementary Fig. 3A**). Men showed higher prevalence under Type 1 definitions compared with women (21.4% vs. 7.0%). In contrast, under Type 2 criteria, prevalence was greater among women (29.1%), particularly in older

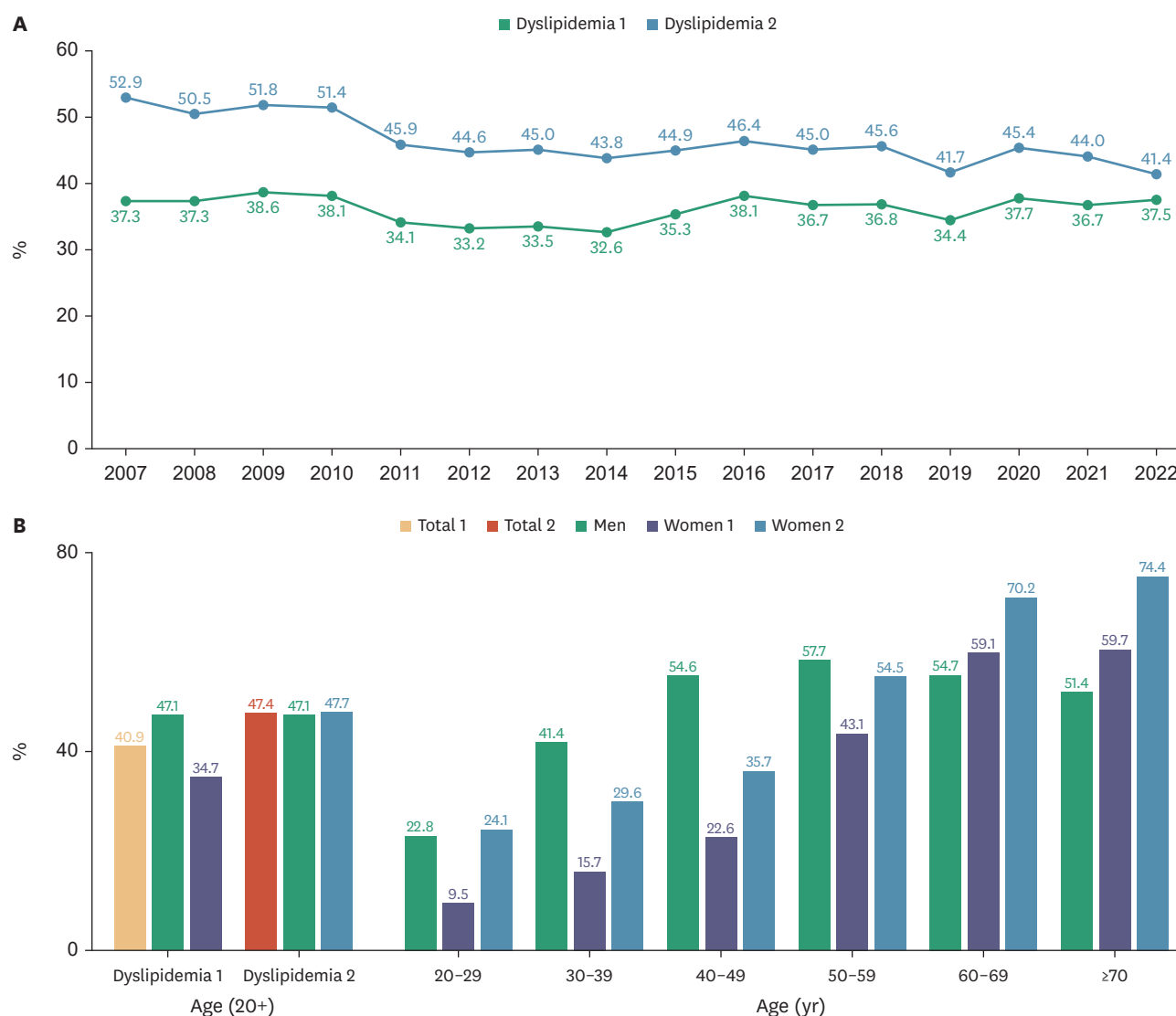


Fig. 2. Prevalence of dyslipidemia. (A) Age-standardized prevalence of dyslipidemia, standardized to the 2005 Korean population. (B) Crude prevalence of dyslipidemia by sex and age groups. Data from 2007–2022 Korea National Health and Nutrition Examination Survey; adults aged ≥ 20 years. Dyslipidemia 1 was defined as hyper-LDL-cholesterolemia, hypertriglyceridemia, or hypo-HDL-cholesterolemia (<40 mg/dL in both sexes); Dyslipidemia 2 as hyper-LDL-cholesterolemia, hypertriglyceridemia, or hypo-HDL-cholesterolemia (<40 mg/dL in men; <50 mg/dL in women). Total 1 and Women 1 were based on the definition of Dyslipidemia 1, while Total 2 and Women 2 were based on the definition of Dyslipidemia 2. LDL, low-density lipoprotein; HDL, high-density lipoprotein.

groups, reaching 44.1% among women in their 70s compared with 25.9% among men (Supplementary Fig. 3B).

3. Hypercholesterolemia

The prevalence of hypercholesterolemia increased substantially from 2007 to 2022. Age-standardized prevalence rose from 8.8% to 22.4%, representing more than a twofold increase (Fig. 3A). Crude prevalence rose even more sharply, reaching 27.4% in 2022, indicating that nearly 1 in 4 Korean adults has hypercholesterolemia (Fig. 3B). Management indicators showed substantial improvement over time. By 2022, the awareness rate reached 68.0%, with 61.2% of affected individuals receiving treatment. The overall control rate was 54.1%, while among those on lipid-lowering medications, 87.4% achieved target cholesterol levels (Fig. 4).

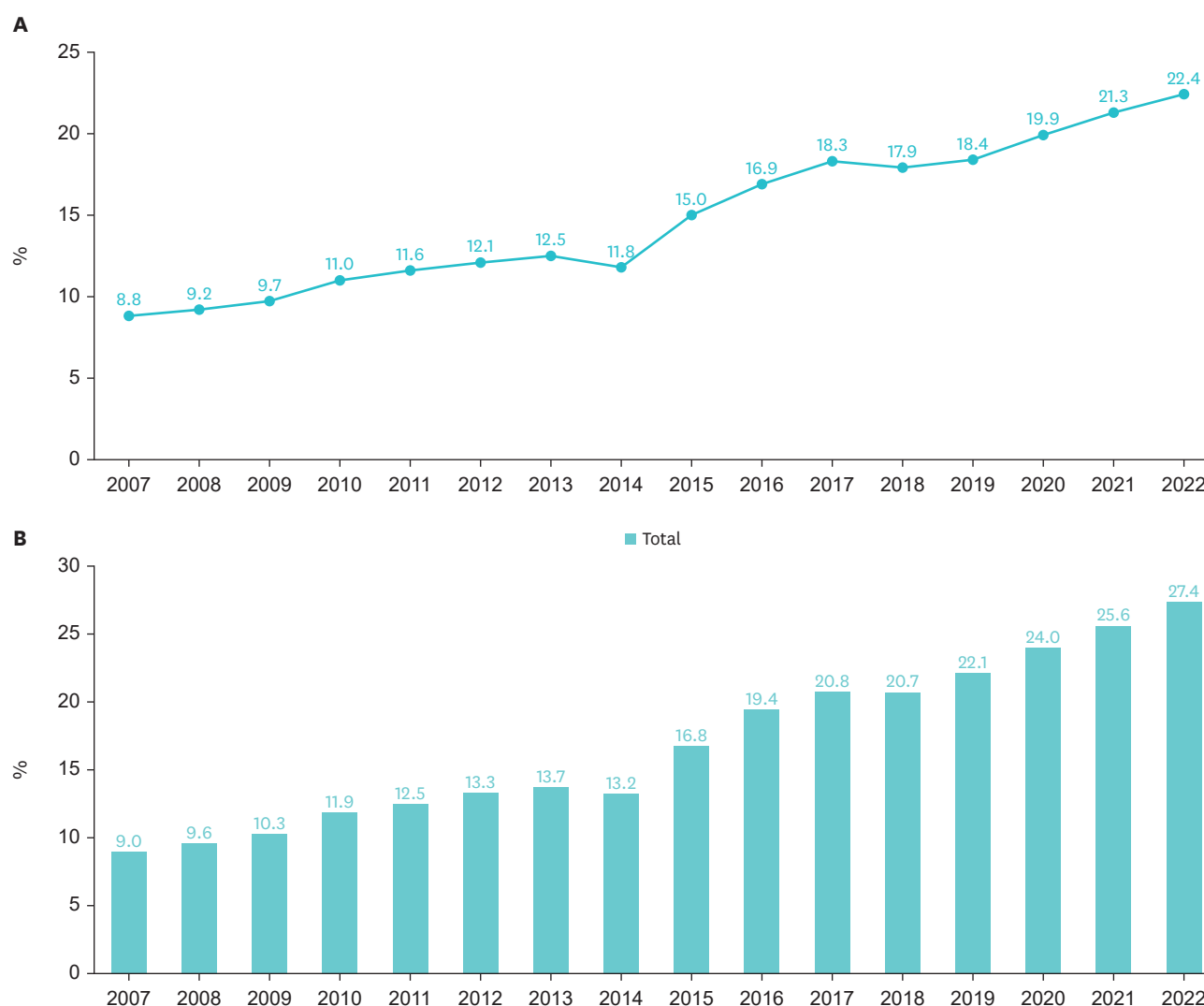


Fig. 3. Prevalence of hypercholesterolemia. (A) Age-standardized prevalence of hypercholesterolemia, standardized to the 2005 Korean population. (B) Crude prevalence of hypercholesterolemia. Data from 2007–2022 Korea National Health and Nutrition Examination Survey; adults aged ≥ 20 years. Hypercholesterolemia was defined as total cholesterol ≥ 240 mg/dL or use of a lipid-lowering drug.

Temporal analysis revealed significant improvements in all management indicators. From 2007–to 2022, awareness rates increased from 38.3% to 68.0%, treatment rates from 25.8% to 61.2%, and control rates from 19.1% to 54.1%. The control rate among those receiving lipid-lowering therapy showed particular improvement, rising from 72.4% to 87.4%.

Comparable management patterns were observed in men and women. Women showed numerically higher rates of awareness (69.0% vs. 66.7%, $p=0.43$) (**Supplementary Fig. 4A**) and treatment (62.6% vs. 59.5%, $p=0.28$) (**Supplementary Fig. 4B**) compared to men, but without statistical significance. Control rates among those receiving treatment became more similar over time (**Supplementary Fig. 4C**), with 2022 rates of 87.8% for men and 87.2% for women ($p=0.84$) (**Supplementary Fig. 4D**), suggesting improved therapeutic effectiveness in both sexes.

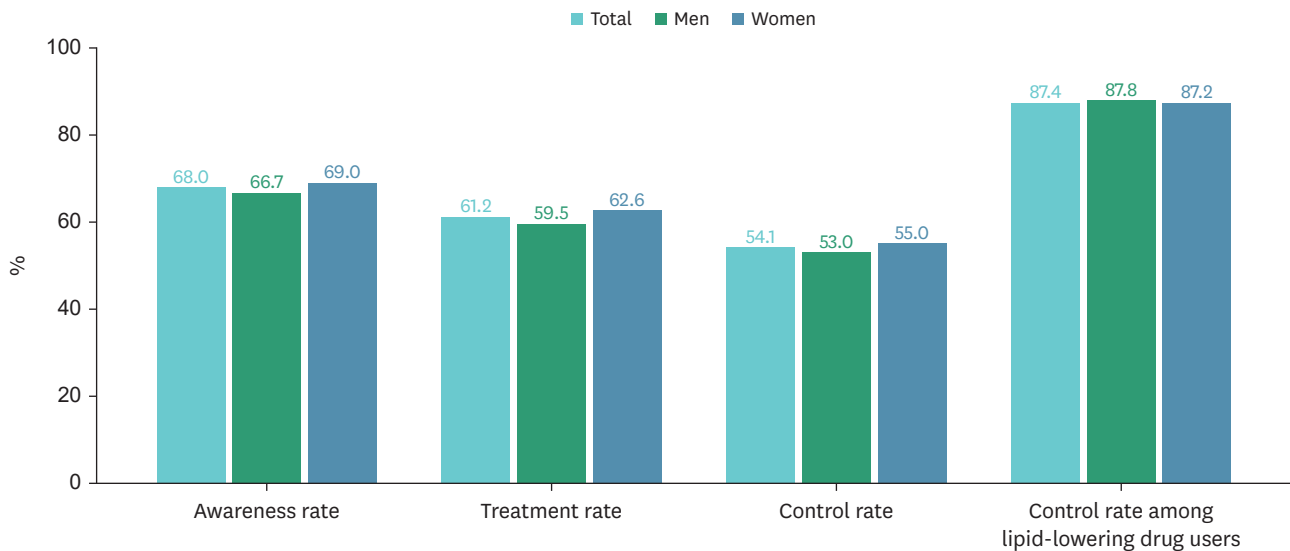


Fig. 4. Management of hypercholesterolemia, showing the awareness rate, treatment rate, and control rate. Data from 2019–2022 Korea National Health and Nutrition Examination Survey; adults aged ≥ 20 years with hypercholesterolemia. Awareness was defined as self-reported physician-diagnosed hypercholesterolemia or dyslipidemia; treatment as self-reported use of lipid-lowering drugs; control as total cholesterol < 200 mg/dL.

4. Dyslipidemia in specific populations

Analysis of dyslipidemia prevalence across different metabolic conditions revealed significant variations. Among individuals with diabetes, prevalence increased stepwise with worsening glucose metabolism (**Fig. 5A**). Rates rose from 25.2% in normoglycemic individuals to 50.7% in those with prediabetes and 70.2% in individuals with diabetes. When applying the stricter LDL-C threshold of ≥ 100 mg/dL for diabetes, prevalence rose markedly to 87.0%. Similar trends were observed with blood pressure status (**Fig. 5B**). Dyslipidemia prevalence increased from 27.6% in normotensive individuals to 42.6% in prehypertension and 61.2% in hypertension. Target achievement rates varied by clinical definition. Among individuals with diabetes, 56.3% met the LDL-C target of < 100 mg/dL (**Supplementary Fig. 5A**), but only 24.6% reached the more stringent target of < 70 mg/dL. In those with hypertension, 74.4% achieved the goal when the criterion was LDL-C < 130 mg/dL (**Supplementary Fig. 5B**), whereas only 44.9% achieved target levels when the cutoff was set at < 100 mg/dL.

Body composition also showed a strong association with dyslipidemia prevalence (**Fig. 5C**). Prevalence followed a clear gradient across BMI categories: 11.7% in underweight, 27.4% in normal weight, 44.2% in overweight, and 55.2% in obese individuals. Abdominal obesity demonstrated an even stronger effect, with prevalence nearly doubling from 30.8% in individuals without central obesity to 59.0% in those with abdominal obesity (**Fig. 5D**).

5. Health behaviors

The analysis of dietary patterns among adults with dyslipidemia revealed varying levels of adherence to nutritional recommendations (**Fig. 6A**). While most participants consumed protein within recommended levels (82.5% of men, 86.7% of women), compliance with carbohydrate guidelines was low (33.6% of men, 31.0% of women). Approximately half of adults achieved the recommended total energy intake (50.6% of men, 47.4% of women), while fat intake showed moderate adherence (58.0% of men, 55.2% of women). Vegetable consumption was particularly inadequate, with only 31.1% of men and 27.2% of women meeting the recommended daily intake (**Fig. 6B**). Despite some improvement over time,

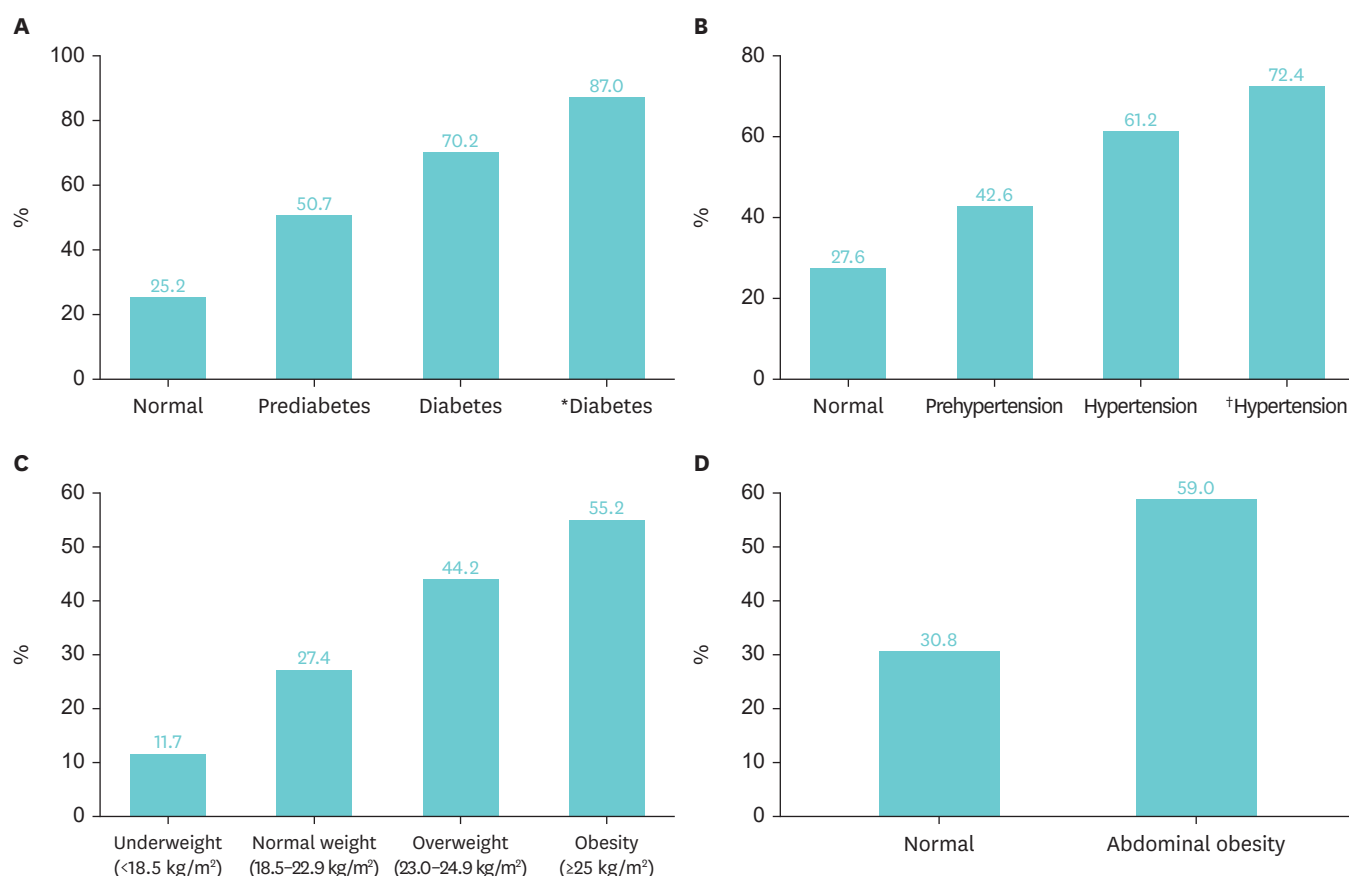


Fig. 5. Prevalence of dyslipidemia by metabolic conditions. Data from 2016–2022 Korea National Health and Nutrition Examination Survey; adults aged ≥20 years. (A) Prevalence by diabetes status. Prediabetes was defined as a fasting plasma glucose level of 100–125 mg/dL or a HbA1c level of 5.7%–6.4%. Diabetes was defined as a fasting plasma glucose level ≥126 mg/dL, an HbA1c level ≥6.5%, a previous diagnosis of diabetes, or current use of glucose-lowering medication or insulin. Dyslipidemia was defined as any of the following: LDL cholesterol ≥160 mg/dL, triglycerides ≥200 mg/dL, HDL cholesterol <40 mg/dL, or use of lipid-lowering medication. (B) Prevalence by hypertension status. Prehypertension was defined as a SBP of 120–139 mmHg or a DBP of 80–89 mmHg. Hypertension was defined as a SBP ≥140 mmHg, a DBP ≥90 mmHg, or current use of blood pressure-lowering medication. Dyslipidemia was defined as any of the following: LDL cholesterol ≥160 mg/dL, triglyceride level ≥200 mg/dL, HDL cholesterol <40 mg/dL, or use of lipid-lowering medication. (C) Prevalence by obesity status. Obesity was defined as a BMI ≥25 kg/m². Values in parentheses indicate BMI. (D) Prevalence by abdominal obesity status. Abdominal obesity was defined as a waist circumference ≥90 cm in men and ≥85 cm in women. HbA1c, glycated hemoglobin; LDL, low-density lipoprotein; HDL, high-density lipoprotein; SBP, systolic blood pressure; DBP, diastolic blood pressure; BMI, body mass index.

*Dyslipidemia (alternative definition) was defined as LDL cholesterol ≥100 mg/dL, triglycerides ≥200 mg/dL, HDL cholesterol <40 mg/dL, or use of lipid-lowering medication. †Dyslipidemia (alternative definition) was defined as LDL cholesterol ≥130 mg/dL, triglyceride level ≥200 mg/dL, HDL cholesterol <40 mg/dL, or use of lipid-lowering medication.

saturated fat intake remained excessive, with 40% of men and 30% of women exceeding recommended thresholds. Physical inactivity was highly prevalent, affecting 51.8% of men and 58.6% of women with dyslipidemia (**Fig. 6C**). Sex differences were striking in smoking and alcohol use. Current smoking was reported by 32.3% of men versus 5.5% of women ($p<0.001$), while regular alcohol consumption was reported by 69.8% of men versus 41.8% of women ($p<0.001$). Over time, a gradual decline in smoking prevalence was observed, particularly among men, decreasing from a peak of 48.3% in 2010 to 30.0% in 2022.

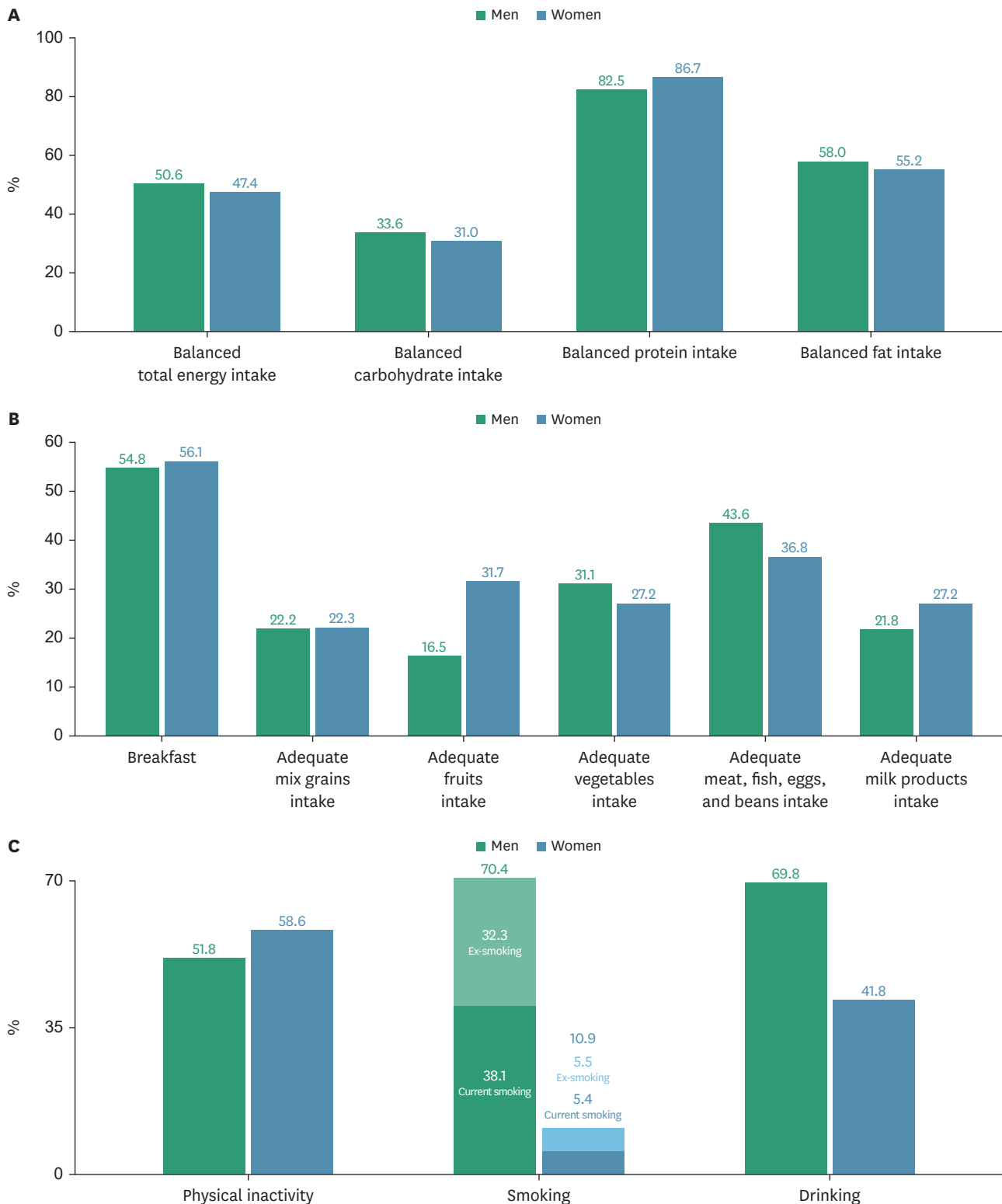


Fig. 6. Health behaviors among adults with dyslipidemia. Data from 2016–2022 Korea National Health and Nutrition Examination Survey; adults aged ≥ 20 years with dyslipidemia. (A) Distribution of balanced macronutrient intake. (B) Distribution of vegetable and saturated fat consumption. (C) Distribution of physical activity, smoking, and alcohol consumption by sex. Physical inactivity was defined as engaging in <150 minutes of moderate-intensity activity, <75 minutes of vigorous-intensity activity, or an equivalent combination of both types of activity during the past week. Current smoking was defined as having smoked at least 100 cigarettes in a lifetime and currently smoking. Alcohol drinking was defined as consuming alcohol more than once a month during the past year.

DISCUSSION

The prevalence of dyslipidemia among adults in Korea has shown significant changes since the initial DFS publications. Previous editions documented crude prevalence rates of 47.8% (2015 DFS), 40.5% (2018 DFS), 38.4% (2020 DFS), and 48% (2022 DFS). The current 2024 DFS demonstrates a renewed increase, with prevalence reaching 47.4% in the general population (47.1% in men and 47.7% in women) under the Dyslipidemia 2 definition. This trend parallels rising rates of hypercholesterolemia, which affected 27.4% of the population in 2022.

Total cholesterol and LDL-C levels steadily increased, while HDL-C improved in a favorable direction. Non-HDL cholesterol fluctuated but slightly decreased overall, and TG levels have remained relatively stable. Although TG and HDL-C are generally inversely related,¹³ this association can be influenced by multiple factors, including body weight, dietary patterns, alcohol consumption, and physical activity,¹⁴ and thus may not always align. The observed rise in HDL-C despite stable TG levels, coupled with increasing LDL-C, likely reflects multifactorial determinants beyond direct TG metabolism.¹⁵ These findings suggest a mixed impact of public health interventions and lifestyle changes. From an atherogenic risk standpoint, the continued increase in total cholesterol and LDL-C is concerning, although the modest decline in non-HDL cholesterol may partially mitigate risk.¹⁶ These findings underscore that stable TG levels should not be misinterpreted as evidence of an overall improvement in lipid-associated cardiovascular risk.

Although management metrics have improved, with awareness and treatment rates of hypercholesterolemia increasing and the control rate rising substantially from 19.1% to 54.1% over the past decade, nearly half of affected individuals remain inadequately controlled. Interpretation of these rates requires caution, as current guidelines emphasize LDL-C as the primary therapeutic target.^{1,17} Despite advances in awareness, treatment, and control, mean total cholesterol and LDL-C levels in the overall population have continued to climb. Similar paradoxical findings have been reported in other national surveys.¹⁸⁻²⁰ One likely explanation is that management indicators are calculated among diagnosed and treated individuals, whereas population averages include newly developed, untreated cases. Persistent westernized dietary habits, characterized by high intake of saturated fats and sugar-sweetened beverages and low intake of vegetables and dietary fiber^{21,22} along with sedentary lifestyles,²³ likely contribute to the influx of new dyslipidemia cases, counteracting therapeutic gains. Our data further confirm suboptimal adherence to dietary and physical activity recommendations among individuals with dyslipidemia. In addition, treatment intensity in primary care may remain insufficient, with frequent reliance on low-dose statins and delayed escalation of therapy.²⁴ Younger individuals, who often remain asymptomatic, are also more likely to be under-screened, undertreated, or less adherent to therapy.^{25,26} Meanwhile, Korea's universal healthcare system, which facilitates broad access to medical care including lipid-lowering therapy, in conjunction with ongoing education for both patients and physicians, may have contributed to improvements in awareness and treatment rates. However, these gains have not yet reversed the rising trend in population-level cholesterol, indicating that more comprehensive strategies are required. Strengthening hypercholesterolemia management will require not only intensified pharmacologic treatment but also robust, population-wide lifestyle interventions to address dietary westernization and physical inactivity. Expanding targeted screening to younger adults and reinforcing LDL-C-specific treatment goals as quality indicators in clinical practice may further enhance long-term cardiovascular risk reduction.

Sex-specific analysis revealed distinct patterns. Under the Dyslipidemia 2 definition, prevalence in men remained relatively stable through middle age before declining slightly after 60, while prevalence in women continued to rise, peaking at 74.4% in their 70s. This pattern in women is largely attributable to elevated rates of hyper-LDL-cholesterolemia (46.9%) and hypo-HDL-cholesterolemia (44.1%) in older age groups, reflecting postmenopausal metabolic changes in cholesterol regulation.²⁷ Although overall awareness and treatment rates for hypercholesterolemia were comparable between men and women, the age-related deterioration in women's lipid profiles highlights the need for targeted interventions in postmenopausal women. The control rates among treated individuals were similar between sexes, indicating equitable therapeutic efficacy once treatment is initiated.

The strong associations between dyslipidemia and metabolic disorders, including diabetes, hypertension, and obesity, underscore the interconnected nature of these cardiometabolic risk factors. Dyslipidemia prevalence reaches 87.0% in adults with diabetes and 72.4% in those with hypertension when adjusted LDL-C thresholds are applied. The stepwise increase in prevalence with worsening metabolic profiles highlights the importance of integrated management strategies that address multiple risk factors simultaneously. Furthermore, only 56.3% of patients with diabetes achieved the recommended LDL-C target of <100 mg/dL, while 74.4% of individuals with hypertension met their LDL-C target of <130 mg/dL. These findings emphasize the critical need for stricter LDL-C control in high-risk groups to effectively reduce cardiovascular risk.²⁸

This study has several inherent limitations. First, its cross-sectional design restricts the ability to infer causality between observed patterns and their underlying determinants. Second, reliance on self-reported data regarding health behaviors and physician-diagnosed hypercholesterolemia may introduce recall or reporting bias. Third, it was not possible to directly compare health behaviors—including diet, smoking, alcohol consumption, and physical activity—between individuals with and without dyslipidemia. Fourth, although this study evaluated awareness, treatment, and control rates for hypercholesterolemia, current guidelines emphasize LDL-C target-based management.^{1,17} Comprehensive risk stratification of the entire population with corresponding LDL-C control rates could not be performed within the framework of this nationwide survey. Instead, LDL-C control rates were assessed only in populations with common comorbidities, such as diabetes mellitus and hypertension. Finally, no information was available on medication therapy, which may influence lipid profiles. Further analyses of treatment patterns and temporal changes in pharmacotherapy are warranted.

In conclusion, the 2024 DFS highlights the persistent and increasing burden of dyslipidemia in South Korea, including rising rates of hypercholesterolemia. Although awareness and treatment indicators have improved, control rates remain inadequate, particularly among high-risk populations. Unhealthy behaviors—including insufficient physical activity, poor dietary habits, smoking, and alcohol consumption—likely exacerbate the problem. These findings underscore the need for comprehensive management strategies and targeted interventions for individuals with comorbid conditions. Future efforts should prioritize integrated approaches that combine lifestyle modification with aggressive treatment protocols to mitigate this major public health challenge.

SUPPLEMENTARY MATERIALS

Supplementary Table 1

Age-standardized LDL-C levels by direct and calculated methods

Supplementary Fig. 1

Prevalence of hyper-LDL-cholesterolemia. Data from Korea National Health and Nutrition Examination Survey; adults aged ≥ 20 years.

Supplementary Fig. 2

Prevalence of hypertriglyceridemia. Data from Korea National Health and Nutrition Examination Survey; adults aged ≥ 20 years.

Supplementary Fig. 3

Prevalence of hypo-HDL-cholesterolemia. Data from Korea National Health and Nutrition Examination Survey adults aged ≥ 20 years. HDL, high-density lipoprotein.

Supplementary Fig. 4

Sex-specific trends in hypercholesterolemia management. Data from 2019–2022 Korea National Health and Nutrition Examination Survey; adults aged ≥ 20 years with hypercholesterolemia.

Supplementary Fig. 5

Control rate of low-density lipoprotein-cholesterol in specific populations. Data from 2016–2022 Korea National Health and Nutrition Examination Survey; adults aged ≥ 20 years.

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