

# DYSLIPIDEMIA FACT SHEETS IN KOREA, 2018



**KSoLA**  
The Korean Society of Lipid and Atherosclerosis



# DYSLIPIDEMIA FACT SHEETS IN KOREA, 2018

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The Korean Society of Lipid and Atherosclerosis



# Dyslipidemia Fact Sheets in Korea from the Korean Society of Lipid and Atherosclerosis (KSoLA)

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Economic and social developments in Korea have significantly impacted lifestyles and diet of its people, thus resulting in an increase in non-communicable diseases such as dyslipidemia, atherosclerosis, cardiovascular diseases as well as diabetes. KSoLA is a nonprofit organization, founded in 2001. KSoLA's mission is to prevent and treat atherosclerosis, and to improve public awareness of atherosclerosis and its risk factors.

In effort to uphold its mission, since 2015, KSoLA has been publishing Dyslipidemia Fact Sheets based on the nationwide survey, the Korea National Health and Nutrition Examination Survey (KNHANES) conducted by the Ministry of Health and Welfare and the Korean Centers for Disease Control and Prevention (KCDC). These Fact Sheets contain nation-representative statistics of dyslipidemia, along with medical issues associated with dyslipidemia. The purpose is to increase public awareness of the disease as well as encourage those in healthcare professions to collaborate and communicate with each other to accomplish KSoLA's mission.

**President**

Myung Ho Jeong



**Chairman**

Hyo-Soo Kim



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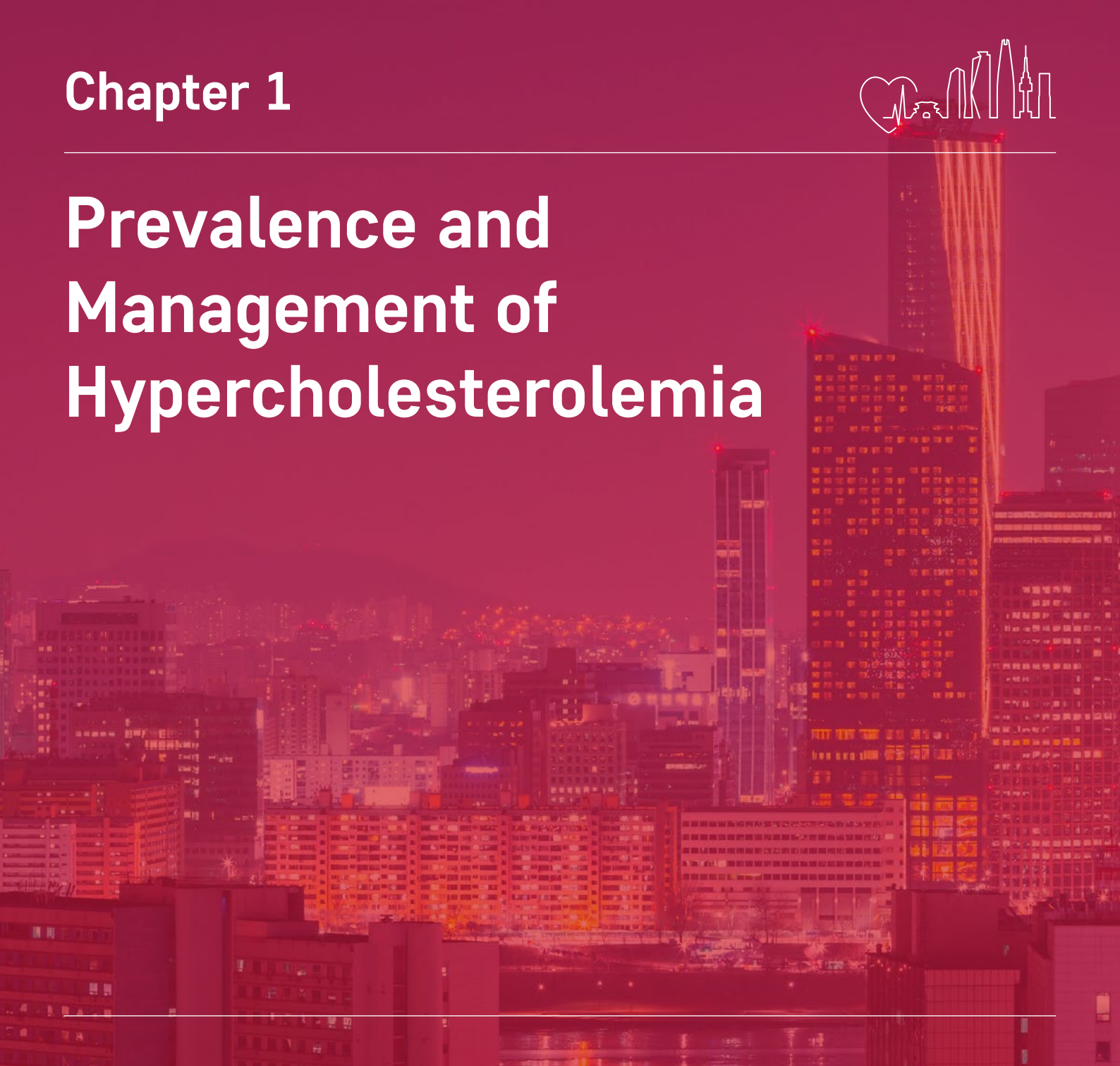
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### Summary and Conclusion

# Chapter 1



# Prevalence and Management of Hypercholesterolemia



# Definitions

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Hypercholesterolemia was defined by total cholesterol  $\geq 240$  mg/dL, previously diagnosed, or taking any anti-dyslipidemic drug(s).

# Data Sources

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The estimates were derived from the 2012-2016 Korea National Health and Nutritional Examination Survey (KNHANES) of the Korea Centers for Disease Control and Prevention (KCDC) and the National Health Insurance Service.

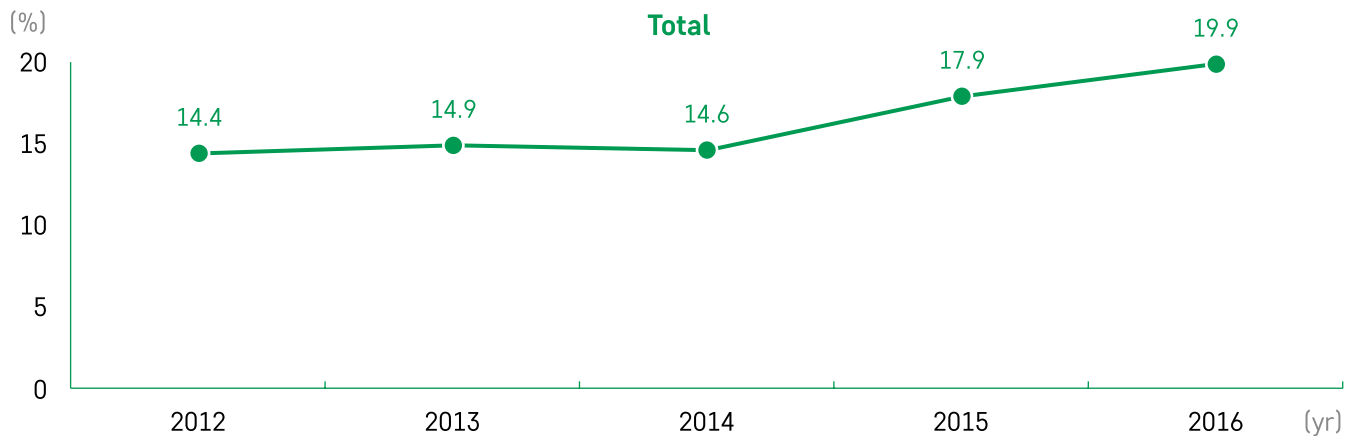
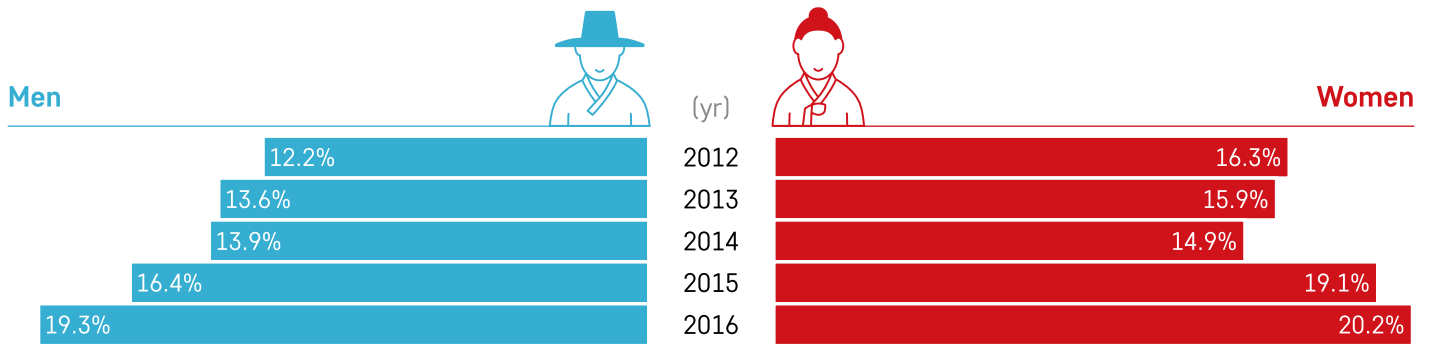
# Prevalence of Hypercholesterolemia

The prevalence of hypercholesterolemia in adults 30 years or older is 19.9% in 2016.

**“Nearly 1 out of 5 adults has hypercholesterolemia.”**



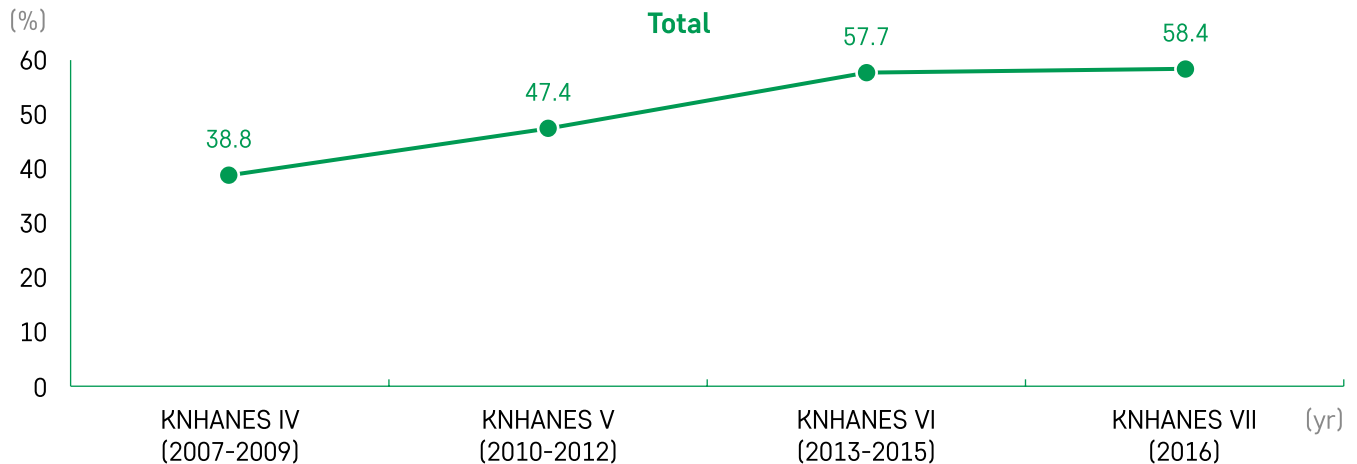
Changes of prevalence of hypercholesterolemia in Korea from 2012-2016



# Awareness of Hypercholesterolemia

The awareness rate of hypercholesterolemia is 58.4%.

**“Four out of 10 adults with hypercholesterolemia are not aware of their condition.”**

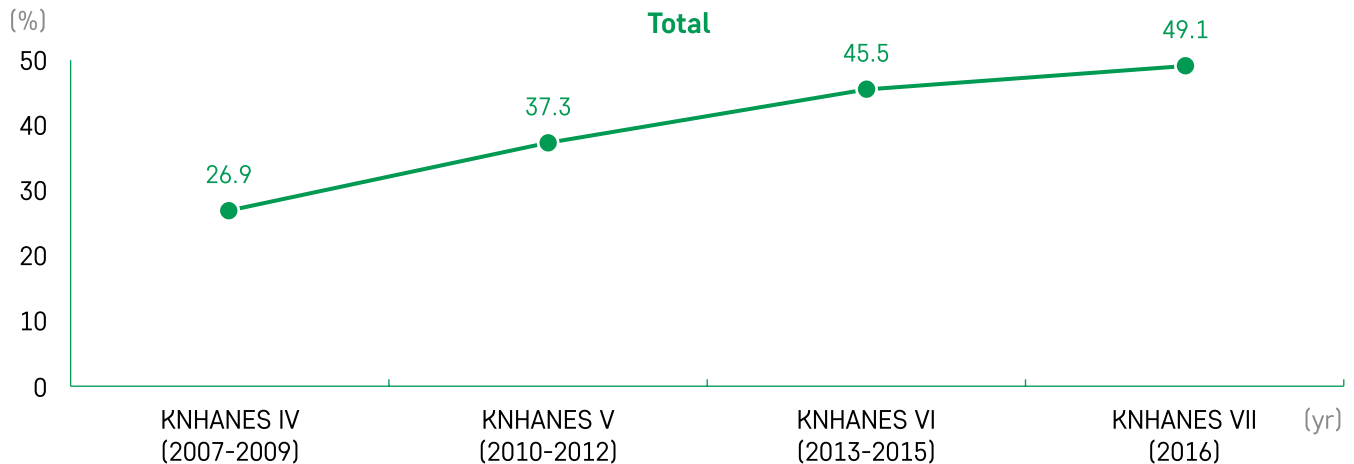




# Treatment Rate of Hypercholesterolemia



The treatment rate among adults with hypercholesterolemia is 49.1%.  
**“Less than half of adults with hypercholesterolemia take medications.”**

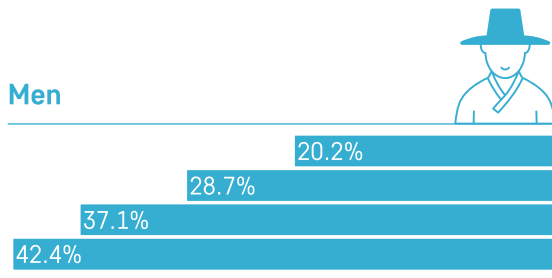


# Control Rate of Hypercholesterolemia



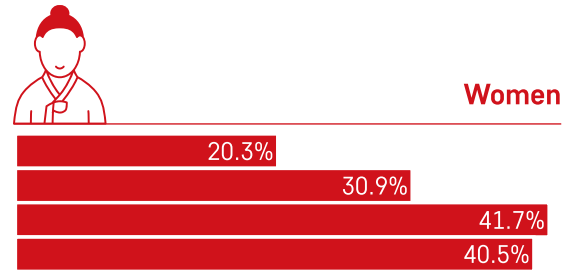
The control rate among adults with hypercholesterolemia is 41.3% for target goal of total cholesterol <200 mg/dL.

**“Only 2 out of 5 adults with hypercholesterolemia achieve target cholesterol levels.”**



## Among adults with hypercholesterolemia

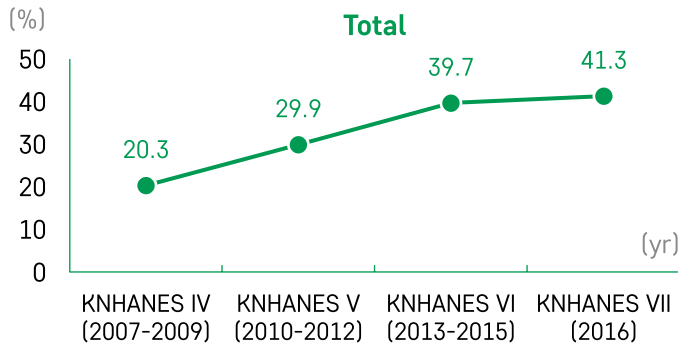
KNHANES IV(2007-2009)  
KNHANES V(2010-2012)  
KNHANES VI(2013-2015)  
KNHANES VII(2016)



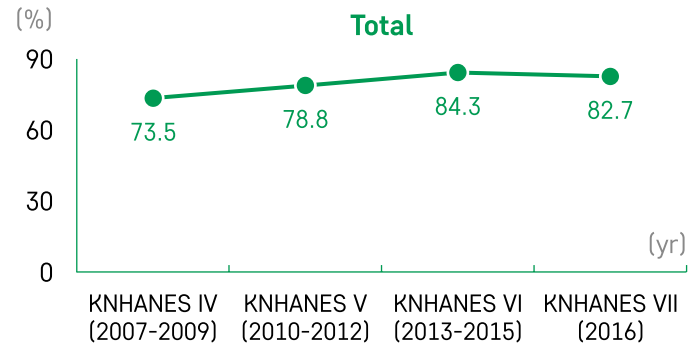
## Among adults with anti-dyslipidemic drug(s)



KNHANES IV(2007-2009)  
KNHANES V(2010-2012)  
KNHANES VI(2013-2015)  
KNHANES VII(2016)



Among adults with hypercholesterolemia



Among adults with anti-dyslipidemic drug(s)

## Chapter 2

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# Dyslipidemia in Korea, 2018



# Definitions

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- Hyper-low density lipoprotein (LDL) cholesterolemia was defined as serum LDL-cholesterol  $\geq 160$  mg/dL or taking antidyslipidemic drug(s).
- Hypo-high density lipoprotein (HDL) cholesterolemia was defined as serum HDL-cholesterol  $< 40$  mg/dL.
- Hypertriglyceridemia was defined as serum triglycerides  $\geq 200$  mg/dL.
- Dyslipidemia was diagnosed as having one of the definitions stated above, taking any medication for dyslipidemia, or previously diagnosed.

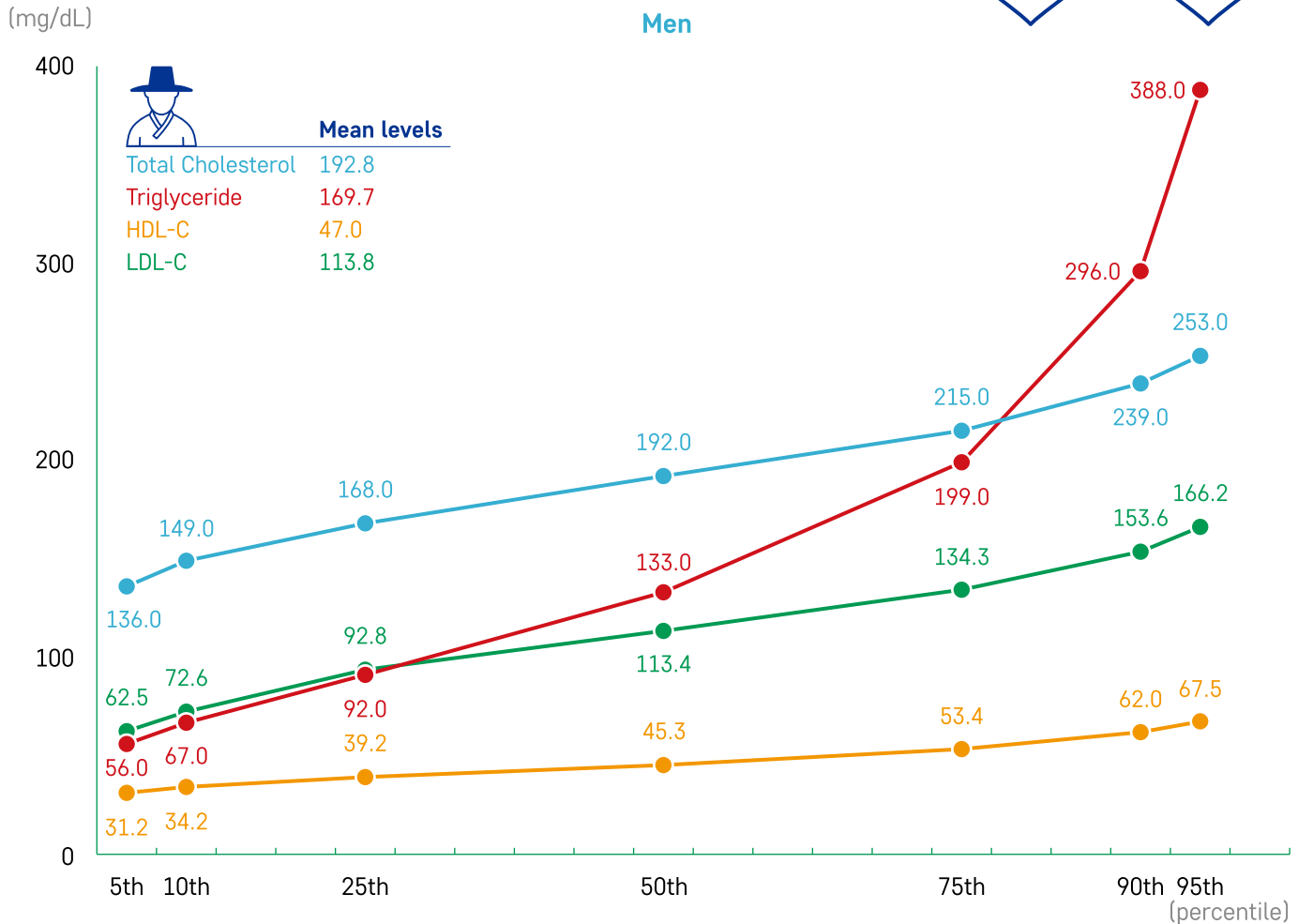
# Data Sources

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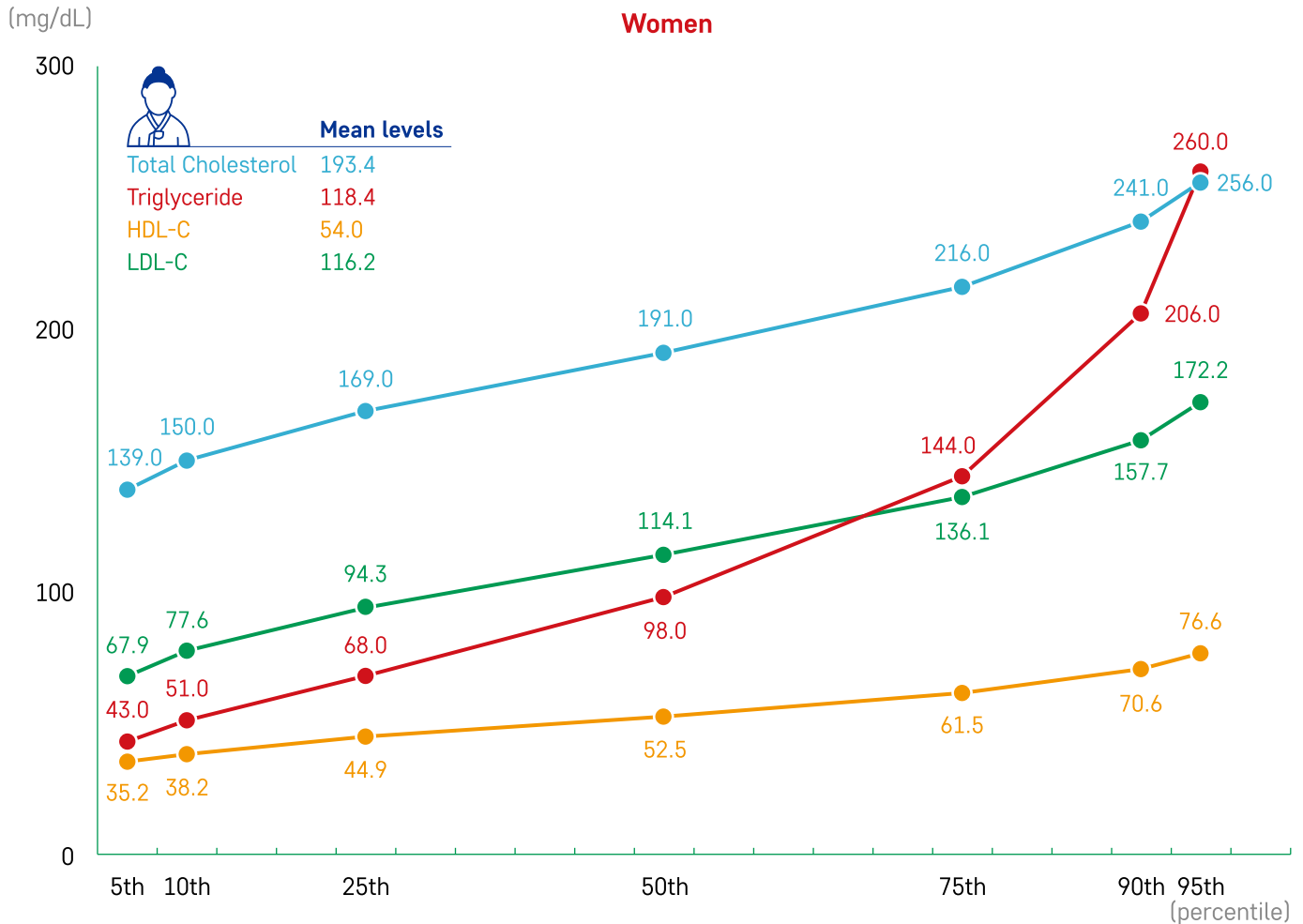
The estimates were derived from the 2014-2016 Korea National Health and Nutritional Examination Survey (KNHANES) of the Korea Centers for Disease Control and Prevention (KCDC).

# Lipid Profiles in Korean Adults

The mean serum total cholesterol levels in adults aged 30 years or older are 192.8 mg/dL in men and 193.4 mg/dL in women.

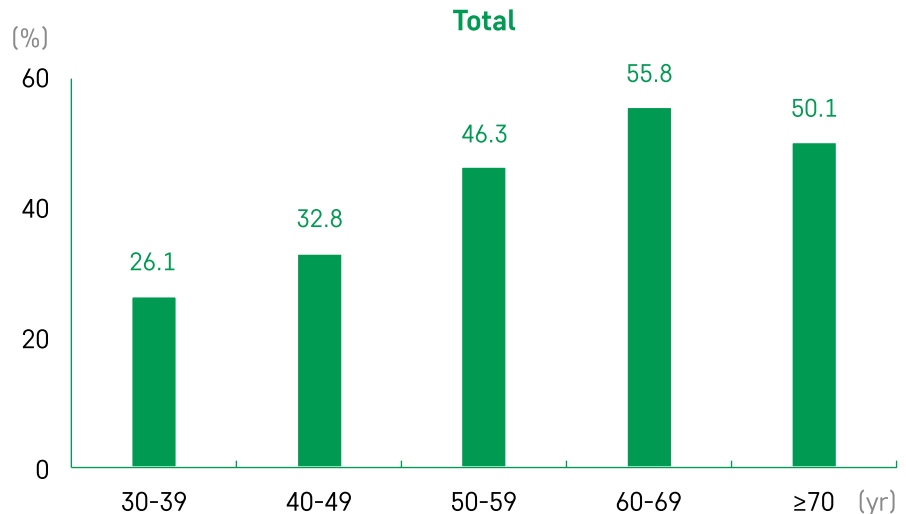
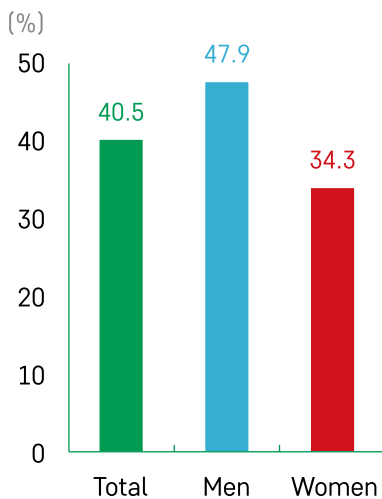
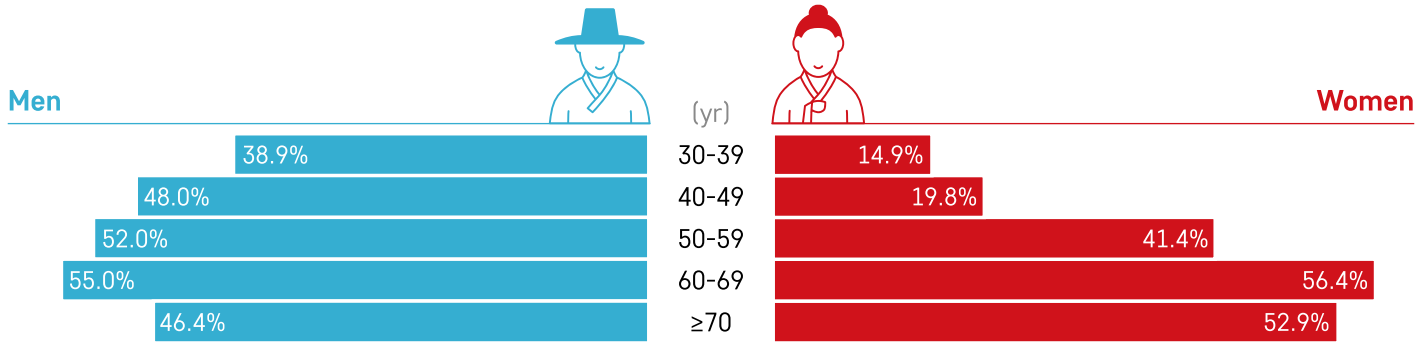
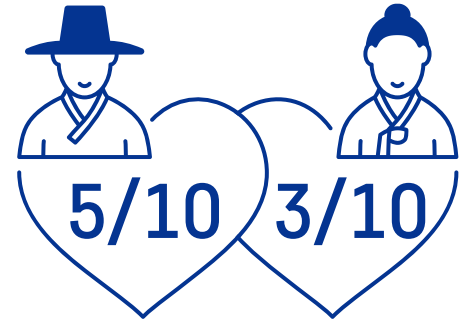


# Lipid Profiles in Korean Adults



# Prevalence of Dyslipidemia

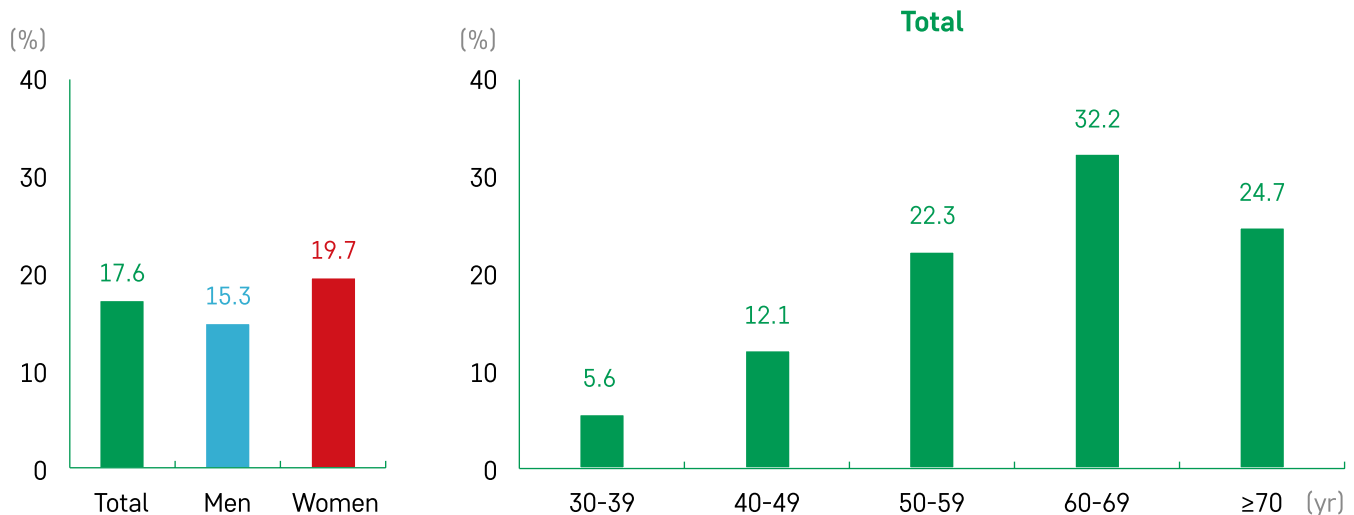
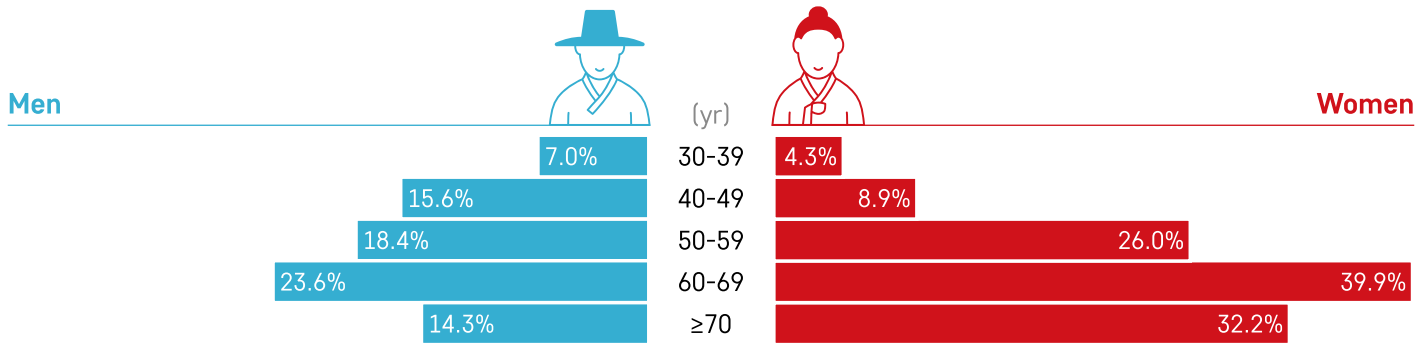
Four among 10 adults aged 30 years or older have dyslipidemia.  
**“About 5 out of every 10 men and 3 out of every 10 women are dyslipidemic.”**



# Hyper-LDL cholesterolemia

The prevalence of hyper-LDL cholesterolemia among adults aged 30 years or older is 17.6%. It increases with age, where 1 out of every 4 men and 2 out of every 5 women aged 60 years or older have hyper-LDL cholesterolemia.

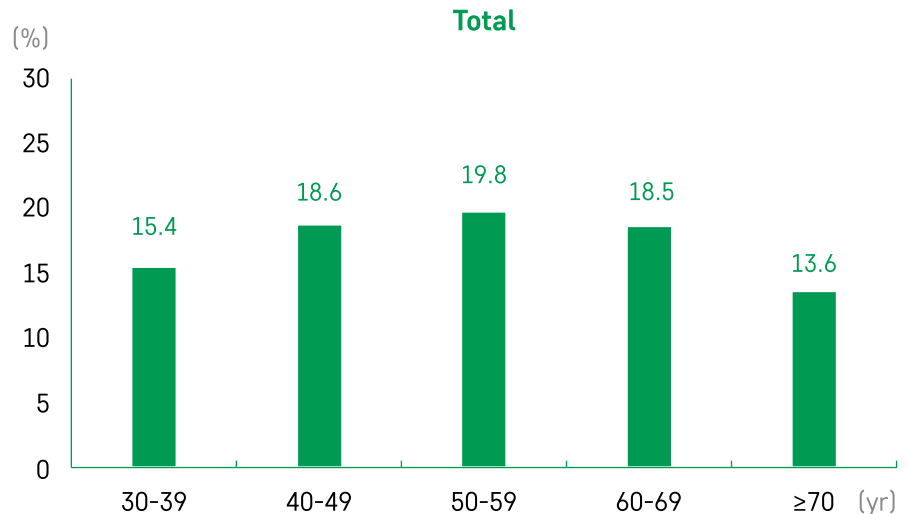
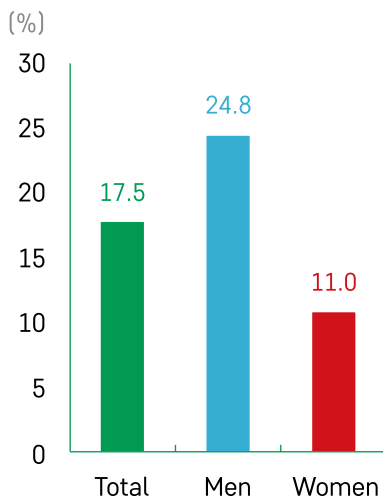
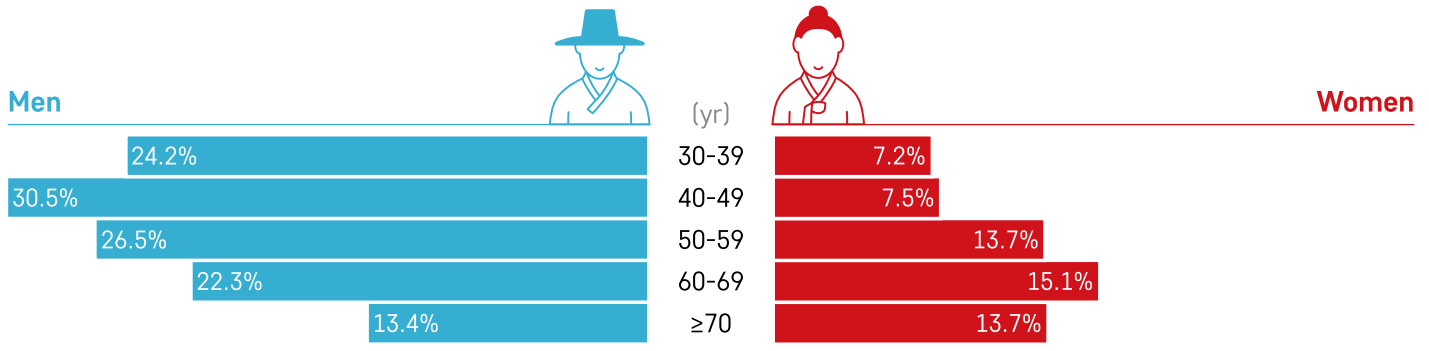
***“The proportion of women with hyper-LDL cholesterolemia in their 50s is 6 times higher than those in their 30s.”***





# Hypertriglyceridemia

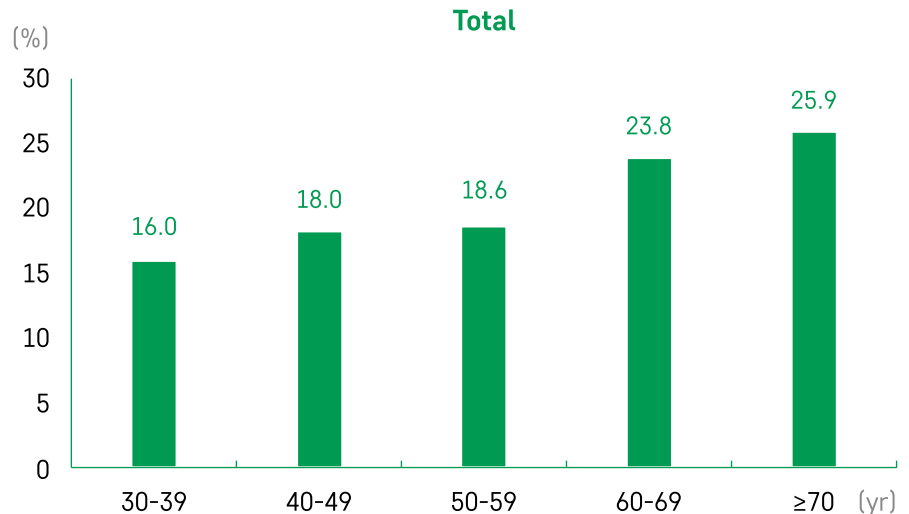
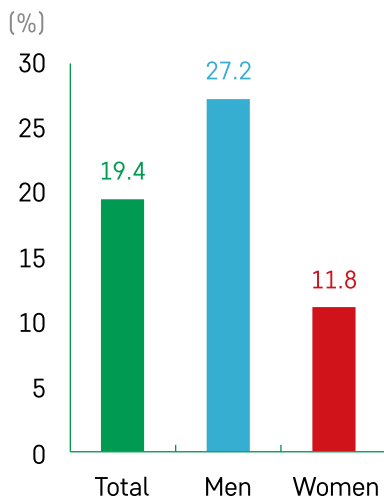
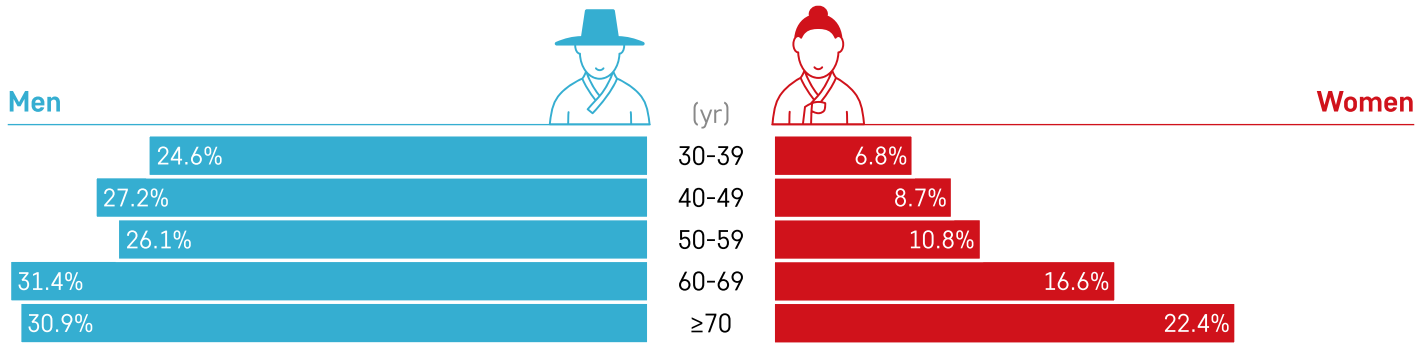
The prevalence of hypertriglyceridemia among adults aged 30 years or older is 17.5%.  
**“The proportion of men with hypertriglyceridemia in their 40s is 4 times higher than those of women within the same age group.”**



# Hypo-HDL cholesterolemia

The prevalence of hypo-HDL cholesterolemia among adults aged 30 years or older is 19.4%.

**“The proportion of women with hypo-HDL cholesterolemia in their 50s is 1.5 times higher than those in their 30s.”**



# Dyslipidemia in Adults with Obesity

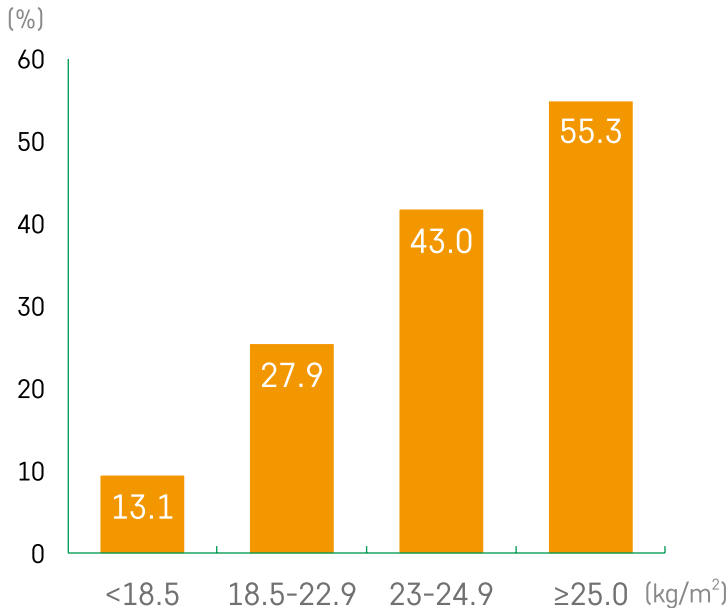


Even within the normal range of body weight (Body mass index 18.5-22.9 kg/m<sup>2</sup>), 1 out of every 4 adults has dyslipidemia.

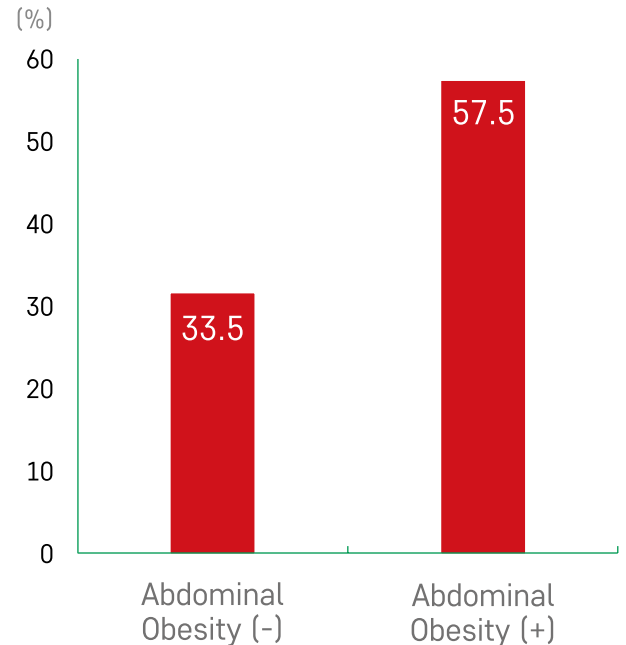
In cases with abdominal obesity, 3 out of every 5 adults show dyslipidemic profiles.

**“About half of overweight or obese adults have dyslipidemia.”**

**Prevalence (%) of dyslipidemia according to body mass index**



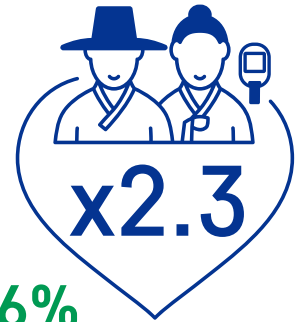
**Prevalence (%) of dyslipidemia according to abdominal obesity**



Abdominal obesity was defined by using waist circumference ≥90 cm for men, ≥85 cm for women.

# Dyslipidemia in Adults with Diabetes

*“The proportion of diabetic adults with dyslipidemia is 2.3 times higher than non-diabetics.”*

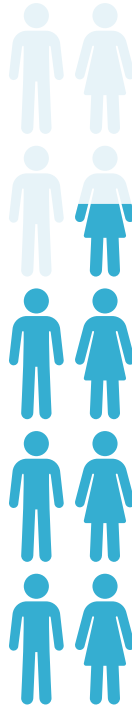


37.3%



Non-diabetic  
(LDL-C  $\geq 160$  mg/dL)

65.7%



Diabetic with  
LDL-C  $\geq 160$  mg/dL

86.6%



Diabetic with  
LDL-C  $\geq 100$  mg/dL

Diabetes was defined by fasting plasma glucose  $\geq 126$  mg/dL, previously diagnosed, or taking any anti-diabetic medication.

# Dyslipidemia in Adults with Hypertension



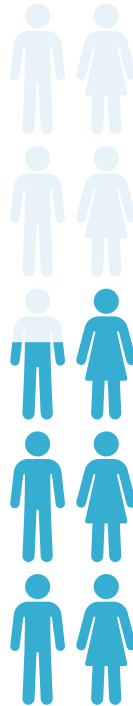
*“The proportion of hypertensive adults with dyslipidemia is 2.1 times higher than normotensives.”*

33.6%



Normotensive with  
LDL-C  $\geq 160$  mg/dL

55.8%



Hypertensive with  
LDL-C  $\geq 160$  mg/dL

71.0%



Hypertensive with  
LDL-C  $\geq 130$  mg/dL



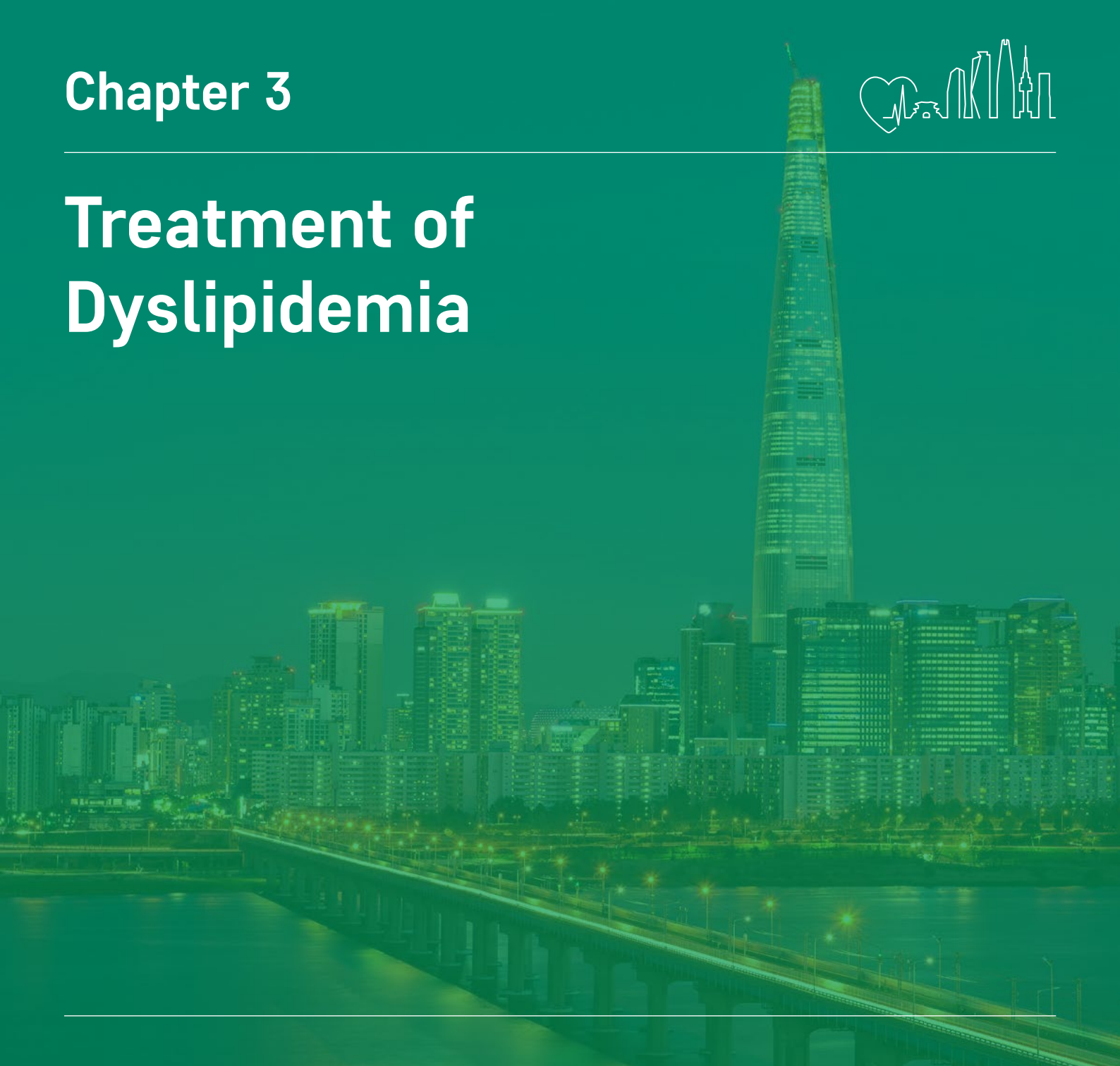
# Chapter 3

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# Treatment of Dyslipidemia

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# Definitions

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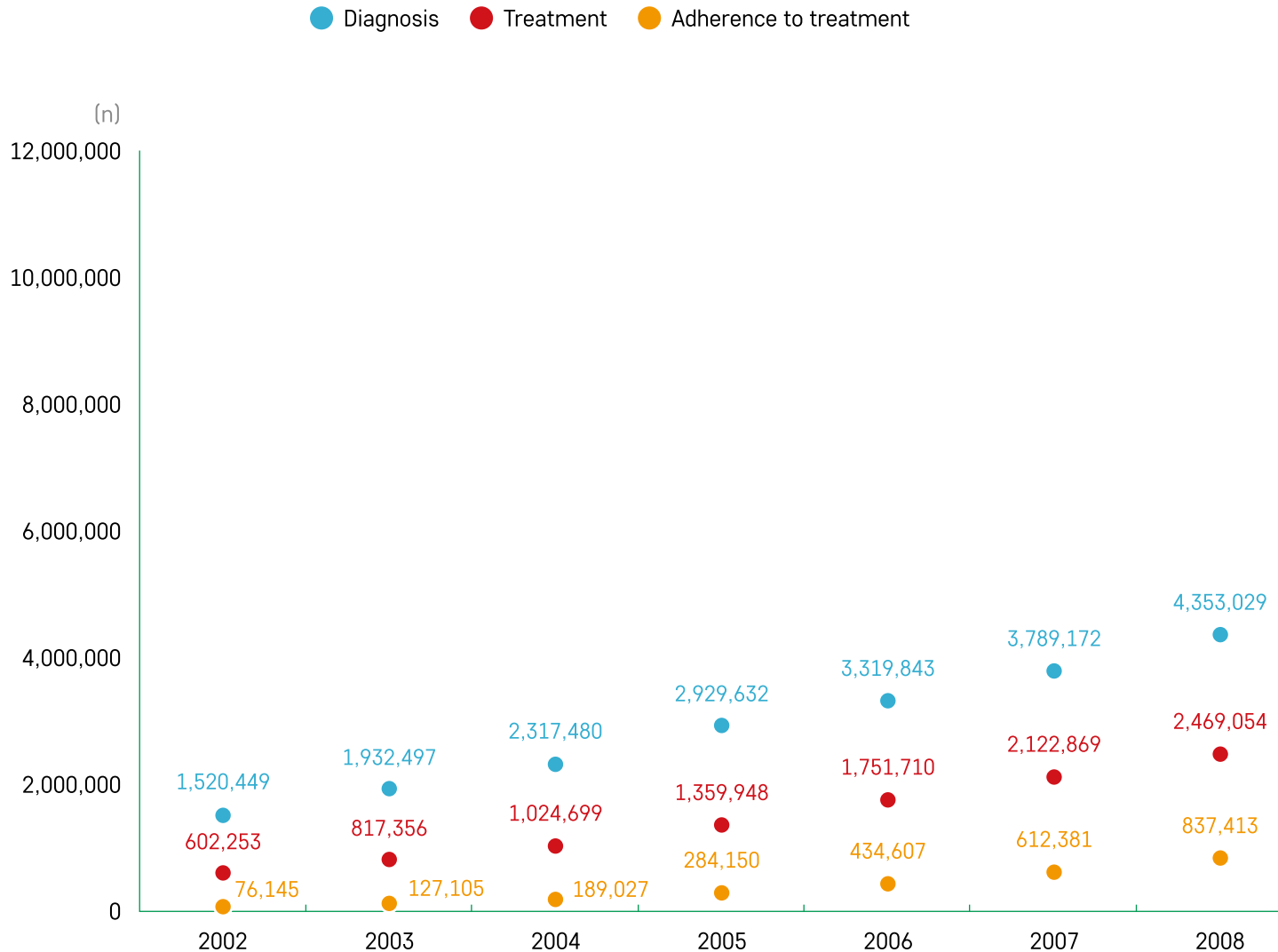
- Diagnosis of dyslipidemia was based on the disease-classification codes (ICD-10 code E78) of the health insurance claim forms and database on health screening service.
- Treatment was defined based on both ICD-10 code (E78) and prescription of anti-dyslipidemic drug(s).
- Adherence to treatment was defined as the condition wherein anti-dyslipidemic drug(s) was prescribed more than 290 days within a year ( $\geq 80\%$  of year).

# Data Sources

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The total number of people diagnosed or treated with dyslipidemia was determined using the National Health Insurance Big Data from 2002 through 2016 made by National Health Insurance Service (NHIS).

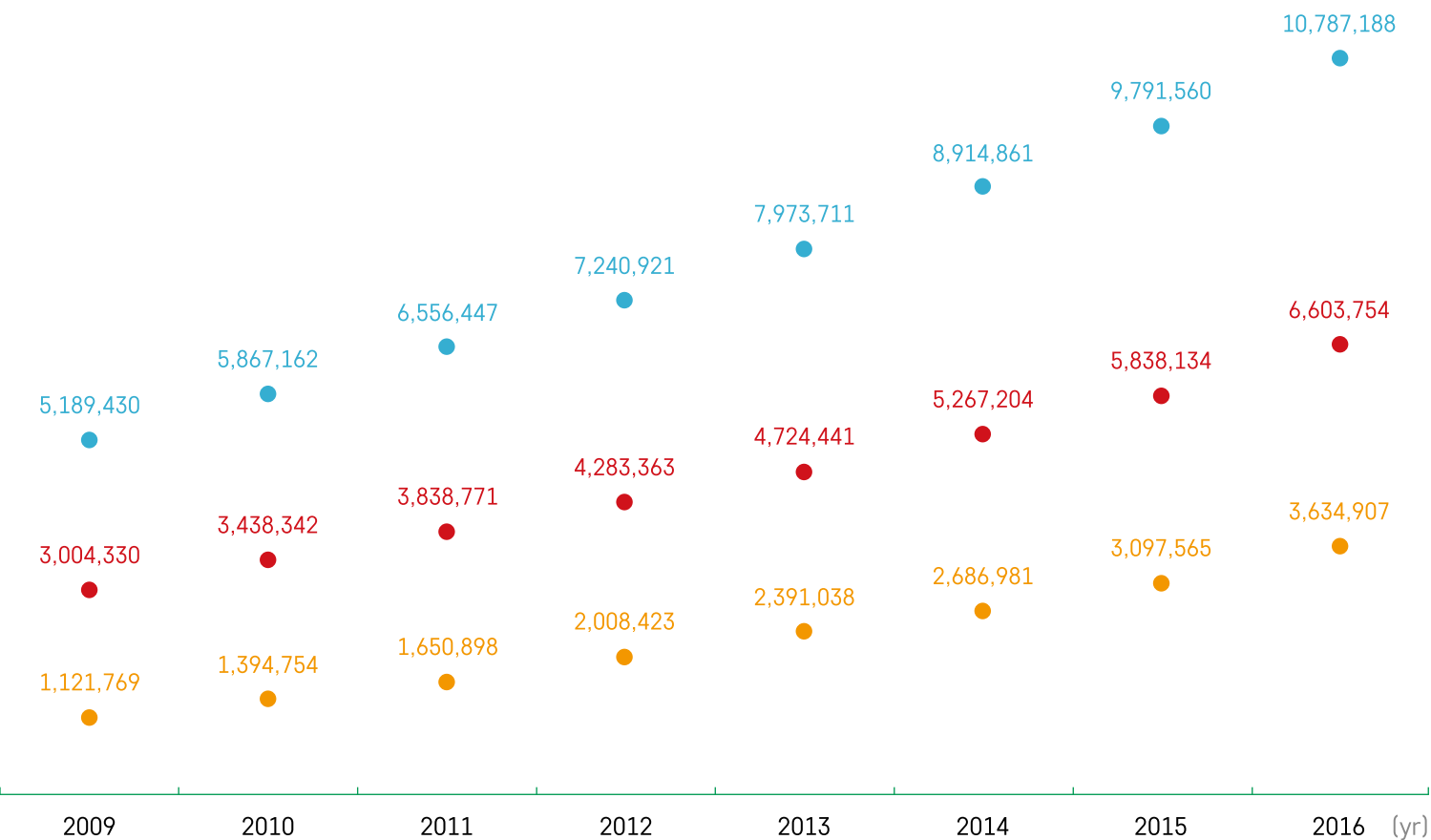
# Treatment of Dyslipidemia



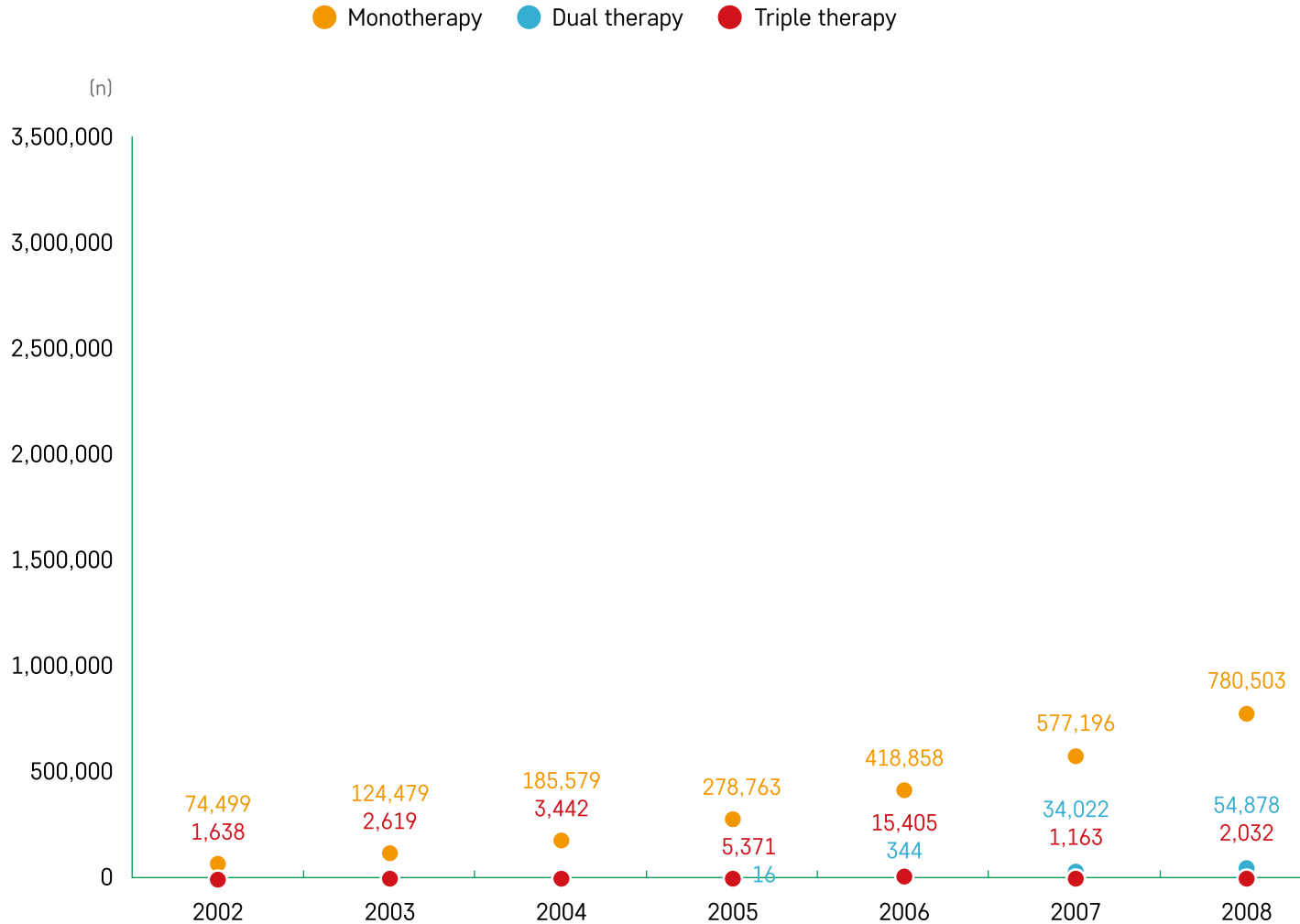


About 10.7 million Korean people have dyslipidemia in 2016.  
The number of people adhered to treatment for dyslipidemia has markedly increased over the last 15 years (47.7 times).

**“Only 1 of 3 people with dyslipidemia adheres to treatment.”**



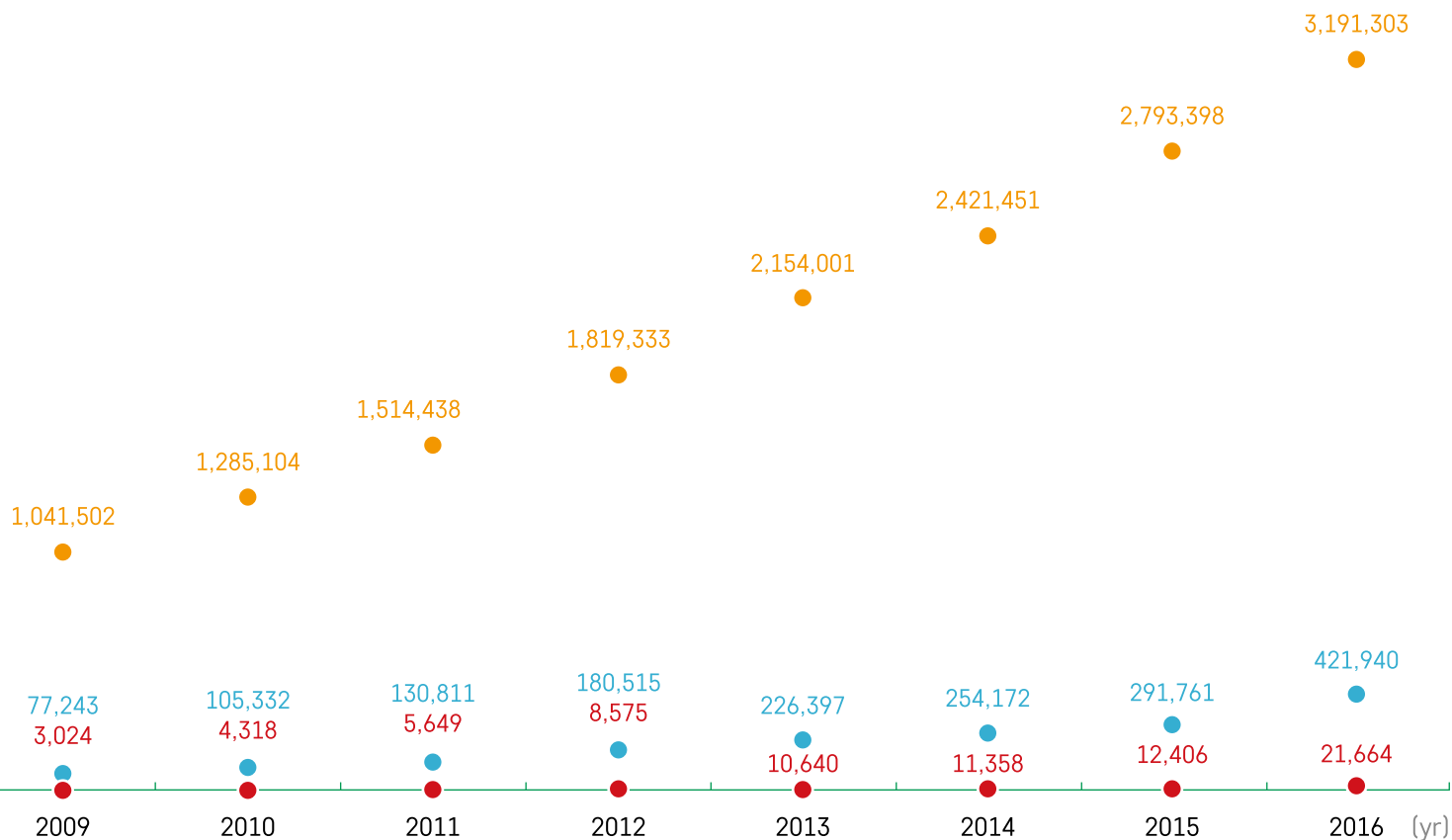
# Changes in Prescription of Anti-Dyslipidemic Drugs



Most people (87.8%) with dyslipidemia have been treated with monotherapy. People with dyslipidemia receiving dual therapy have steadily increased since 2002, and the proportion was 11.6% in 2016.

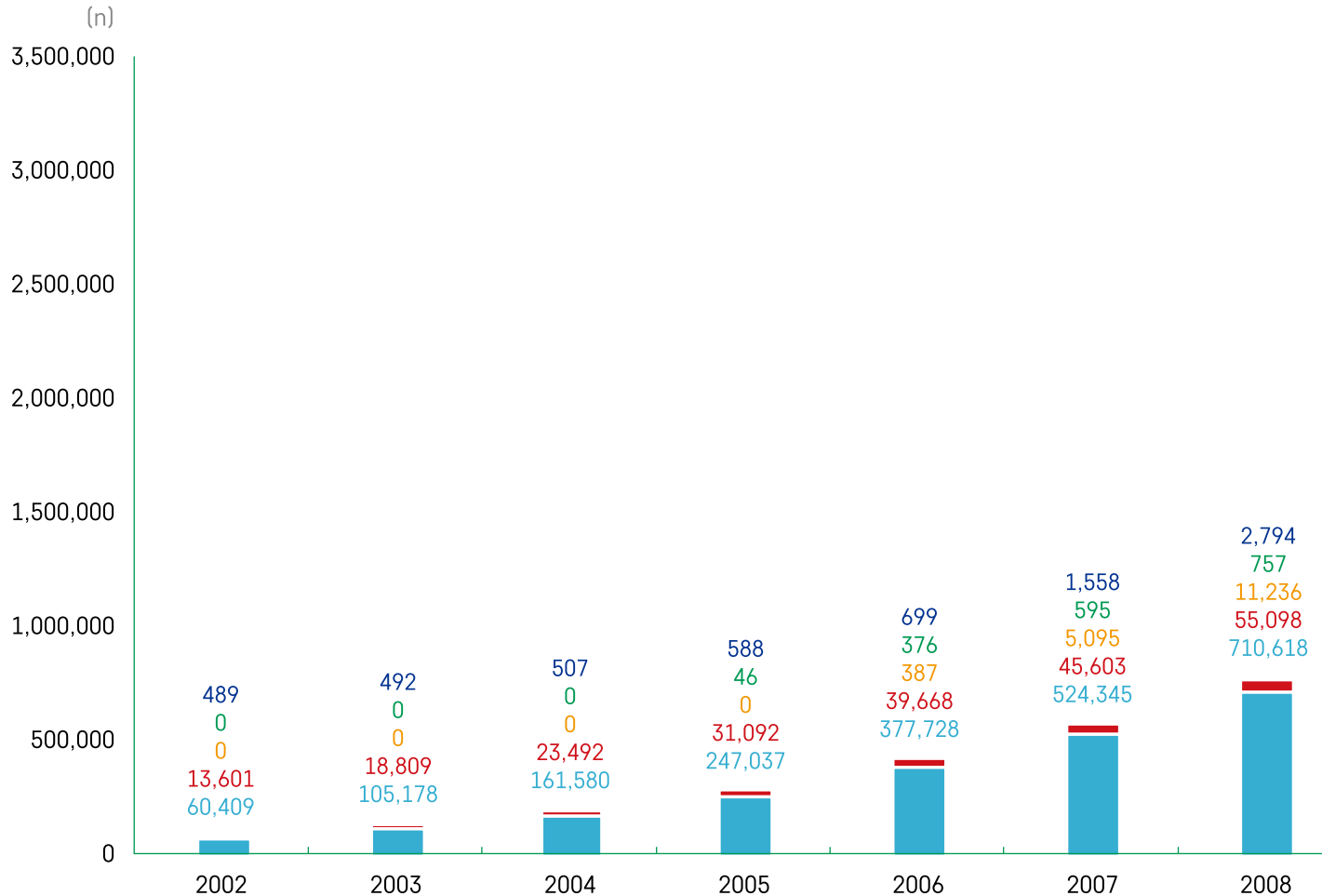
Only 0.6% of people with dyslipidemia are receiving treatment with triple therapy.

***“In 2016, monotherapy, dual therapy and triple therapies for dyslipidemia are 87.8%, 11.6%, and 0.6%, respectively.”***



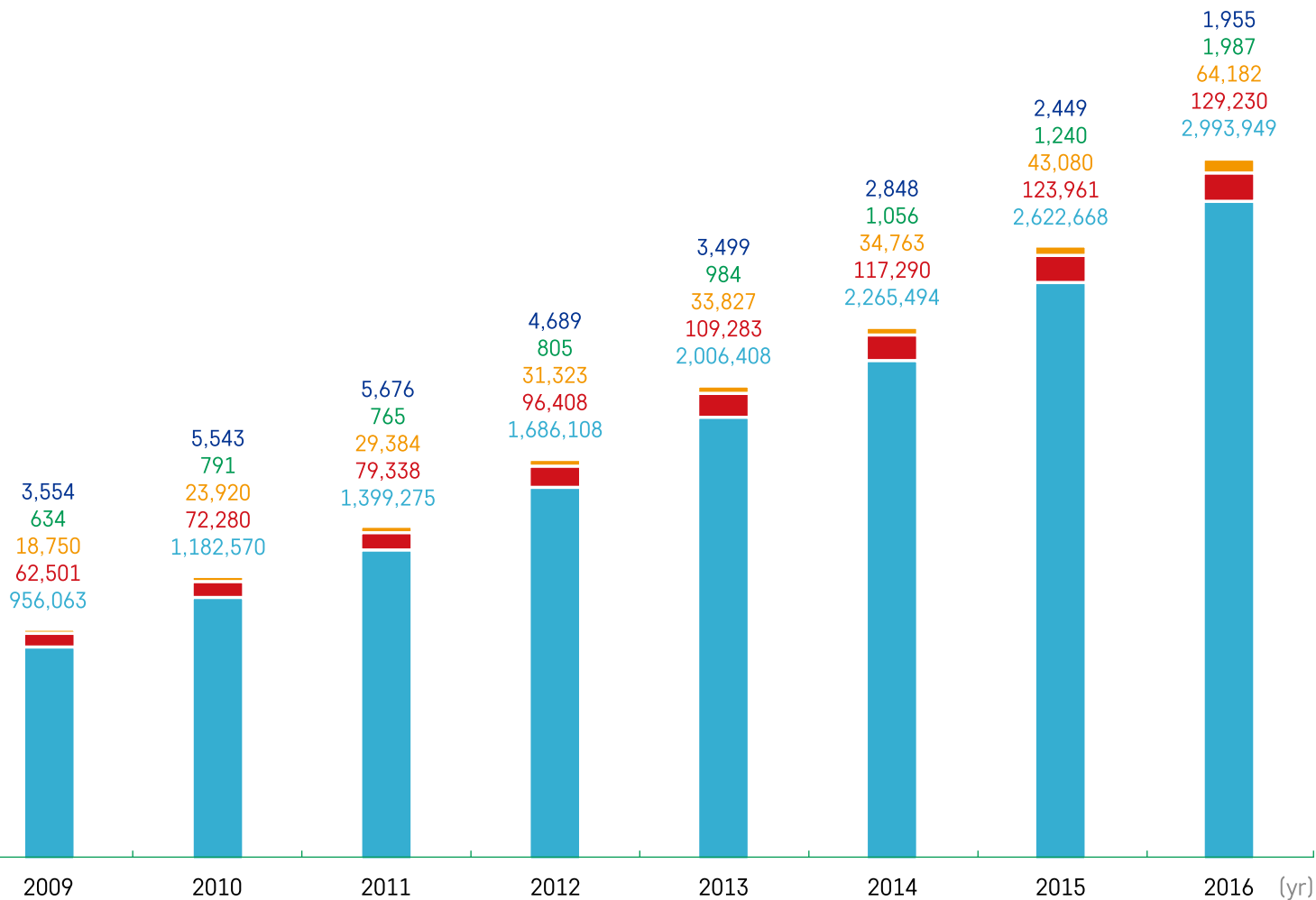
# Trend in Monotherapy

● Statin ● Fibrate ● Omega-3 ● Ezetimibe ● Others (niacin or cholestyramine)



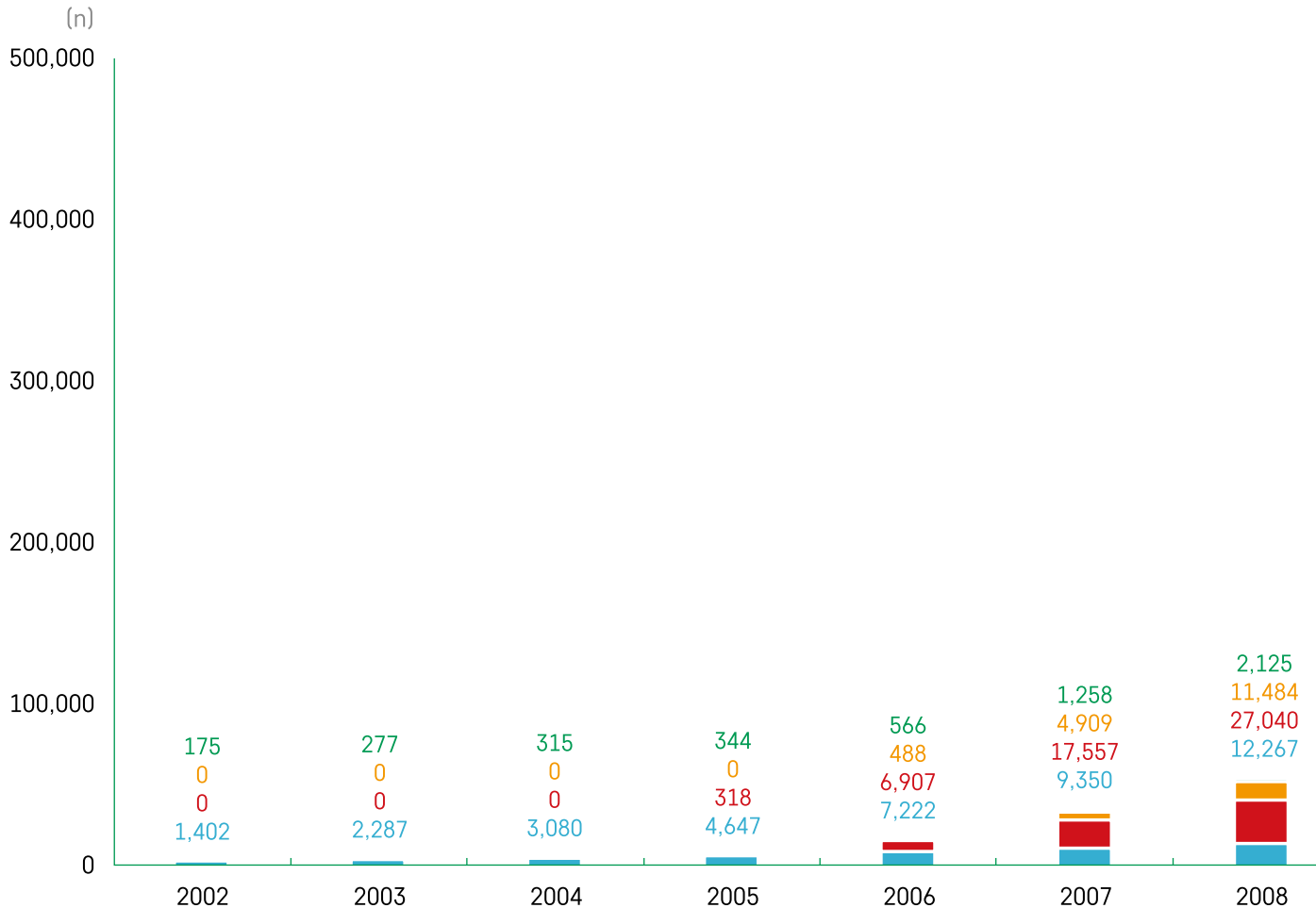
Statin comprises a large proportion of monotherapy, which is 93.8% in 2016.

The use of fibrate has decreased from 18.3% in 2002 to 4.0% in 2016, while the use of omega-3 has increased from 0.1% in 2006 to 2.0% in 2016.



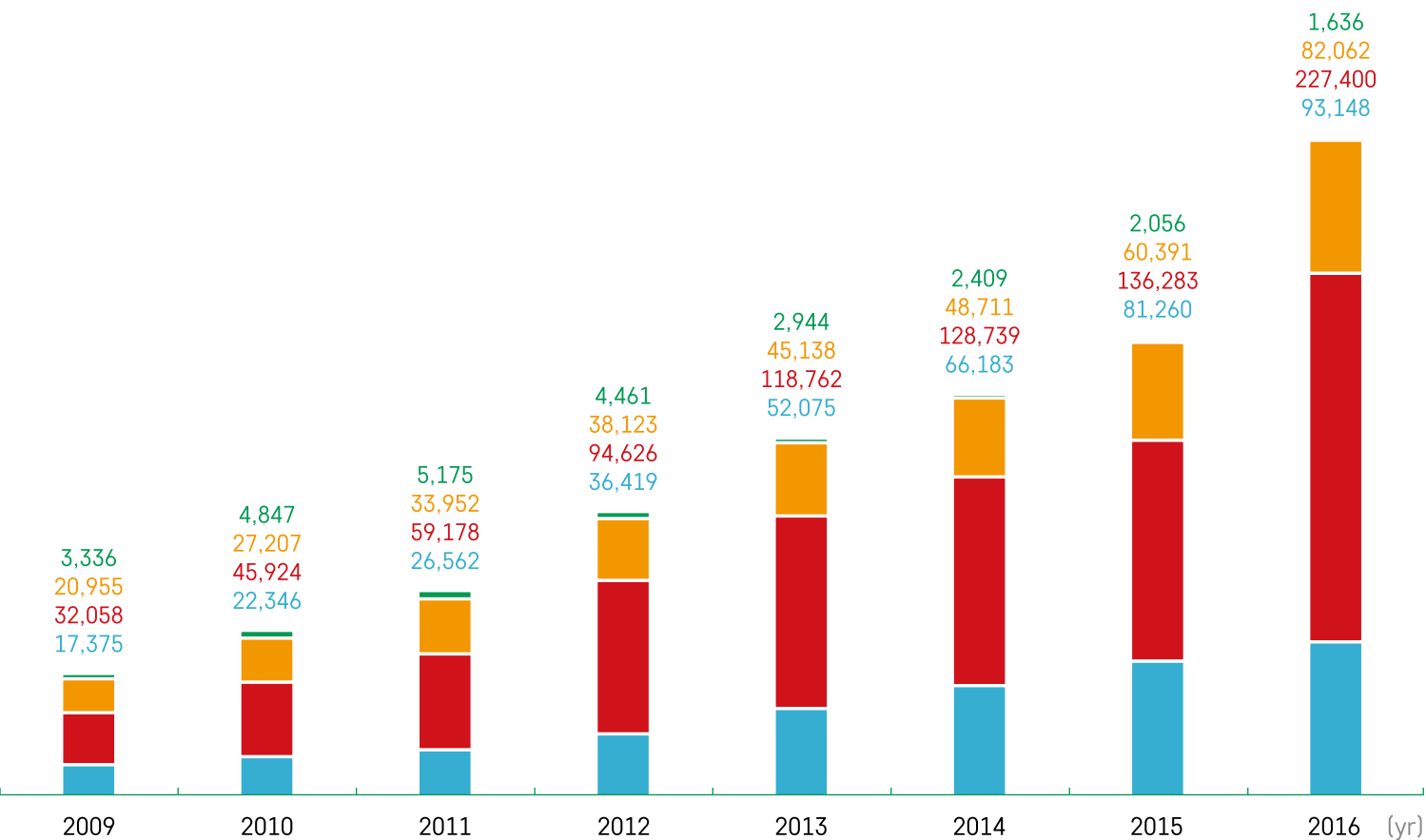
# Trend in Dual Therapy

● Statin+Fibrate   
 ● Statin+Ezetimibe   
 ● Statin+Omega-3   
 ● Statin+Others (niacin or cholestyramine)



Dual therapy with statin and ezetimibe has increased since 2006 and comprises 56.3% of dual therapy in 2016.

The use of fenofibrate or omega-3 in combination with statin has also increased and are 23.0% and 20.3% in 2016, respectively.



# Chapter 4



## Trends in Dietary Intake in Korea from 2007 to 2016





# Definitions

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- Energy intake was estimated using the 24h dietary recall data from the 2007–2016 Korea National Health and Nutritional Examination Survey (KNHANES).
- Excessive energy intake was defined as the condition wherein the percentage of energy intake was greater than 125% of the estimated energy requirement (EER) recommended by the Korean Dietary Reference Intake (KDRI).
- The percentage of energy intake from carbohydrate, protein, and fat was calculated using the following method: e.g.) The percentage of energy intake from protein =  $(\text{g of protein intake} \times 4) / \{(\text{g of protein intake} \times 4) + (\text{g of fat intake} \times 9) + (\text{g of carbohydrate intake} \times 4)\} \times 100$

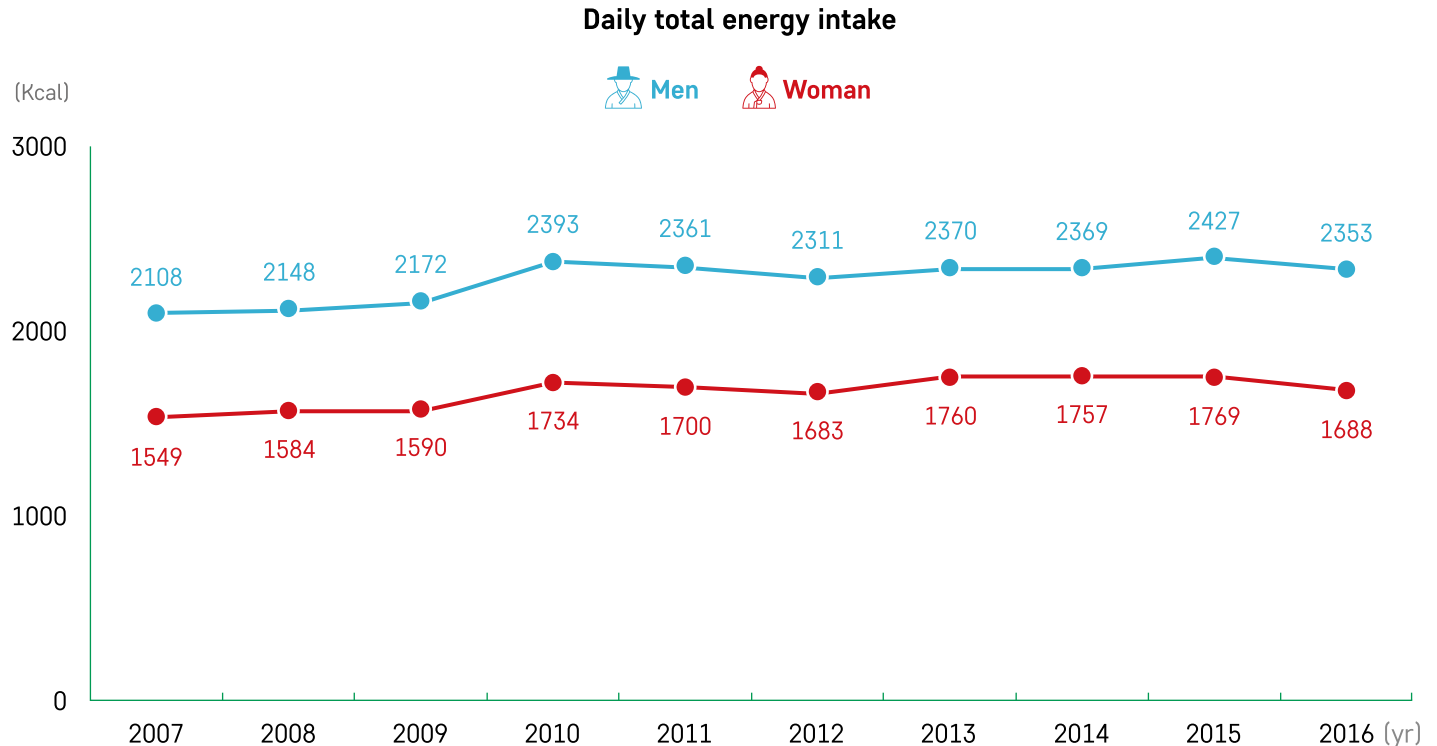
# Data Sources

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The data for the estimated energy intake and the proportion of macronutrients were obtained from the 2016 National Health Statistics and 2017 Chronic Disease and Issue (the Korea Centers for Disease Control and Prevention, KCDC, and the Korean Ministry of Health and Welfare 2017). The reported data in the 2016 National Health Statistics and 2017 Chronic Disease and Issue were determined using data from the 2007–2016 Korea National Health and Nutritional Examination Survey (KNHANES) conducted by the Korea Centers for Disease Control and Prevention (KCDC).

# Total Energy Intake

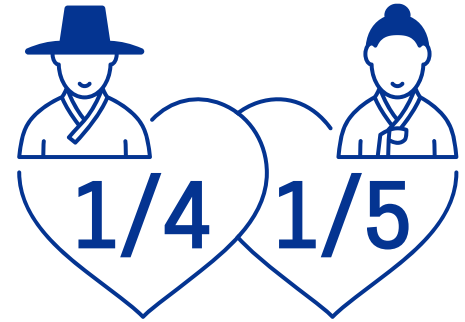
Total energy intake has steadily increased in men since 2007, while it has been maintained at a relatively constant level in women.



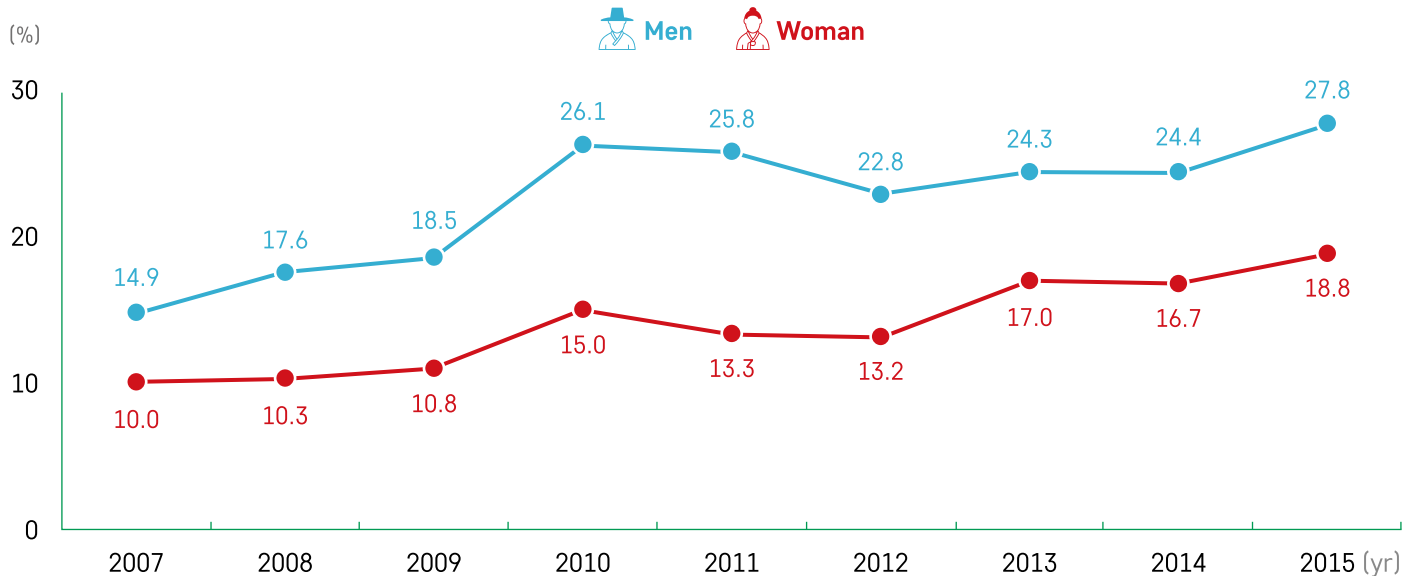
- 1) Reference 2016 National Health Statistics (KCDC)
- 2) Data source 2007-2016 Korea National Health and Nutritional Examination Survey (KNHANES) conducted by KCDC.
- 3) Subjects Koreans aged 1 year or older. The amounts of energy intake were standardized to the age structure of the Korean population in the fall, 2005.

# Excessive Energy Intake

The proportion of people with excessive energy intake has continuously increased both in men and women since 2007. In 2015, the percentages of people with excessive energy intake are 27.8% in men and 18.8% in women. **“One of 4 men and 1 of 5 women take excessive energy in Korea (125% of the KDRI).”**



Excessive energy intake

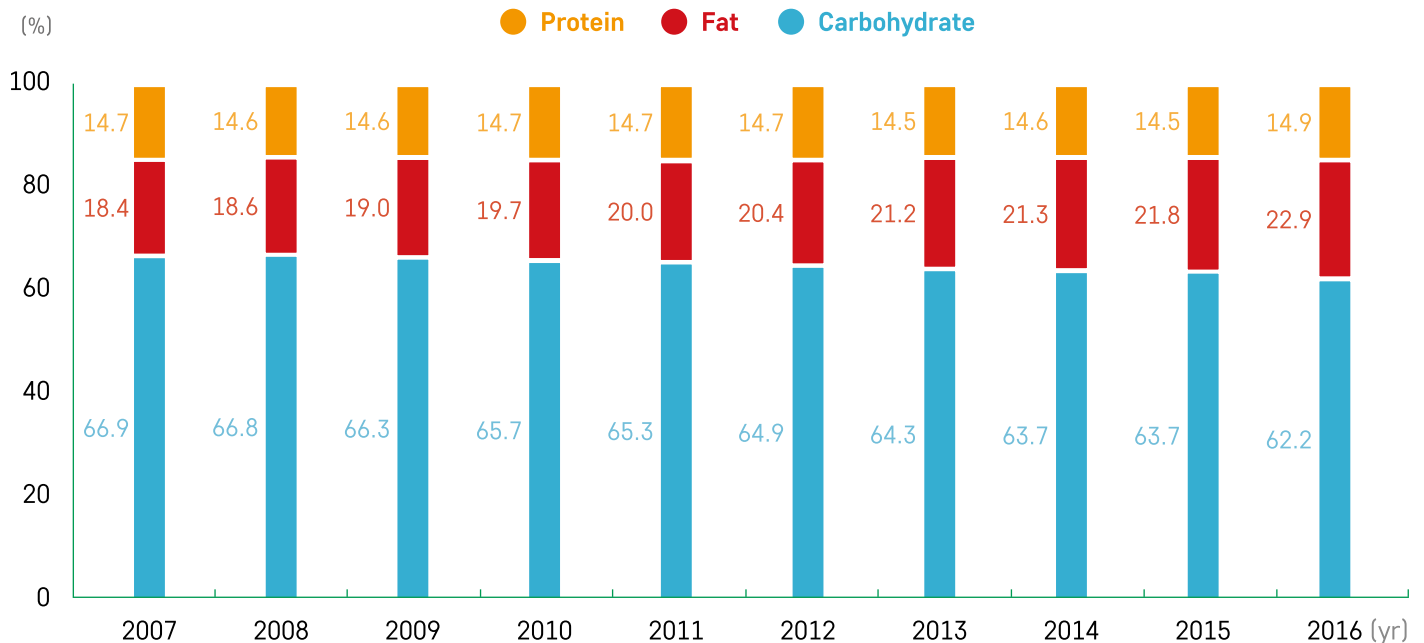


- 1) Excessive energy intake Energy intake that is greater than 125% of the estimated energy requirement (EER) recommended by the Korean Dietary Reference Intake (KDRI).
- 2) Subjects Korean people aged 19 years or older, The incidence of excess energy intake was standardized to the age structure of the Korean population in the fall, 2005.
- 3) Reference 2017 Chronic Disease and Issue, KCDC
- 4) Data source 2007-2015 Korea National Health and Nutritional Examination Survey (KNHANES) conducted by KCDC.
- 5) The data should be interpreted with caution. The results were calculated from 1 day dietary records and the energy intake could have been overestimated.

# Dietary Macronutrient Intake

The percentage of energy intake from fat has increased from 18.4% in 2007 to 22.9% in 2016, while the percentage of energy intake from carbohydrate has decreased from 66.9% in 2007 to 62.2% in 2016. The percentage of energy intake from protein has remained relatively constant over the last 10 years.

Percentages of energy intake from macronutrients



- 1) Reference 2016 National Health Statistics (KCDC)
- 2) Data source 2007-2016 Korea National Health and Nutritional Examination Survey (KNHANES) conducted by KCDC.
- 3) Subjects Koreans aged 1 year or older. The amounts of energy intake were standardized to the age structure of the Korean population in the fall, 2005.

## Chapter 5



# Treatments of Dyslipidemia, Diabetes, and Hypertension in Korea: Joint Statement of KSoLA, KDA, and KSH

# Definitions

---

Treatment for each disease was defined based on both ICD-10 code and the prescription of relevant medications more than once.

# Data Sources

---

The total number of people treated with dyslipidemia, diabetes and hypertension were derived from National Health Insurance Service (NHIS).

KSoLA, the Korean Society of Lipid and Atherosclerosis

KDA, Korean Diabetes Association

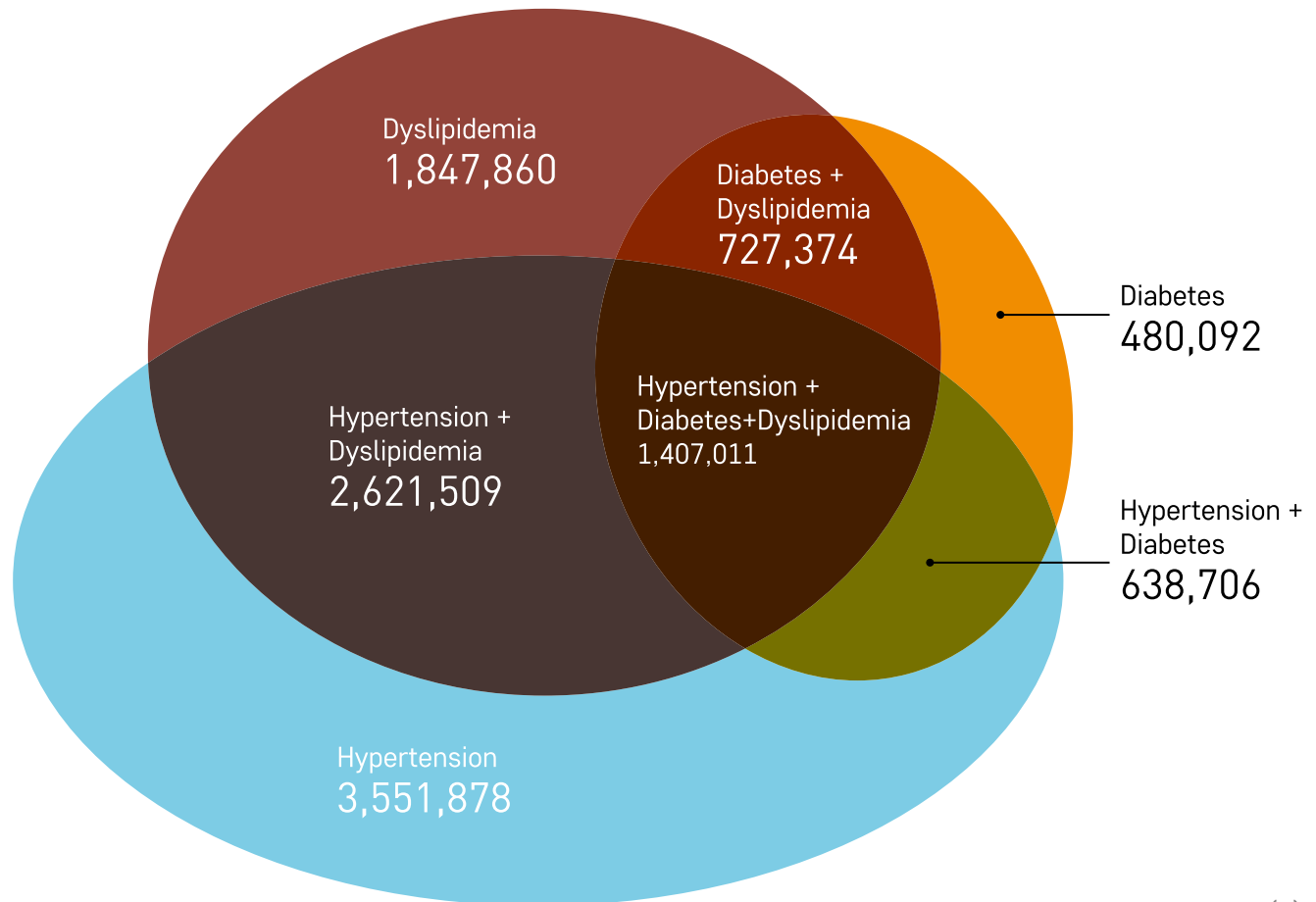
KSH, the Korean Society Hypertension

# Treatments of Dyslipidemia, Diabetes, and Hypertension in 2016

Treatment of dyslipidemia (n), 6,603,754

Treatment of diabetes (n), 3,253,183

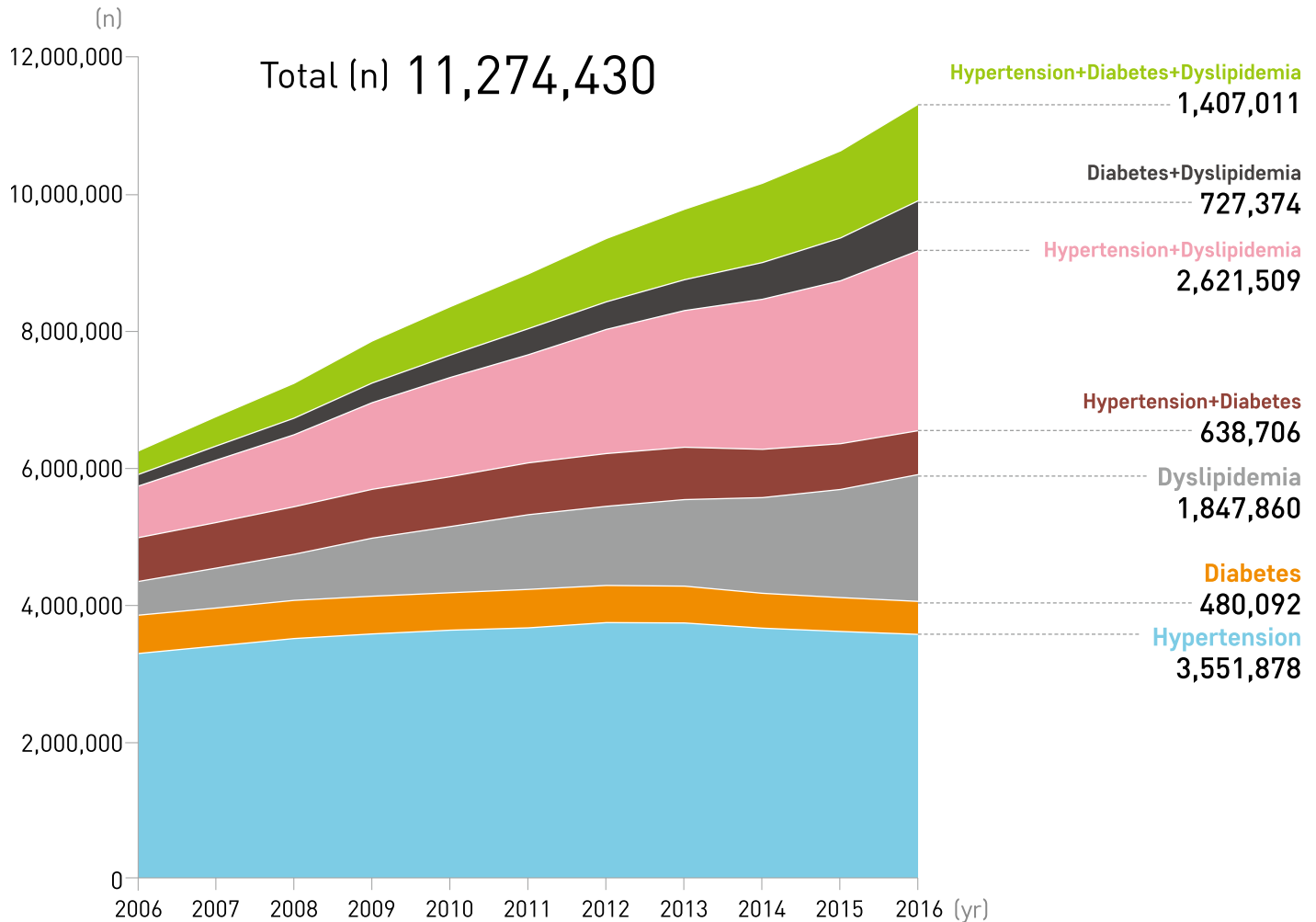
Treatment of hypertension (n), 8,219,104



(n)



# Ten Years of Trend of Treatments for Dyslipidemia, Diabetes, and Hypertension





# Summary and Conclusion

---

- In Korea, 4 among 10 Korean adults aged 30 years or older had dyslipidemia. Specifically, nearly 5 and more than 3 in 10 men (47.9%) and women (34.3%), respectively, were dyslipidemic.
- Prevalence of dyslipidemia increased with age in both sexes, and it was more prominent in women aged 50 years or older.
- The number of people adherent to treatment with anti-dyslipidemic drug(s) was increased by 47.7 times in 2016 compared to those in 2002.
- About 1 in every 6 adults aged 30 years or older had hyper-LDL cholesterolemia, and it was more common in women than in men. The prevalence increased with age in both sexes, so that 1 in every 5 men and every 3 women aged 60 years or older had hyper-LDL cholesterolemia.
- In all age groups, prevalences of hypertriglyceridemia and hypo-HDL cholesterolemia in men were approximately twice as high as those in women. Especially, in the age group of 40-49 years, the percentage of men with hypertriglyceridemia was 4 times higher than that of women.
- Dyslipidemia was observed in 1 out of every 4 adults with normal body weight and in about half of overweight or obese adults. More than 3 out of every 5 adults with abdominal obesity were also dyslipidemic.
- Nearly 2 out of every 3 adults with diabetes had dyslipidemia. When the LDL-C cut-off value was strictly set to 100 mg/dL, nearly 9 out of every 10 every adults with diabetes were diagnosed with dyslipidemia.
- Nearly 2 out of every 3 adults with hypertension had dyslipidemia.
- One in every 4 men and every 5 women consumed more energy than the body required.
- The percentage of energy intake from fat has increased by 1.2 times in 2016 (22.9%) compared to those in 2007 (18.4%).

# Organization

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<b>Chairman</b>	<b>Hyo-Soo Kim</b>	Seoul National University
<b>Secretary General</b>	<b>Kyung Woo Park</b>	Seoul National University
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<b>Publication Committee</b>	<b>Myung-A Kim</b>	Seoul National University
<b>Public Relations Committee</b>	<b>Jae Hyeon Kim</b>	Sungkyunkwan University
<b>Foreign Cooperation Committee</b>	<b>Zu han Kim</b>	Chonnam National University
<b>Insurance and Legislation Committee</b>	<b>Jaetaek Kim</b>	Chung-Ang University
<b>Education Committee</b>	<b>Sang-Hak Lee</b>	Yonsei University
<b>Clinic Research Committee</b>	<b>Hyun-Jae Kang</b>	Seoul National University
<b>Basic Research Committee</b>	<b>Kyung-Hyun Cho</b>	Yeungnam University
<b>Clinical Practice Guideline Committee</b>	<b>In-Kyung Jeong</b>	Kyung Hee University
<b>Food and Nutrition Committee</b>	<b>Hyojee Joung</b>	Seoul National University
<b>2018 President</b>	<b>Myung Ho Jeong</b>	Chonnam National University
<b>2018 Vice-president</b>	<b>Jae-Ryong Kim</b>	Yeungnam University
	<b>Myoungsook Lee</b>	Sungshin University

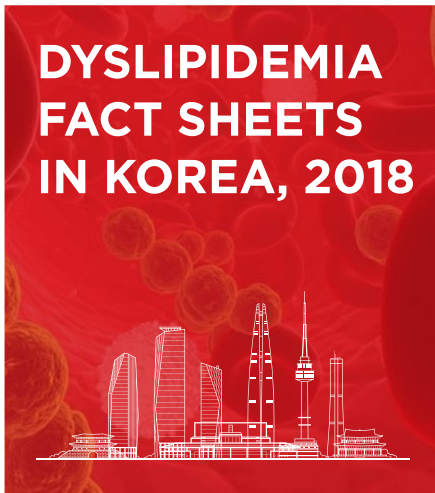
# Public Relations Committee

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<b>Secretary</b>	Jong Chul Won	Inje University
<b>Members</b>	Ji Cheol Bae	Sungkyunkwan University
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	Eun Young Lee	The Catholic University of Korea
	Jae Hyuk Lee	Myongji Hospital
	Min-Ho Lee	Soonchunhyang University
	Sung-Ji Park	Sungkyunkwan University
	Min Soo Song	Esoo Hospital
	Sunghwan Suh	Dong-A University
	Sung Hoon Yu	Hanyang University



# DYSLIPIDEMIA FACT SHEETS IN KOREA, 2018



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