

2017 Obesity Fact Sheet



Welcome message

2017 Obesity Fact Sheet

Dear Colleagues,

It is my great honor and pleasure to publish the '2017 Obesity Fact Sheet' of the Korean Society for the Study of Obesity (KSSO).

The '2017 Obesity Fact Sheet' is the 3rd edition, with the 1st Edition published in 2015. It contains many contemporary aspects of obesity and its related comorbidities in Koreans. Representative data sources provided valuable information from the Korean National Health and Nutrition Examination Survey (KNHANES) and from the National Health Insurance Service (NHIS).

Data pertaining to over 10 million Korean adults were meticulously analyzed and described, providing excellent information regarding the health status of Koreans. We have designed this Fact Sheet to provide useful information to both public and health care providers.

We encourage you to take this booklet to improve your knowledge and clinical practice for Koreans. Additional information is anticipated in next year's Fact Sheet and we hope it will be of assistance to doctors, nurses, nutritionists, physical educators, other health professionals, and to the general public.

We would like to cordially thank Dr. Kyung-do Han, Prof. Yong-Gyu Park and the team of statisticians who dedicated their knowledge, expertise and time to assist in the publication of this booklet. We especially

thank members of the NHIS for their active support of our work. This booklet resulted from efforts of the NHIS-KSSO MOU Committee who worked collectively and tirelessly to produce this booklet. I would like to express my sincere appreciation to the Director of the NHIS-KSSO MOU Committee, Won-Young Lee, and to the co-Director, Yang-Hyun Kim, for their unwavering dedication and kindness.

I hope this booklet may be of assistance to health care providers and general public. It is our intention that the information it provides be applied to the promotion of Korean health. Obesity is an important cause of major chronic metabolic diseases and cancers. Not only is KSSO an academic organization but it has a role in policy-making, aiming to protect the health of the general population. We hope this Fact Sheet provides a valuable contribution to Korean national health policy formulation.

Best Regards,



President of KSSO
Kee-Hyoung Lee



Chairman, Board of Directors
Soon Jib Yoo

Summary of 2017 Obesity Fact Sheet



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FOR THE STUDY
OF OBESITY

- The prevalence of obesity and abdominal obesity increased since 2009
- The prevalence of obesity with abdominal obesity also increased especially in 20s, 30s, and 40s.
- As the socioeconomic status increased, the prevalence of obesity increased in men and the prevalence of both obesity and abdominal obesity decreased in women.
- The one-person household had increased risk for obesity and abdominal obesity than more than one-person households especially in young male adults (19-39 years).
- The incidence of type 2 diabetes mellitus, hypertension and dyslipidemia gradually increased as the body mass index (BMI) and waist circumference increased, and even in subjects with more than BMI 35 kg/m²
- The hazard ratio for myocardial infarction and ischemic stroke was higher in obesity stage I and stage II than normal weight.
- The prevalence of irregular menstruation was higher in obese women than non-obese women in all age groups.
- BMI was strongly associated with increased incidence of breast cancer among postmenopausal women, whereas it was inversely associated with incidence of breast cancer among premenopausal women.
- Maternal complications, such as eclampsia, and high-risk pregnancies, increased as the BMI of women increased.



Data source of 2017 Obesity Fact Sheet

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Source of data

- The percentages and the total number of people over the age of 20 were determined using the National Health Checkup Database from 2006 through to 2015 and derived from the National Health Insurance Service (NHIS).
- Korean National Health and Nutrition Examination Survey (KNHANES) data 2010-2015 from the Korea Centers for Disease Control & Prevention were also used to analyze the prevalence of women's health and obesity-related socioeconomic status.
- People over the age of 20 were included.

Data presentation

- Data were presented according to age and sex standardization, using the 2010 Census of the Korean population.
- Obesity Prevalence= [(Patients who were obese, based on a body mass index of $\geq 25 \text{ kg/m}^2$) / (total number of individuals from the National Health Checkup)] X 100 (%).
- Regarding socioeconomic variables, the level of education were divided into four groups: elementary school, middle school, high school, and university or higher. Income levels were divided into quartiles, ranging from Quartile 1 (the lowest) to Quartile 4 (the highest).

Definition of Obesity, Abdominal obesity, Class I and Class II obesity

- Obesity was defined as a body mass index (BMI, weight in kilograms divided by the square of height in meters) $\geq 25.0 \text{ kg/m}^2$ in adults, in accordance with the Asia-Pacific criteria of the WHO guidelines (WHO, 2000).
- Abdominal obesity was defined as a waist circumference (WC) $\geq 90 \text{ cm}$ in men and $\geq 85 \text{ cm}$ in women, according to the definition of the KSSO.
- Class I obesity was defined as $25 \leq \text{BMI} < 30 \text{ kg/m}^2$ and Class II obesity was defined as a BMI $\geq 30.0 \text{ kg/m}^2$.



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01

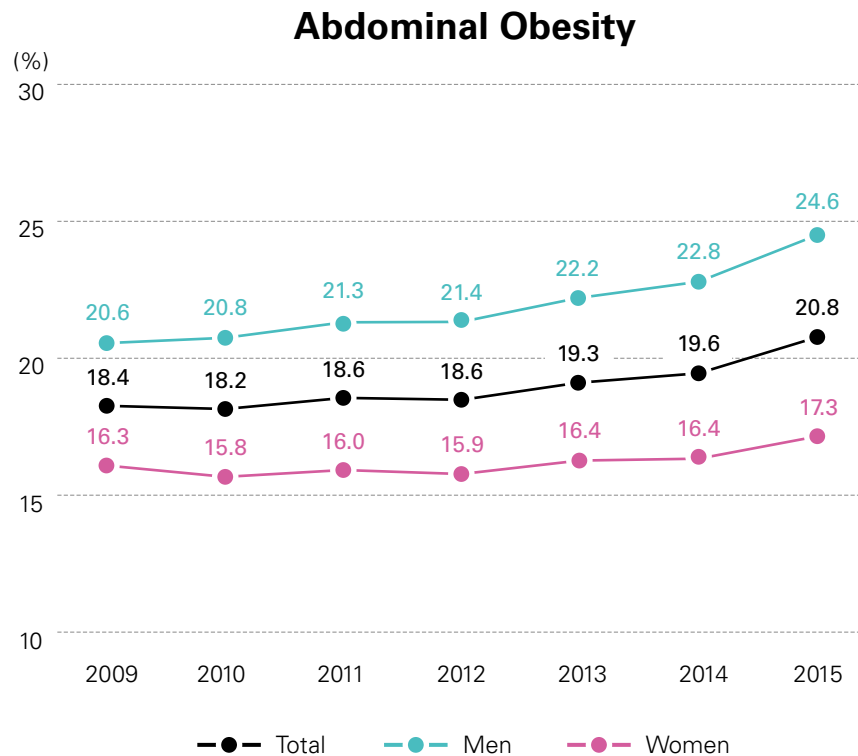
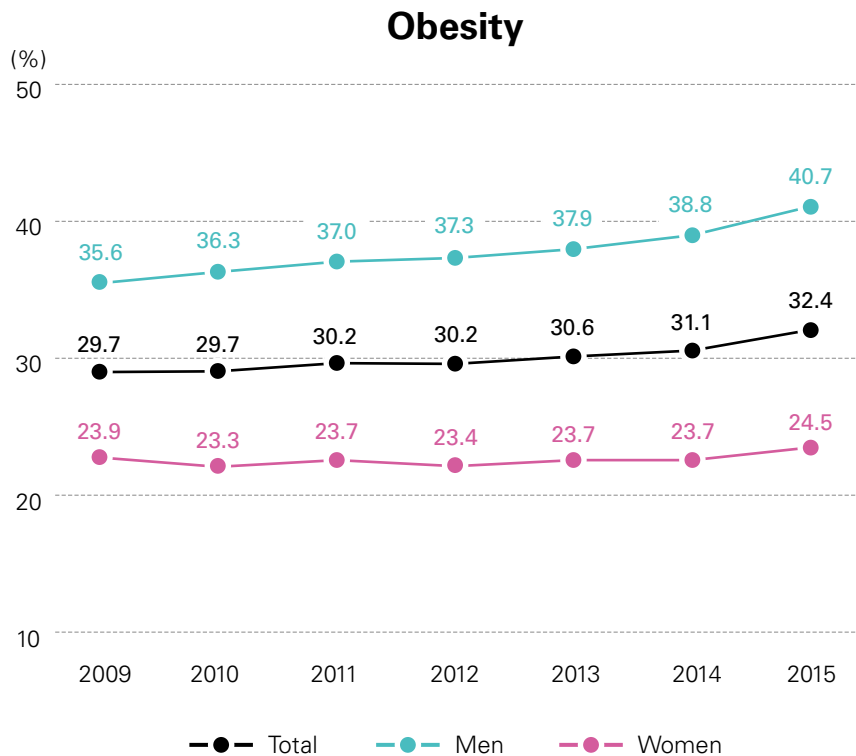
Obesity trend



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The prevalence of obesity and abdominal obesity

The prevalence of obesity steadily increased from 29.7% in 2009 to 32.4% in 2015 and the prevalence of abdominal obesity also steadily increased from 18.4% in 2009 to 20.8% in 2015.



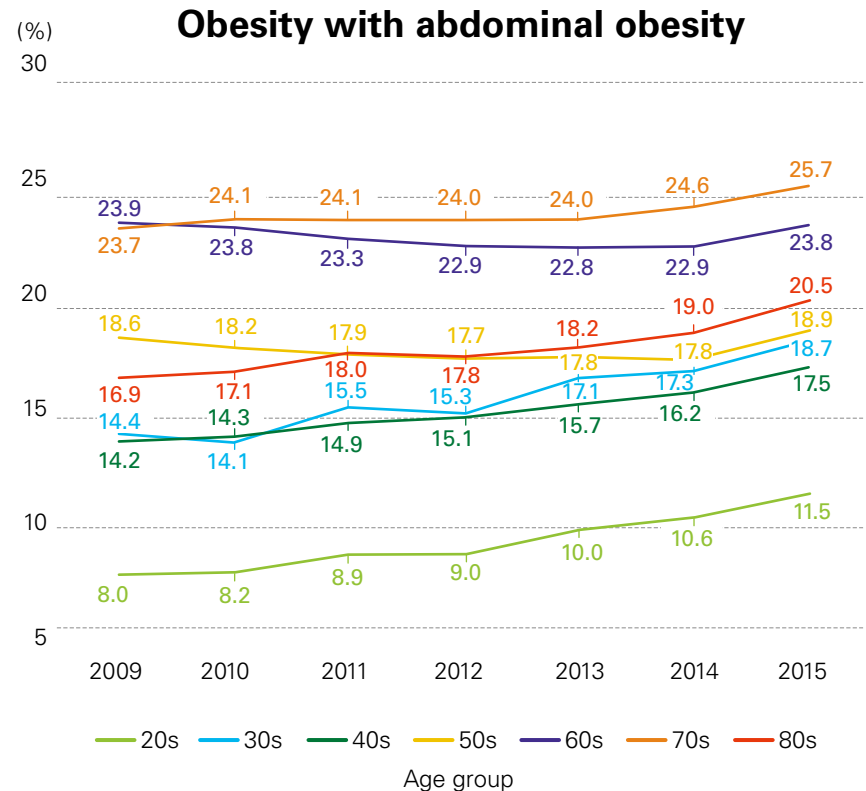
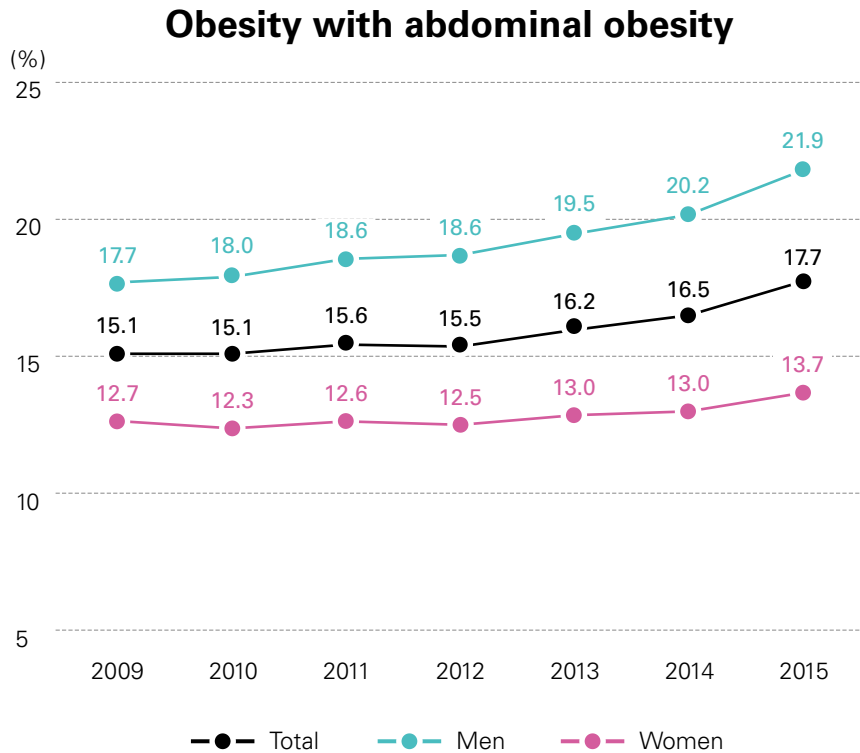
Data derived from the NHIS data set: 2009-2015

Data was presented by age and sex standardization using the 2010 Census Korean population.

The definition of obesity is a BMI $\geq 25\text{kg}/\text{m}^2$ and that of abdominal obesity is a WC $\geq 90\text{cm}$ in men and $\geq 85\text{cm}$ in women.

The prevalence of obesity with abdominal obesity

The prevalence of obesity with abdominal obesity increased steadily from 15.1% in 2009 to 17.7% in 2015, and this phenomenon was especially observed in individuals in their second, third and fourth decades.

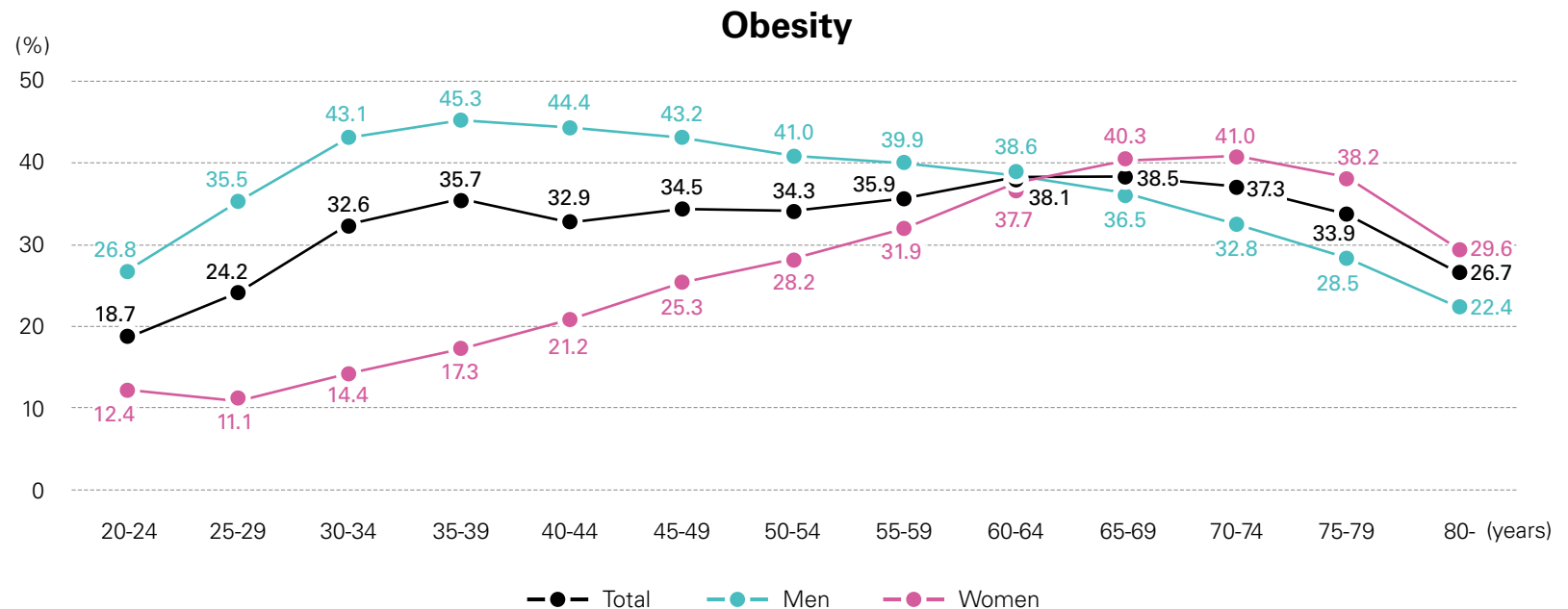


Data derived from the NHIS data set: 2009-2015

Data was presented by age and sex standardization using the 2010 Census Korean population.

The prevalence of obesity, by age group, between 2014 and 2015

- The prevalence of obesity increased steadily among those aged between 20 and 60 years, but decreased from 70 years of age, in total.
- In men, the prevalence increased until 30–40 years of age, but decreased from 40–50 years of age.
- In women, the prevalence increased to the mid-70 years of age, and decreased from the mid-70 years of age.



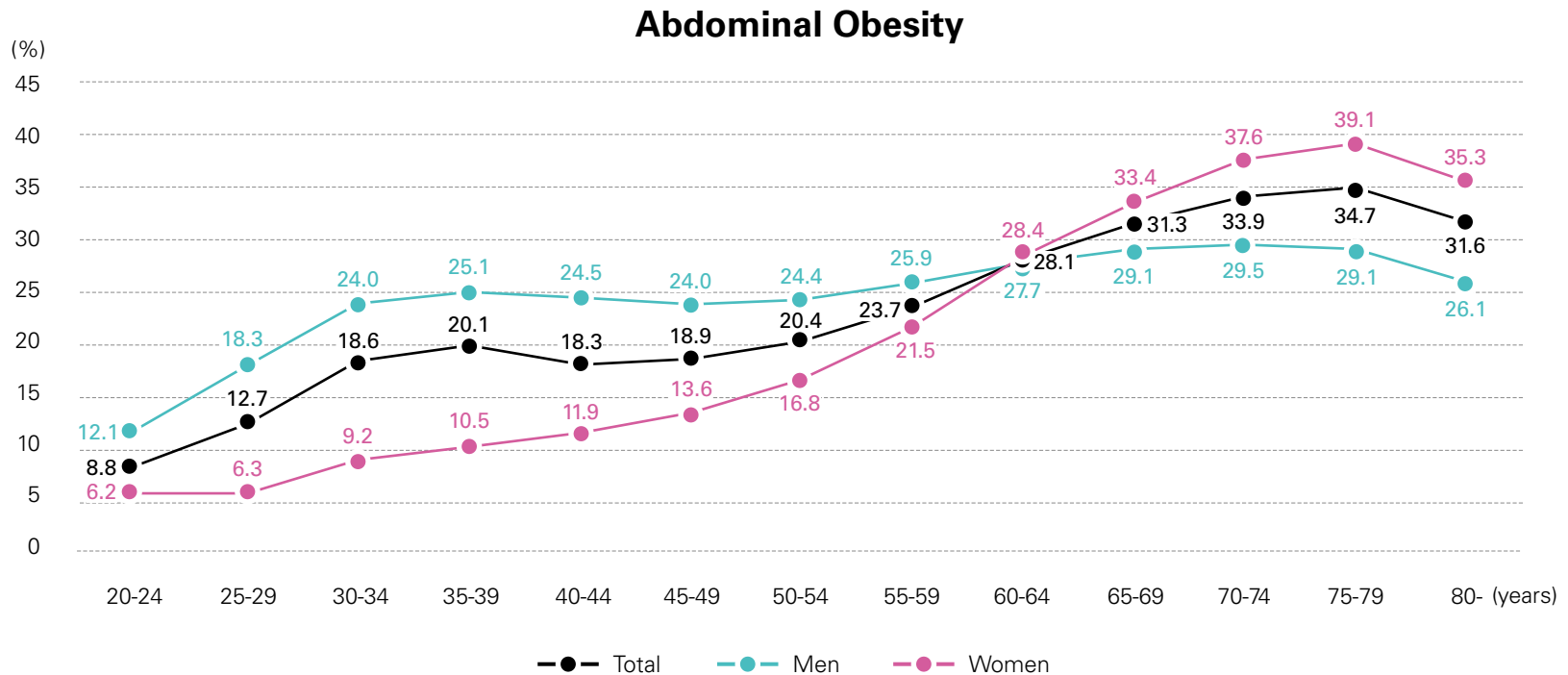
Data derived from the NHIS data set: 2014-2015

Data was presented by age and sex standardization using the 2010 Census Korean population.

The definition of obesity is a BMI $\geq 25\text{kg/m}^2$.

The prevalence of abdominal obesity, by age group, between 2014 and 2015

- The prevalence of abdominal obesity increased steadily from 20–30 years of age to 70–80 years of age, but decreased from 80–90 years of age, in total.
- Before 60–70 years of age, the prevalence of abdominal obesity was higher in men than in women, but after 60–70 years of age, the prevalence of abdominal obesity in women was higher than in men.



Data derived from the NHIS data set: 2014-2015

Data was presented by age and sex standardization using the 2010 Census Korean population.

The definition of abdominal obesity is a WC \geq 90cm in men and \geq 85cm in women.

02

Obesity and socioeconomic status

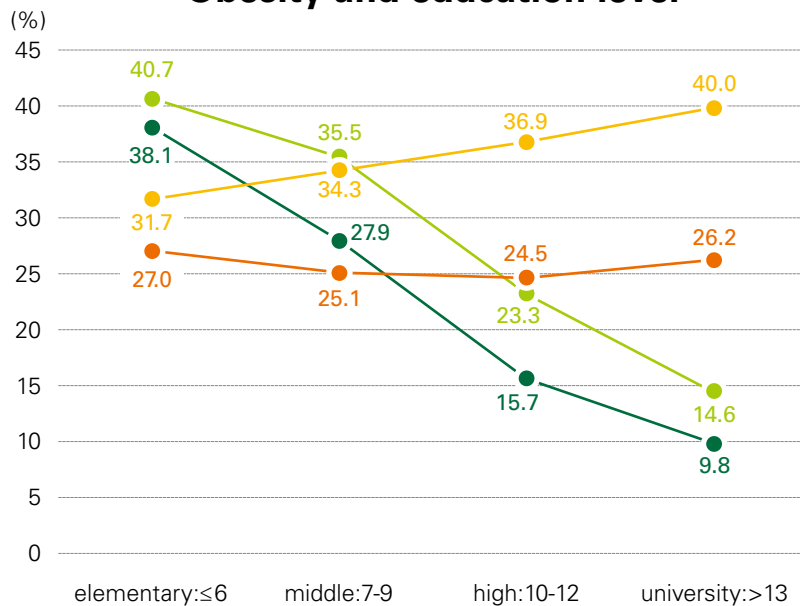
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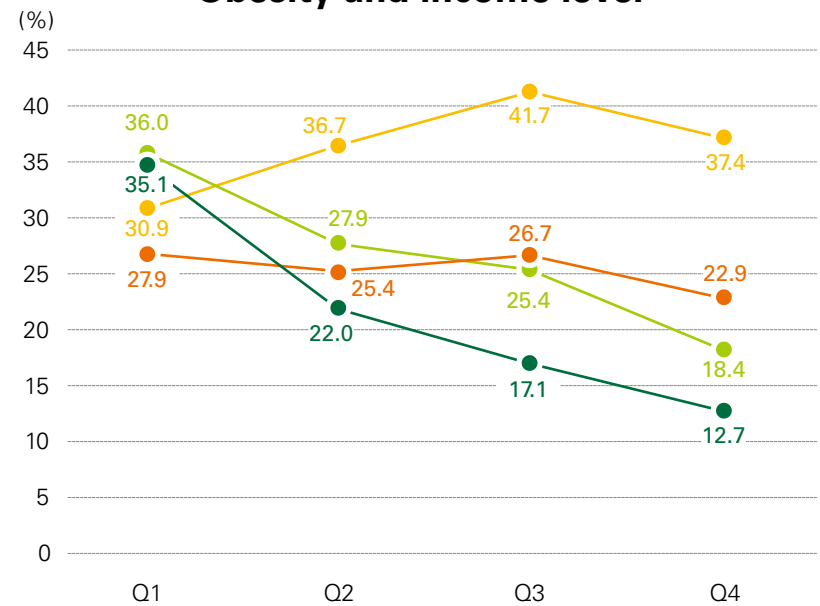
Obesity and socioeconomic status

- In men, as education and income levels increased, the prevalence of obesity increased. However, no similar trend was found in abdominal obesity.
- In women, as education and income level increased, both the prevalence of obesity and abdominal obesity decreased.

Obesity and education level



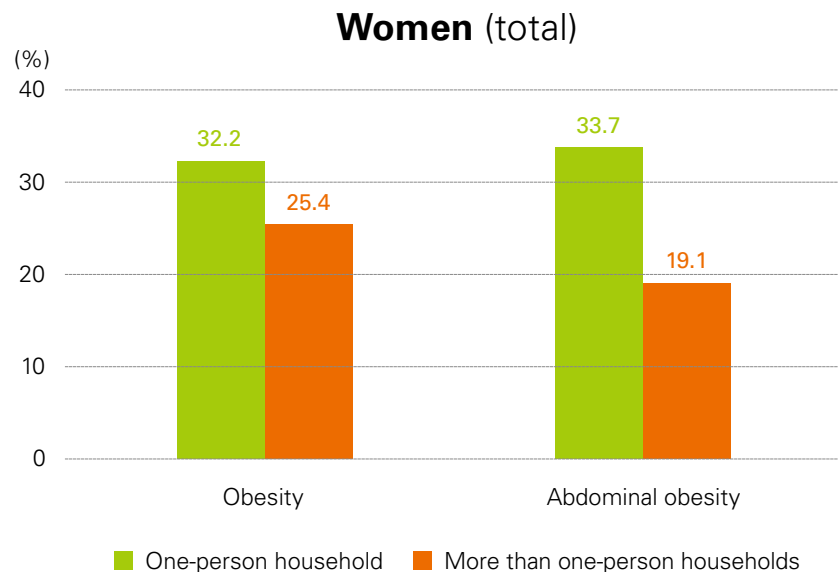
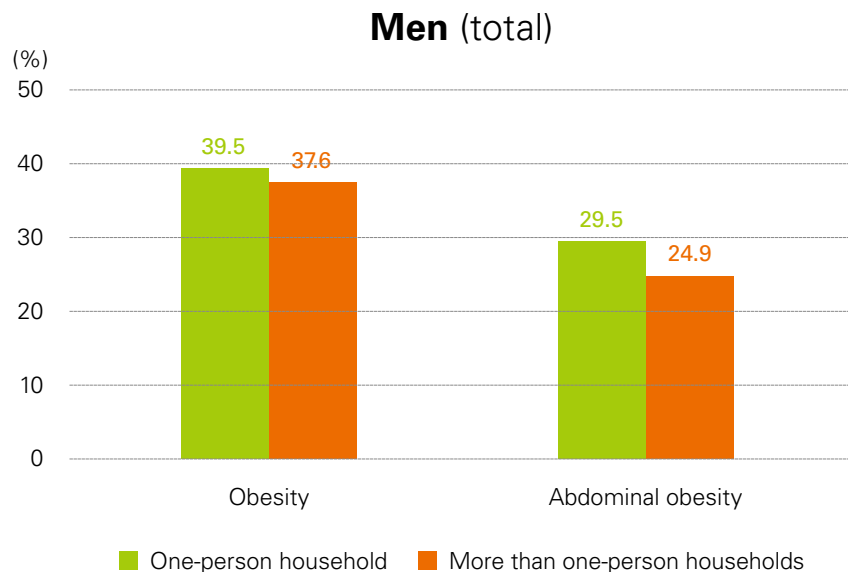
Obesity and income level



Men — Obesity — Abdominal obesity
 Women — Obesity — Abdominal obesity

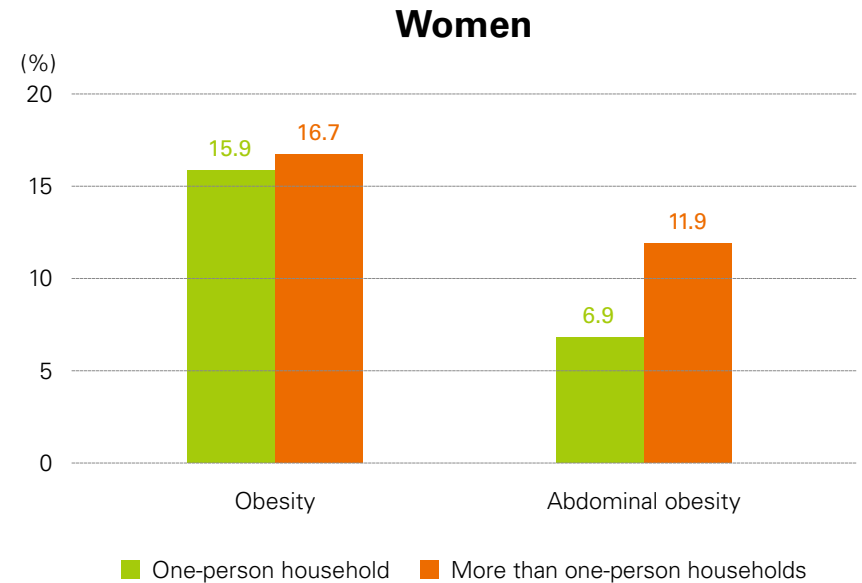
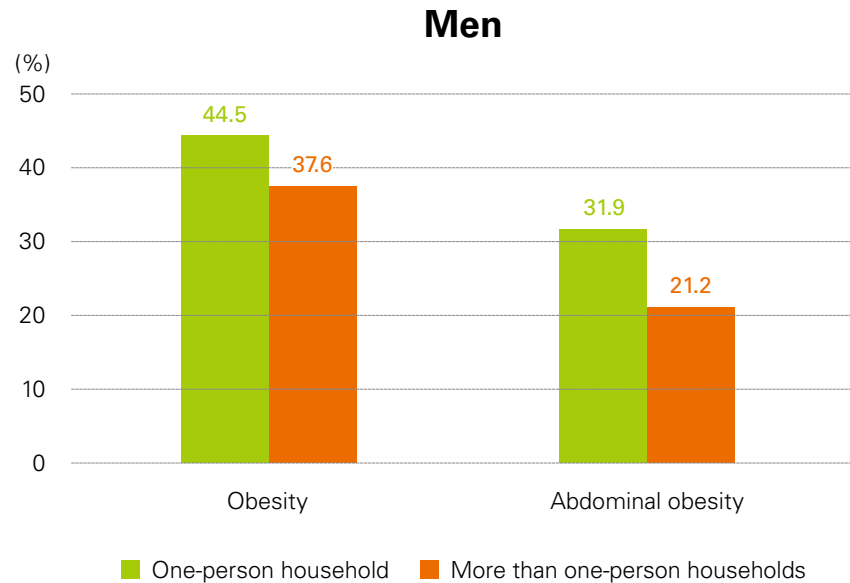
The prevalence of obesity and abdominal obesity in one-person household versus more than one-person households

In both men and women, the prevalence of obesity and abdominal obesity was higher in one-person household than in more than one-person households, and this trend was more prominent among women.



The prevalence of obesity and abdominal obesity in one-person household versus more than one-person households, among the young adult group (aged 19-39 years)

- In men, the prevalence of obesity and abdominal obesity was higher in one-person households than in more than one-person households.
- In women, however, the prevalence of obesity and abdominal obesity was lower in one-person households than in more than one-person households.



The definition of T2DM, hypertension, dyslipidemia, MI, and ischemic stroke

T2DM

- 1) ICD-code: E11~14 &
 - 2) T2DM medication
- Mean F/U duration: 5.3 years

Hypertension

- 1) ICD-code: I10~13, and I15 &
 - 2) Hypertension medication
- Mean F/U duration: 5.2 years

Dyslipidemia

- 1) ICD-code: E78 &
 - 2) Dyslipidemia medication
- Mean F/U duration: 5.0 years

MI

- 1) ICD-code: I21,22 &
 - 2) Events-related hospitalization
- Mean F/U duration: 5.4 years

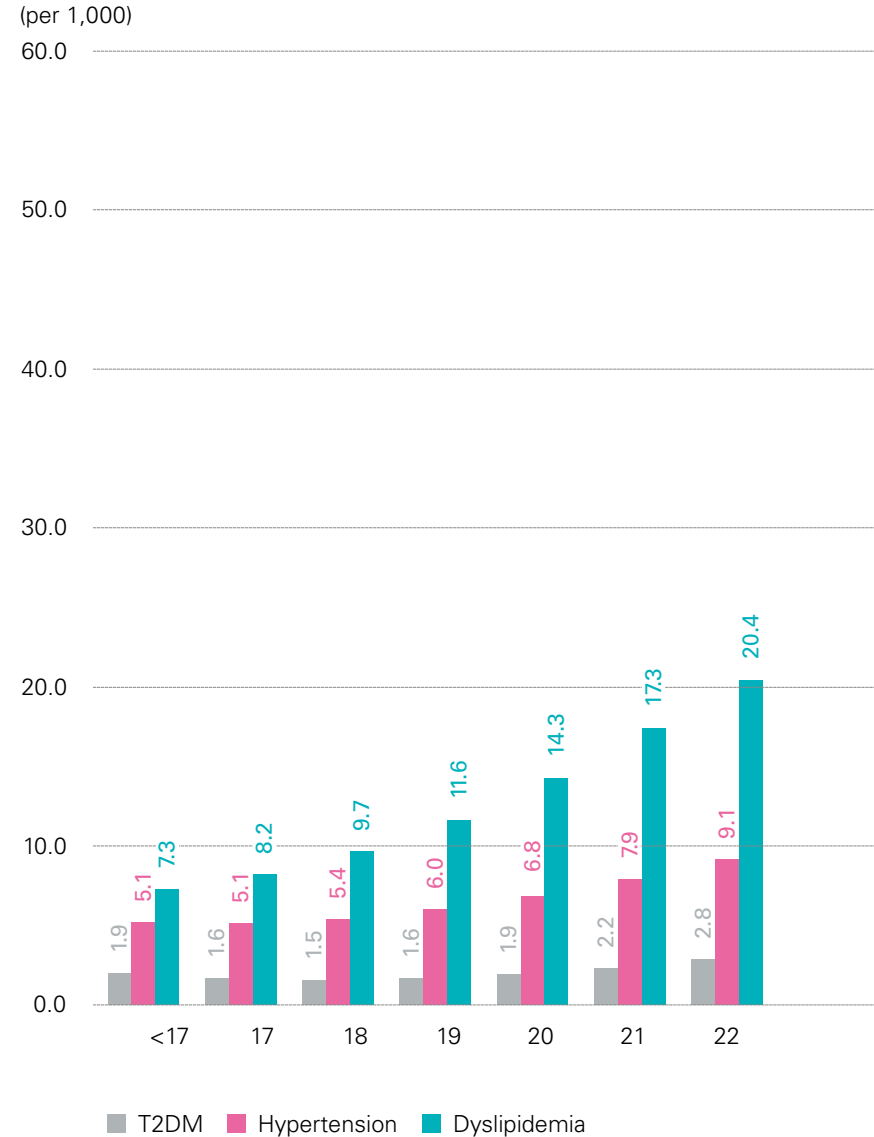
Ischemic Stroke

- 1) ICD-code: I63,64 &
 - 2) Events-related hospitalization &
 - 3) Claim for CT or MRI
- Mean F/U duration: 5.4 years

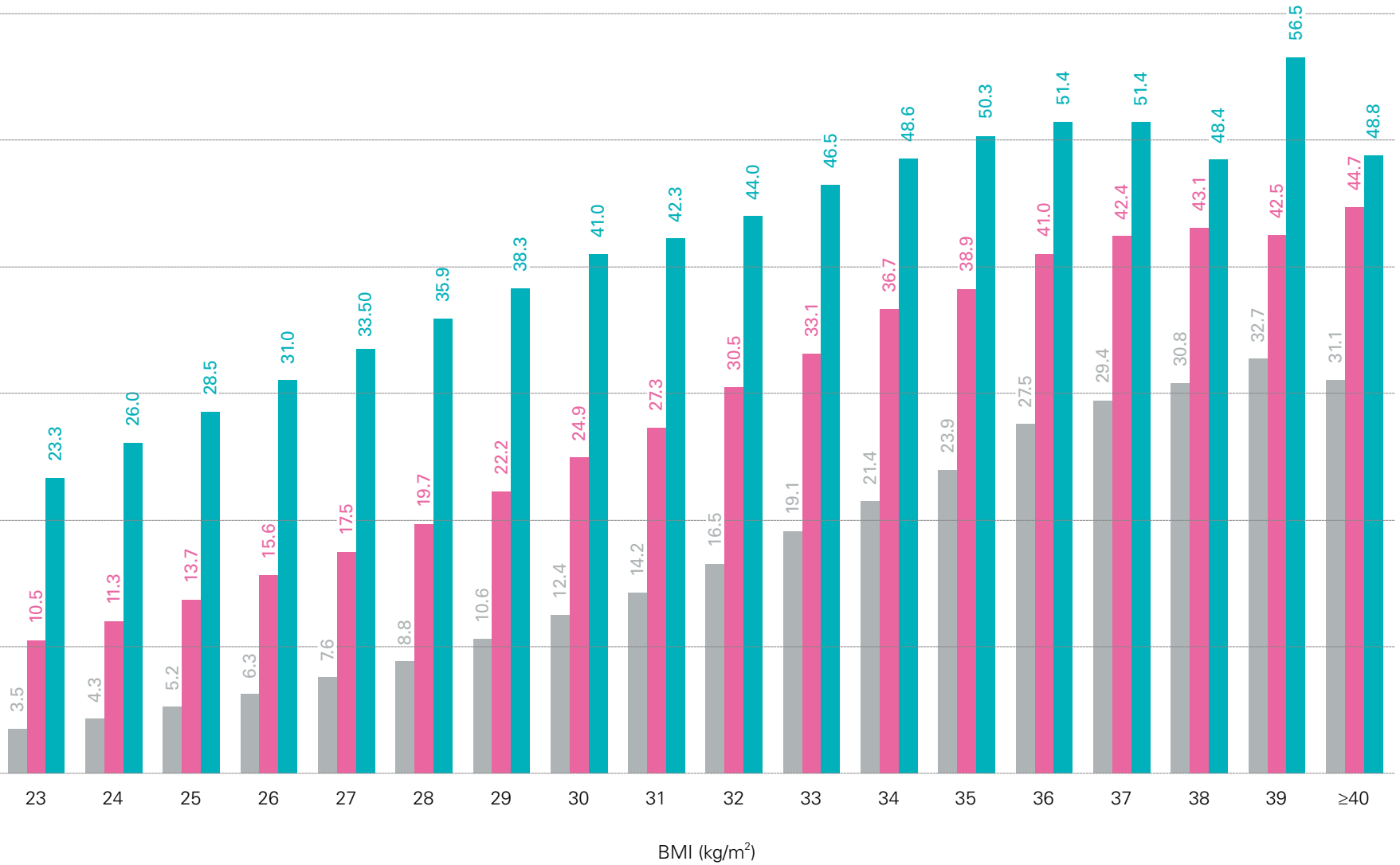
T2DM, Type 2 diabetes mellitus; MI, myocardial infarction; CT, computed tomography, and MRI, magnetic resonance imaging

The incidence rate of T2DM, hypertension and dyslipidemia, according to BMI level 2009–2015

- Incident T2DM, hypertension and dyslipidemia increased gradually from the lowest level of BMI.
- Even in individuals with a BMI more than 35 kg/m², the incidence of morbidity still increased.
- Individuals who did health checkup during 2009-2012 were included and followed up to 2015.

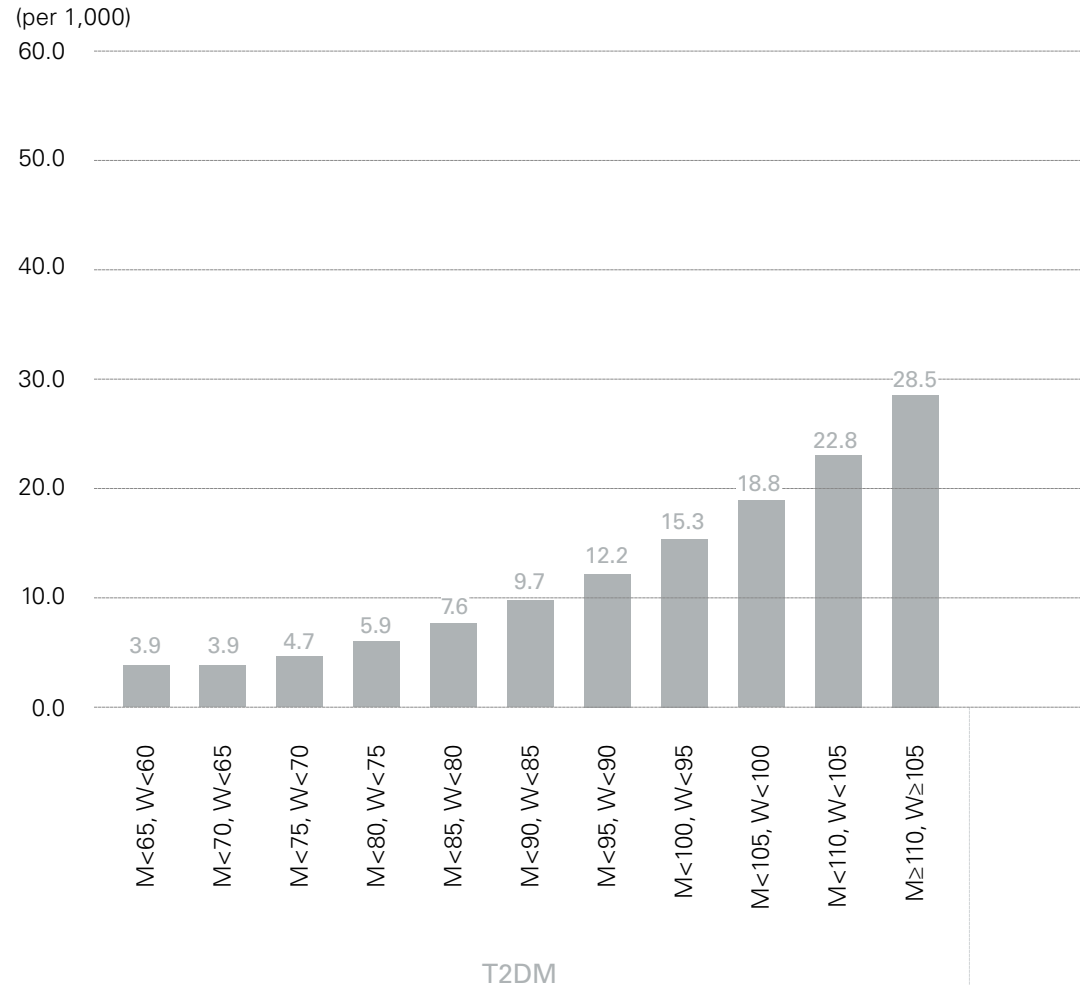


Age, sex-adjusted rates by BMI per 1kg/m²

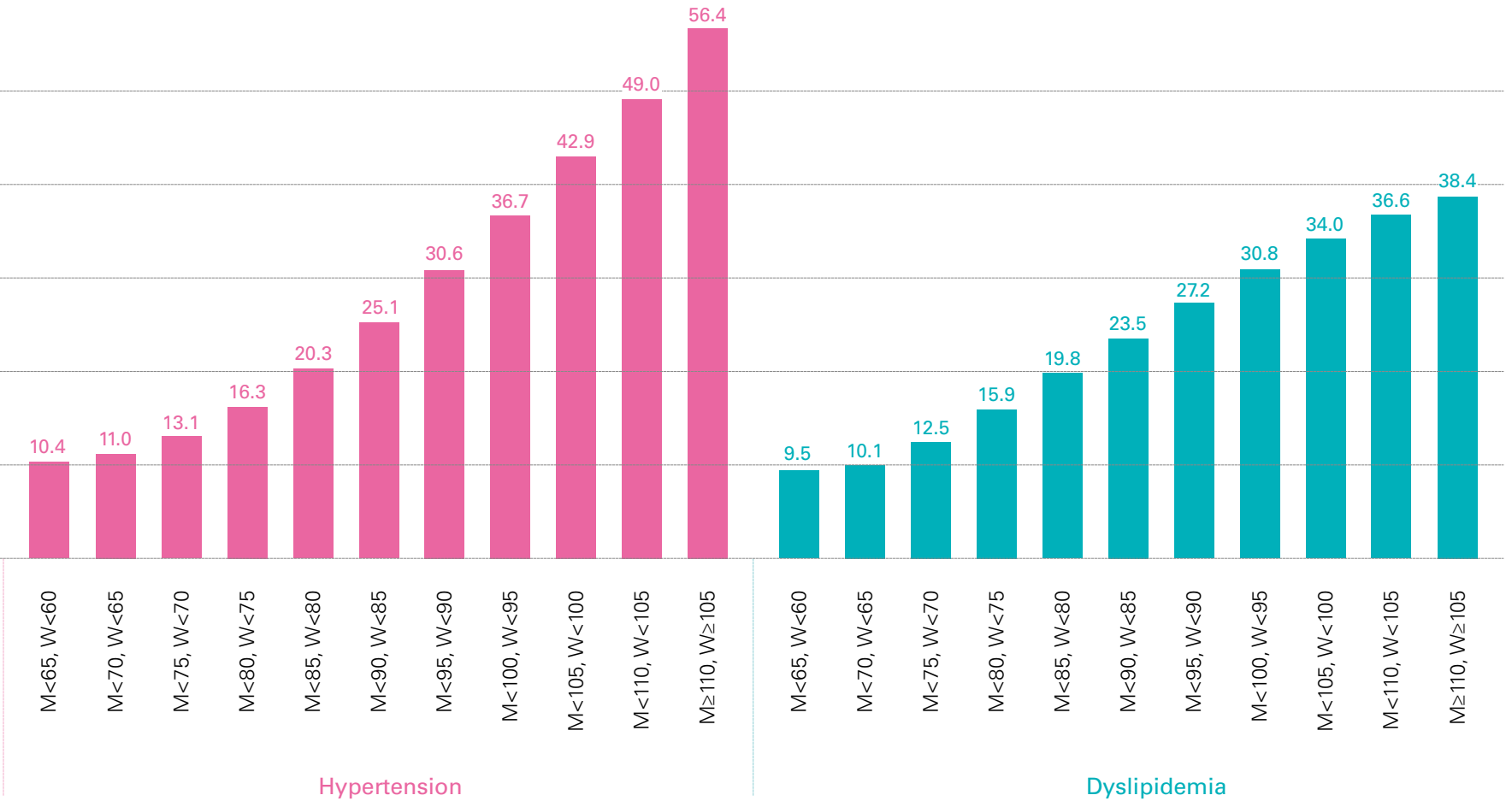


The incidence rate of T2DM, hypertension and dyslipidemia, according to WC 2009–2015

- Incident T2DM, hypertension and dyslipidemia increased gradually from the lowest level of WC.
- People who did health checkup during 2009-2012 were included and followed up to 2015.

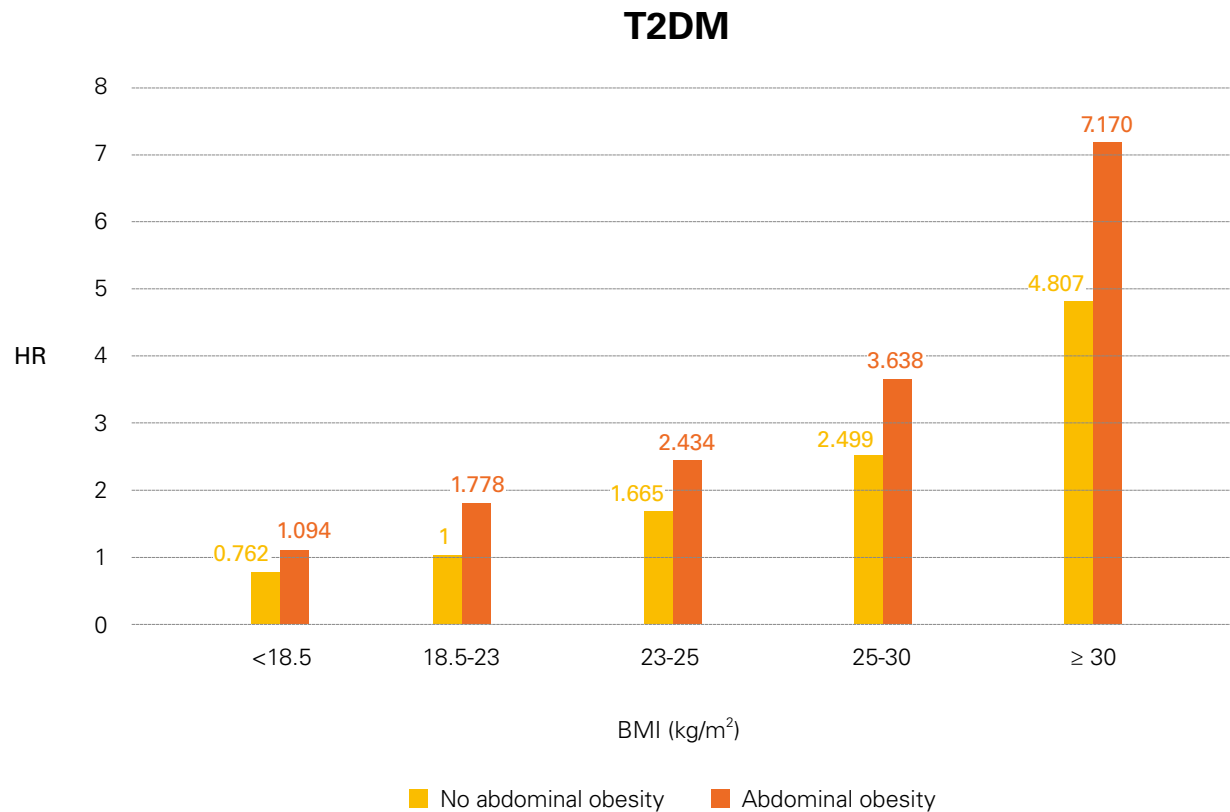


Age, sex-adjusted rates by BMI per 1kg/m²



The HR for T2DM, hypertension, dyslipidemia, MI, and ischemic stroke, according to combined BMI and WC

HR for each morbidities was higher in individuals with abdominal obesity than individuals without abdominal obesity after adjustment with age and sex.



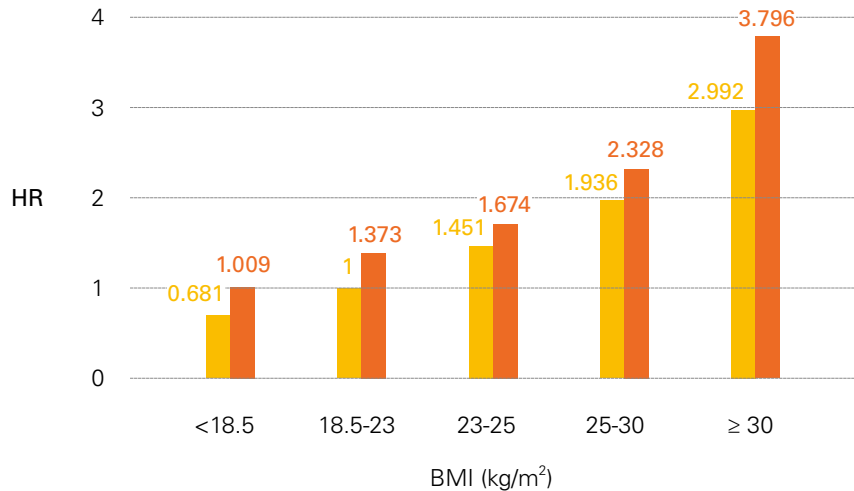
Age and sex were adjusted.

People who did health checkup during 2009-2012 were included and followed up to 2015.

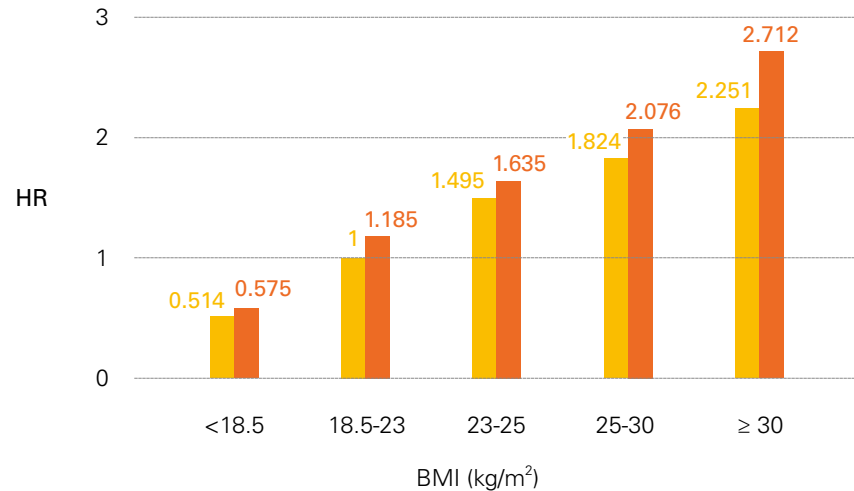
HR, hazard ratio

Data derived from the NHIS data set: 2009-2015

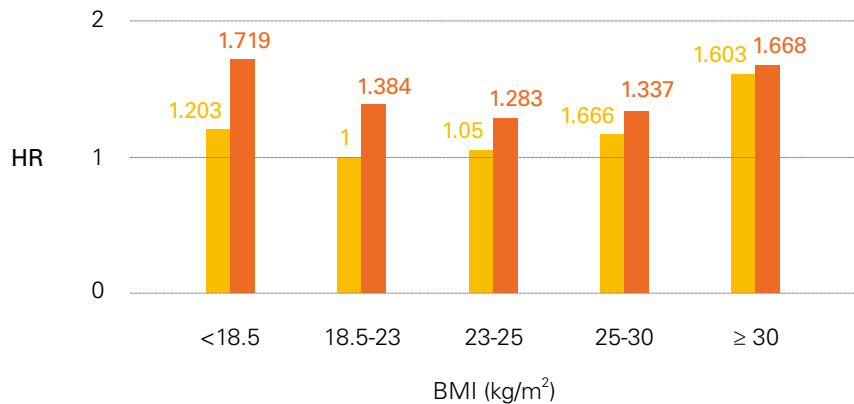
Hypertension



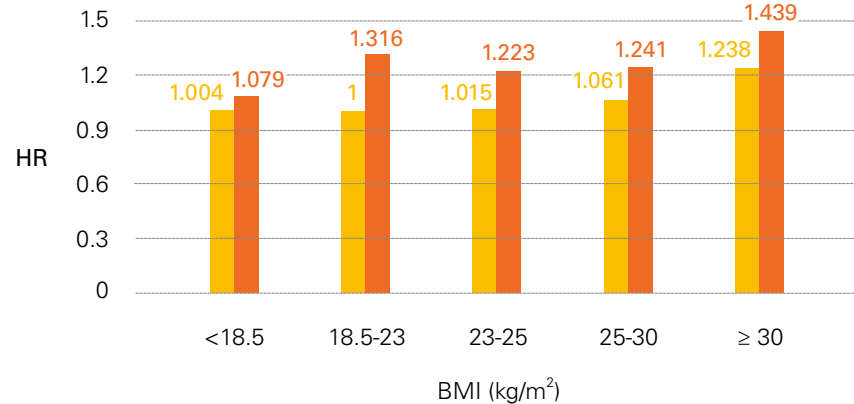
Dyslipidemia



MI



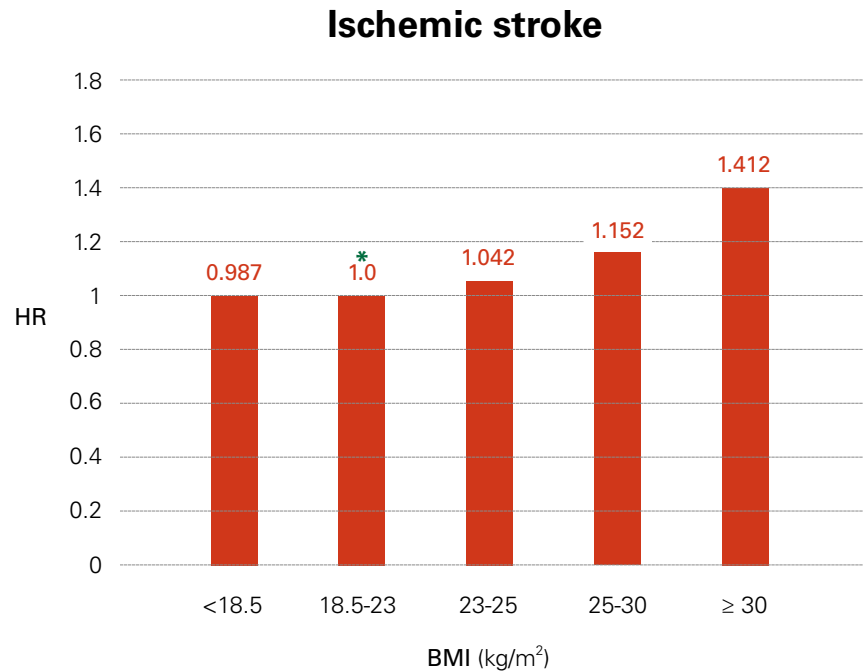
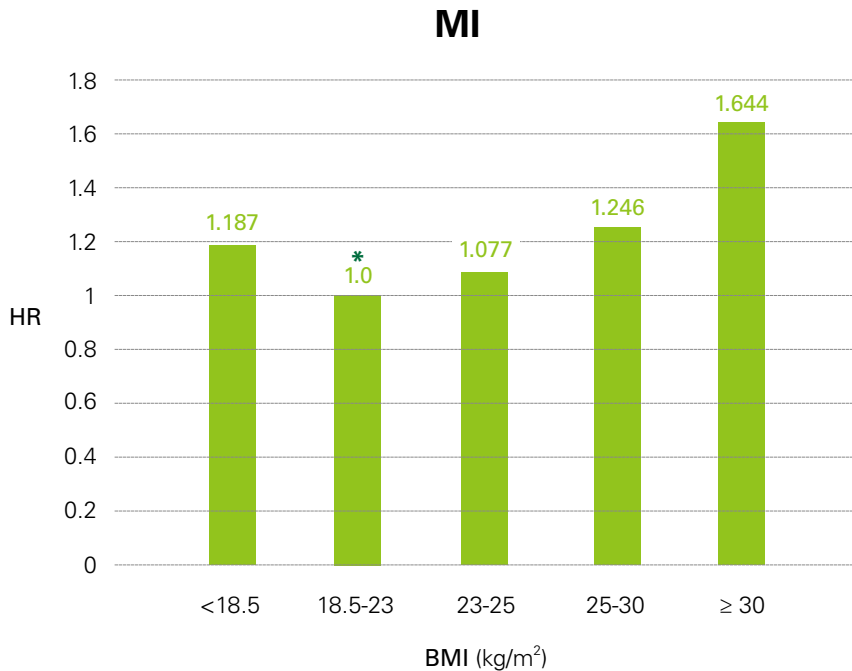
Ischemic stroke



■ No abdominal obesity ■ Abdominal obesity

The HR for MI and ischemic stroke

- The HR for incident MI was 24.6% higher in the class I obesity group and 64.4% higher in the class II obesity group than in the normal weight group (BMI 18.5-25 kg/m²), after adjustment for age and sex, with a mean FU period of 5.4 years.
- The HR for incident stroke was 15.2% higher in the class I obesity group and 41.2% higher in the class II obesity group than in the normal weight group (BMI 18.5-25 kg/m²), after adjustment for age and sex, with a mean FU period of 5.4 years.



* Reference group

Age and sex were adjusted.

People who did health checkup during 2009-2012 were included and followed up to 2015.

Data derived from the NHIS data set: 2009-2015.

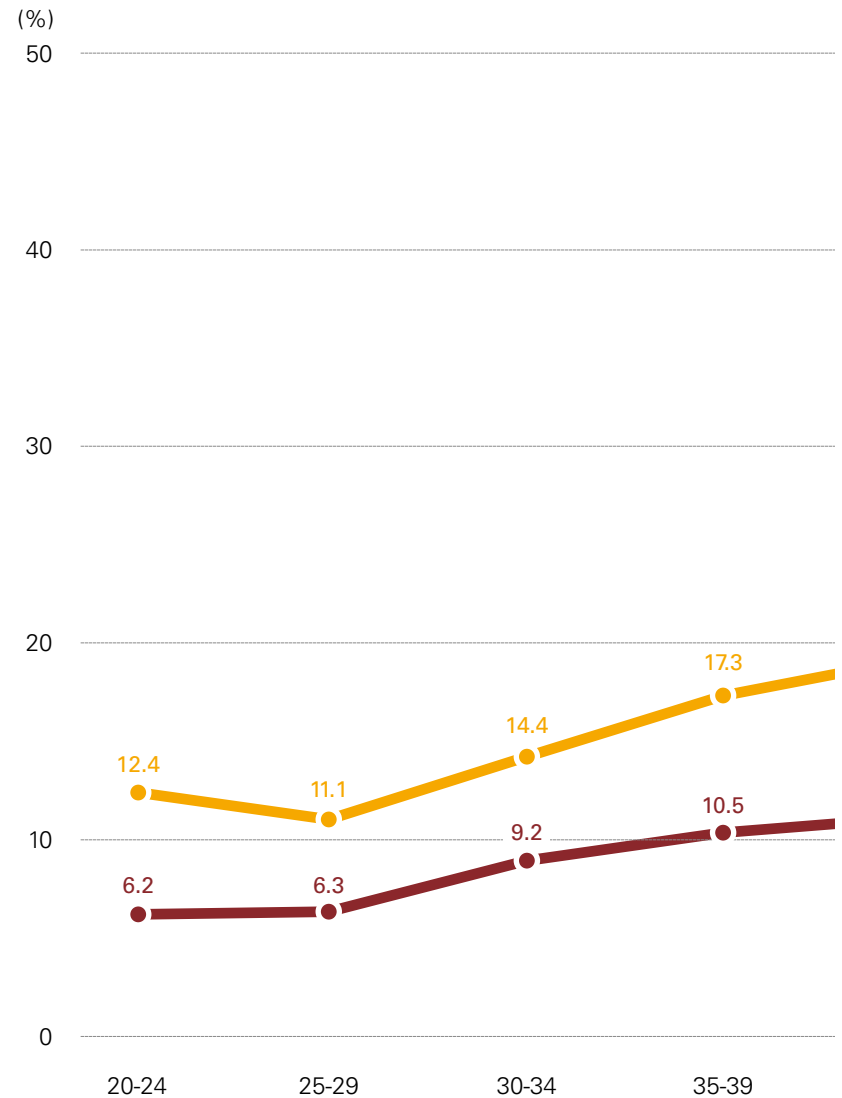
04 | Obesity and women

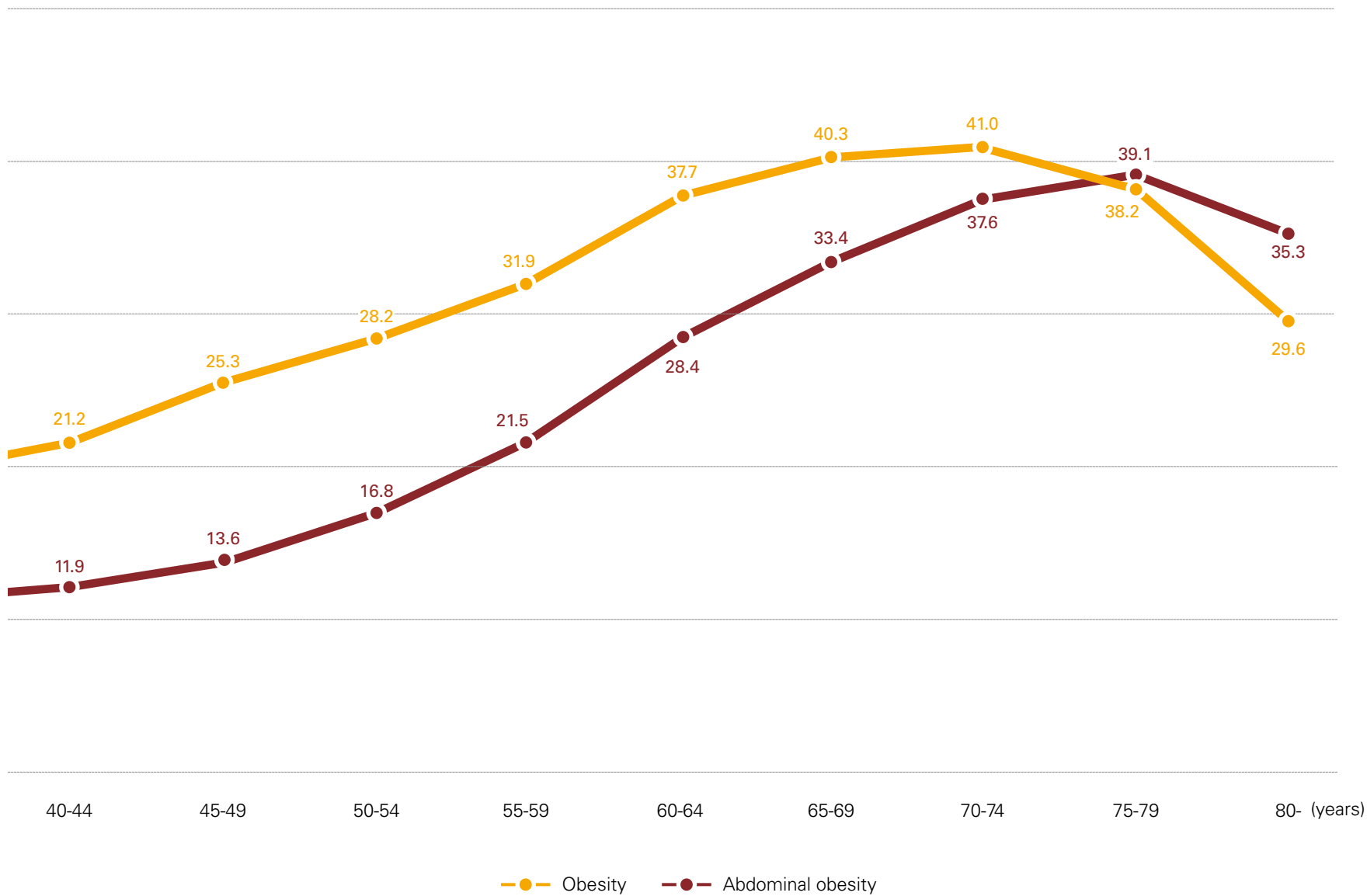
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The prevalence of obesity and abdominal obesity in women, according to age group

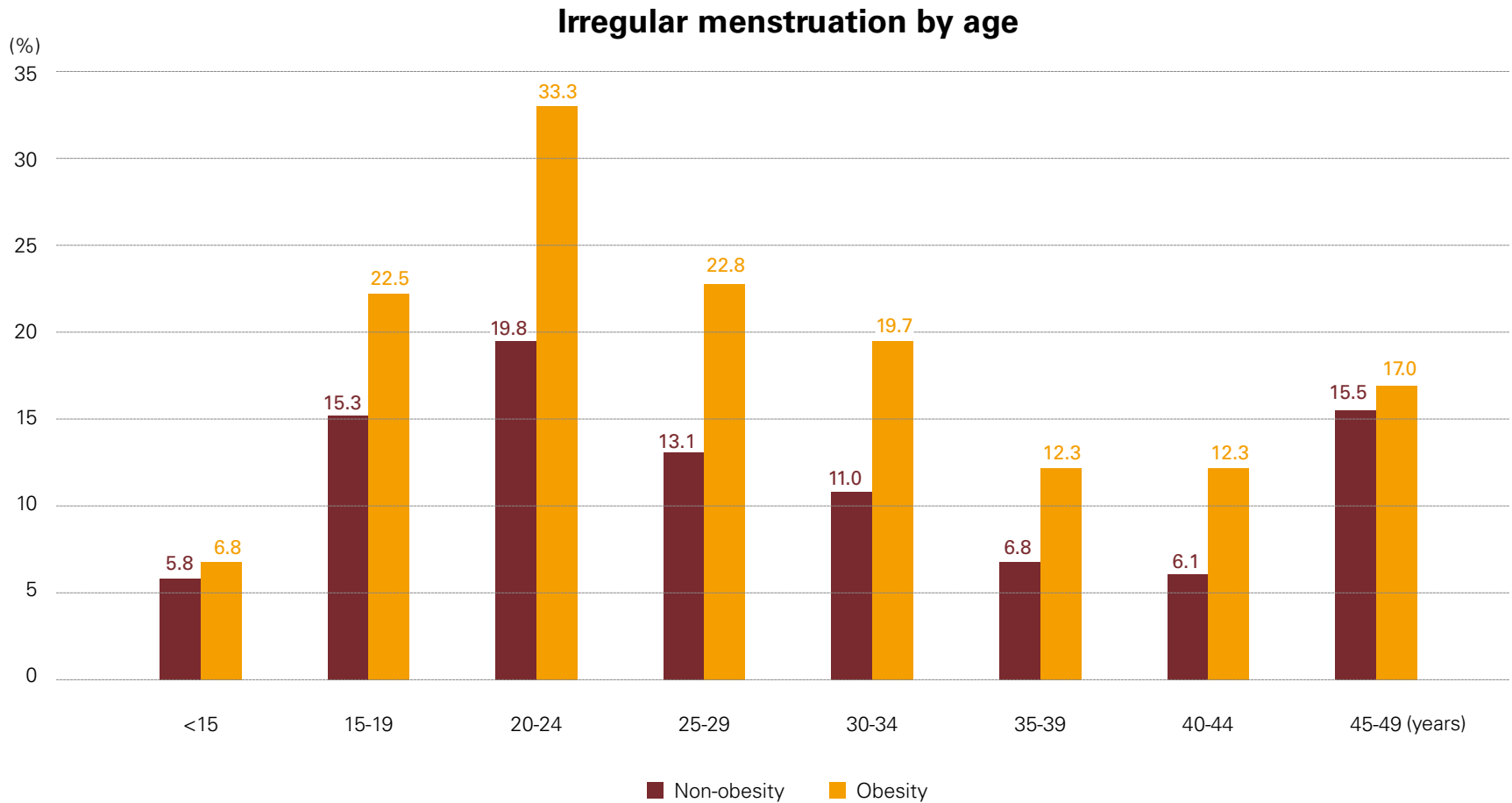
- The prevalence of obesity and abdominal obesity in women increased, according to age group.
- At the age of 50, the prevalence of abdominal obesity was higher than the prevalence of obesity.





Irregular menstruation

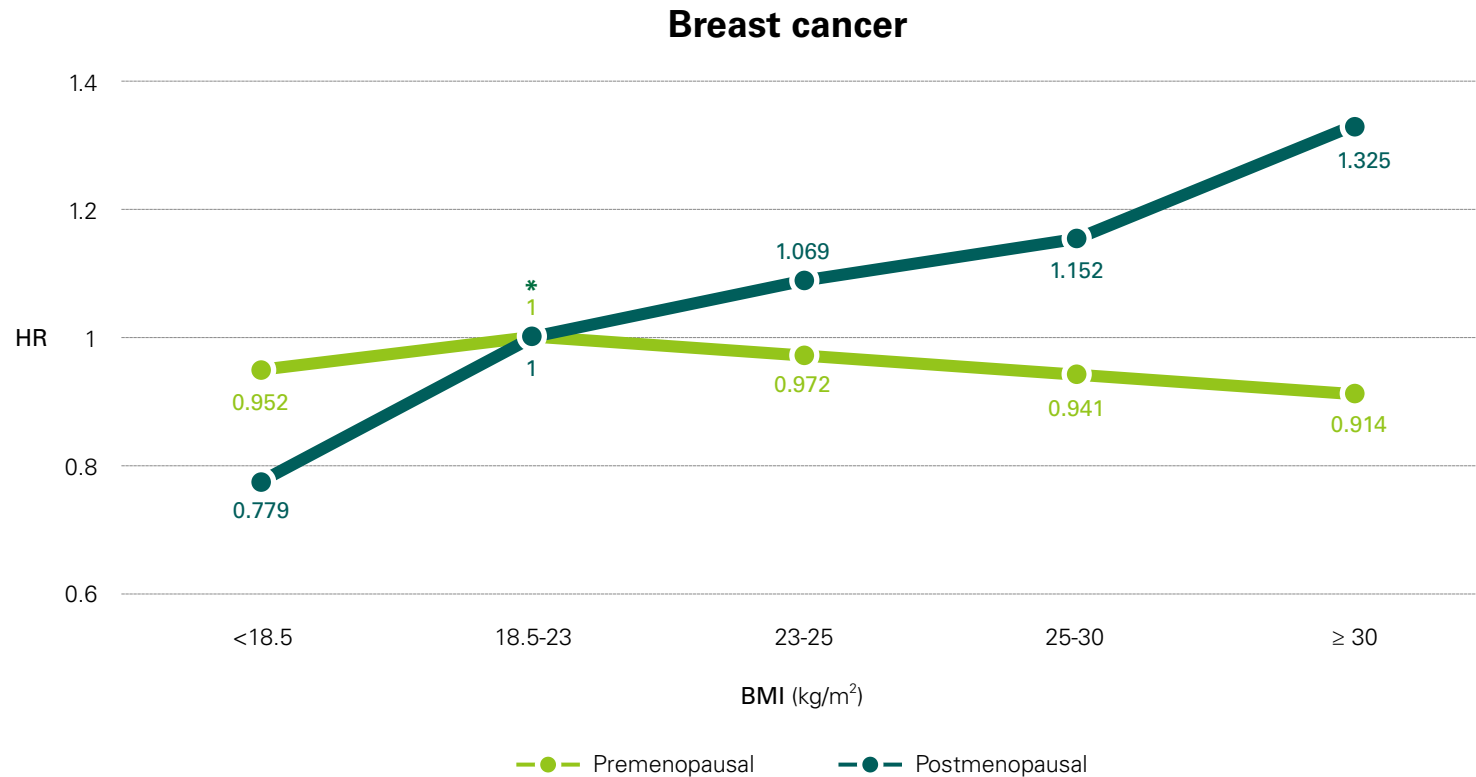
Prevalence of irregular menstruation was higher in the obesity group than in the non-obese group in all age groups.



The diagnosis of irregular menstruation is based on self-questionnaire.
Data derived from the KNHANES 5th 2010-2012

BMI and breast cancer risk

BMI was associated with increased incidence of breast cancer among postmenopausal women, whereas it was inversely associated with incidence of breast cancer among premenopausal women.



* Reference group

Menopausal status was determined at the age of 50 years, which was assumed to represent the usual age at menopause among Korean women.

Breast cancer was defined as ICD-C50 and a registration for intractable and rare diseases.

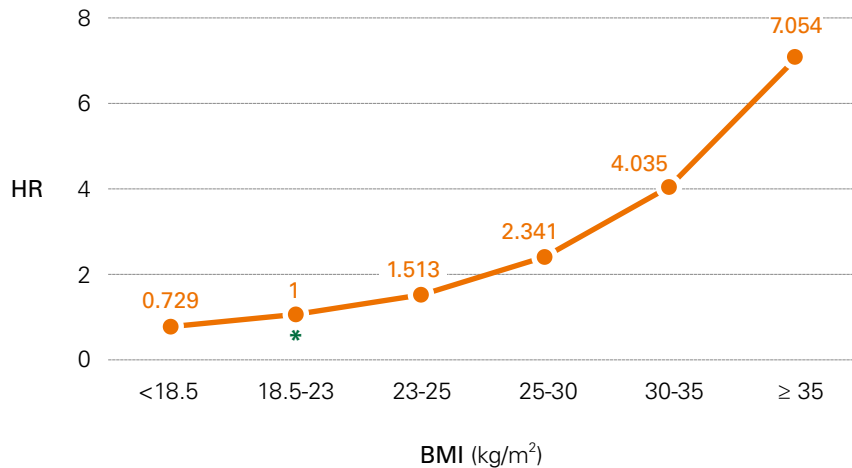
People who did health checkup during 2006-2012 were included and followed to 2015.

Data derived from the NHIS data set: 2006-2015

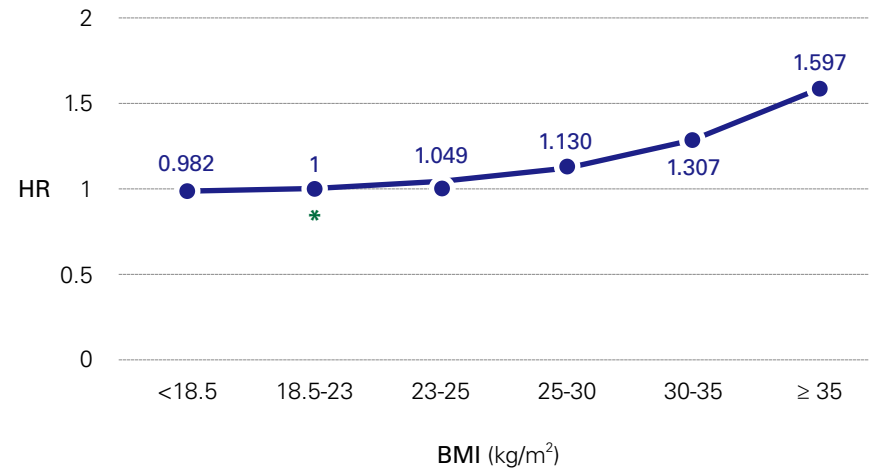
Prepregnancy weight and maternal complication

The maternal complications such as eclampsia and high-risk pregnancies increased as the BMI of women increased.

Eclampsia



High-risk pregnancies



* Reference group

Age-adjusted data

Eclampsia was defined as ICD O11, 14.0, 14.1, 14.9, 15.0, 15.1, 15.2, and 15.9.

High risk pregnancies was defined as ICD-Z 35.8 and 35.9.

The event within 280 before delivery was included during 2007-2015.

Data derived from the NHIS data set: 2006-2015

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