

# Prevalence of the metabolic syndrome in Luxembourg according to the Joint Interim Statement definition estimated from the ORISCAV-LUX study

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## Background

The prevalence of the metabolic syndrome (MS) has been determined in many countries worldwide but never in Luxembourg. This research aimed to 1) establish the gender- and age-specific prevalence of MS and its components in the general adult population of Luxembourg, according to the most recent Joint Interim Statement (JIS) definition, by using both the high and low cut-off points to define abdominal obesity (table 1), and 2) compare and assess the degree of agreement with the Revised National Cholesterol Education Programme-Adult Treatment Panel III (R-ATPIII) and the International Diabetes Federation (IDF) definitions.

Table 1 Ethnic-specific cut-off points for waist circumference

Ethnic group (Europid)	Waist circumference	Reference
♂	≥ 94 cm	IDF
♀	≥ 80 cm	
♂	≥ 102 cm	European cardiovascular societies
♀	≥ 88 cm	

## Methods

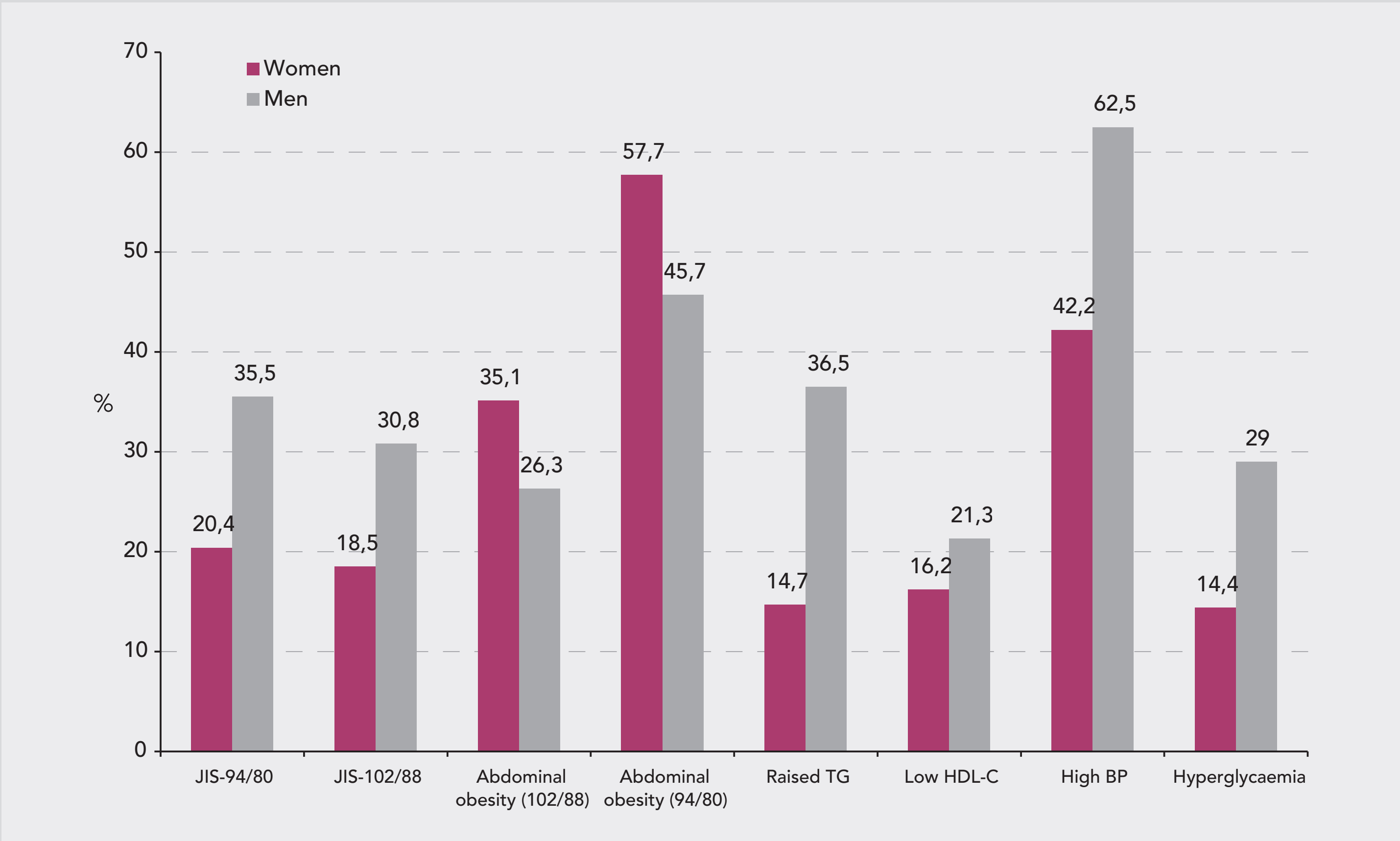
A representative stratified random sample of 1349 European subjects, aged 18-69 years, participated to ORISCAV-LUX survey. Logistic regression and odds ratios (OR) were used to study MS prevalence with respect to gender and age. The Framingham risk score (FRS) to predict the 10-year coronary heart disease (CHD) risk was calculated to compare the proportion of MS cases below or above 20%, according to both high and low waist circumference (WC) thresholds. Cohen's kappa coefficient ( $\kappa$ ) was utilized to measure the degree of agreement between MS definitions.

## Results

### JIS definition based on higher and lower WC thresholds

The prevalence of the MS defined by the JIS was 28.0% and 24.7% when using the low (94/80) and the high (102/88) WC cut-off points, respectively. The prevalence was significantly higher in men than in women (OR=2.6 and 2.3 for the low and high WC thresholds), as were all components of the MS except abdominal obesity measured by both thresholds (Figure 1). Among the other components, hypertension was the most commonly abnormal criterion (52.5 %) in the study population.

Figure 1 JIS-prevalence of the MS and of its components according to gender



### FRS and JIS definition

After excluding participants with history of CHD, subjects were cross-classified according to their MS status (MS or not MS) for each definition and to their 10-year predicted FRS (> 20% or < 20%). Regardless of the definition used, the proportion of subjects at high 10-year CHD risk was significantly greater in the MS group than in the non MS group. When focussing on the WC thresholds, the proportion of subjects at high CHD risk, by using the JIS-102/88 criterion, was comparable to that obtained with the JIS-94/80 definition [9.65% (95%CI: 6.50 – 12.8) against 8.55% (95%CI: 5.75 – 11.4)], respectively, suggesting that the 10-year predicted risk of CHD by FRS did not depend on the threshold used. (Table 2)

Table 2 The JIS prevalence of metabolic syndrome according to 10-year predicted risk of coronary heart disease, using the two waist circumference thresholds

Metabolic syndrome		Total	10-Year CHD risk (FRS ≥ 20 %) N (%) (95% CI)	P-Value*
JIS-94/80	Yes	386	33 (8.55) (5.75 – 11.4)	<0.0001
	No	916	7 (0.76) (0.20 – 1.33)	
JIS-102/88	Yes	342	33 (9.65) (6.50 – 12.8)	<0.0001
	No	960	7 (0.73) (0.19 – 1.27)	

\*P value indicates the comparison between the 10-year CHD risk classes according to the presence of the MS for each WC threshold.

### JIS-94/80 versus IDF and R-ATPIII definitions

Figure 2 illustrates the gender- and age- specific prevalence of MS using the three definitions. Overall, JIS-94/80 yielded a higher MS prevalence than IDF and R-ATPIII in both genders. For all age groups, the prevalence of MS by using the JIS-94/80 definition was higher than the IDF and R-ATPIII. Regardless of the definition, the prevalence increased markedly with age.

Figure 2 Gender- and age-specific prevalence of the metabolic syndrome according to the R-ATPIII, IDF and JIS-94/80 definitions

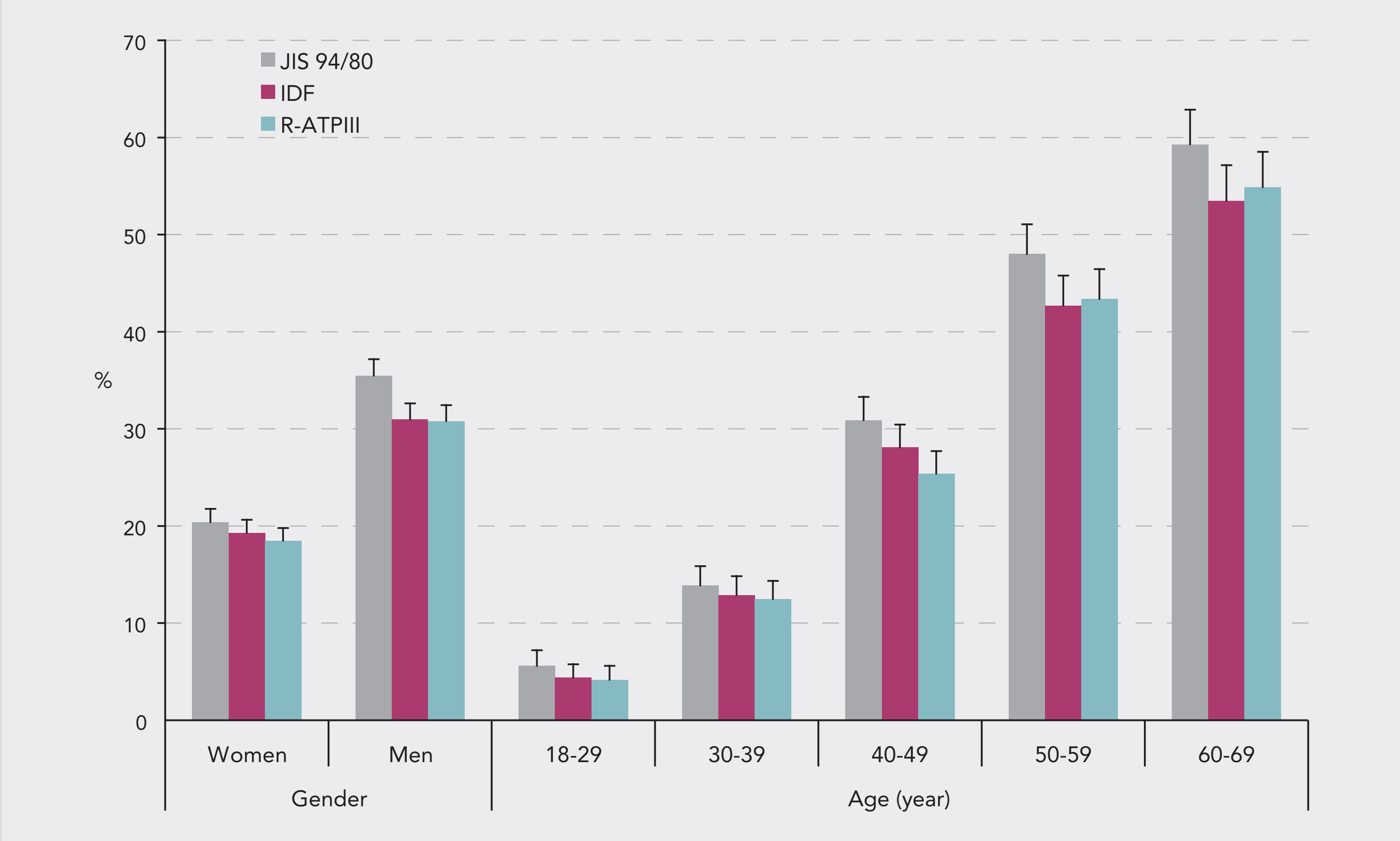


Table 3 reports the agreement between the 3 definitions according to gender. Globally, excellent agreement was observed between the three definitions of MS ( $\kappa=0.89$ ), in particular between JIS and IDF ( $\kappa=0.93$ ). Agreement was significantly higher in women than in men, and differed between age groups.

Table 3 Percentage of observed agreements between the definitions of the metabolic syndrome

Agreement* Percent ± SE (Cohen's kappa coefficient)				
	JIS-94/80 vs IDF	JIS94/80 vs R-ATPIII	IDF vs R-ATPIII	JIS-94/80 vs IDF vs R-ATPIII
Total	97.2 ± 0.46 (0.93)	96.7 ± 0.55 (0.91)	93.9 ± 0.65 (0.84)	93.9 ± 0.65 (0.89)
Women	98.9 ± 0.38 (0.96)	98.1 ± 0.54 (0.94)	97.0 ± 0.65 (0.90)	97.0 ± 0.65 (0.94)
Men	95.5 ± 0.84 (0.90)	95.4 ± 0.80 (0.89)	90.8 ± 1.12 (0.78)	90.8 ± 1.12 (0.86)
P-value	0.0003	0.007	<0.0001	<0.0001

\* Percentage of participants who were classified as either having or not having the metabolic syndrome under the considered definitions of the metabolic syndrome.

## Conclusion

Regardless of the definition used, the adult population of Luxembourg reveals a high prevalence of MS. The rate increased markedly with age, showing a gender-specific difference. This fact underscores the importance of promoting healthy lifestyles, such as proper nutrition, weight management, and adequate physical activity among the apparently healthy adults to fight against this emerging cardiometabolic disorder. Our findings contribute to build evidence regarding the definitive construct of the MS, to help selecting the waist circumference thresholds for Euroid populations, and to support the need to revise the guidelines for abdominal obesity levels.