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BODY MASS INDEX CUT-OFFS FOR IDENTIFYING NONCOMMUNICABLE DISEASES IN MALAYSIA

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Introduction

- Noncommunicable diseases (NCDs) are among the leading causes of death and contributes to approximately 70% of all deaths worldwide[1]

- Elevated body mass index (BMI) is recognized as a major risk factor for NCDs. Several studies have determined various BMI cut-offs for classifying dyslipidemia, hypertension, diabetes or at least one cardiovascular risk factor (CRF) [2,3,4].

- For Malaysian adults, the proposed optimal BMI cut-off points for the risk of diabetes mellitus, hypertension and hypercholesterolemia varied from $23.34 kg/m^2$ to $24.14 kg/m^2$ for men and from $24.04 kg/m^2$ to $25.4 kg/m^2$ for women[3]. However, they were determined based on data collected in 2006, more than a decade ago.

Objective

The aim of this study is to verify the sensitivity and specificity of these cut-off points for the Malaysian adult population using data from a recent national survey.

Method

Data : National Health and Morbidity Survey (NHMS) 2019[5]

NHMS 2019
National Health & Morbidity Survey

Subject : Adults aged 18 years and above

✓ **BMI**
weight(kg)/height^2(m^2)

✓ **Diabetes Mellitus**
(6.1 mmol/L (fasting) or more than 11.1 mmol/L (non-fasting)

✓ **Hypertension**
systolic ≥140 mmHg and/or diastolic ≥90 mmHg

✓ **Hypercholesterolemia**
total cholesterol of 5.2 mmol/L or more

Descriptive analyses
(complex survey design & unequal selection probabilities)

* Sensitivity
The ability of a given BMI cut-off point to correctly classify an individual as diabetes, hypertension, or hypercholesterolemia
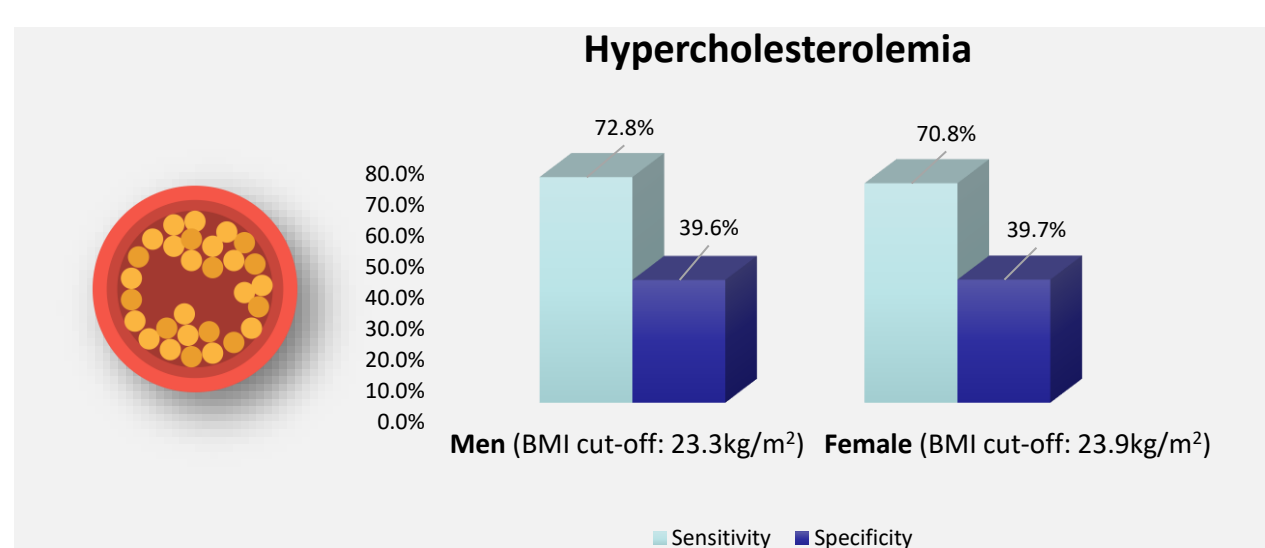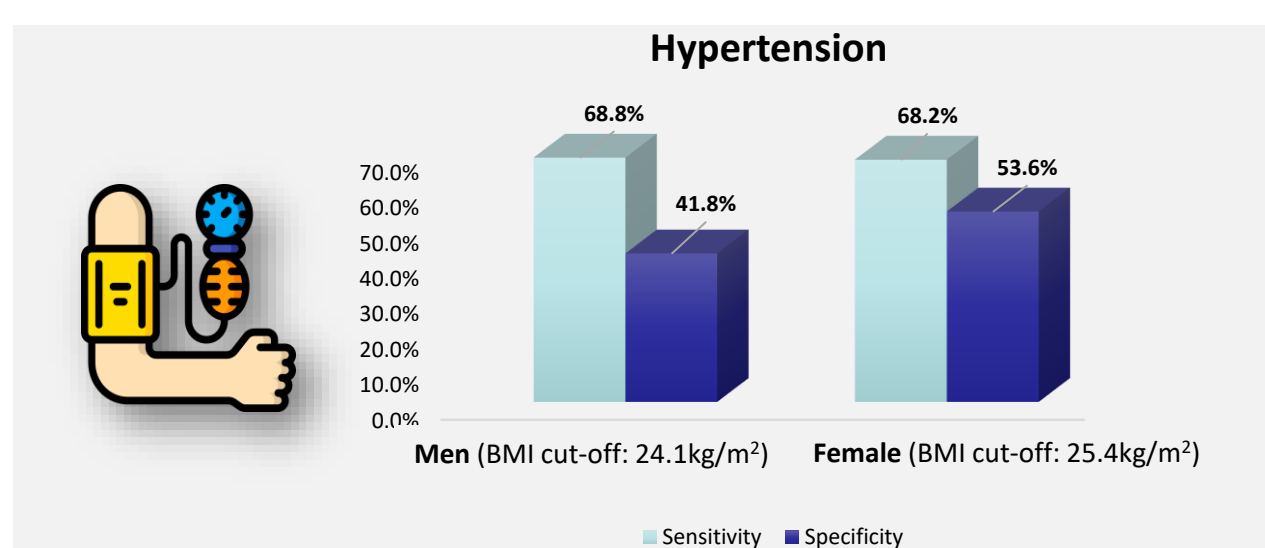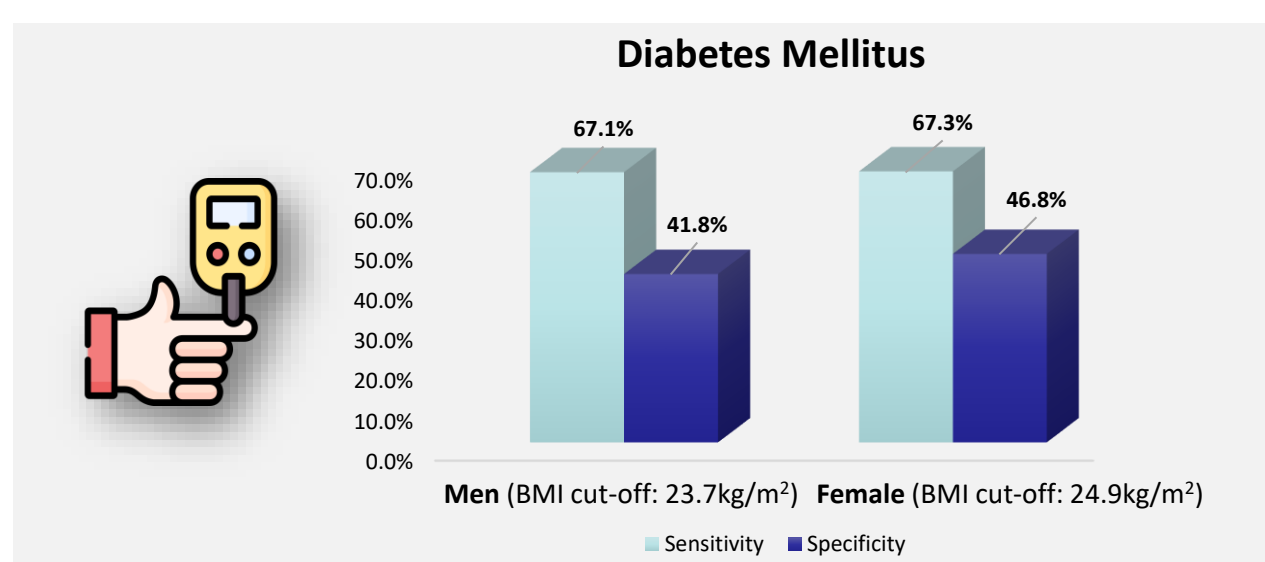
* Specificity
The ability of a given BMI cut-off point to correctly classify an individual as non-diabetes, non-hypertension, or non-hypercholesterolemia

		Disease	Non-disease
BMI cut-off (kg/m^2)	≥ 23.0	True Positive (TP)	False Positive (FP)
	<23.0	False Negative (FN)	True Negative (TN)

Sensitivity = TP/(TP/FN)
Sensitivity = TP/Diseased

Specificity = TN/(TN/FP)
Specificity = TN/Not Diseased

Figure 1 : Diagram demonstrating the basis for deriving sensitivity and specificity

Results

Descriptive:

- The total number of respondents aged ≥ 18 years was 10,472 (4785 males and 5687 females)
- Majority aged between 31 to 59 years.
- 51.0% Malay, 21.5% Chinese, 11.1% Other bumiputras, 10.6% other ethnic groups and 5.8% Indian.
- The prevalence of BMI above $23.0 kg/m^2$ was 66.0% (BMI range from $14 kg/m^2$ to $55 kg/m^2$)

Diabetes Mellitus

| | Men (BMI cut-off: 23.7kg/m²) | Female (BMI cut-off: 24.9kg/m²) |
Sensitivity 67.1% / Specificity 41.8% | Sensitivity 67.3% / Specificity 46.8%

■ Sensitivity ■ Specificity

Hypertension

| Men (BMI cut-off: 24.1kg/m²): Sensitivity 68.8%, Specificity 41.8% | Female (BMI cut-off: 25.4kg/m²): Sensitivity 68.2%, Specificity 53.6% |

■ Sensitivity ■ Specificity

Hypercholesterolemia

| Men (BMI cut-off: 23.3kg/m²): Sensitivity 72.8%, Specificity 39.6% | Female (BMI cut-off: 23.9kg/m²): Sensitivity 70.8%, Specificity 39.7% |

■ Sensitivity ■ Specificity

Discussion/Conclusion

- Our findings indicate that the proposed BMI cut-offs (23.3 to 24.1 kg/m^2 for men and 24.0 to 25.4 kg/m^2 for women) correctly identified more than 67% of those with NCDs and correctly identified more than 39% of those without.

- The BMI cut-off points proposed by the previous study showed acceptable sensitivity but relatively low specificity.

- Therefore, we suggest that the use of these proposed BMI cut-offs for classification of overweight among Malaysian adults should be revised periodically to increase its sensitivity and specificity for the NCDs screening and weight management programs.

References

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