

# Optimal waist circumference cut-off values for predicting cardiovascular risk factors in a multi-ethnic Malaysian population

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## Summary

### Introduction:

Previous studies have proposed the lower waist circumference (WC) cutoffs be used for defining abdominal obesity in Asian populations.

**Objective:** To determine the optimal cut-offs of waist circumference (WC) in predicting cardiovascular (CV) risk factors in the multi-ethnic Malaysian population.

**Methods:** We analysed data from 32,703 respondents (14,980 men and 17,723 women) aged 18 years and above who participated in the Third National Health and Morbidity Survey in 2006. Gender-specific logistic regression analyses were used to examine associations between WC and three CV risk factors (diabetes mellitus, hypertension, and hypercholesterolemia). The Receiver Operating Characteristic (ROC) curves were used to determine the cut-off values of WC with optimum sensitivity and specificity for detecting these CV risk factors.

### Introduction

Abdominal obesity (AO) is closely associated with an increased risk of cardiovascular diseases, and type 2 diabetes mellitus [1]. AO is also associated with risk of all-cause, cardiovascular and cancer mortality independent of body mass index [2]. One of the most common surrogate measures of abdominal adiposity in epidemiological studies is waist circumference (WC). Currently, several WC cut-offs are in use to define abdominal obesity. The World Health Organisation [3] defines AO as WC > 102 cm in men and > 88 cm in women. However, this definition when applied to an Asian population, might underestimate the prevalence of obesity-related metabolic disorders, thus failing to identify those at risk of cardiovascular disease. There is evidence showing that Asian populations have increased risk of cardiovascular diseases at cut-offs even lower than the WHO (1998) recommendation values [4–7]. Previous studies have recommended ethnic-specific WC cutoffs for Asian populations [8–10]. The International Diabetes Institute/Western Pacific World Health Organisation/International Association for the study of

obesity/International Obesity Task Force recommended modified Asian criteria of WC cut-offs  $>90$  cm for men and  $>80$  cm for women [11]. The International Diabetes Federation (IDF) recommended pragmatic ethnic specific cut-offs for South Asian populations (Malay, Chinese and Asian Indian) of  $\geq 90$  cm for men and  $\geq 80$  cm for women [12]. A study of optimal WC cut-off points indicated that lower cut-offs (93.2 cm for men, 85.2 cm for women) than the current recommendations should be used to define abdominal obesity in Malaysian adults. But, these cut-offs were derived based on association with BMI rather than with the risk of obesity-related disorders [13]. Another study among patients who attended primary care clinics has proposed a single WC cut-off of 83 cm for Malaysian adults regardless of gender for predicting dyslipidemia, hypertension, diabetes or at least one cardiovascular (CV) risk factor [14]. However, there is a question of generalizability as the study only involve a small sample of patients, and was not derived from a population-based study. Hence, we analysed data from the third National Health and Morbidity Survey 2006, which is a nationally representative, population-based cross sectional study to determine the optimal WC cut-off value for Malaysian adults. Further, the sensitivity and specificity of these cut-off values were compared with WHO and IDF cut-offs for predicting diabetes mellitus, hypertension, and hypercholesterolemia or at least one of the CV risk factors.