

Waist Circumference and Waist-Hip Ratio

Report of a
WHO Expert Consultation

GENEVA, 8-11 DECEMBER 2008



World Health
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Abbreviations and acronyms

ATP	Adult Treatment Panel
AUC	area under the receiver operating characteristic curve
BMI	body mass index
CARDIA	Coronary Artery Risk Development in Young Adults
CVD	cardiovascular disease
DEXA	dual X-ray absorptiometry
FAO	Food and Agriculture Organization of the United Nations
FPR	false-positive rate
IDF	International Diabetes Federation
MESA	Multi-Ethnic Study of Atherosclerosis
NCD	noncommunicable disease
NCEP	National Cholesterol Education Program
NHANES	National Health and Nutrition Examination Survey
NHLBI	National Heart, Lung and Blood Institute
NIH	National Institutes of Health
ROC	receiver operating characteristic
STEPS	STEPwise Approach to Surveillance (WHO)
SWAN	Study of Women's Health Across the Nation
TPR	true-positive rate
US	United States
WHO	World Health Organization

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1 Introduction

The World Health Organization (WHO) Expert Consultation on Waist Circumference and Waist–Hip Ratio was held in Geneva, Switzerland on 8–11 December 2008. The consultation was organized by WHO's Department of Nutrition for Health and Development, in collaboration with the Department of Chronic Diseases and Health Promotion. It was opened by Dr Ala Alwan, WHO Assistant Director-General for Noncommunicable Diseases and Mental Health. The consultation was convened as part of WHO's:

- efforts in implementing the recommendations made at the WHO Consultation on Appropriate Body Mass Index for Asian Populations (WHO, 2004);
- response to the emerging problem of obesity and related chronic diseases, in particular in low- and middle-income countries.

The 1997 WHO Expert Consultation on Obesity recognized the importance of abdominal fat mass (referred to as abdominal, central or visceral obesity), which can vary considerably within a narrow range of total body fat and body mass index (BMI). It also highlighted the need for other indicators to complement the measurement of BMI, to identify individuals at increased risk of obesity-related morbidity due to accumulation of abdominal fat (WHO, 2000a). Waist–hip ratio (i.e. the waist circumference divided by the hip circumference) was suggested as an additional measure of body fat distribution. The ratio can be measured more precisely than skin folds, and it provides an index of both subcutaneous and intra-abdominal adipose tissue (Bjorntorp, 1987). The suggestion for the use of proxy anthropometric indicators arose from a 12-year follow-up of middle-aged men, which showed that abdominal obesity (measured as waist–hip ratio) was associated with an increased risk of myocardial infarction, stroke and premature death, whereas these diseases were not associated with measures of generalized obesity such as BMI (Larsson et al., 1984). In women, BMI was associated with increased risk of these diseases; however, waist–hip ratio appeared to be a stronger independent risk factor than BMI (Lapidus et al., 1984).

The 2002 WHO Expert Consultation on Appropriate Body Mass Index for Asian Populations and Its Implications for Policy and Intervention Strategies (WHO, 2004) reviewed the issue of ethnic differences in the meaning of BMI cut-off values. In populations with a predisposition to central (i.e. abdominal or visceral) obesity and the related increased risk of developing metabolic syndrome, the consultation recommended that, where possible, waist circumference should be used to refine action levels based on BMI. For example.

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