宿泊型新保健指導（スマート・ライフ・ステイ）プログラム　3か月後アンケート

アンケート③

大項目	中項目	番号	小項目	回答
Ⅰ．宿泊プログラムにご参加いただいてから約3か月が経過しました。現在の健康状態についてお聞かせください。 当てはまる番号に○を、（　　）に文字や数字を記入してください。				
病歴	現病歴	1	現在、治療中の病気はありますか	【内科系疾患】 1. 高血圧　2. 糖尿病　3. 脂質異常症　4. 狭心症、心筋梗塞　5. その他の心臓病 6. 脳卒中　7. 肝臓病　8. 腎臓病　9. がん　10. 喘息　11. 痛風　12. 貧血 13. 骨粗鬆症 【整形外科】 14. 首　15. 肩　16. 腰　17. 股関節　18. 膝　19. 足首 20. その他（　　）　21. なし
	服薬状況	1A	上記の病気で服薬していますか	1. はい　2. いいえ ⇒「はい」と答えた方は、服薬内容を確認させていただきます。お薬手帳などの服薬内容が分かるものを添付してください。
自覚症状	健康感	2	自分で健康だと感じていますか	1. 非常に健康だと思う　2. 健康なほうだと思う　3. あまり健康ではない　4. 健康ではない
Ⅱ．現在の生活習慣についてお聞かせください。　当てはまる番号に○を、（　　）に数字を記入してください。				
運動習慣	身体活動量	3	日常生活において歩行又は同等の身体活動を1日1時間以上実施していますか	1. はい　2. いいえ
	運動 行動変容ステージ	4	運動習慣を身につけることについて、何か取り組んでいますか。	1. 関心はない 2. 運動しなくてはいけないと思うが、実行できない 3. 今すぐにでも実行したい 4. 定期的な運動をして6か月未満である 5. 定期的な運動をして6か月以上である
	4の質問で、4または5と答えた方のみ、下記の4Aをお答えください			
	運動内容	4A	1週間単位で実施している運動の種目と実施時間、週あたりの頻度をお答えください	種目1（　　）⇒　1日あたりの時間（　　）分　、週あたりの日数（　　）日 種目2（　　）⇒　1日あたりの時間（　　）分　、週あたりの日数（　　）日 種目3（　　）⇒　1日あたりの時間（　　）分　、週あたりの日数（　　）日
	自信度 セルフエフィカシー	5	定期的に運動を行っていく自信がありますか 完全に自信がある状態を100%。全く自信がない状態を0%とすると、現在は何%ですか	（　　）%
食生活	食事 行動変容ステージ	6	食生活について、何か改善していますか。	1. 関心はない 2. 興味はあるが難しい 3. 今すぐにでも実行したい 4. 改善を実行して6か月未満である 5. 改善を実行して6か月以上である
	食生活	7	健康な食事をとっていく自信がありますか 完全に自信がある状態を100%。全く自信がない状態を0%とすると、現在は何%ですか	（　　）%
	糖質量	8	いつも食べているご飯の量はどのくらいですか	1. 100g（子ども茶碗盛）　2. 150g（茶碗普通盛）　3. 200g（茶碗中盛） 4. 250g（茶碗大盛）　5. 300g（茶碗普通×2）
	野菜量（食物繊維）	9	1日に野菜を何食食べていますか	1.　3食　2.　2食　3.　1食　4. ほとんど食べない
	脂質や塩分量	10	外食の頻度はどのくらいですか	1. ほとんどしない　2. 週に1～2回　3. 週に3～4回 4. 1日1回　5. 1日1回以上
	過剰エネルギー	11	間食の頻度はどのくらいですか	1.　ほとんど食べない　2.　1日1回　3.　1日2回　4.　1日3回以上
	遅い夕食時間	12	就寝前の2時間以内に夕食をとることが週に3回以上ありますか	1. はい　2. いいえ
	過剰エネルギー	13	夕食後に間食（3食以外の夜食）をとることが週に3回以上ありますか	1. はい　2. いいえ
飲酒	頻度	14	お酒を飲む頻度はどの程度ですか	1. 週1日　2. 週2～3日　3. 週4～6日　4. 毎日 5. 全く飲まない
	14の質問で、1～4と答えた方のみ、下記の14Aをお答えください			
	量	14A	飲酒日の1日あたりの飲酒量はどの程度ですか 清酒1合（180ml）の目安：ビール中瓶1本（500ml）、焼酎35度（80ml）、ウイスキーダブル1杯（60ml）、ワイン2杯（240ml）	1. 1合未満　2. 1～2合未満　3. 2～3合未満　4. 3合以上
喫煙	喫煙習慣	15	現在、タバコを吸いますか	1. はい　2. いいえ
	15で「はい」と答えた方のみ、下記の15Aにお答えください			
	喫煙 行動変容ステージ	15A	禁煙についてどう思いますか	1. 禁煙する気はない 2. 禁煙しなくてはいけないと思うが、実行できない 3. 禁煙を1か月以内にでも実行したい
睡眠	睡眠	16	睡眠によって休養が十分とれていますか	1. はい　2. いいえ

宿泊型新保健指導（スマート・ライフ・ステイ）プログラム　6か月後アンケート

アンケート④

大項目	中項目	番号	小項目	回答
Ⅰ．宿泊プログラムにご参加いただいてから約6か月が経過しました。現在の健康状態についてお聞かせください。 当てはまる番号に○を、（　　）に文字や数字を記入してください。				
病歴	現病歴	1	現在、治療中の病気はありますか	【内科系疾患】 1. 高血圧　2. 糖尿病　3. 脂質異常症　4. 狭心症、心筋梗塞　5. その他の心臓病 6. 脳卒中　7. 肝臓病　8. 腎臓病　9. がん　10. 喘息　11. 痛風　12. 貧血 13. 骨粗鬆症 【整形外科】 14. 首　15. 肩　16. 腰　17. 股関節　18. 膝　19. 足首 20. その他（　　）　21. なし
	服薬状況	1A	上記の病気で服薬していますか	1. はい　2. いいえ ⇒「はい」と答えた方は、服薬内容を確認させていただきます。お薬手帳などの服薬内容が分かるものを添付してください。
自覚症状	健康感	2	自分で健康だと感じていますか	1. 非常に健康だと思う　2. 健康なほうだと思う　3. あまり健康ではない　4. 健康ではない
Ⅱ．現在の生活習慣についてお聞かせください。　当てはまる番号に○を、（　　）に数字を記入してください。				
運動習慣	身体活動量	3	日常生活において歩行又は同等の身体活動を1日1時間以上実施していますか	1. はい　2. いいえ
	運動 行動変容ステージ	4	運動習慣を身につけることについて、何か取り組んでいますか。	1. 関心はない 2. 運動しなくてはいけないと思うが、実行できない 3. 今すぐにでも実行したい 4. 定期的な運動をして6か月未満である 5. 定期的な運動をして6か月以上である
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	自信度 セルフエフィカシー	5	定期的に運動を行っていく自信がありますか 完全に自信がある状態を100%。全く自信がない状態を0%とすると、現在は何%ですか	（　　）%
食生活	食事 行動変容ステージ	6	食生活について、何か改善していますか。	1. 関心はない 2. 興味はあるが難しい 3. 今すぐにでも実行したい 4. 改善を実行して6か月未満である 5. 改善を実行して6か月以上である
	食生活	7	健康な食事をとっていく自信がありますか 完全に自信がある状態を100%。全く自信がない状態を0%とすると、現在は何%ですか	（　　）%
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	遅い夕食時間	12	就寝前の2時間以内に夕食をとることが週に3回以上ありますか	1. はい　2. いいえ
	過剰エネルギー	13	夕食後に間食（3食以外の夜食）をとることが週に3回以上ありますか	1. はい　2. いいえ
飲酒	頻度	14	お酒を飲む頻度はどの程度ですか	1. 週1日　2. 週2～3日　3. 週4～6日　4. 毎日 5. 全く飲まない
	14の質問で、1～4と答えた方のみ、下記の14Aをお答えください			
	量	14A	飲酒日の1日あたりの飲酒量はどの程度ですか 清酒1合（180ml）の目安：ビール中瓶1本（500ml）、焼酎35度（80ml）、ウイスキーダブル1杯（60ml）、ワイン2杯（240ml）	1. 1合未満　2. 1～2合未満　3. 2～3合未満　4. 3合以上
喫煙	喫煙習慣	15	現在、タバコを吸いますか	1. はい　2. いいえ
	15で「はい」と答えた方のみ、下記の15Aにお答えください			
	喫煙 行動変容ステージ	15A	禁煙についてどう思いますか	1. 禁煙する気はない 2. 禁煙しなくてはいけないと思うが、実行できない 3. 禁煙を1か月以内にでも実行したい
睡眠	睡眠	16	睡眠によって休養が十分とれていますか	1. はい　2. いいえ

（例）　　様式C

生活習慣病予防のための宿泊を伴う効果的な保健指導プログラムの開発に関する研究

参加者の皆様へ　研究説明書

１．　本事業の目的

本研究では、特定健診等の結果、保健指導の対象とされる方について、ホテル・旅館に宿泊しながら生活習慣病予防のための保健指導を受けるプログラムを開発し、その効果を検証することを目的としています。

なお、本研究事業は厚生労働科学研究「生活習慣病予防のための宿泊を伴う効果的な保健指導プログラムの開発に関する研究（研究代表者：津下一代、あいち健康の森健康科学総合センター）として実施するものです。

２．　調査の内容・方法

・プログラム内容について

1泊2日あるいは2泊3日のプログラムでは、身体計測・血圧測定、血液検査、簡易血糖値測定（自己血糖測定）、糖尿病等生活習慣病に関する講義、食生活・運動の実践を行います。

プログラム終了後、月に1回電話あるいは電子メールによる支援を行います。

・効果の評価について

1泊2日あるいは2泊3日のプログラム参加前・宿泊終了時のアンケート、3か月後、6か月後のアンケート、体重、腹囲、血圧、血液データを調査します。また、来年度の特定健診結果を用いて、今年度の特定健診結果からの変化を確認します。

３．　安全性

通常の採血にて実施しますので、重篤な副作用は特に想定されません。
治療を急ぐ場合が発生した場合には、介入を中断します。

４．測定結果・調査内容の守秘

検査の結果は、ご説明の上ご本人に返却いたします。今後の健康管理にご活用ください。個人のデータを他の目的に使用したり個人名を公表するようなことはありません。

５．検査・調査の費用等

本研究で行う検査・調査に関する料金は一切必要ありません。

担当者　あいち健康の森健康科学総合センター　　○○○○（氏名）
連絡先　〒470-2101 愛知県知多郡東浦町大字森岡字源吾山1-1
電話　0562-82-0211

（例）　　様式Ｄ

生活習慣病予防のための宿泊を伴う効果的な保健指導プログラムの開発に関する研究について

同　意　書

公益財団法人愛知県健康づくり振興事業団　理事長 殿

１	研究目的の説明	□　済み
２	調査の内容・方法の説明	□　済み
３	安全性についての説明	□　済み
４	測定結果・調査内容の守秘についての説明	□　済み
５	検査・調査の費用等についての説明	□　済み
６	研究に関するご質問、お問い合わせについての説明	□　済み

説明担当者　＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿

私は本研究・調査について、その目的、内容、調査、方法について、また得られた結果の個人的な秘密が守られることについて説明を受け、十分に理解し、納得しましたので、調査に参加することに同意いたします。また、検査・測定結果・調査が研究目的で使用されることにも同意いたします。

平成　　年　　月　　日

住　　所

本人氏名

Ⅳ.　研究成果の刊行に関する一覧表　刊行物・別刷

Ⅳ.（様式第19）

学 会 等 発 表 実 績

委託業務題目「生活習慣病予防のための宿泊を伴う効果的な保健指導プログラムの開発に関する研究」
機関名　公益財団法人　愛知県健康づくり振興事業団

学会誌・雑誌等における論文掲載

掲載した論文（発表題目）	発表者氏名	発表した場所（学会誌・雑誌等名）	発表した時期	国内・外の別
Global Trend in Overweight and Obesity and Its Association With Cardiovascular Disease Incidence	Yatsuya H, Li Y, Hilawe EH, Ota A, Wang C, Chiang C, Zhang Y, Uemura M, Osako A, Ozaki Y, Aoyama	J-STAGE	2014	国外

総説

論文タイトル	著者名	発表雑誌名
肥満症の予防・治療の効果	津下一代	日本医師会雑誌 143（1）49-53, 2014
特定健診2千万人のデータを活用した保健事業のPDCA	津下一代	保健医療科学 63（5）438-448, 2014
運動療法、病院から地域連携へ	津下一代	Diabetes Frontier 25(6)663-667, 2014
特定健診・特定保健指導と行政的な取り組み	村本あき子、津下一代	月刊糖尿病　6(8)：81-88, 2014-09
The role of chronobiology and circadian rhythms in type 2 diabetes mellitus: implications for management of diabetes	Takeshi Kurose, Takanori Hyo, Daisuke Yabe, Yutaka Seino	ChronoPhysiology and Therapy
糖尿病教育のツールと学術集会	矢部大介、清野裕	Diabetes Frontier Vol.25　No.6　2014-12
糖尿病カンバセーション・マップTM	黒瀬健、矢部大介、表孝徳	糖尿病診療マスター Vol.12 No.4
運動療法 ステップアップで考えよう より効果的な方法と継続への道	小熊祐子	プラクティス Vol.31 No.3

雑誌掲載

掲載内容	雑誌名
27年度「宿泊型新保健指導試行事業」説明会 多職種連携で体験型の保健指導　　プログラムの効果を検証	週刊　保健衛生ニュース 第1797号, 7-10, 2014, 2, 23
宿泊型新保健指導の第２回説明会を開催	週刊　保健衛生ニュース 第1798号, 28, 2014, 3, 2

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http://www.j-circ.or.jp

REVIEW

Global Trend in Overweight and Obesity and Its Association With Cardiovascular Disease Incidence

Hiroshi Yatsuya, MD, PhD; Yuanying Li, PhD; Esayas Haregot Hilawe, PhD; Atsuhiko Ota, MD, PhD; Chaochen Wang, BSc; Chifa Chiang, PhD; Yan Zhang, BSc; Mayu Uemura, BSc; Ayaka Osako, BSc; Yukio Ozaki, MD, PhD; Atsuko Aoyama, MD, PhD

Although the global prevalence of both the overweight and obese is on the rise, there are variations among regions or countries, and sexes. Approximately half or more than half of the population are overweight/obese defined as body mass index ≥25 kg/m^2 in the Americas (61.1%), Europe (54.8%), and Eastern Mediterranean (46.0%) according to the World Health Organization, while a much lower prevalence is observed in Africa (26.9%), South-East Asia (13.7%), and the Western Pacific (25.4%). Females are more likely to be overweight/obese in the Eastern Mediterranean, Africa, South-East Asia and the majority of countries in the Americas and Western Pacific but not in the most of the countries in Europe. These region-sex-ethnicity differences in prevalence may be a clue to the causes of the obesity epidemic. Epidemiological studies done in the USA, Europe, and Asia found that higher BMI was significantly associated with increased incidence of coronary artery disease (CAD) and ischemic stroke, but the association with hemorrhagic stroke incidence was not always consistent. The association of BMI with CAD and ischemic stroke was generally independent of known mediators, which would indicate the importance of controlling or preventing overweight/obesity for the prevention of cardiovascular disease.

Key Words: Coronary artery disease; Epidemiology; Ischemic stroke; Obesity; Stroke

Obesity is a state of excess fat accumulation that accompanies wide range of health disadvantages. The World Health Organization (WHO) defines a body mass index (BMI) of ≥25 kg/m^2 as overweight, and a BMI of ≥30 kg/m^2 as obesity.[1] The global prevalence of the overweight and obese is on the rise.[2] The Global Burden of Disease Study estimated that the proportion of overweight or obese adults in 2013 was 36% in men and 37% in women worldwide.[3] Globally, the epidemic has affected both developed and developing countries, men and women, and adults and children, although there are great variations in their prevalence and trends among regions or countries, and sexes.

Because obesity is believed to cause a number of established risk factors for cardiovascular diseases (CVD) such as hypertension, dyslipidemia, and diabetes,[4] the growing prevalence of obesity is assumed to increase the global CVD burden. However, it is also known that other changes in diet and lifestyle have led to changes in the prevalence of these risk factors, and presumably in CVD incidence.[5,6] An example of this would be a dramatic decrease in stroke mortality observed after World War 2 in Japan because of the decrease in severe hypertension,[7] although the average BMI also increased during this period.[8–10] Therefore, the association of obesity with CVD remains to be investigated, especially in terms of differences in the association by time period as well as how the association (if any) would be mediated by the established risk factors.[11] Also, there may be differences in the threshold of BMI where significant BMI would be observed, because significant differences exist in the prevalence of obesity by sex and ethnicity. Hence, we set 2 aims in this review. The first aim was to provide an overview of global trends of overweight and obesity according to the WHO regions and countries within each region by sex. The second aim was to provide up-to-date information on cohort studies that have investigated the associations of BMI with coronary artery disease (CAD) and stroke in various parts of the world.

Methods

Overweight and Obesity Trends

The review compiles the prevalence of overweight and obesity for every country in the WHO's 6 regions of the world (Africa, the Americas, Eastern Mediterranean, South-East Asia, Western Pacific, and Europe).

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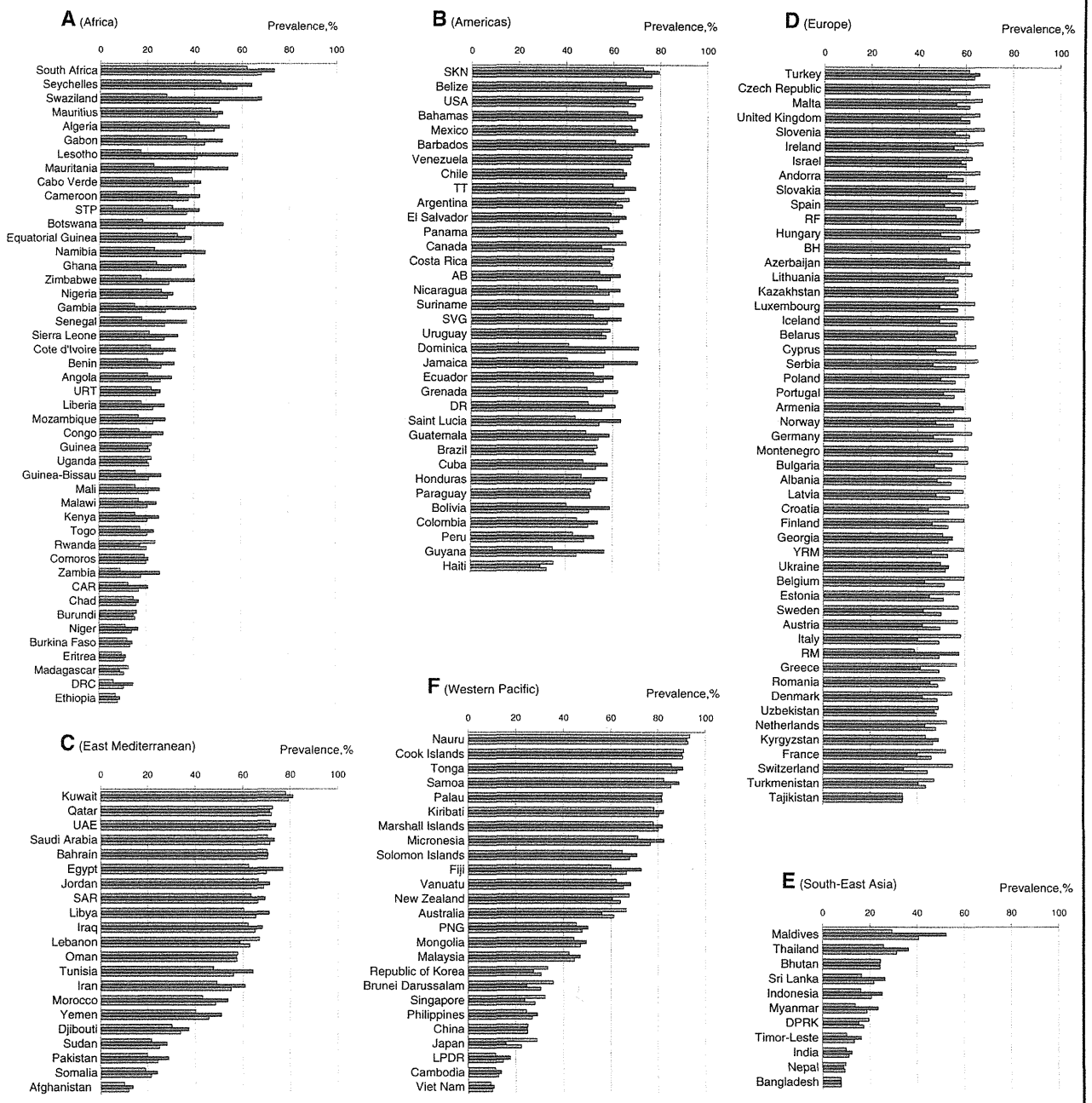

Figure 1. Bar graphs showing the prevalence of overweight/obesity (BMI ≥25 kg/m²) among adults aged ≥20 years in countries of the 6 WHO regions of the world in 2008. (**A**–**F**) Estimates for every country in Africa, the Americas, East-Mediterranean, Europe, South-East Asia, and the West Pacific, respectively, for which data were available. Blue, men; red, women; green, total. Countries are sorted according to the prevalence of overweight in total population. All estimates are age standardized. BMI, body mass index; CAR, Central African Republic; DRC, Democratic Republic of the Congo; STP, Sao Tome and Principe; URT, United Republic of Tanzania (**A**), AB, Antigua and Barbuda; DR, Dominican Republic; SKN, Saint Kitts and Nevis; SVG, Saint Vincent and the Grenadines; TT, Trinidad and Tobago; USA, United States of America (**B**), Iran, Islamic Republic of Iran; SAR, Syrian Arab Republic; UAE, United Arab Emirates (**C**), BH, Bosnia and Herzegovina; RM, Republic of Moldova; RF, Russian Federation; YRM, The former Yugoslav Republic of Macedonia (**D**), DPRK, Democratic People's Republic of Korea (**E**), Micronesia, Federated States of Micronesia; LPDR, Lao People's Democratic Republic; PNG, Papua New Guinea (**F**). Coefficients of variation (CV) of the prevalence of overweight/obesity were 0.47 in Africa, 0.15 in the Americas, 0.37 in the East-Mediterranean, 0.10 in Europe, 0.50 in South-East Asia, and 0.51 in West Pacific. Data were obtained from the WHO Global Health Observatory Data Repository and reproduced with permission, http://apps.who.int/gho/data/node.main.A896?lang=en.

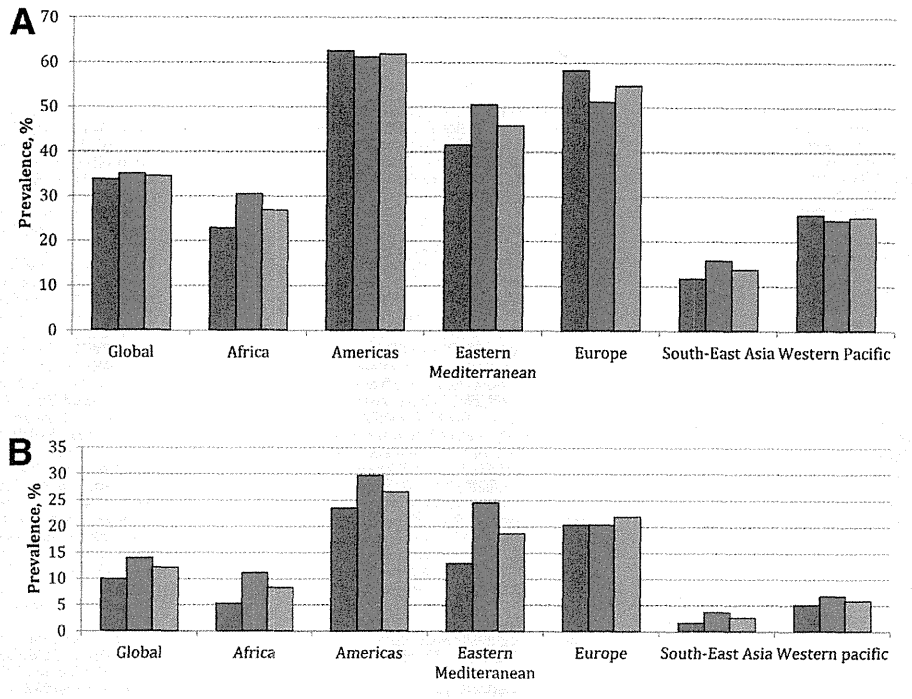

Figure 2. Bar graphs showing the prevalence of overweight/obesity (BMI ≥25 kg/m², **A**) and obesity (BMI ≥30 kg/m², **B**) among adults aged ≥20 years in the 6 WHO regions of the world in 2008. Blue, men; red, women; green, total. All estimates are age standardized. BMI, body mass index. Data were obtained from the WHO Global Health Observatory Data Repository and reproduced with the permission, http://apps.who.int/gho/data/node.main.A896?lang=en.

The data were primarily obtained from the WHO's Global Health Observatory Data Repository (http://apps.who.int/gho/data/node.main.A896?lang=en) in July 2014. The most recent data available (2008) were used for the analyses. Age-standardized estimates were used in preference to crude estimates so that comparison among countries and among regions would be possible. Comparisons among regions and countries have been described and reproduced here with permission from the WHO. We elaborated country-level comparisons in each region. As shown in **Figures 1** and **S1**, countries were sorted according to prevalence in the total population. As a measure of heterogeneity within a region, the coefficient of variation (CV) of the prevalence of overweight/obesity was calculated. The 10-year trend (2000–2009) of the mean BMI in 24 selected countries (4 from each region) was also examined. The 24 countries were purposefully selected by the authors, because they are the main countries with big population in each region.

Review of Prospective Studies

We searched for relevant literature in PubMed using keywords: cohort study, follow up study, body weights and measures, body mass index, coronary heart/artery disease, ischemic heart disease, stroke. We restricted our search to studies of incidence because mortality would be affected by a number of other factors. As the present review was not systematic, the search was also restricted to studies published within 5 years as of June 2014. However, older literature was selected from previous reviews, meta-analyses, or consortia. CAD was defined in the studies included in the review as fatal or non-fatal myocardial infarction and sudden death within 1 h of onset of symptoms. Angina associated with cardiac procedures was not usually included as it can be influenced by the healthcare setting. Stroke was classified as ischemic or hemorrhagic. When possible, the latter was further restricted to intracerebral hemorrhage.

The following information was obtained: mean age or the range, mean BMI or the range, sample size, BMI of the reference category, lowest BMI significantly associated with the incidence, and list of confounding and mediating variables included in the statistical model. Relevant information was extracted separately for sex whenever possible.

Results

Prevalence of Overweight/Obesity

According to the estimates of the WHO, more than one-third (34.5%) of adults in the world aged ≥20 years were overweight or obese in 2008, with females (35.1%) having a slightly higher preponderance than males (33.8%). However, these figures are highly variable when separately analyzed for the 6 WHO-designated regions; the Americas, Europe, and Eastern Mediterranean regions had the highest proportion of overweight/obese adults at 61.1%, 54.8% and 46.0%, respectively. Unlike observations in the rest of the world, males in Europe were more likely to be overweight/obese than their female counterparts (**Figure 2A**). This also applies to some relatively high income countries in the Americas and Western Pacific region (described later).

Separate analyses for obesity show that approximately 12%

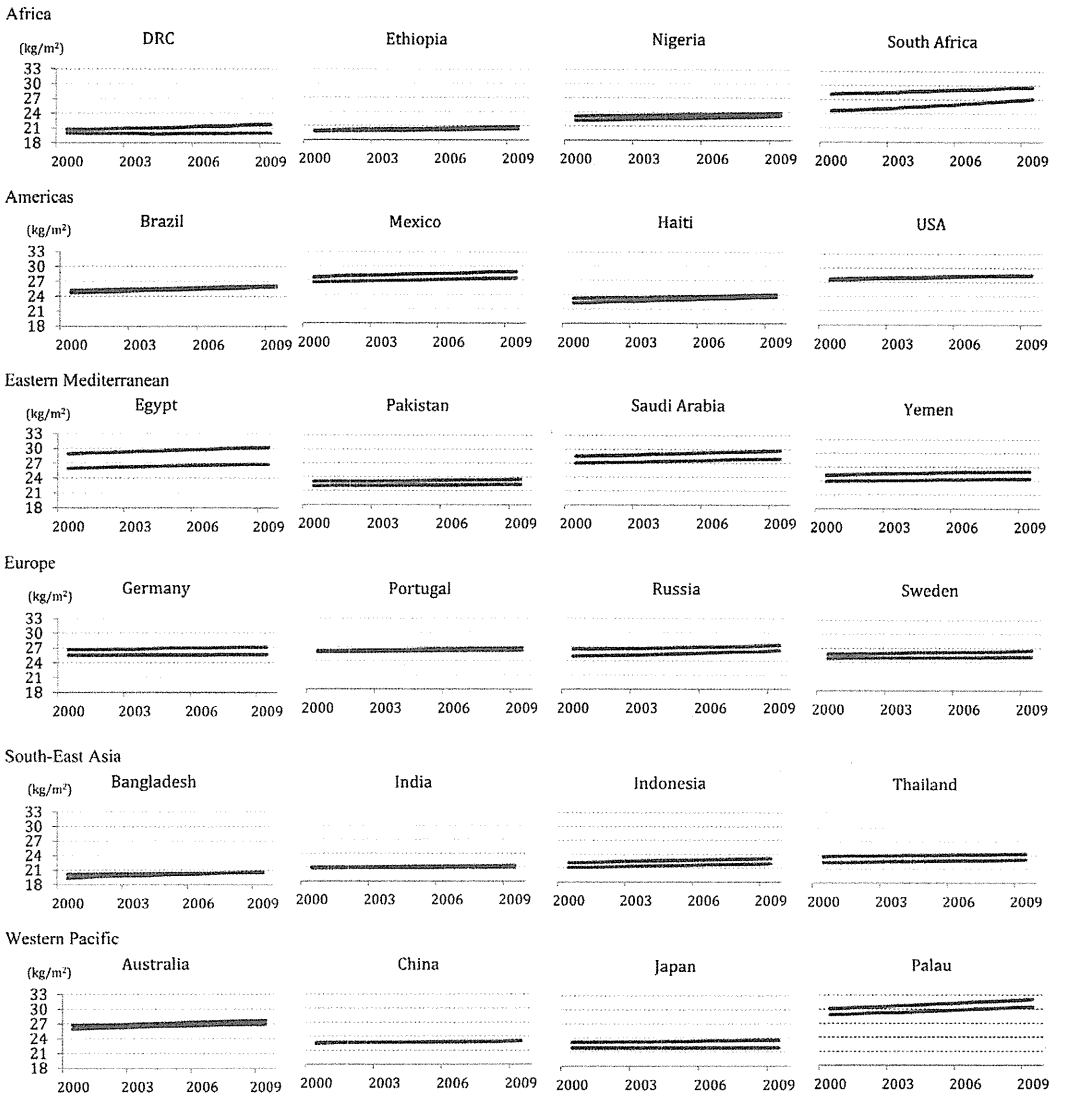

Figure 3. Ten-year (2000–2009) trend of mean BMI in 24 selected countries representing the 6 WHO regions of the world: Africa (represented by Democratic Republic of Congo (DRC), Ethiopia, Nigeria and South Africa); the Americas (represented by Brazil, Haiti, Mexico, and the United States of America (USA)); East-Mediterranean (represented by Egypt, Pakistan, Saudi Arabia and Yemen); Europe (represented by Germany, Portugal, Russia, and Sweden); South-East Asia (represented by Bangladesh, India, Indonesia, and Thailand); and the West Pacific (represented by Australia, China, Japan, and Palau). All estimates are age standardized. Blue, males; red, females. BMI, body mass index. Data obtained from the WHO Global Health Observatory Data Repository and reproduced with the permission, http://apps.who.int/gho/data/node.main.A896?lang=en.

of the global adult population was obese in 2008. The Americas (26.7%), Europe (21.9%), and the Eastern Mediterranean (18.7%) were the top 3 regions with the highest burden of the disease (**Figure 2B**).

Overweight/Obesity in Africa

Overall, 26.9% of African adults were overweight or obese in 2008, with notable heterogeneity among countries (CV: 0.47). South Africa (68.0%), the Seychelles (57.7%) and Swaziland (50.3%) topped the list of African countries with the highest prevalence of overweight or obesity among adults (**Figure 1A**). The same 3 countries had the highest proportion of adults with obesity: South Africa (33.5%), the Seychelles (24.6%) and Swaziland (23.4%) (**Figure S1A**). Ethiopia (8.0%), Eritrea (10.7%) and Burkina Faso (13.0%) made the last 3 with regard to prevalence of overweight or obesity, and Ethiopia, Madagascar, and Eritrea had the lowest prevalence of obesity in the region at 1.2%, 1.7%, and 1.8%, respectively.

Generally, obesity was twice more common among females than it was among males in Africa.

Overweight/Obesity in the Americas

The proportion of overweight and obese adults is the highest in the Americas among the 6 WHO regions (**Figures 1A,B**). The prevalence of overweight/obesity and obesity was 61.9% and 26.7% in that order. In almost all countries in the region,

more than half of the population was overweight or obese. Saint Kitts and Nevis (76.2%), Belize (71.0%) and the United States of America (69.4%) were the top 3 countries with the highest proportions of overweight/obese adults in the region, while Haiti (32.0%), Guyana (44.7%) and Peru (47.9%) relatively had the lowest prevalence of the condition (**Figure 1B**).

The overall prevalence of overweight/obesity was slightly higher in males (62.6%) than in females (61.2%), but obesity was more common in females (29.7%) than it was in males (23.5%) (**Figures 2A,B**).

Overweight/Obesity in the Eastern Mediterranean

The Eastern Mediterranean region is home to most of the oil-rich Arab countries. Although the overall prevalence of overweight/obesity was 46.0%, country-specific figures were 55% or above in the majority of the countries, with modest heterogeneity (CV: 0.37). Gulf countries such as Kuwait (79.3%), Qatar (72.1%) and the United Arab Emirates (72.0%) had the highest proportion of overweight/obese adults in the region, while poverty-stricken countries such as Afghanistan (11.8%), Somalia (21.5%), and Pakistan (24.3%) had relatively the lowest proportion of overweight/obese people (**Figure 1C**).

Approximately 18.7% of adults in the region were obese. Kuwait (42.8%), Saudi Arabia (35.2%), and Egypt (34.6%) were the top 3 in the list of countries with high proportions of obese adults (**Figure S1C**). Afghanistan (11.8%), Somalia (21.5%), and Pakistan (24.3%) made the bottom end of the list.

Females were more likely to be overweight and obese than their male counterparts in all countries in the region.

Overweight/Obesity in Europe

The proportion of overweight/obese adults is the second largest in Europe (54.8%) in the world (**Figures 2A,B**). Most countries in the region had a similar prevalence of overweight/obesity (CV: 0.10); Turkey, Czech Republic and Malta had relatively the highest share at 63.8%, 61.7%, and 61.6%, respectively, whereas Tajikistan (33.8%), Turkmenistan (43.8%) and Switzerland (44.3%) had relatively the smallest number of overweight/obese adults (**Figure 1D**).

More than one-fifth (21.9%) of the regions' adults were obese in 2008. The prevalence of obesity was similar across countries in the region. The same group of countries with the highest and lowest proportions of overweight people also had the highest and lowest proportion of obese people in the region (**Figure S1D**).

There were some peculiarities with regard to the sex distribution of overweight and obesity in the region. Overweight/obesity was more common among males than among females in most countries, but the likelihood of obesity was similar for both sexes.

Overweight/Obesity in South-East Asia

The prevalence of overweight/obesity (13.3%) and obesity (2.7%) in South-East Asia was the lowest in 2008 (**Figures 2A,B**) among the 6 WHO regions. However, there were notable differences across countries (CV: 0.50). The Maldives, Thailand and Bhutan had the highest proportion of both overweight/obese and obese adults in the region (**Figures 1E,S1E**). The prevalence of overweight/obesity in the 3 countries were 40.7%, 31.7% and 24.4%, while corresponding figures for obesity were 16.7%, 8.5% and 5.5%, respectively. In contrast, Bangladesh, Nepal, and India had the lowest proportion of adults with overweight/obesity and obesity: the prevalence of overweight/obesity was 7.7%, 9.3%, and 11.2%, whereas that of obesity was 1.1%, 1.5%, and 1.9%, in that order.

In most countries of the region, females were more likely to be overweight/obese and obese than their male counterparts.

Overweight/Obesity in the Western Pacific

The overall prevalences of overweight/obesity and obesity in the Western Pacific were 25.4% and 21.9%, respectively. However, country-specific figures showed wide variation (CV: 0.51). The prevalence of overweight/obesity exceeded 60% in most of the island countries. Nauru, Cook Islands and Tonga had 92.8%, 90.6% and 88.1% overweight/obese adults, in that order (**Figure 1F**). These countries also had the highest proportion of obese adults in the region at 71.1%, 64.1% and 59.5%, respectively (**Figure S1F**). In contrast, the prevalence of overweight/obesity in Vietnam (10.1%), Cambodia (12.7%), and Lao People's Democratic Republic (14.8%) was the lowest in the region (**Figure 1F**). The same 3 countries had the lowest proportion of obese adults in the region: the prevalence of obesity was 1.6%, 2.3%, and 3.0% in Vietnam, Cambodia and Lao PDR, respectively (**Figure S1F**).

Approximately 22.4% of adults in Japan were overweight/obese in 2008, but the proportion of obese adults was 4.5%. These figures are low in comparison to the corresponding values for Australia or New Zealand, other high-income countries in the region, but comparable to Singapore or Republic of Korea. In contrast, Japanese women had lower prevalence of overweight than women of these developed countries in the region.

Overall, overweight/obesity was more common in males than it was in females and obesity was more common in females than in males.

Trend of Mean BMI (2000–2009)

The 10-year trend of age-standardized mean BMI for 24 selected countries from each WHO region is presented (**Figure 3**). Generally, mean BMI steadily increased between the years 2000 and 2009 in almost all countries. In most low- and middle-income countries, females tend to have higher mean BMI than males, and the reverse was observed in high-income countries. Japanese women did not seem to experience any increase in the average level of BMI.

Summary of Prospective Studies

CAD In general, BMI was positively associated with CAD incidence independent of confounding factors such as age, smoking, alcohol drinking, and physical activity (**Table 1**).[12–29] The lowest BMI associated with increased risk varied by studies, in part because of different reference categories defined. Studies from the USA,[12,13] Europe,[14] Japan,[15] and other countries[16,17] showed this value to be lower than 25 in men. However, there are studies that reported the value to be 25 or greater: from the USA[18] and Europe,[19–22] and Japan.[23,24] In women, the threshold value seems to be 25 or greater according to the reports from the USA[12,13,25] and Europe,[19,20,26] except for 1 study from the USA that reported 23.[27] Furthermore, a few studies reported BMI of 30 or more: from the USA,[28] Europe (women),[19] and Japan.[24]

The association of BMI with the incidence CAD remained significant after inclusion of mediators such as total cholesterol, systolic blood pressure (SBP) and diabetes in the statistical model in many studies, including the Framingham Heart Study,[12] JALS,[15] and the Korea Medical Insurance Corporation study.[17]

Ischemic Stroke (Table 2) BMI was positively associated with ischemic stroke incidence independent of confounding

Table 1. Cohort Studies Reporting an Association of BMI With the Incidence of CAD

Country, study name‡	Year of publication	Baseline, year	Follow-up, years	Age, range or mean, years	BMI, mean, kg/m²	Sample size	Sex
USA, Framingham Heart Study[12]	2000	1956	Max. 24.0	30–62	NA	2,213	M
						2,567	W
USA, Nurses' Health Study[27]	2006	1980	Max. 20.0	34–59	NA	88,393	W
USA, Health Professionals Follow-up Study[13]	2010	1986	Max. 16.0	39–75	25.5	27,859	M
USA, Nurses' Health Study		1986	Max. 16.0	39–65	25.3	41,534	W
USA, ARIC Study[28]	1998	1987–1989	Mean 6.2	45–64	27.4†	6,618	M
					27.7†	7,852	W
USA, Physicians' Health Study[18]	2001	1988	Mean 3.9	40–84	25.4	16,164	M
USA, Women's Health Study[25]	2008	1992	Mean 10.9	≥45	26.0	38,987	W
UK, Renfrew-Paisley Study[19]	2006	1972–1976	Max. 20.0	45–64	25.9†	6,992	M
					25.9†	8,152	W
UK, British Regional Heart Study[14]	1997	1978–1980	Mean 14.8	40–59	25.5	7,735	M
Northern Ireland and France, PRIME Cohort Study[29]	2010	1991–1993	Max. 10.0	50–59	25.5	10,602	M
UK, EPIC-Norfolk Study[21]	2007	1993–1997	Mean 9.1	45–79	26.6	11,117	M
					26.3	13,391	W
UK, Scottish Health Cohort Study[20]	2013	1995/1998, 2003	Median 10.0	44.6	NA	9,320	M
				45.1		12,161	W
UK, Million Women Study[26]	2013	1996–2001	Mean 9.0	56.0	26.1	1,178,939	W
Denmark, Copenhagen General Population Study[22]	2014	2003–2011	Median 3.6	20–100	NA	31,294	M(–)#
							M(+)#
						40,233	W(–)#
							W(+)#
Australian, Sax Institute's 45 and UP Study[16]	2014	2006–2008	Median 3.4	45–103	NA	158,546	Combined
Japan, CIRCS[23]	2007	1975–1987, varies by communities	Median 18.3	40–69	22.9†	3,595	M
					23.4†	5,492	W
Japan, JALS[15]	2010	1985–1999, varies by cohorts	Max. 20.0	40–89	23.0	19,760	M
					23.4	25,475	W
Japan, JPHC Study[24]	2008	1990–1993	Mean 9.7	40–69	NA	43,235	M
						47,444	W
Korea, Korea Medical Insurance Corporation Study[17]	2005	1990–1992	Max. 9.0	35–59	23.0†	133,740	Combined

†Calculated by authors, *Result from MI, #(–) denotes without metabolic syndrome, (+) with metabolic syndrome. ‡ARIC, Atherosclerosis Risk in Communities Study; CIRCS, Circulatory Risk in Communities Study; EPIC-Norfolk, European Prospective Investigation Into Cancer and Nutrition in Norfolk Cohort; JALS, Japan Arteriosclerosis Longitudinal Study; JPHC Study, Japan Public Health Center-Based Study. BMI, body mass index; CAD, coronary artery disease; CHD, coronary heart disease; DM, diabetes; FEV1, forced expiratory volume in 1 second; HC, high cholesterol or dyslipidemia or hypercholesterolemia; HDLC, high-density lipoprotein cholesterol; HTN, hypertension; HRT, hormone replacement therapy; LDLC, low-density lipoprotein cholesterol; NA, not available; M, men; W, women; MI, myocardial infarction; Ref, reference category; RTA, randomized treatment assignments; SBP, systolic blood pressure; TC, total cholesterol; TG, triglyceride. Variables: dr, drinking; edu, education; ex, physical activity or exercise; fhx, family or parental history; hx, history; meno, menopausal status; salary, income or salary; sm, smoking.

(**Table 1** continued the next page.)

Country, study name‡	Model with confounding variables			Model with mediator variables	
	Ref	Lowest BMI with association	Variables adjusted	Lowest BMI with association	Variables adjusted
USA, Framingham Heart Study[12]	<23.8	23.8	Age, sm	23.8	Plus TC
	<22.3	27.6		27.6	
USA, Nurses' Health Study[27]	18.5–22.9	23.0	Age, sm, dr, fhx of CHD, meno, HRT, aspirin use		
USA, Health Professionals Follow-up Study[13] USA, Nurses' Health Study	18.5–22.9	23.0 25.0	Age	23.0 25.0	Plus sm, dr, fhx of MI, height, marital status, profession, HRT, saturated fat, trans fat, polyunsaturated fats, folate, vitamin E, total energy, HC, HTN, DM
USA, ARIC Study[28]	<24.7	None	Age, sm, dr, ethnicity, fhx of CHD		
	<23.3	31.0			
USA, Physicians' Health Study[18]	<22.8	25.7 25.7*	Age, sm, dr, ex, RTA, fhx of MI, multivitamins, aspirin use		
USA, Women's Health Study[25]	<25.0	25.0	Age, sm, dr, RTA, parental hx of MI, HRT, dietary factors		
UK, Renfrew-Paisley Study[19]	18.5–24.9	25.0, 25.0*	Age, sm, adjusted FEV1, social class		
		30.0, 30.0*			
UK, British Regional Heart Study[14]	20.0–21.9	24.0	Age, sm, dr, ex, social class		
Northern Ireland and France, PRIME Cohort Study[29]	First quintile	Third quintile	Age, center	None	Plus sm, dr, ex, edu, HTN, DM, HDLC, TG
UK, EPIC-Norfolk Study[21]	<23.9	25.5	Age	27.0	Plus sm, dr, ex, SBP, TC
	<22.8	24.7		24.7	
UK, Scottish Health Cohort Study[20]	18.5–24.9	25.0	Age, sm, dr, year of survey		
		25.0			
UK, Million Women Study[26]	22.5–24.9	25.0	Age, sm, dr, ex, social class		
Denmark, Copenhagen General Population Study[22]	18.5–24.9			30.0, 30.0*	Age, sm, plasma LDLC, lipid-lowering medication use, aspirin use
				25.0, 25.0*	
				None, 25.0*	
				25.0, 25.0*	
Australian, Sax Institute's 45 and UP Study[16]	20.0–22.49	22.5	Age, sex, sm, dr, edu, region of residence, salary, health insurance		
Japan, CIRCS[23]	<25.0	25.0	Age, community	None	Plus sm, dr, meno, time since last meal, serum TC
		None		None	
Japan, JALS[15]	<21.0	23.0*	Age, sm, dr	27.5*	Plus SBP, serum TC
		None*		None*	
Japan, JPHC Study[24]	23.0–24.9	30.0, 27.0*	Age	30.0, 30.0*	Plus sm, dr, ex, hx of HTN, DM, public health center, intake of green vegetables, fish
		None, None*		None, None*	
Korea, Korea Medical Insurance Corporation Study[17]	18.0–19.0	23.0	Age, sex, sm, dr, ex, health insurance	23.0	Plus HTN, DM, TC
		25.0*		30.0*	

factors in studies across the USA,[30–32] Europe[33–35] and Asia.[15,36–41] A few studies found the association only in men[42,43] or in women[16,44] in contrast to CAD, adjusting for mediators such as SBP and diabetes significantly attenuated the association in most studies from the USA[30,32,33] and Europe.[34] However, some studies in East Asia[36,39–41,43,44] and Finland[35] indicated the associations to be independent of such mediators.

Hemorrhagic Stroke (Table 3) Relatively few studies have been performed in the USA and Europe probably because hemorrhagic stroke is less prevalent. BMI values that showed a significant association with increased incidence of hemorrhagic stroke are in the range 25–30 kg/m^2 in studies in Asia[15,37–39,41,43,44] and the USA.[31] After adjusting for mediators, namely SBP or hypertension, the association became attenuated in most studies.[15,40,43] However, there is a study that showed increased hemorrhagic stroke risk in women with

Table 2. Cohort Studies Reporting an Association of BMI With the Incidence of Ischemic Stroke

Country, study name‡	Year of publication	Baseline, year	Follow-up, years	Age, range or Mean, years	BMI, mean, kg/m²	Sample size	Sex
USA, Nurses' Health Study[30]	1997	1980	Max. 12.0	34–59	NA	93,337	W
USA, Physicians' Health Study[31]	2002	1982	Mean 12.5	53.1#	24.9	21,414	M
USA, ARIC Study[32]	2010	1987/1989	Median 16.9	45–65	27.6	7,619	Black M
					27.4	4,566	White M
					30.8	2,330	Black W
					26.6	5,289	White W
USA, Women's Health Study[33]	2005	1993	Mean 10.0	≥45	26.0	39,053	W
Sweden, Multifactor Primary Prevention Study[34]	2004	1970	Max. 28.0	47–55	25.5	7,402	M
Sweden, Swedish Women's Lifestyle and Health Cohort Study[42]	2006	1991–1992	Mean 11.4	30–50	NA	45,449	W
Finland, Six Independent Cross-sectional Population Surveys[35]	2007	1972–1997, varies by cohorts	Mean 19.5	25–74	NA	23,967	M
						26,029	W
Japan, CIRCS[16]	2007	1975–1987, varies by community	Median 18.3	40–69	22.9†	3,813	M
					23.4†	5,646	W
Japan, JALS[15]	2010	1985–1999, varies by cohort	Max. 20.0	40–89	23.0	19,760	M
					23.4	25,475	W
Japan, Hisayama Study[43]	2011	1988	Max. 12.0	40–79	NA	1,037	M
						1,384	W
Japan, JPHC Study[44]	2011	1995–1998/1999	Median 7.9	45–74	NA	32,847	M
						38,875	W
China, China Stroke Prevention Project[36]	2013	1987	Max. 11.0	>35	NA	12,560	M
						14,047	W
China, China National Hypertension Survey[37]	2010	1991	Mean 8.3	≥40	22.6	75,655	M
						79,081	W
China, Shanghai Women's Health Study[38]	2009	1996–2000	Mean 7.3	40–70	23.9	67,083	W
China, Kailuan Study[39]	2013	2006–2007	Mean 4.0	18–98	25.0	94,744	Combined
Korea, no study name[40]	2004	1986–1990	Max. 10.0	40–64	23.1	234,863	M
Korea, Korean Prevention Cancer Study[41]	2008	1992–1995	Max. 13.0	30–95	23.2	439,582	W#

†Calculated by authors, #nonsmoker. ‡ARIC, Atherosclerosis Risk in Communities Study; CIRCS, Circulatory Risk in Communities Study; JALS, Japan Arteriosclerosis Longitudinal Study; JPHC Study, Japan Public Health Center-Based Study. BG, blood glucose; BP, blood pressure; FBG, fasting BG; OC, oral contraceptive use. Other abbreviations as in Table 1.

(**Table 2** continued the next page.)

BMI ≥30 kg/m² independent of hypertension and diabetes.[44]

Discussion

We confirmed a global obesity trend that is on the rise, although there are significant variations by sex, regions of the world and countries. Cultural perceptions towards obesity may serve as a possible explanation for the observed sex differences in the distribution. For instance, obesity is seen as a sign of wealth and an important attribute of beauty for women in Africa.[45] Women traditionally are expected to stay at home in most of the countries in the Eastern Mediterranean region, and this may have contributed to the observed sex disparity in the prevalence of obesity in the region. East Asian women generally had lower BMI than men and women in other regions, which may be related to social norms (pressure).[46–48] These region-sex-ethnicity differences in prevalence may be a clue to the causes of the obesity epidemic. More studies, including qualitative ones that collect individual risk factors and behaviors, are warranted. One of the limitations of comparisons across countries by using international reports such as the one we used (ie, WHO Global Health Observatory Data Repository) would be differences in the survey methods, and data for some countries are estimates modeled using data from other

Country, study name‡	Model with confounding variables			Model with mediator variables	
	Ref	Lowest BMI with association	Variables adjusted	Lowest BMI with association	Variables adjusted
USA, Nurses' Health Study[30]	<21.0	29.0	Age, sm, dr, ex, OC, meno, HRT, time period, aspirin use, antioxidant score	None	Plus HTN, DM, HC
USA, Physicians' Health Study[31]	<23.0	25.0	Age, sm, dr, ex, hx of angina, fhx of MI prior to 60 years of age, RTA		
USA, ARIC Study[32]	14.4–<23.9	32.0	Age, sm, dr, ex, edu	None	Plus SBP, HTN medication, DM, HDLC, von Willebrand factor, albumin
		32.0		None	
		None		None	
		32.0		None	
USA, Women's Health Study[33]	<20.0	27.0	Age, sm, dr, ex, HRT	None	Plus hx of HTN, DM, HC
Sweden, Multifactor Primary Prevention Study[34]	20.0–22.49	30.0	Age, sm, ex, fhx of stroke, occupational class, stress	None	Plus SBP, HTN treatment, DM, serum TC
Sweden, Swedish Women's Lifestyle and Health Cohort Study[42]	20.0–24.9	None	Age, sm, dr, edu, age at first birth, use of OC	None	Plus hx of HTN, DM
Finland, Six Independent Cross-sectional Population Surveys[35]	18.5–24.9	25.0	Age, sm, dr, ex, edu, study year, fhx of stroke	25.0	Plus SBP, TC, hx of DM
		30.0		30.0	
Japan, CIRCS[16]	<25.0	None	Age, community	None	Plus sm, dr, time since last meal, meno, serum TC
		25.0		None	
Japan, JALS[15]	23.0–24.9	27.5	Age, sm, dr	None	Plus SBP, TC
		25.0		None	
Japan, Hisayama Study[43]	<21.0	25.0	Age	23.0	Plus sm, dr, ex, SBP, ECG abnormalities, DM, TC, HDLC, TG
		None		None	
Japan, JPHC Study[44]	23.0–24.9	None	Age, study community	None	Plus sm, dr, HTN, DM
		27.0		30.0	
China, China Stroke Prevention Project[36]	18.5–24.9	25.0	Age, sm, dr, edu	25.0	Plus hx of DM, HTN, heart disease
		25.0		25.0	
China, China National Hypertension Survey[37]	18.5–24.9	25.0	Age, sex, sm, dr, ex, edu, residence area		
		25.0			
China, Shanghai Women's Health Study[38]	<21.1	24.4	Age, sm, dr, ex, edu, occupation, salary, meno, use of OC, HRT, aspirin, intake of saturated fat, vegetables, fruits, sodium		
China, Kailuan Study[39]	<22.05	22.05	Age, sex, sm, dr, ex, edu, salary, marital status	24.0	Plus hx of HTN, DM, HC
Korea, no study name[40]	22.0–23.9	24.0	Age, sm, dr, ex, salary	24.0	Plus BP, BG, TC
Korea, Korean Prevention Cancer Study[41]	18.5–19.9	20.0	Age, dr, ex	23.0	Plus FBG, SBP, TC

countries and specific country characteristics.[2]

We also found that higher BMI was significantly associated with increased incidence of CAD and ischemic stroke and to a lesser degree with the incidence of hemorrhagic stroke among relatively recent studies included in the review. However, these findings are somewhat inconsistent with old (baseline years being 1960s to 1970s) studies carried out in Japanese[49,50] or in African Americans.[51,52] This might be related to the fact that hypertension without being overweight used to constitute most of the cases of hypertension in rural communities in Japan in the 1960s, but it decreased significantly by the 1980s, accompanied by increases in the proportion of hypertension among the overweight.[53]

BMI cutoff value differed by studies, which precluded definite statement about the threshold. However, BMI ≥25.0 kg/m^2 would be a reasonable representation of increased CVD risk, although there may be lower cutoff for BMI than 25.0 (ie, 23.0), implying that the association of BMI with CVD may be linear. Future studies may provide a more accurate view regarding the threshold by using the same reference and BMI cutoff values.

Variables included in the statistical models varied among studies as well. Models with similar or same variables would be informative when comparing the results to infer differences by ethnicity, sex or other traits of the studied population. Another limitation of the present review is that we only collected studies on BMI. Studies using other obesity measures may have yielded different results.[54] Also, this was not a systematic review. Information provided here may not be thorough. However, we believe that obesity, however it is measured, significantly increases the risk of CAD and ischemic stroke and probably hemorrhagic stroke.

Table 3. Cohort Studies Reporting an Association of BMI With the Incidence of Hemorrhagic Stroke

Country, study name‡	Year of publication	Baseline, year	Follow-up, years	Age, range or mean, years	BMI, mean, kg/m²	Sample size	Sex
USA, Nurses' Health Study[30]	1997	1980	Max. 12.0	34–59	NA	93,337	W
USA, Physicians' Health Study[31]	2002	1982	Mean 12.5	53.1#	24.9	21,414	M
USA, Women's Health Study[33]	2005	1993	Mean 10.0	≥45	26.0	39,053	W
Sweden, Multifactor Primary Prevention Study[34]	2004	1970	Max. 28.0	47–55	25.5	7,402	M
Sweden, Swedish Women's Lifestyle and Health Cohort Study[42]	2006	1991–1992	Mean 11.4	30–50	NA	45,449	W
Finland, Six Independent Cross-sectional Population Surveys[35]	2007	1972–1997, varies by cohort	Mean 19.5	25–74	NA	23,967 26,029	M W
Japan, JALS[15]	2010	1985–1999, varies by cohort	Max. 20.0	40–89	23.0 23.4	19,760 25,475	M W
Japan, Hisayama Study[43]	2011	1988	Max. 12.0	40–79	NA	1,037 1,384	M W
Japan, JPHC Study[44]	2011	1995/1998–1999	Median 7.9	45–74	NA	32,847 38,875	M W
China, China Stroke Prevention Project[36]	2013	1987	Mean 9.1	>35	NA	12,560 14,047	M W
China, China National Hypertension Survey[37]	2010	1991	Mean 8.3	≥40	22.6	75,655 79,081	M W
China, Shanghai Women's Health Study[38]	2009	1996–2000	Mean 7.3	40–70	23.9	67,083	W
China, Kailuan Study[39]	2013	2006–2007	Mean 4.0	18–98	25.0	94,744	Combined
Korea, no study name[40]	2004	1986–1990	Max. 10.0	40–64	23.1	234,863	M
Korea, Korean Prevention Cancer Study[41]	2008	1992–1995	Max. 13.0	30–95	23.2	439,582	W#

†Calculated by authors, *Result from intracerebral hemorrhage; #nonsmoker. ‡CIRCS, Circulatory Risk in Communities Study; JALS, Japan Arteriosclerosis Longitudinal Study; JPHC Study, Japan Public Health Center-Based Study. Abbreviations as in Tables 1,2.

(Table 3 continued the next page.)

From the viewpoints of public health and preventive medicine, the association of BMI with CAD and ischemic stroke independent of known mediators indicates the importance of controlling or preventing overweight/obesity, because it would benefit us through unknown pathways. Recent trends in rising BMI would likely offset advancing medical and behavioral management of established risk factors, especially hypertension. Because many people still live where medical management is not so available, the global burden of obesity, and moreover, the double burden of communicable and non-communicable diseases, will likely increase if this trend continues.

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Country, study name‡	Model with confounding variables			Model with mediator variables	
	Ref	Lowest BMI with association	Variables adjusted	Lowest BMI with association	Variables adjusted
USA, Nurses' Health Study[30]	<21.0	None	Age, sm, dr, ex, OC, meno, HRT, time period, aspirin use, antioxidant score	None	Plus HTN, DM, HC
USA, Physicians' Health Study[31]	<23.0	30.0	Age, sm, dr, ex, hx of angina, fhx of MI prior to 60 years of age, RTA		
USA, Women's Health Study[33]	<20.0	None	Age, sm, dr, ex, HRT	None	Plus hx of HTN, DM, HC
Sweden, Multifactor Primary Prevention Study[34]	20.0–22.49	None*	Age, sm, ex, fhx of stroke, occupational class, stress	None*	Plus SBP, HTN treatment, DM, serum TC
Sweden, Swedish Women's Lifestyle and Health Cohort Study[42]	20.0–24.9	None*	Age, sm, dr, edu, age at first birth, use of OC	None*	Plus hx of HTN, DM
Finland, Six Independent Cross-sectional Population Surveys[35]	18.5–24.9	None None	Age, sm, dr, ex, edu, study year, fhx of stroke	None None	Plus SBP, TC, hx of DM
Japan, JALS[15]	<21.0	27.5 25.0	Age, sm, dr	None* None*	Plus SBP, TC
Japan, Hisayama Study[43]	<21.0	25.0 None	Age	None None	Plus sm, dr, ex, SBP, ECG abnormalities, DM, TC, HDLC, TG
Japan, JPHC Study[44]	23.0–24.9	None* 30.0*	Age, study community	None* 30.0*	Plus sm, dr, HTN, DM
China, China Stroke Prevention Project[36]	18.5–24.9	None None	Age, sm, dr, edu	None None	Plus hx of DM, HTN heart disease
China, China National Hypertension Survey[37]	18.5–24.9	25.0 30.0	Age, sm, dr, ex, edu, residence area		
China, Shanghai Women's Health Study[38]	<21.1	26.6*	Age, sm, dr, ex, edu, occupation, salary, meno, use of OC, HRT, aspirin, intake of saturated fat, vegetables, fruits, sodium		
China, Kailuan Study[39]	<22.05	27.7	Age, sex, sm, dr, ex, edu, salary, marital status	None	Plus hx of HTN, DM, HC
Korea, no study name[40]	22.0–23.9	24.0*	Age, sm, dr, ex, salary	26.0*	Plus BP, BG, TC
Korea, Korean Prevention Cancer Study[41]	18.5–19.9	28.0 None*	Age, dr, ex	None None*	Plus FBG, SBP, TC

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Supplementary Files

Supplementary File 1

Figure S1. Bar graphs showing the prevalence of obesity (BMI ≥30 kg/m^2) among adults aged ≥20 years in countries of the 6 WHO regions of the world in 2008.

Please find supplementary file(s);
http://dx.doi.org/10.1253/circj.CJ-14-0850

肥満症の予防・治療の効果

津下一代

キーワード◉肥満症，メタボリックシンドローム，特定保健指導，減量

はじめに

肥満症とは肥満に伴う健康障害を有し，減量によりその改善または進展防止が図られる病態である[1]．内臓脂肪蓄積に伴い種々のアディポサイトカイン分泌動態に異常を来し，血圧，血糖，脂質等の異常をもたらすメタボリックシンドローム（以下，Met S）では特に減量指導の必要性が認識され，平成20年度から特定保健指導として制度化されている[2]．

本稿では肥満症に対する生活習慣介入の効果について，文献レビューならびに特定保健指導等の効果分析結果を示し，「肥満症の改善のためには，どのくらいの減量が求められるのか」に着目して最新の知見を紹介したい．

I 文献レビューからみた減量プログラムの効果

肥満は世界共通の健康課題であることから，肥満を伴う代謝障害に対する生活習慣介入研究が1990年代より世界各国で進められ，長期的なフォローアップデータについても近年公表され始めている．

肥満を伴う耐糖能障害（IGT）を対象とした生活習慣介入ランダム化比較試験（RCT）としては，体重7%減量を目標としたDiabetes Prevention Program（DPP）[3]，5～10kgの体重減量を目指したFinnish Diabetes Prevention Study（DPS）[4]，1kg/月でBMI 23kg/m^{2}を目指すDa Qing IGT and Diabetes Study[5]などが代表的である．これらは初期6か月に毎週または隔週で個別またはグループ介入を行うなど，かなり強力な介入を行うプログラムであるが，3～4年の観察期間で生活習慣介入群では糖尿病の発症が対照群に比して半減していることを報告した．

DPSの追跡研究では10年間以上追跡した結果を示した（図1）[6]．体重は1年後に平均5%減量を達成しているが，その後増加して10年後では1%減となっていた．対照群では1年目に1%程度の減量をみたが，その後は増加に転じ，10年目には1%増となった．10年後においても介入群と対照群との間で体重減少率において有意差がみられている．血糖やOGTT 2時間後血糖値も対照群より低値を示す傾向である．

肥満を伴う2型糖尿病に対する生活習慣介入として，Look AHEAD研究においては，通常の糖尿病診療のほかに強力に生活習慣介入している[7]．介入群では1年後に体重が8.6%減少し，HbA1c，血圧（SBP，DBP），中性脂肪（TG），尿中微量アルブミンの低下，HDL-Cの上昇を認めている．4年後には4.7%減のレベルまで戻っているが，介入前の体重までには復しておらず，対照群（1.1%減）よりも減量効果が維持されていた．

The effects of lifestyle intervention on obesity diseases
Kazuyo Tsushita : Comprehensive Health Science Center, Aichi Health Promotion Public Interest Foundation
あいち健康の森健康科学総合センター長

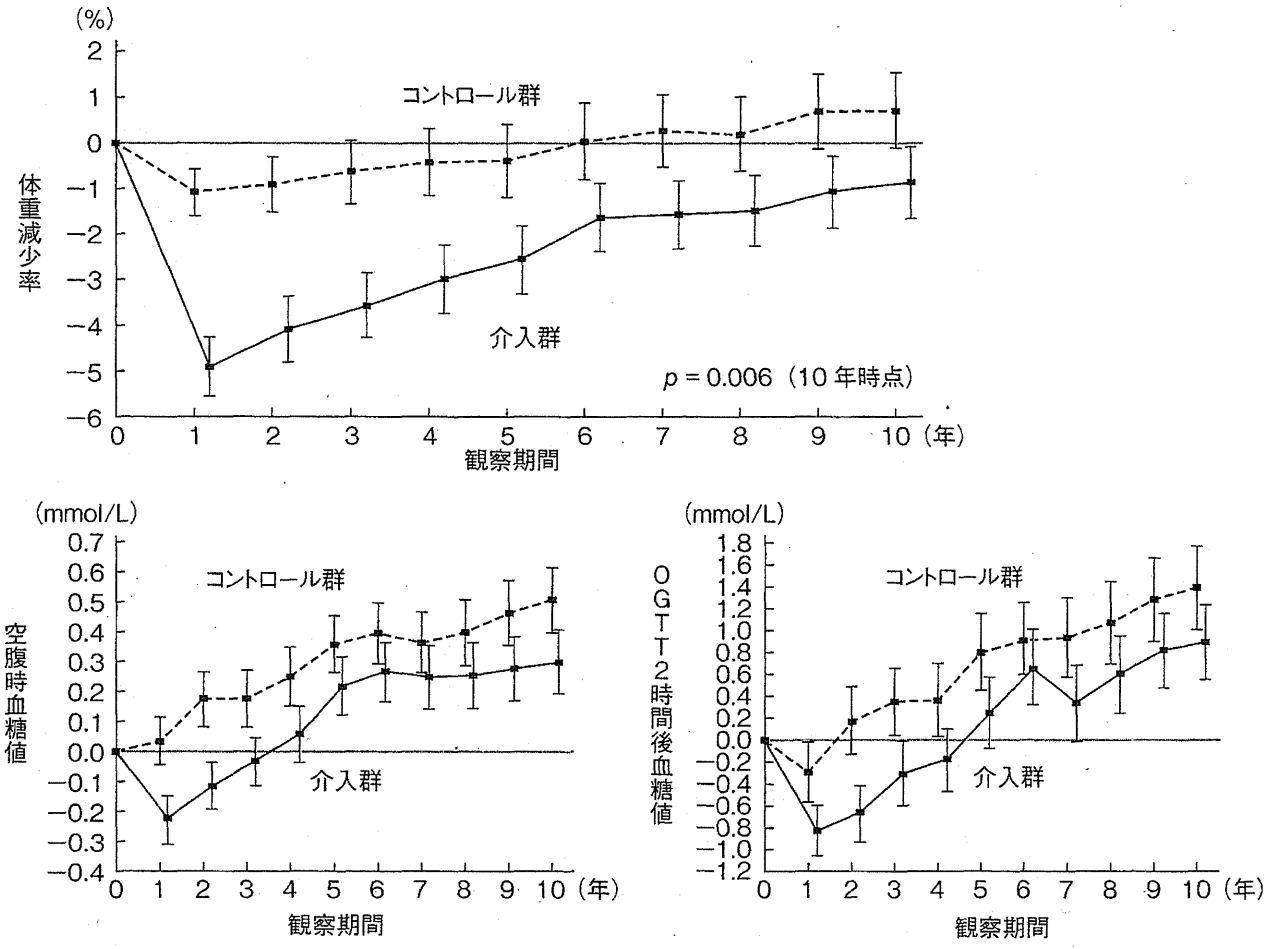

図 1　肥満を伴う IGT に対する生活習慣介入―Finnish Diabetes Prevention Study（DPS）における長期フォローアップ結果

（Lidström J, *et al*：*Diabetologia* 2013；56：284-293 より引用）

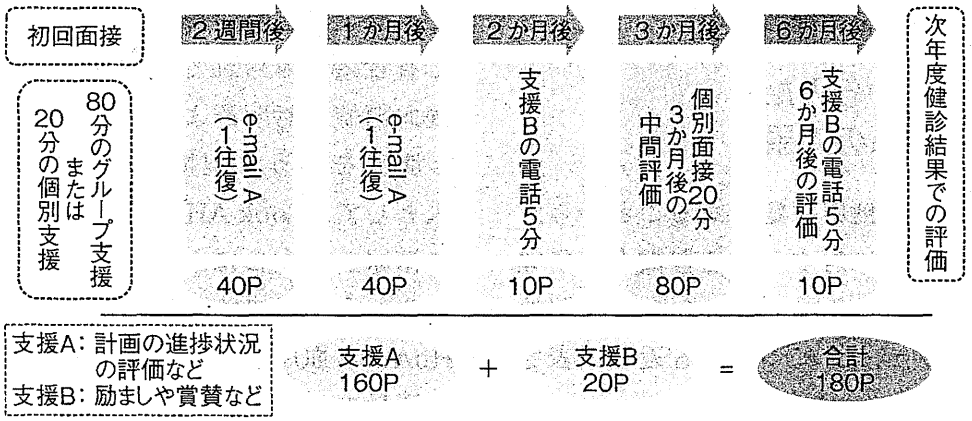

図 2　特定保健指導積極的支援例（面接・電話・e-mail を組み合わせた例）

平成 25 年度からの第 2 期より，支援 B は必須ではなく，支援 A のみでも 180 ポイント以上達成すればよいこととなった．

［厚生労働省：第 3 回健診・保健指導の在り方に関する検討会資料　資料 3　特定保健指導にかかる課題について．平成 24 年 2 月 6 日より引用］

これまでの生活習慣介入研究では集中的に生活習慣改善指導を行う期間と効果検証のために観察する期間を設定しているものが多い．集中的な介入期間においては減量や検査値の改善等の効果がみられるものの，観察期間においては緩やかに体重の増加がみられる．改善効果を維