

Prevalence of Hypertension and/or Obesity in Patients With Type 2 Diabetes Mellitus Throughout the World: A Systematic Literature Review

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BACKGROUND

- Type 2 diabetes mellitus (T2DM) is a disorder of the metabolism characterized by insensitivity of the tissues to insulin and progressively insufficient production of insulin.¹
- An estimated 90% of diabetes cases are T2DM.²
- Hypertension³⁻⁸ and obesity⁹⁻¹⁵ increase the risk of long-term vascular complications of T2DM, including stroke, chronic kidney disease, heart disease, peripheral vascular disease, and death.
- Increasing rates of T2DM^{16,17} and its common comorbidities, hypertension¹⁸ and obesity,^{16,17} have been documented throughout the world.¹⁹
- The prevalence of diabetes is expected to rise from 366 million in 2011 to 552 million in 2030, due to increasing prevalence of T2DM in every country.¹⁹

OBJECTIVE

- To determine the rates of hypertension and/or obesity among patients with T2DM, as reported in observational studies.

METHODS

Study Selection (Figure 1)

- We conducted a systematic literature review of PubMed, Embase, and Cochrane Library (including the National Health Service Economic Evaluation Database [NHS EED]) for publications related to T2DM plus hypertension and/or obesity (English, 2001-2011).
- Two searches were conducted.
 - Search 1^a was conducted July 25, 2011 (PubMed, Embase, and NHS EED), and August 2, 2011 (Cochrane Library without NHS EED).
 - Search 2 was conducted on February 16, 2012 (all databases).
- Search strategies used a combination of medical subject heading (MeSH) terms and title words for the disease and comorbidities of interest and epidemiology terms.
- Additionally, bibliographies of included studies were examined.

Inclusion and Exclusion Criteria

Inclusion criteria:

- Observational studies that presented prevalence rates for hypertension and/or obesity in patients with T2DM.^b

Exclusion criteria:

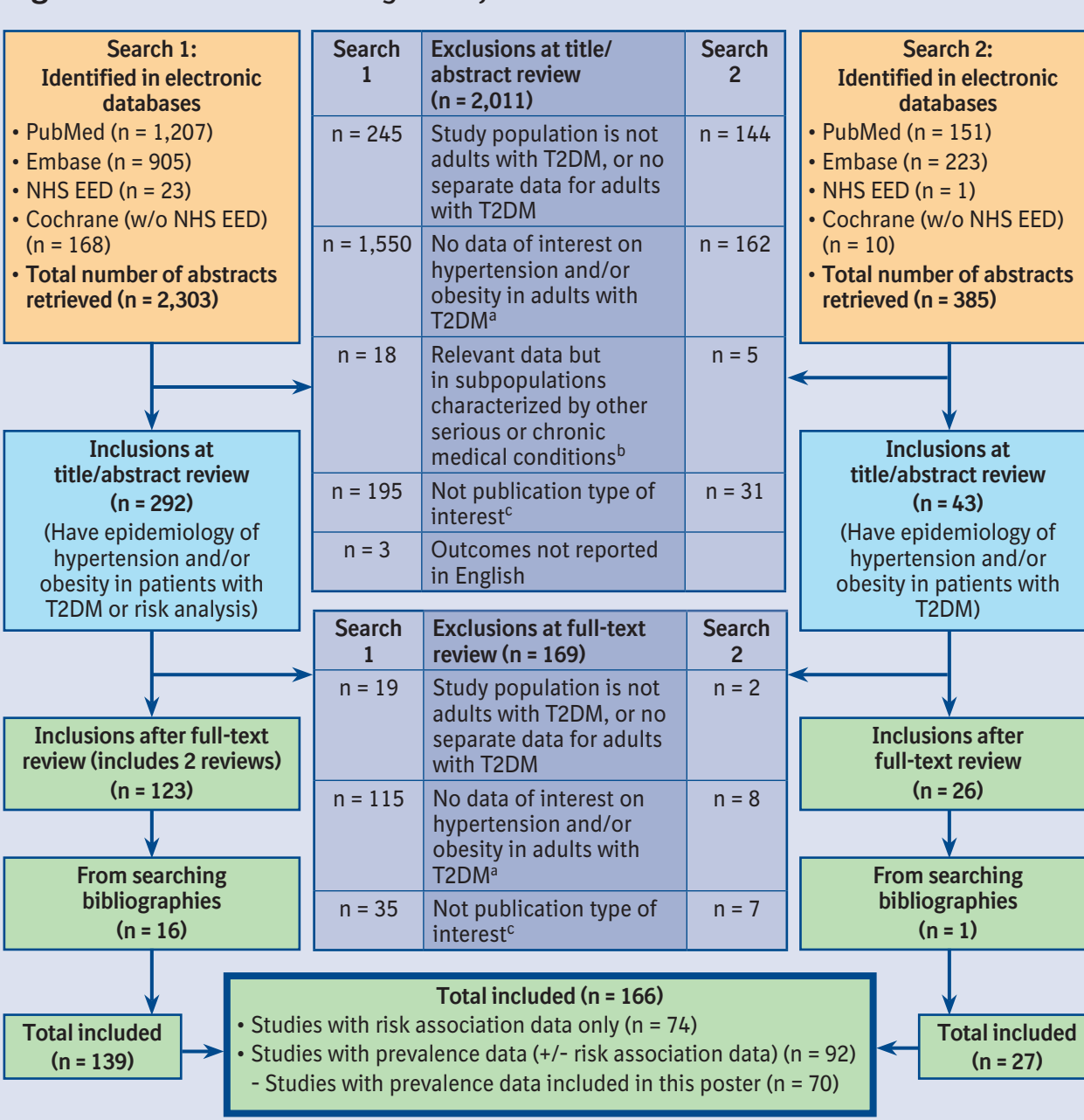
- The study did not present prevalence rates specifically for patients with T2DM.
- The T2DM population was defined by having another chronic illness, such as cancer or atrial fibrillation.
- The study was not reported in English.
- The study was published before 2001.

^a Search 1 was a larger literature review that also included terms for risk of diabetic complications.

^b Inclusion criteria did not include pre-established definitions of hypertension and obesity.

RESULTS

Figure 1. PRISMA Flow Diagram of Review and Inclusion/Exclusion



^a Data of interest = incidence or prevalence of hypertension and/or obesity among adults with T2DM (searches 1 and 2) or risk association of hypertension/obesity with long-term micro- or macrovascular complications of T2DM (search 1 only).

^b Does not exclude patients hospitalized with T2DM complications.

^c Publication types excluded were commentaries, case studies, interim reports when end-of-study data were available, and reviews for which primary data were already included.

Table 1. Number and Size of Studies Reporting Prevalence Data by Region

Region	Number of Studies	Type of Prevalence Data				Median Study Size	Maximum Study Size
		Any Hypertension Alone	Any Obesity Alone	Hypertension With Obesity	Hypertension With Obesity		
Africa	9	8	5	1	210	754	
Asia	34	29	15	5	669	89,857	
Europe	32	26	15	6	1,610	49,919	
North America	6	4	6	1	1,512	138,336	
Oceania	1	1	1	0	--	5,724 ^a	
South America	6	6	4	2	190	842	
Multiregion (Belgium, Benin)	1	1	0	0	--	738	
Total	89	75	46	15	--	--	

^a Combined sample size for two observational studies from one publication.²⁰

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RESULTS (continued)

- A total of 2,688 abstracts were screened (Figure 1).
- Three studies of specific subclassifications of hypertension (e.g., masked hypertension) were omitted, leaving 89 studies for inclusion in this review (Table 1).

Prevalence of Hypertension Among Patients With T2DM

- Among the reviewed studies, hypertension was defined by blood pressures at or above 140/90, 130/85, and 130/80 mmHg or the use of antihypertensive medications.
- Figure 2 shows the prevalence rates of hypertension by the regions alphabetically, with countries within a region ranked by the highest estimate.

Prevalence of Obesity Among Patients With T2DM

- In all regions, the cutpoint for defining obesity by body mass index (BMI) was 30 kg/m², except in a few Asian studies, in which the cutpoint was 25 kg/m².^{15,21-25}

- For waist circumference (WC), obesity was most commonly defined by measurements of at least 88 cm for women and at least 102 cm for men (in Africa,^{26,27} Asia,^{25,28,29} and Europe³⁰⁻³²).

- For waist-to-hip ratio (WHR), the cutpoints for obesity were: WHR > 0.85 for women and > 0.90 for men.^{25,31-34}

- Figure 3 shows the prevalence rates of obesity by the regions alphabetically, with countries within a region ranked by the highest estimate. Obesity was determined by BMI, WC, WHR, BMI and/or WHR, or BMI or WHR.

Prevalence of Hypertension and Obesity Among Patients With T2DM

- Figure 4 shows the prevalence rates of hypertension with obesity by the regions alphabetically, with countries within a region ranked by the highest estimate.

- Obesity was determined by BMI or WC. Hypertension was defined by blood pressures at or above 144/83, 140/90, 130/85, and 130/80 mmHg or the use of antihypertensive medications.

Figure 2. Hypertension Prevalence Rates Among Patients With Type 2 Diabetes Mellitus by Region and Country

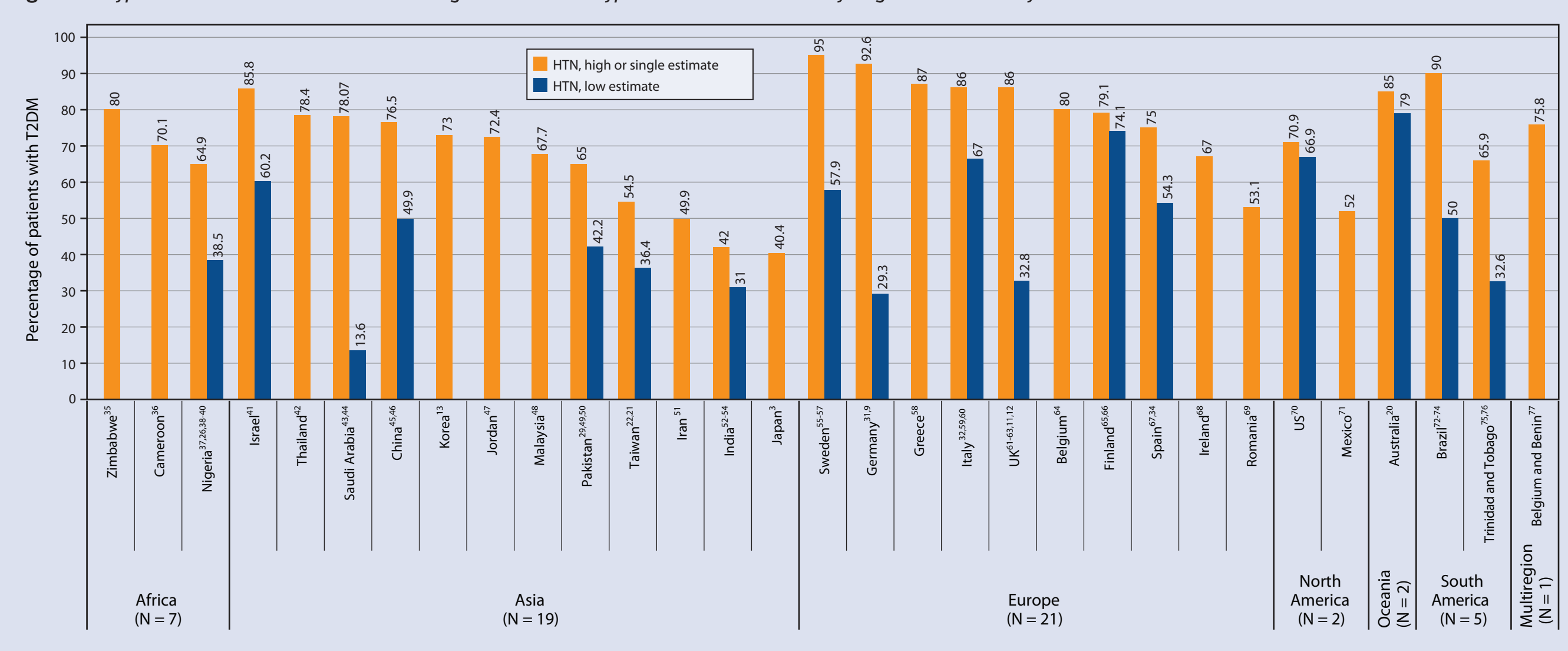


Figure 3. Prevalence of Obesity Among Patients With T2DM by Region and Country

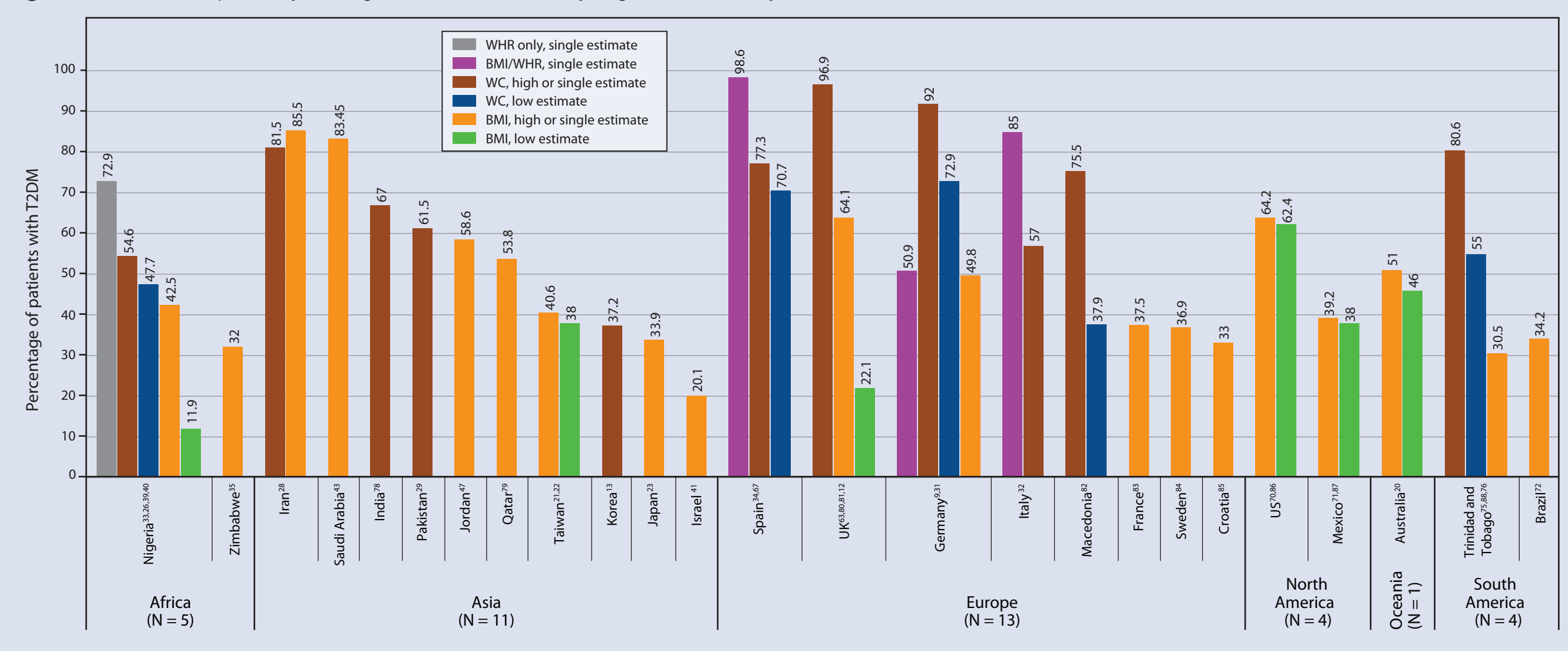
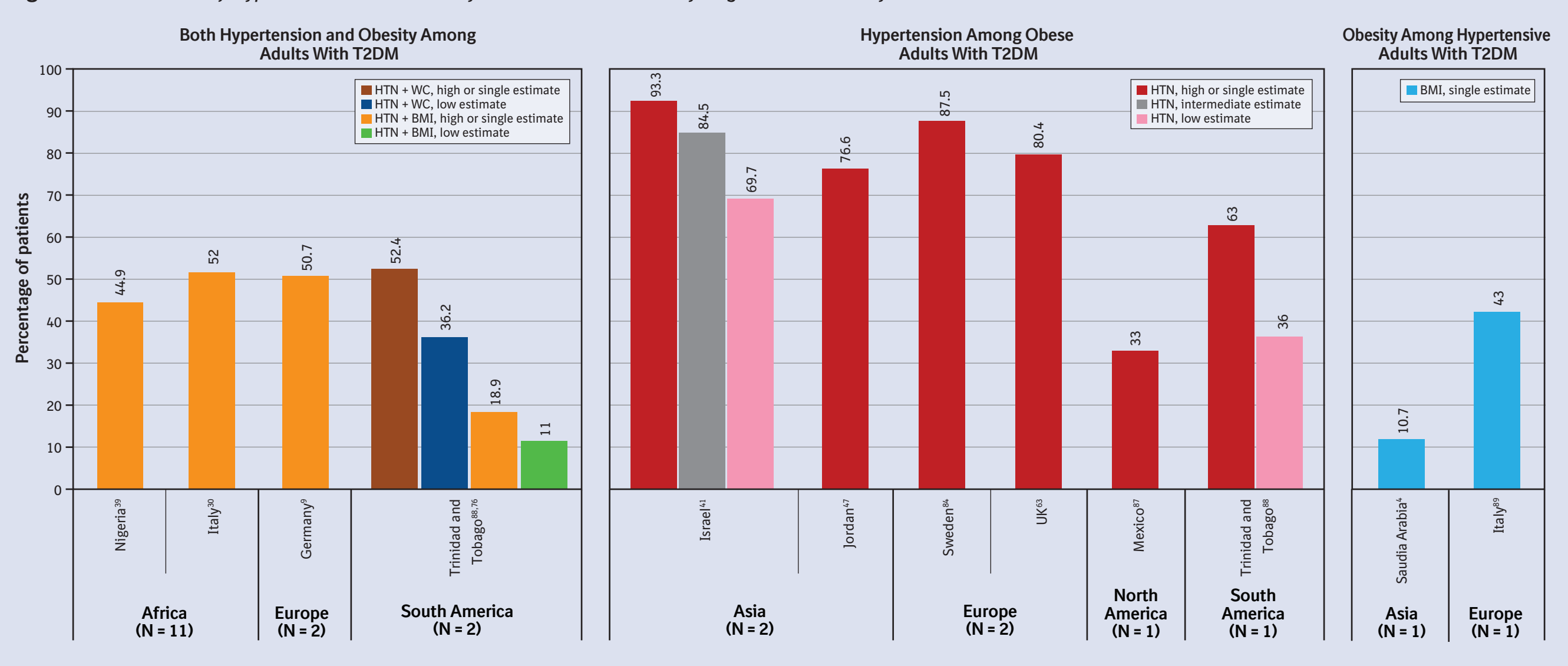


Figure 4. Prevalence of Hypertension With Obesity in Adults With T2DM by Region and Country



LIMITATIONS

- Interpretation of the findings in this review is limited by the lack of representation for some sizable populations.
 - For example, there were no studies in Canada or Russia or many countries in Africa, Southeast Asia, or South America.
 - Few studies were identified for China, although it is the country with the largest absolute number of patients with diabetes (90 million).¹⁹
- Possible explanations for these data gaps are:
 - This review was focused on studies presenting separate prevalence data for patients with T2DM, apart from diabetes as a whole, and information on comorbidities is often gathered for patients with diabetes without regard to type.
 - The search was limited to studies in English, and regionally relevant epidemiology studies may be published in the native language for that region.
- Studies of metabolic syndrome in patients with T2DM were not included, unless the abstract indicated that the components of the syndrome were analyzed separately. Excluded studies of metabolic syndrome may have contained prevalence data not referred to in the abstract.

CONCLUSIONS

- The ranges of prevalence rates for hypertension or obesity were broad for many of the regions. The variations in rates within a region may be due to patient selection methods.
- Most of the studies reported hypertension rates well above 50%, with rates exceeding 75% in many of the studies.
- Only Asia had countries (Iran, India, Japan) with maximum hypertension rates below 45%.
- Obesity rates were well above 30% in most of the studies.
- Only a few studies reported the combination of hypertension and obesity among patients with T2DM, but most found rates of 50% or higher.
- Among obese adults, hypertension rates were above 70% in Asia and above 80% in Europe.