European Journal of Epidemiology (2019) 34:711–713
https://doi.org/10.1007/s10654-019-00503-8

CORRESPONDENCE

Prevalence of overweight and obesity in Western countries: discrepancies in published estimates

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Received: 27 June 2018 / Accepted: 26 February 2019 / Published online: 2 March 2019

Abstract
Two papers were extracted and pooled data from published sources were used to estimate the distribution of BMI values for adults living in many countries around the world. The NCD Risk Factor Collaboration and the Global Burden of Disease Study 2013 presented data for 200 and 188 countries, respectively. We extracted estimates from the two datasets for the prevalences of overweight and obesity in 28 Western countries. The two studies used similar methodology for extracting and pooling data, however the papers show serious discrepancies in several countries. Our analysis reveals the need for increased standardization of the identification and analysis of surveys of BMI distribution. This is necessary in order to facilitate comparability of study results and accurate global monitoring of obesity trends. Our findings also indicate that if findings from Western countries contain serious discrepancies, then findings from middle-income and low-income countries will likely have a poor level of accuracy as far fewer surveys of BMI distribution have been carried out.

Keywords Obesity · BMI · Errors in surveys · Population surveys

Introduction

There has been enormous interest in the epidemic of obesity that has taken place across the world over the past 30 years. In order to achieve a better understanding of the causes of this epidemic and to make sound policy decisions, it is essential that we have reasonably accurate data on the prevalences of overweight and obesity in different countries. Two papers published in the *Lancet* extracted and pooled data from published sources and made estimates of the distribution of BMI values for adults living in many countries around the world. Our aim was to compare the estimates made in the two datasets. We draw attention to serious discrepancies between the data presented in the two papers.

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Comparison of prevalence estimates of overweight and obesity in Western countries: discrepancies revealed

The NCD Risk Factor Collaboration (NCD study) [1] presented data on 200 countries. We used data for adults (age ≥ 18) in 2014. The Global Burden of Disease Study 2013 (GBD study) [2] presented data on 188 countries. We used data for adults (age ≥ 20) in 2013. We extracted estimates from the two datasets for the prevalences of overweight (BMI ≥ 25 to < 30 kg/m^2) and obesity (BMI ≥ 30 kg/m^2) in 28 Western countries (24 countries from Europe plus Canada, the USA, Australia, and New Zealand). With the NCD study we calculated the prevalences of obesity by adding the prevalences of BMI ≥ 30 to < 35, ≥ 35 to < 40, and ≥ 40 kg/m^2. With the GBD study, we calculated the prevalences of overweight by subtracting the prevalences of obesity from the prevalences of combined overweight/obesity (BMI ≥ 25 kg/m^2).

As the two studies used a similar methodology for extracting and pooling data, one would therefore expect similar estimates for the same countries. Yet, our comparison of the data presented in the two papers shows several serious discrepancies (see Table 1). The most notable examples are as follows:

Table 1 Comparison on prevalence of adult overweight and obesity in Western countries using data from NCD Risk Factor Collaboration [1] and the Global Burden of Disease Study [2]

Country	Gender	NCD study		GBD study	
		Overweight[a]	Obesity[b]	Overweight	Obesity
Canada	M	42.2	26.8	42.6	21.9
	F	31.2	28.7	28.0	20.5
Australia	M	42.0	27.6	40.7	27.5
	F	29.7	27.8	26.3	29.8
New Zealand	M	40.8	27.9	43.3	28.1
	F	29.2	30.4	30.0	30.0
USA	M	39.2	33.6	39.2	31.7
	F	28.0	34.8	28.0	33.9
Italy	M	44.3	7.3	39.7	18.6
	F	31.6	21.6	23.7	17.7
Spain	M	43.8	9.1	42.1	20.2
	F	30.6	24.1	25.6	20.9
France	M	44.9	21.9	36.6	19.3
	F	29.6	21.9	23.1	19.7
Greece	M	44.5	22.3	52.3	19.1
	F	30.9	24.3	31.7	19.4
Iceland	M	43.1	21.8	46.7	26.9
	F	29.2	19.6	32.1	28.8
Czech Republic	M	44.5	24.7	47.7	17.8
Netherlands	M	44.3	18.3	40.5	12.7
Poland	M	42.3	22.9	45.7	18.3

[a]BMI ≥ 25 to < 30 kg/m^2

[b]BMI ≥ 30 kg/m^2

1. The data for Australia, New Zealand, and the USA reveal reasonable consistency between the two datasets for both overweight and obesity. But in the case of obesity in Canada, the NCD values are higher by 4.9% (men) or 8.3% (women), compared with the GBD study. Smaller differences were seen for overweight among women where the NCD is higher by 3.2% (Canada) and 3.4% (Australia). Other differences for these countries appear to be random.
2. The prevalences given in the NCD study for obesity in men in Italy and Spain are implausibly low. This suggests an error in data extraction.
3. There are discrepancies between the two datasets of about 5–8% for the prevalences of overweight in Italy, Spain, France, and Greece.
4. There are discrepancies between the two datasets of about 5–9% for the prevalences of obesity in Iceland, Czech Republic, the Netherlands, and Poland.

Methodological and conceptual reasons for apparent discrepancies in prevalence estimates

Each paper presents a full list of these published studies as tables in supplementary appendices. Our detailed examination of these and the studies' methods reveals important differences in the methodological approach that are likely to explain the discrepancies seen in the table above. First, the two studies applied different inclusion and exclusion criteria for the data selected. The GBD study explicitly excluded the MONICA surveys that were a source for many country-years in the NCD study. This difference highlights the need for consensus on the acceptable use of data representative of subnational populations in global prevalence estimates. Second, the GBD study applied a correction equation for self-reported BMI but did not appear to address biologically implausible values (BIVs) other than excluding the World Health Surveys due to suspected implausible data; by contrast, the NCD study dropped BIVs of measured BMI. Both approaches may be problematic because they can introduce error in the prevalence estimates. As others have shown, many of the extremely high values of body size currently flagged as BIVs are very likely correct and their removal can reduce the overall estimates for the prevalence of obesity, with the degree of underestimation varying across ethnic groups [3, 4]. Moreover, the correction equations for adult self-reported BMI should account for significant gender-specific predictors such as education level among women [5] that were overlooked by the GBD study. Education is a strong predictor of BMI, as is country economic development, which are missing as covariates in the GBD study.

Data accuracy and harmonization of survey identification and analysis

Our analysis highlights the issue of major differences in estimates of prevalences of overweight and obesity in Western countries. These estimates were published by experts in the same leading journal using rigorous scientific methods. Increased standardization of the identification and treatment of population-based studies of obesity may aid in the comparability of study results and accurate monitoring of obesity trends. If findings from Western countries contain serious discrepancies, then findings from middle-income and low-income countries will likely have a poor level of accuracy as far fewer surveys of BMI distribution have been carried out.

Compliance with ethical standards

Conflict of interest The authors declare that they have no competing interests.

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