



## Trabajo Original

Valoración nutricional

### Ten-year trends (2000-2010) in bias of self-reported weight, height and body mass index in a Mediterranean adult population

*Tendencia a diez años (2000-2010) en el sesgo de auto-reporte de peso, talla e índice de masa corporal en una población adulta mediterránea*

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#### Abstract

**Aim:** To assess trends in the biases of self-reported versus measured weight, height, and body mass index (BMI) in adults over the period 2000-2010 in a Mediterranean adult population.

**Methods:** The sample population consisted of young (18-35) and middle-aged (36-55) adults living in the Balearic Islands, Spain. The data represent 1,089 people during 1999-2000 and 1,081 people during 2000-2010. Weighted-based frequency estimates were used.

**Results:** While no differences between self-reported and measured weight, height and BMI were found in the respondents, it was seen that a decreasing percentage of the population knows their own weight and/or height. A rise in awareness was found in normal-weight men (from 95.0% to 98.9%), and also in normal-weight men and in the middle-aged obese category whose self-reported BMI was not defined as "correct" (from 41.2% to 85.7% and from 41.0% to 67.6% respectively).

**Conclusions:** A substantial proportion of the population does not know their own weight or height. The obtained results suggest the need to develop strategies to enhance awareness of own weight and height.

#### Key words:

Biases. Self-reported.  
Body mass index.  
Adults. Balearic  
Islands.

#### Resumen

**Objetivo:** evaluar la tendencia del sesgo de la percepción subjetiva frente a la medida de peso, talla e índice de masa corporal (IMC) en una población adulta mediterránea durante el periodo 2000-2010.

**Métodos:** la población estudiada fueron adultos jóvenes (18-35 años) y de mediana edad (36-55 años) de las Islas Baleares. Los datos representan 1089 personas durante 1999-2000 y 1081 personas durante 2000-2010 en los que se registró la percepción subjetiva y la medida de peso, altura e IMC. Se utilizaron datos ponderados sobre el censo.

**Resultados:** si bien no se encontraron diferencias entre la percepción subjetiva y la medición de peso, altura e IMC en los encuestados, se observó que un porcentaje cada vez menor de la población conoce su propio peso y/o altura. Aumenta la propia percepción en hombres con peso normal (de 95,0% a 98,9%); la percepción subjetiva de IMC no se definió como "correcta" en estos mismos sujetos y en obesos de mediana edad (de 41,2 % a 85,7% y de 41,0% a 67,6%, respectivamente).

**Conclusiones:** una proporción importante de la población no conoce su propio peso o altura. Los resultados obtenidos sugieren la necesidad de desarrollar estrategias para aumentar la conciencia del propio peso y altura

#### Palabras clave:

Sesgo. Percepción  
subjetiva. Índice  
de masa corporal.  
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## INTRODUCTION

Overweight and obesity poses one of the most serious public health challenges of the 21st century (1). Self-reported rather than measured body weight and height are usually used because interview methods are time- and cost-efficient on large population samples (2). An appropriate body self-perception can lead to healthy behaviours in weight-loss policies and eating disorders. However, many adults may be unaware of their present body weight and height (2-4), and self-reported data are usually linked with under-reporting weight and over-reporting height (5). Over reporting of height can result in a lower body mass index (BMI), and underestimation of overweight and obesity prevalence could be outlined after comparing self-reported data to measured data (6). Weight and height self-perception may be influenced by many factors: gender, socio-economic rules, mass media, lifestyles, diet and nutritional status. Furthermore, it has been reported that the influence of social desirability on self-reports has the potential to change over time as social and cultural norms towards weight and obesity change (5).

In the first decade of the 21st century, diet and traditional food patterns in the Balearic Islands, an archipelago located off the Mediterranean eastern coast of Spain, have been affected by the socio-cultural changes seen in the rest of Spain and Europe, the development of a tourism-based economy, and a high population growth mainly due to an influx of people from overseas (6), and then the introduction of new dietary, lifestyle and socio-cultural habits (7).

The aim of this study was to assess trends in the biases of self-reported versus measured weight, height, and body mass index (BMI) in adults over the 2000-2010 period in a Mediterranean adult population.

## METHOD

The sample population included in this analysis were young (18-35) and middle-aged (36-55) adults living in the Balearic Islands. The data represent 1,089 people during the 1999-2000 period and 1,081 people during the 2009-2010 period. Samples sizes were considered sufficient to detect risk factors with 95% confidence and a precision rate of 3.0%. Weighted data based on the results of the 2001 and 2011 Balearic Islands census were used.

## ETHICS

Both studies were conducted according to the guidelines laid down in the Declaration of Helsinki, and all procedures were approved by the Balearic Islands Ethics Committee. Written informed consent was obtained from all subjects.

## ANTHROPOMETRIC MEASUREMENTS

Body weight was determined to the nearest 100 g using a digital scale (Tefal sc9210, Tefal, Rumilly, France). The subjects were

weighed in bare feet and light clothes. Height was determined using a mobile anthropometer (Kawe 44444, Kirchner & Wilhelm GmbH + Co. KG, Asperg, Germany) to the nearest millimetre, with the subject's head in the Frankfurt plane. Height and weight measures were used to calculate BMI ( $\text{kg}/\text{m}^2$ ). BMI was classified as normal-weight ( $18.5 < 25.0$ ), overweight ( $25.0 < 30.0$ ) and obese ( $\geq 30.0$ ). Data from the underweight category were not included.

Self-reported weight and height was defined as "correct" if the absolute difference between self-reported minus measured weight and height was lower than 2.0 kg and 2.0 cm, respectively. Self-reported BMI was defined as "correct" if the absolute difference between reported minus measured BMI was lower than  $1.40 \text{ kg}/\text{m}^2$ .

## STATISTICS

Analyses were performed with SPSS version 21.0 (Chicago, IL, USA). Significant differences in prevalence were calculated by means of  $\chi^2$ . Mean differences in self-reported and measured weight, height and BMI were tested by unpaired Students' *t* test. The level of significance for acceptance was  $p < 0.05$ .

## RESULTS

While no differences between self-reported and measured weight, height and BMI were found during the 2000-2010 period in the respondents, it was seen that a decreasing percentage of the population knows their own weight and/or height (Table I). Overall, results showed a rise in awareness in the normal-weight category (from 96.1% to 98.7%), specifically among men (Table II). When subjects whose self-reported BMI was not defined as "correct" were analysed, a rise in awareness was also found in normal-weight men (from 41.2% to 85.7%). Moreover, increased awareness was shown in obese subjects, particularly middle-aged adults, who demonstrated a rising perception of their weight and/or height (from 41.0% to 67.6%).

## DISCUSSION

Despite no differences between self-reported and measured data being found over the 2000-2010 period, our results revealed a decreasing percentage of respondents self-reporting data. Nevertheless, amongst those responding, a rise in awareness was found in normal-weight men, and also in normal-weight men and middle-aged obese subjects whose self-reported BMI was not defined as "correct".

In the USA and Canada, the biases between mean self-reported and measured weight increased 0.2 and 0.3 kg over the 1976-1980 and 2003-2004 periods, respectively (8). Moreover, in the USA, the prevalence of weight/height discrimination grew from 7.3% in 1995-1996 to 12% in 2004-2006 affecting the entire normal-weight population apart from the elderly (9). No

**Table I.** Mean differences between self-reported and measured weight (kg), height (cm), and BMI (kg/m<sup>2</sup>) over the study period (2000-2010) (1-3)

		N <sup>a</sup>	%R <sup>a,1</sup>	Mean	SD	95% CI	Mean difference: 99/00-09/10	p <sup>2</sup>
<i>Weight bias</i>								
All	1999-2000	923	89.4**	-0.53	2.10	-(0.66-0.39)	-0.12	0.189
	2009-2010	906	85.7	-0.41	1.73	-(0.52-0.30)		
<i>Sex</i>								
Men	1999-2000	209	91.1	-0.54	1.85	-(0.70-0.38)	-0.11	0.314
	2009-2010	389	87.1	-0.43	1.62	-(0.58-0.27)		
Women	1999-2000	714	89.0*	-0.51	2.36	-(0.72-0.29)	-0.12	0.410
	2009-2010	517	84.6	-0.39	1.82	-(0.55-0.23)		
<i>Age groups</i>								
18-35 years	1999-2000	541	86.2	-0.32	1.84	-(0.49-0.15)	0.00	0.993
	2009-2010	579	84.9	-0.32	1.81	-(0.48-0.15)		
36-55 years	1999-2000	382	94.8***	-0.71	2.29	-(0.91-0.51)	-0.21	0.103
	2009-2010	327	87.0	-0.50	1.64	-(0.65-0.35)		
<i>Height bias</i>								
All	1999-2000	925	90.1**	0.22	1.27	(0.14-0.30)	0.04	0.460
	2009-2010	905	85.6	0.18	1.16	(0.10-0.25)		
<i>Sex</i>								
Men	1999-2000	201	87.7	0.22	0.97	(0.13-0.30)	0.12	0.066
	2009-2010	398	89.1	0.10	1.03	(0.00-0.20)		
Women	1999-2000	724	90.7***	0.21	1.54	(0.07-0.36)	-0.03	0.743
	2009-2010	507	83.0	0.24	1.27	(0.13-0.36)		
<i>Age groups</i>								
18-35 years	1999-2000	564	90.3***	0.21	1.00	(0.12-0.30)	0.07	0.328
	2009-2010	566	83.1	0.14	1.28	(0.02-0.26)		
36-55 years	1999-2000	361	89.7	0.22	1.48	(0.09-0.35)	0.01	0.899
	2009-2010	339	90.2	0.21	1.04	(0.12-0.30)		
<i>BMI bias</i>								
All	1999-2000	851	82.6**	-0.15	0.73	-(0.19-0.10)	-0.02	0.698
	2009-2010	817	77.4	-0.13	0.57	-(0.17-0.10)		
<i>Sex</i>								
Men	1999-2000	188	82.1	-0.12	0.43	-(0.16-0.09)	-0.02	0.407
	2009-2010	366	82.0	-0.10	0.42	-(0.14-0.06)		
Women	1999-2000	663	82.7***	-0.17	0.96	-(0.27-0.08)	0.00	0.916
	2009-2010	451	74.1	-0.17	0.68	-(0.23-0.10)		
<i>Age groups</i>								
18-35 years	1999-2000	503	80.2*	-0.10	0.48	-(0.14-0.05)	0.00	0.960
	2009-2010	513	75.6	-0.10	0.55	-(0.15-0.04)		
36-55 years	1999-2000	348	86.5*	-0.19	0.88	-(0.27-0.11)	-0.02	0.673
	2009-2010	304	80.9	-0.17	0.58	-(0.22-0.11)		

%R: percentage of subjects reporting weight (kg) and/or height (cm); SD: standard deviation; CI: confidence interval; BMI: body mass index. <sup>a</sup>Unweighted. <sup>1</sup>Significant differences among periods were tested by  $\chi^2$ : \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ . <sup>2</sup>Mean differences were tested by an unpaired Students' t test. <sup>3</sup>Underweight people were not included in the analysis.

**Table II.** Ten-year trends of awareness between BMI (kg/m<sup>2</sup>) categories according to measured and self-reported data recorded over the 2000-2010 period (1,2)

		Measured BMI (kg/m <sup>2</sup> ) categories			
		N <sup>a</sup>	Normal-weight (18.5 < 25.0)	Overweight (25.0 < 30.0)	Obesity (30+)
<i>All subjects</i>					
N <sup>a</sup>	1999-2000	851	525	234	92
	2009-2010	817	483	242	92
All, %	1999-2000	851	96.1*	89.1	78.8
	2009-2010	817	98.7	88.2	84.8
<i>Sex, %</i>					
Men	1999-2000	188	95.0*	93.3	75.7
	2009-2010	366	98.9	93.9	84.2
Women	1999-2000	663	96.9	80.8	83.3
	2009-2010	451	98.1	79.8	85.4
<i>Age groups, %</i>					
18-35 years	1999-2000	503	95.9	87.6	91.7
	2009-2010	513	98.5	83.0	85.3
36-55 years	1999-2000	348	96.4	90.0	75.5
	2009-2010	304	98.9	91.3	84.5
<i>Subjects whose self-reported BMI minus measured BMI &gt; ± 1.40 kg/m<sup>2</sup></i>					
N <sup>a</sup>	1999-2000	183	83	67	33
	2009-2010	154	51	62	41
All, %	1999-2000	183	71.4*	52.1	44.4*
	2009-2010	154	87.2	51.5	66.7
<i>Sex, %</i>					
Men	1999-2000	30	41.2*	60.0	37.0*
	2009-2010	59	85.7	68.8	62.5
Women	1999-2000	153	83.0	45.9	55.6
	2009-2010	95	84.8	37.1	69.6
<i>Age groups, %</i>					
18-35 years	1999-2000	85	69.4	41.7	66.7
	2009-2010	89	86.2	39.3	64.3
36-55 years	1999-2000	98	74.1	57.4	41.0*
	2009-2010	65	88.2	61.5	67.6

BMI: body mass index. <sup>a</sup>Unweighted. Underweight people were excluded from the analysis. <sup>1</sup>Percentages refer to awareness: the percent of respondents in the measured BMI categories, who are assigned to the same BMI category based on their self-reported BMI scores. <sup>2</sup>Significant differences among periods were tested by  $\chi^2$ : \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

differences were shown by the overweight and obese population in this analysis (9). In Europe around 30% of the population misclassifies their current weight (10). A decreasing trend for people who misperceived their current weight over the 1995-2008 period was found in Denmark (11).

While no biases between self-reported and measured BMI were found in the USA over the 1976-2004 period, stable awareness in the normal-weight population and decreased awareness in the

overweight and obese population (from 75.3% to 66% and from 79.5 to 53.4%, respectively) were described for the 1998-2007 period (12). In Canada rising biases between self-reported and measured BMI were observed over the 1986-2005 period, from -0.8 to -1.1 (12). In an Irish study, Shiely et al. (5) described rising biases between self-reported and measured BMI during 1998-2007 with an increased tendency to underestimate BMI when self-reporting. In addition, they concluded that there was

underestimation of self-reported BMI when compared with measured BMI among the overweight and obese population. In Spain, contrary to our results, while the prevalence of overweight ( $\geq 25 \text{ kg/m}^2$ ) increased, the frequency of misperceived overweight remained stable at around 35% in men and 20.8% in women (13).

## CONCLUSIONS

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Despite finding a rising awareness of self-weight and height among those who did respond, particularly in normal-weight male and middle-aged obese subjects, a substantial proportion of the population does not know their own weight or height. These results suggest the need to develop strategies to enhance awareness about own weight and height.

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