



Excess weight and disability among the elderly in Argentina

Exceso de peso y discapacidad en las personas mayores de la Argentina

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ABSTRACT The aim of this paper is to analyze the relationship between excess weight and the condition of disability among elderly people in Argentina and to assess the extent to which a protective factor could be operating that reduces or mitigates the effect of overweight on the loss of functional skills in people over 64 years of age. In order to do so, microdata from Argentina's 2009 National Survey of Risk Factors [*Encuesta Nacional de Factores de Riesgo*] was utilized. To measure the association among overweight, obesity and disability status, as well as the interaction of weight status and age, logistic regression models were estimated. The results indicate that although overweight and obesity have a positive net effect on the occurrence of disabilities, this effect is lower among people 64 years of age and older. This result could be suggesting that among older people a protective factor is at work that, while not reversing the direct relationship between excess weight and disability, seems to attenuate it.

KEY WORDS Obesity; Overweight; Disabled Persons; Elderly; Argentina.

RESUMEN El objetivo del presente trabajo es analizar la relación entre el exceso de peso y la condición de discapacidad en las personas mayores de la Argentina y evaluar en qué medida podría estar operando algún factor protector que reduzca o atenúe el efecto del exceso de peso sobre la pérdida de capacidades funcionales en las personas mayores de 64 años. Para ello se utilizan los microdatos de la Encuesta Nacional de Factores de Riesgo 2009. Con el objeto de medir la asociación entre sobrepeso, obesidad y la condición de discapacidad, así como la interacción de la condición de peso y la edad, se estiman modelos de regresión logística. Los resultados indican que, si bien el sobrepeso y la obesidad tendrían un efecto neto positivo sobre la presencia de discapacidades, este sería menor entre las personas de 64 años y más. Los resultados sugieren que entre las personas mayores existe algún factor protector, que si bien no revierte la relación directa entre exceso de peso y discapacidad, parece atenuarla.

PALABRAS CLAVES Obesidad; Sobrepeso; Personas con Discapacidad; Adulto Mayor; Argentina.

INTRODUCTION

The population of Argentina is one of the most elderly in Latin America (along with Uruguay and Cuba) and it is expected that this will have an impact on the number of disabled people, because the probability to have disability increases exponentially with age.

However, even if age is an important risk factor that increases the presence of disabilities, it is not the only factor. Chronic affections such as heart, cerebrovascular, osteoarticular and pulmonary diseases, diabetes and poor socioeconomic conditions occurring at advanced ages or even during childhood may have a major impact on the probability of reporting disabilities during adult and advanced ages.⁽¹⁻⁸⁾

According to statistics for the year 2000, the prevalence of disabilities in activities of daily living (ADL) among people of 60 years old or older from Buenos Aires (one of the most aged areas of Argentina) was more than 17.4% and, taking into account the instrumental activities of daily living (IADL), the figure goes up to 27.1%, almost a third of the population of that age.⁽⁹⁾

A recent study comparing the prevalence of disabilities in ADL in large urban populations of Latin America shows that elderly populations are not the ones presenting a higher number of prevalence of disabilities self-reports. A correlation was found between disability reports and reports of chronic conditions highly related with disability, suggesting that the differences may not respond merely to different propensities for reporting disabilities between populations.⁽¹⁰⁾

Furthermore, obesity is a condition that is reaching high magnitude prevalence in the Argentinian population. According to estimates for the year 2010 of the World Health Organization,⁽¹¹⁾ men aged 15 and over from Argentina may show one of the highest obesity prevalence of America (only underneath United States) reaching a 37.4%. In the case of women of the same age the figure may be higher (37.8%); although in this case, Argentina does not rank in the first positions because several countries show even higher figures (Barbados, Dominica, Trinidad and Tobago, USA, Jamaica, Nicaragua, Mexico, among others). In the study conducted

by Kain, Vio and Albala,⁽¹²⁾ Argentina already ranks first in the chart of Latin American countries with higher obesity prevalence in preschool age children in statistics for 1994.

A number of studies describe the singularities of obesity in the countries of the region: poorer countries show lower obesity prevalence⁽¹³⁾; generally, a higher obesity prevalence is observed among women in countries with a higher income per capita and in those countries with lower stunting rates among children⁽¹³⁾; growing tendencies are observed as countries emerge from poverty, especially in urban areas⁽¹⁴⁾; among middle-income and more developed countries obesity tends to decrease as income increases, which is especially true among women.⁽¹⁵⁾

A growing number of studies⁽¹⁶⁻²²⁾ mention early nutritional deficiencies, during pregnancy and childhood, as an important factor that increases the risk of obesity in the populations of the region, following Barker hypothesis.⁽²³⁾ Meanwhile the fast nutritional changes noticed in these countries, with increases in the intake of energy and especially saturated fats, and a stagnation and even a drop in the consumption of fiber-rich foods, may be another important explanatory factor for obesity increase in the region.⁽²⁴⁾ Also the rapid changes in physical activity patterns, associated with urbanization and the change towards more sedentary jobs and recreational activities^(18,25) should be added. On the other hand, several specific studies for Argentinian population show a clear inverse association between obesity and socioeconomic level⁽²⁶⁻²⁹⁾ although such association would not be so clear for being overweight.⁽⁹⁾

Regarding the association between obesity and disability there is a certain controversy about its effect on the loss of functional capacities, specifically among the elderly population. On one hand, studies of international level suggest that obesity increases the risk of reporting disabilities or makes a functional rehabilitation more difficult.^(29,30) That might be in part due to the fact that obesity increases the risk of diseases highly associated with disability such as diabetes, heart and osteoarticular diseases⁽³¹⁻³³⁾; therefore, the relationship between obesity and disability might seem to be clearly positive.

However, studies suggest that excess weight may have a protective effect in the elderly

population.⁽³³⁻³⁷⁾ The protective mechanism may be especially important among elderly people, because among the main risk factors of disability in this group of people there are falls and fractures (less frequent among younger people). Fractures may be related with the presence of osteoporosis, condition that at the same time may seem less frequent among people with higher levels of body mass index (BMI).^(33-35,38) The decrease in the risk of developing osteoporosis with the BMI might be due to the higher estrogen production of the adipose tissue and higher levels of leptin associated with higher body weight.⁽³⁹⁾

The study conducted by Barrera et al.⁽³³⁾ is based on a wide sample of people aged 70 and over belonging to low socioeconomic strata, for which measures of bone mineral density were taken and then compared with the appropriate standard values to determine the presence of osteoporosis. According to the results, the risk of developing osteoporosis in men and women with a BMI higher than 30 kg/m² is approximately 33% lower compared to the subjects with a normal BMI. On this subject, Nakaoka et al.'s work⁽³⁴⁾ discovers that high levels of BMI are protective against the risk of developing osteoporosis in men and women of middle and advanced age. Wu et al.,⁽³⁵⁾ based on a longitudinal study, also find an association between changes in the BMI and changes on the bone mineral density. The previous findings are consistent with the results of Kato et al.'s work,⁽³⁶⁾ who found a lower rate of hip fracture among obese older people. According to Galvard et al.,⁽³⁷⁾ the lower fracture rate is consistent with the notion of "the cushion effect" of body fat over the bony prominences thus reducing the impact of potential falls.

The aim of this paper is to analyze the relationship between excess weight and disability among elderly people in Argentina and to assess to which extent a protective factor that reduces or mitigates the effect of overweight on the loss of functional skills in elderly people could be operating.

METHODS AND MATERIALS

This study is based on a comparative cross-sectional analysis. To measure disability, being obese and overweight, along with the association

between weight condition (obesity or overweight) and disability, microdata from Argentina's 2009 National Survey of Risk Factors [*Encuesta Nacional de Factores de Riesgo*] was utilized. This survey provides self-reported information from Argentinian population aged 18 and over about: size, weight, prevalence of chronic diseases, mobility problems, difficulties with self-care and daily life activities, in addition to a set of sociodemographic variables such as education level, income, age and gender.

The NSRF is a cross-sectional survey carried out in October, November and December of 2009 by the National Ministry of Health of Argentina and the National Institute of Statistics and Censuses of Argentina, along with the collaboration of provincial statistics divisions. The aims of the survey were:

- to know the distribution of risk factors in population aged 18 and over;
- to estimate its prevalence;
- to determine the profile of the population at risk through their sociodemographic, socioeconomic and educational characteristics and their social family environment.^(40 p.5)

The final sample of the 2009 NSRF had the information of 34,732 individuals aged 18 and over out of which 5,751 were over 64 years old.⁽⁴⁰⁾ Extrapolating the data from the population sample, an average age of 38 years old is obtained in the group of 18 to 64 years old (39 years old in the non-extrapolated sample) and a proportion of 53% of women (56% without extrapolation). For its part, in the group aged 65 and over, the average age is 74 (same value without extrapolation) and 57% are women (62% without extrapolation).

Regarding the geographic distribution, the area of Greater Buenos Aires (Autonomous City of Buenos Aires and 24 districts of the province of Buenos Aires) and the Pampean region (the province of Buenos Aires – excluding the 24 districts of the Greater Buenos Aires conurbation – as well as Córdoba, La Pampa, Santa Fe and Entre Ríos) gather more than 70% of the population aged 18 to 64 years old and 77% of the population over 64 years old (extrapolated values).

To identify people with disability the three conditions contemplated in the survey were

considered. To that end, a dichotomous variable with value equal to one when the person interviewed answers:

- having mobility problems (when the person answers that he/she has walking impediments or he/she has to remain in bed);
- self-care problems (when the person answers he/she has problems or that he/she can't dress or wash himself/herself);
- problems with activities of daily living (when the person answers he/she has problems or he/she can't perform these activities).

This is to say that the person is considered "disabled" when he/she shows at least one of the conditions above.

To classify the population according to weight, categories of BMI widely used for adult non-Asian populations were taken,^(41,42) according to which individuals with a BMI < 18.5 belong to the "underweight" category, those with BMI between 18.5 and 24.99 to "normal weight", with BMI ≥ 25 to "overweight" and with BMI ≥ 30 to "obesity". Based on the previous definitions, a dichotomous variable was created for each weight category.

Prevalence of disability and weight were calculated in the sample and in the population represented. The respective confidence intervals were estimated assuming a simple random sampling design, because the information of the design for a proper sampling variance is not available in the NSRF database. This restriction for the calculation of the confidence intervals introduces inconsistencies with the weighted prevalence values, because these take into account the complex design information. As a result, the comparison of the weighted prevalence and the confidence intervals must be made with caution; the comparison with the unweighted prevalence (that implicitly assumes a simple random sampling design) is a more suitable option.

Furthermore, to calculate confidence intervals, the exact method based on F-distribution was applied, because for binominal distribution it results in a superior procedure to other approximations such as those based on Poisson's central limit distribution theorem.⁽⁴³⁾ Also, to measure the association between excess weight and disability

and to evaluate to which extent such association is different among people over 64 years old, the following calculations were carried out:

1. Disability prevalence was estimated according to each weight category for people aged 18 to 64 years old on one hand, and for people over 64 years old on the other hand.
2. Logistic models were estimated with the dependent variable "disability" (dichotomous variable structured as detailed above) controlling for possible confounding factors, such as sex and instruction level of the individuals.
 - a. First separated models were estimated for each age group, with the purpose to assess the association between explanatory variables and the disability condition of each group.
 - b. Then, a model for each age was estimated including interaction terms between weight categories and age groups with the aim to assess specifically if the differences of association between obesity condition and disability among age groups were statistically significant.

Every calculation, except for the confidence intervals of prevalence included in Tables 1, 2 and 3 have been made using the program STATA/SE 12 (StataCorp LP). Robust estimation of standard error of logistics models is consistent to "*Huber SandwichEstimator*" which helps to improve the estimation of the variance of the maximum-likelihood estimation when the underlying model is not approximately correct.⁽⁴⁴⁾ The confidence intervals of Tables 1, 2 and 3 were calculated using Excel according to the work of Correa and Sierra.⁽⁴³⁾

RESULTS

The results tables that are presented below show the total number of people, prevalence and its respective confidence intervals of disability condition and weight, among adult population aged 18 to 64 years old and population over 64 years old, with the aim of assessing disabilities and weight category patterns for both age groups.

Table 1 shows results for disability conditions. The totals expanded to the population show

that more than 1.8 million people aged 18 to 64 years old and almost 1.4 million people over 64 years old may present at least one of the three disability conditions considered, being the most common difficulty to walk (in both age groups).

Although in absolute values the number of people with some disability would be higher among younger people, in relative terms this result is reversed, because the total number of elderly people (with or without disabilities) is substantially lower. Thus, the prevalence of "any of the three disabilities" would be 4 times higher in the group of older adults (affecting 37% of the population aged 65 and over) than the prevalence observed among the population aged 18 to 64 years old (in the order of 9%).

The prevalence of self-reported disabilities associated with walking difficulties may reach almost 7% in the population aged 18 to 64 years old and more than 33% among the population aged 65 and over. Also, difficulties in daily life activities would be present in 5% of the population aged 18 to 64 years old and in 21% of older adults; while prevalence of disability associated with self-care may affect 1% of the younger population and almost 8% of the elderly population.

Table 2 shows the results of the four weight categories (obesity, overweight, normal weight and underweight) for both age groups. A higher prevalence of overweight and obesity is observed among people aged 64 and over than the prevalence observed in the group aged 18 to 64 years old (63% versus 52%), even when both cases exceed 50% of the population. This shows the high prevalence of overweight and obesity at all ages and the positive association between BMI and age.

On the other hand, the level of differences between the age groups analyzed shows a greater distance in overweight than in obesity. That is how overweight among people aged 18 to 64 and people aged 64 and over rises from 34% to 43%, respectively, while obesity prevalence rises from 18% to 20% in each age group, respectively. This prevalence shows that among younger population there would be 3.5 million obese people and 6.7 million overweight people in Argentina, while those figures rise to more than 696 thousand obese people and 1.5 million overweight people among population aged 64 and over.

Table 3 shows the prevalence of disability in each age group. The prevalence of disability

Table 1. Prevalence of disabilities, according to age group and type of disability. Argentina, 2009.

Disability according to age groups	Expanded Sample (n=24,434,595)	Sample (n=34,732)	Weighted prevalence (per 100)	Unweighted prevalence (per 100)	CI 95% ¹
18 TO 64 YEARS					
Walking	1,422,385	2,102	6.87	7.25	7.25; 7.25
Self-care	264,734	401	1.28	1.38	1.38; 1.39
Daily life activities	1,038,636	1,587	5.02	5.48	5.48; 5.48
Some disability ²	1,870,153	2,799	9.03	9.66	9.66; 9.66
65 YEARS AND OVER					
Walking	1,245,133	2,028	33.35	35.26	35.26; 35.27
Self-care	293,133	530	7.85	9.22	9.21; 9.23
Daily life activities	772,301	1,295	20.69	22.52	22.51; 22.53
Some disability ²	1,390,356	2,274	37.24	39.54	39.53; 39.55

Source: Own elaboration based on microdata from Argentina's 2009 National Survey of Risk Factors.

¹Confidence intervals were estimated through the exact method, using a simple random sampling design.

²Values expressed in "some disability" correspond to individuals with mobility problems, self-care problems or daily life activities.

Table 2. Prevalence of nutritional status, according to age group and weight category. Argentina, 2009.

Weight category according to age	Expanded sample (n=23,144,680)	Sample (n=32,448)	Weighted prevalence (per 100)	Unweighted prevalence (per 100)	CI95% ¹
18 TO 64 YEARS					
Obesity	3,472,867	4,969	17.65	18.23	18.23; 18.23
Overweight	6,710,959	9,592	34.10	35.19	35.19; 35.19
Normal weight	8,974,889	12,065	45.61	44.27	44.26; 44.27
Underweight	518,017	630	2.63	2.31	2.31; 2.32
65 YEARS AND OVER					
Obesity	696,856	1,049	20.09	20.20	20.20; 20.22
Overweight	1,493,533	2,189	43.07	42.16	42.15; 42.17
Normal weight	1,237,783	1,888	35.69	36.36	36.36; 36.38
Underweight	39,776	66	1.15	1.27	1.27; 1.29

Source: Own elaboration based on microdata from Argentina's 2009 National Survey of Risk Factors.
¹Confidence intervals were estimated through the exact method, using a simple random sampling design.

among obese and overweight people is higher than the prevalence observed in normal weight people, both in people aged 18 to 64 and people aged 64 and over.

Among younger people the prevalence of disability reaches 9% of overweight people and almost 16% of obese people; while among younger people with normal weight the prevalence of disability is 6%. These differences imply that, in this age group, disability may be 50% more in overweight people than in people with normal weight. Furthermore, obese people show an excess of prevalence of disability of more than 160% (compared with people with normal weight). Such "disability excesses" are fewer than the excesses in the group of people aged 64 and over (of 1% and 30% between overweight and obesity, respectively), even when the prevalence of disability is far higher in this age group, as among overweight people they reach 34% and among obese people 44%. Also, it is important to mention that a third of the people with normal weight show one of the incapacitating difficulties already analyzed. The previous result suggests that although excess weight is associated with a higher presence in the prevalence of disabilities

both in adult population and in population aged 64 and over, among the latter there may exist mitigating factors of the relationship (consistent with the cushion effect theory).

In order to assess to what extent this result remains it is important to measure the relationship controlling factors of demographic composition (for example, among elderly people there are more women) and socioeconomic factors (for example, differences of composition for each level of education) for each age group.

Table 4 shows the results of the logistic model of probability of reporting disability (at least one of the three contemplated by the survey) for each group of age separately.

The odds ratio for being overweight and for being obese is higher in the first age group (18 to 64 years old), consistent with previous results. In the group aged 18 to 64 years old the chance of reporting disabilities among overweight people is 42% higher than among people with normal weight; while in the group aged 64 and over, although the odds ratio is just higher than one, this is not statistically relevant. For its part, among younger people the chance of reporting disabilities among obese people is 135% higher than

among people with normal weight, while among people aged 64 and over the chance is 57%.

Other associations resulting from the model indicate that among women of both age groups there is a higher chance of reporting disabilities, and that among the population with formal education (whether primary, secondary or higher education, uncompleted higher education or more) there are smaller chances of reporting disabilities compared to the uneducated population (reference group) and this is true for both age groups.

Table 5 shows the results of the logistic model for the probability of reporting disabilities among people aged 18 and over (total) with the interaction terms of interest, for specific assessment purposes if the interactions among overweight condition and age group are statistically significant.

Considering that for the three levels of formal education, the association with the chances of reporting disability is negative (and statistically significant), in the following model the categories were grouped in two: with and without formal education. It should be mentioned that the odds ratio of the interaction terms between

obesity condition and age group are both higher than one (people with normal weight being the reference group for both cases), the odds ratio is higher for the interaction term of younger obese people (compared with the obese people aged 64 and older) and the differences between both terms of interaction (both younger obese people and elderly obese people) are statistically significant because the estimated coefficient of each term is not included in the confidence interval of the other, suggesting that, indeed, the increased chances of reporting disabilities in the group of obese people aged 64 and older compared to people with normal weight is lesser than the same increase measured in the population aged 18 to 64 years old. Also, interaction terms between the age group and being overweight also are higher than one (although only people aged under 65 years old is statistically significant) and different from each other, which is also consistent with the notion of a lesser increase in the chance of reporting disabilities among elderly overweight people compared to the same increase among younger people with normal weight.

Table 3. Prevalence of disability, according to nutritional status and age groups. Argentina, 2009.

Weight category according to age group	Expanded sample (n=2,981,459)	Sample (n=4,533)	Weighted prevalence (per 100)	Unweighted prevalence (per 100)	CI95% ¹
18 TO 64 YEARS					
Obesity	550,221	807	15.84	16.24	16.24; 16.26
Overweight	610,023	906	9.09	9.45	9.44; 9.45
Normal weight	543,097	802	6.05	6.65	6.65; 6.66
Underweight	24,312	39	4.69	6.19	6.18; 6.34
65 YEARS AND OVER					
Obesity	304,384	487	43.68	46.43	46.38; 46.48
Overweight	510,445	791	34.18	36.14	36.12; 36.16
Normal weight	417,116	672	33.70	35.59	35.57; 35.63
Underweight	21,861	29	54.96	43.94	43.28; 44.78

Source: Own elaboration based on microdata from Argentina's 2009 National Survey of Risk Factors.

Note: The total number of population with disabilities and the total number of population in this table are lower because only the cases for which information about weight category is available are considered.

¹Confidence intervals were estimated through the exact method, using a simple random sampling design.

Table 4. Logistic regression for the association between disability and selected predictive variables, according to age groups. Argentina, 2009.

Variables	OR	RSE	Z	P>z	CI95%
18 TO 64 YEARS					
WEIGHT CATEGORY					
Obesity	2.353	0.131	15.360	0.000	2.110; 2.625
Overweight	1.418	0.075	6.650	0.000	1.279; 1.572
Normal weight ¹	-	-	-	-	-
Underweight	0.860	0.149	-0.870	0.383	0.613; 1.207
SEX					
Male ¹	-	-	-	-	-
Female	1.593	0.071	10.410	0.000	1.460; 1.740
LEVEL OF EDUCATION					
Received no education ¹	-	-	-	-	-
Primary	0.478	0.066	-5.350	0.000	0.365; 0.627
Secondary	0.207	0.029	-11.350	0.000	0.157; 0.271
Tertiary	0.136	0.020	-13.840	0.000	0.102; 0.180
65 YEARS AND OVER					
WEIGHT CATEGORY					
Obesity	1.567	0.125	5.620	0.000	1.340; 1.832
Overweight	1.065	0.071	0.940	0.347	0.934; 1.214
Normal weight ¹	-	-	-	-	-
Underweight	1.204	0.306	0.730	0.466	0.731; 1.982
SEX					
Male ¹	-	-	-	-	-
Female	1.579	0.096	7.510	0.000	1.402; 1.779
LEVEL OF EDUCATION					
Received no education ¹	-	-	-	-	-
Primary	0.610	0.081	-3.700	0.000	0.470; 0.793
Secondary	0.374	0.054	-6.830	0.000	0.282; 0.496
Tertiary	0.309	0.049	-7.410	0.000	0.226; 0.421
Source: Own elaboration based on microdata from Argentina's 2009 National Survey of Risk Factors.					
¹ Reference value. OR= Odds ratio; RSE= Robust Standard Errors; CI 95%= 95% Confidence interval.					

DISCUSSION

Because of the importance of disability associated to the process of aging the population in Argentina and the increasing obesity and overweight classification among all age groups of Argentinian population, it is interesting to analyze the association between these two conditions. Being overweight

is a condition that increases the risk of chronic conditions such as heart, cerebrovascular, osteoarticular and pulmonary diseases, and diabetes, which at the same time may have an important effect in the probability of reporting disabilities at adult and advanced ages.

In this regard, the relationship between being overweight and disability may seem clearly positive and several studies have shown evidence

Table 5. Logistic regression for the association between disability and predictive variables including interaction terms. Argentina, 2009.

Variables	OR	RSE	Z	P>z	CI95%
WEIGHT CATEGORY ACCORDING TO AGE					
18 TO 64 YEARS					
Obesity	1.615	0.128	6.030	0.000	1.382; 1.887
Overweight	1.074	0.072	1.070	0.285	0.942; 1.224
Normal weight ¹	-	-	-	-	-
Underweight	0.836	0.143	-1.050	0.296	0.597; 1.170
65 YEARS AND OVER					
Obesity	2.870	0.155	19.550	0.000	2.582; 3.190
Overweight	1.588	0.082	8.970	0.000	1.436; 1.758
Normal weight ¹	-	-	-	-	-
Underweight	1.267	0.321	0.930	0.350	0.771; 2.083
AGE					
18 to 64 years ¹	-	-	-	-	-
65 years and over	7.543	0.465	32.790	0.000	6.685; 8.511
SEX					
Male ¹	-	-	-	-	-
Female	1.562	0.056	12.370	0.000	1.455; 1.676
LEVEL OF EDUCATION					
Received no education ¹	-	-	-	-	-
Received education	0.367	0.039	-9.480	0.000	0.298; 0.451
Source: Own elaboration based on microdata from Argentina's 2009 National Survey of Risk Factors.					
¹ Reference value. OR= Odds ratio; RSE= Robust Standard Errors; CI 95%= 95% Confidence interval.					

about this.^(29,30) However, other bodies of literature show evidence of an overweight protective factor over the risk of disability, at least in adult and elderly people.⁽³³⁻³⁷⁾ This factor may be due to the reduced risk of developing osteoporosis observed in elderly people with a BMI higher than 30 kg/m²,^(33,34) which reduces the risk of fractures and with that, the consequences of falls over the risk of disability of elderly people.^(36,37)

The findings of this study show higher prevalence of disability and obesity for elderly people (65 years old and over), compared to the younger group (18 to 64 years old), consistently with the findings of studies on obesity and disability separately.^(45,46) On the other hand, an inverse pattern between a disability condition and the level of education is observed, aligned with the findings obtained in studies of the

main risk factors and of the "protection" of the disability condition.^(9,10) Also, women present a higher possibility of reporting disabilities even when controlling for age. This result is widely documented in the related bibliography.^(9,10)

The main result of this study shows that the increase of the chance of reporting disability in the population group of obese or overweight people aged 64 and over compared to people of normal weight is less than the same increase in population aged 18 to 64 years old, which may be suggesting that effectively among older people a protective factor of excess weight (overweight or obesity) is at work, that while not reversing the direct relationship between excess weight and disability, seems to mitigate it.

However, among the main limitations of this study there is the fact that the measurements of

disability and obesity are self-reported. Health self-reports are widely used, especially in studies at the population level in which direct measurements of the conditions are hardly available,^(8,45,46) and even they may present discrepancies as they are usually close approximations of what it is intended to measure.^(8,45,46) On the other hand, although self-reports may present a certain degree of bias, to some extent, there is no reason to think it would affect the relationship between the two conditions nor the age group differences.

An aspect that may imply a bias relevant to the study object is the use of BMI to measure obesity in the different population groups. BMI is an approximated measure of excess weight and body composition in every age group and there is doubt regarding its use when comparing prevalence of obesity, especially in different age groups.

In the specific case of older people that usually have a height loss as a consequence of the vertebral compression due to aging, a BMI over 30 may represent a reduced body fat of the same value in the same person several years before.⁽⁴⁷⁻⁵⁰⁾ If the previous statement is true, in the group of overweight or obese older people there may be people with normal weight included for whom the relationship with disability is smaller (for all ages). Therefore, the smaller association between excess weight and disability in this age group may be due to overestimation of being overweight and obese and not due to a protective factor.

Moreover, it is important to indicate that due to the nature of the data available (cross-sectional) it was not possible to discount the “reverse causality” effect from the relationship between excess weight and disability, which can be expected to exist to some extent because individuals with disability tend to perform less physical activity than individuals without functional difficulties. Although this statement is true, in order to affect the findings of this study, the reverse causality should be of a substantially different magnitude in both age groups analyzed.

To move forward in the study of the relationship between obesity and disability, it is of crucial importance to have better measures. Specially, and on account of this finding, it would be necessary to have additional measures with higher accuracy to differentiate body components more than the assessment of corpulence estimated by the BMI in every age group and, ideally, to count with cross-sectional data that will help to identify a causal relationship between excess weight and disability condition.

The findings of this study draw attention to the need to move forward with lines of research that will help provide in depth knowledge about the relationship between excess weight and disability, and the importance of considering the special features in the different population groups, so that they can be taken as a basis for the development of public health policies.

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