



Research Article

What Has Happened to The Prevalence of Overweight and Obesity In Colombia? A Systematic Review of Studies Conducted Since 2010

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Abstract

Background

Over the past two decades, the prevalence of obesity and overweight has increased at an alarming rate in low and middle-income countries. Since the last national nutrition survey 2010, there has not been reported a synthesis of prevalence studies about this problem in Colombia. The aim of this study is to conduct a systematic review to determine the prevalence of obesity and overweight among children and adults in Colombia.

Methods

A systematic literature review was conducted in the electronic databases PubMed and SciELO, including studies with probabilistic designs published in Spanish and English from January 2010 to December 2016.

Results

The final selection includes nine studies, 4 of which were conducted in children and 5 in adults. The overall prevalence of overweight and obesity reported in children ranged from 20.2% (5 to 19 years) to 24.8% (9 to 11 years). The overall prevalence of obesity (not including overweight) in adults ranged from 6.1% (18 to 25 years) to 24.6% (20 to 65 years). The overall prevalence of overweight (not including obesity) in adults ranged from 20.2% (18 to 25 years) to 40.2% (>14 years).

Conclusion

Despite the few studies included, this systematic review provides an updated overview about the problem of obesity and overweight in some cities and regions of Colombia. The results show that these

chronic conditions continue being a major challenge to the Colombian society.

Keywords: Noncommunicable disease; Obesity; Overweight

Introduction

Overweight and obesity have become epidemic conditions associated with the increase of all-cause mortality and disability in adults [1,2]. There is compelling evidence that obesity increases the risk of type 2 diabetes, hypertension, coronary heart disease and multiple types of cancer [1-7]. Obese children have higher risk for metabolic complications and for other conditions that affect their quality of life [8,9]. Furthermore, some studies estimate that half of the obese children will be obese in adulthood [10,11].

Worldwide prevalence of obesity has more than double between 1980 and 2014, and about 13% of the world's adults population has this condition, with higher prevalence in women than in men. Over two-thirds of the women in North Africa and the Middle East are overweight or obese, followed by Latin America and the Caribbean, where half of the women are either overweight or obese. In children and adolescents, there was also an important increase in the prevalence, with similar growing patterns for both sexes in comparison to adults [12-14].

According to the last national nutrition survey in Colombia (ENSIN, 2010), 51.2% of the adult population and 17.5% of children and adolescents are overweight or obese [15]. Since ENSIN 2010, there has not been a synthesis of prevalence studies about this problem in Colombia. Therefore, the aim of this study was to conduct a systematic review to determine the prevalence of obesity and overweight in children and adults since 2010. The results of this study may provide insights for civil society and decision makers about a problem that has public health implications.

Methods

Search strategy

We carried out a systematic review of original studies that established the prevalence of obesity and overweight in children ages 5 to 17 years and adults ages 18 and older in Colombia, both at local or national level. The search was conducted in the bibliographic databases PubMed and SciELO and comprised quantitative studies published from January 2010 to December 2016. Free text terms were used in the search with the Boolean operator "OR", including "obesity", "Colombia" and "Colombian". This search procedure favored sensitivity in order to reduce the probability of omitting relevant studies. We also searched previous national or regional nutrition surveys conducted since 2010, no including the national nutrition survey 2010 (ENSIN 2010). Finally, we made a manual search of all health journal included in the bibliographic index of the Colombian Department of Science and Technology. We limited the search to those studies published in English or Spanish.

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Study selection and inclusion criteria

Only prevalence studies with probabilistic designs were considered in this review. We did not include studies conducted in pregnant women and institutionalized populations and patients.

Data extraction

For each included study, the first and second authors independently extracted the data, based on titles and abstracts. Subsequently, these two reviewers extracted the basic information from the manuscript texts and assessed the quality of each study validity. In case of disagreement, the last author reviewed the manuscript and a final agreement was reached through a deliberative process. The following information were obtained and summarized from each study: authors, date, city, department, study population, sample size, prevalence and sociodemographic correlates.

Quality assessment

The quality assessment of the selected studies was carried out using the following criteria: appropriateness of sample size, prevalence estimates by sex, report of confidence intervals and avoidance of selection bias [16]. Three categories of quality were defined based on an adaptation of the Support Unit for Research Evidence (SURE) [17]: reliable, important limitations and fatal flaws. Studies with fatal flaws were not included in the review.

The findings of each study were summarized in terms of prevalence with the confidence intervals, when available. Due to the heterogeneity of the age groups and regions of the selected studies and the scarcity of the data, it was not feasible to conduct a meta-analysis.

Results

Figure 1 shows the search procedures based on the PRISMA approach. The initial search identified 384 citations. After excluding papers based on titles and abstracts and removing duplicates, 115 articles were accepted to a complete review of the full text. Twenty-two articles followed the inclusion criteria and 9 were finally included, after excluding redundant publications and studies with poor quality. Four studies were conducted in children and 5 in adults. All the studies used objective anthropometric measures of height and weight in order to calculate BMI index.

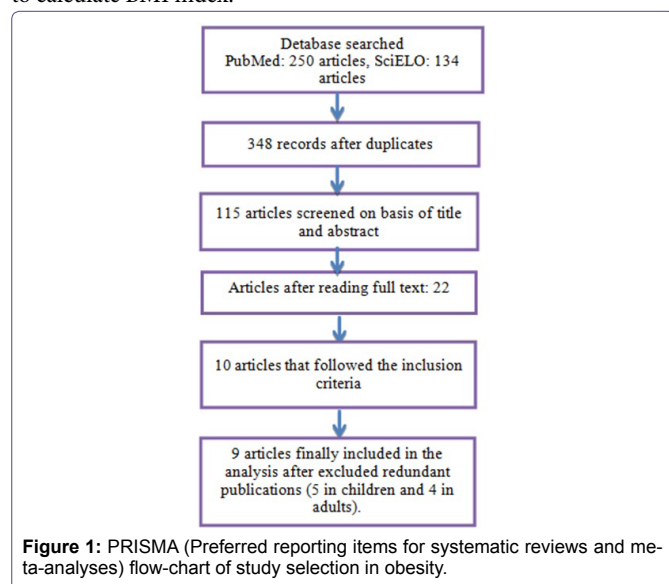


Figure 1: PRISMA (Preferred reporting items for systematic reviews and meta-analyses) flow-chart of study selection in obesity.

Results of studies conducted in children

Table 1 shows the characteristics of the included studies that established prevalence of obesity and overweight in Colombian children since 2010.

Muthuri et al., conducted the ISCOLE study in 12 countries, including Colombia (Bogotá). They found an overall prevalence of obesity and overweight of 24.8% among 573 children evaluated from 15 public and 5 private schools in the urban area of Bogotá [18].

Vera et al., conducted a study on 157 children ages 7 to 9 years from two educational institutions located in low-income areas in Bogotá. They found an overall prevalence of 29.3% overweight and obesity. Overweight prevalence was higher in females (13.7%) than in males (7.7%), contrary to obesity with a higher relative frequency in males (9.2%) than females (4%) [19].

Galiano et al., conducted a study in Tunja (Department of Boyacá) among 1165 school children between 5 and 19 years old. They found 17.6% children with overweight and 2.6% with obesity, with a higher prevalence in males. High socioeconomic status, living in food secure households and being educated in private schools were positively associated with overweight or obesity [20].

Alvarez-Castaño et al., assessed the nutritional profile from 2.719 urban and rural households in Medellín, Antioquia. The prevalence of obesity and overweight in children were 7.2% and 16.9%, respectively [21].

Results of studies conducted in adults

Table 2 shows the characteristics of the included studies about prevalence of obesity and overweight in the Colombian adult population since 2010.

Rangel-Caballero et al., conducted a study on the obesity and overweight prevalence in college student ages 18-25 years in Bucaramanga (Department of Santander). This study reported an overall prevalence of obesity and overweight of 6.1% and 20.26%, respectively [22].

Ruiz et al., conducted a multicenter study in three Colombian cities including 5,474 participants over 18 years old, collecting information about sleep disorders and its relation with anthropometric, demographic and geographic characteristics. This study reported obesity prevalence in men of 10.3%, 15.7% and 17.8% in the cities of Bogotá, Bucaramanga and Santa Marta, respectively. The prevalence of obesity in women was 16.7%, 18.7% and 25.5% in the aforementioned cities, respectively. With respect to overweight, the greater prevalence was reported in men who lived in Bucaramanga with 46.1% and the lower prevalence was reported in men residing in Santa Marta with 32.2% [23].

A study about the prevalence of cardiovascular risk factors in an indigenous population of Cristiania (Department of Antioquia) was conducted by Cataño-Bedoya et al., They found an obesity prevalence of 8%, being 10.3% in women and 3% in men. The prevalence of overweight was 40.2%, 48.6% in women and 24.4% in men [24].

Álvarez et al., conducted a study in Medellín (Department of Antioquia) on a sample of 5,556 adults, ages 19-69 years living in urban households. This study reported an obesity prevalence of 19.1% in women and 11.4% in men and an overweight prevalence of 33.1% and 37.1%, respectively [25].

Navarro-Lechuga et al., conducted a study in urban neighborhoods of Soledad (Department of Atlántico) among 790 adult ages

Study	Municipality (Department)	Study Population	Definition of Obesity or Overweight	Sample Size	Prevalence (95% CI)
Muthuri et al., 2016 [18]	Bogotá D.C (Cundinamarca)	Children ages 9 to 11 years from public and private schools	BMI using WHO 2007 growth reference	295	Overweight (obesity inclusive): 24.8% 95% CIs were not reported Prevalence were not reported by sex
Vera et al., (2014) [19]	Bogotá D.C	Children ages 7-9 years from public and private schools	BMI using WHO 2007 growth reference	157	Obesity prevalence by sex: Males: 9.2% Females: 4.0% Overweight prevalence by sex: Males: 7.7% Females: 13.6% 95% CIs were not reported Overall prevalence were not reported
Galiano et al., 2012 [20]	Tunja (Boyacá)	Children ages 5 to 19 years from public and schools, no streets	BMI using WHO 2007 growth reference	1165	Obesity: 2.6% Males: 4.1% Females: 1.2% Overall overweight: 17.6% Males: 18.1% Females: 17.1% 95% CIs were not reported
Álvarez-Castaño et al (2010) [21]	Medellín (Antioquia)	Children and adolescent population ages 5-17 years (rural and urban households)	BMI using WHO 2007 growth reference	1960	Overall obesity: 7.2% Overall overweight: 16.9% 95% CIs were not reported Prevalence were not reported by sex

Table 1: Characteristics of the included studies on prevalence of childhood obesity in Colombia conducted since 2010.

Study	Municipality (Department)	Study Population	Definition of Obesity or Overweight	Sample Size	Prevalence (95%CI)
Rangel-Caballero et al., (2013) [22]	Bucaramanga (Santander)	College students ages 18-25 years	BMI using the WHO standards by adults	306	Overall obesity: 6.1% Overall overweight: 20.2% Overweight (obesity inclusive) by sex: Females: 16.6% Males: 41.48% 95% CIs were not reported
Ruiz et al., (2013) [23]	Bogotá (Cundinamarca), Bucaramanga (Santander), Santa Marta (Magdalena)	Adult population, 18 years and over	BMI using the WHO standards by adults	5474	Obesity prevalence by sex: Females: Bogotá 16.7% (14.8-18.9) Bucaramanga 18.7% (16.6-21.1) Santa Marta 25.5% (23.2-27.9) Males: Bogotá 10.3% (7.9-13.4) Bucaramanga 15.7% (13.1-18.8) Santa Marta 17.8% (14.9-21.2) Overweight prevalence by sex (not including obesity): Females: Bogotá 34.4% (31.8-37.1) Bucaramanga 36.2% (33.4-39.0) Santa Marta 33.7% (31.2-36.3) Males: Bogotá 34.6% (30.5-38.9) Bucaramanga 46.1% (42.2-50.0) Santa Marta 32.6% (28.8-36.6) Overall prevalence were not reported
Cataño Bedoya et al., (2011) [24]	Cristiania (Antioquia)	Indigenous population ages over 14 years (Embera Chamí)	BMI using WHO 2007 growth reference by persons ages less than 18 years	488	Overall obesity: 8.0% Males: 3.0% Females: 10.6% Overall overweight (not including obesity): 40.2% Males: 24.4% Females: 48.6% 95% CIs were not reported
Álvarez-Castaño et al., (2010) [25]	Medellin (Antioquia)	Adults ages 18-69 years (urban households)	BMI using the WHO standards by adults	5556	Obesity prevalence by sex: Males: 11.4% Females: 19.1% Overweight prevalence (not including obesity) by sex: Males: 37.1% Females: 33.1% 95% CIs were not reported overall prevalence were not reported
Navarro Lechuga et al., (2010) [26]	Soledad (Atlántico)	Adult population ages 20-65 years (urban households)	BMI using the WHO standards by adults	790	Overall obesity: 24.6% Males: 20.6% Females: 26.8% 95% CIs were not reported

Table 2: Characteristics of the included studies on prevalence of adult obesity in Colombia conducted since 2010.

20-65 years. They found an obesity prevalence of 24.6%, with 26.8% in women and 20.6% in men [26].

Discussion

This review provides an overview of the problem of obesity and overweight from studies conducted in some Colombian cities after the last national nutrition survey 2010. Despite the few studies selected according with inclusion criteria of the systematic review and the scarcity of the data, these results provide an updated panorama about the obesity and overweight problems in some cities and regions of Colombia. The results show that these chronic conditions are a major challenge to the Colombian society.

The majority of findings of this review suggest that obesity and overweight are growing problems, mainly in the largest cities of Colombia. In the specific case of the studies conducted among children, Muthuri et al., and Alvarez-Castaño et al., found prevalence rates in Bogota and Medellin are similar to those reported in Mexico at the end of the decade of 1990 [18,21]. In this country the prevalence of overweight and obesity among girls ages 5 to 11 years grew from 25.5% in 1999 to 32.8% in 2016 [27]. The two studies that reported results by gender among children, found that males had higher prevalence than females, although they did not report the confidence intervals to assess the overlapping of estimations [19,20].

The highest prevalence of overweight and obesity among adults was found in males from Bucaramanga (61.8%), females from Santa Marta (59.2%) and indigenous from Cristianía (59.2%). All these prevalence rates were higher than those reported in the ENSIN 2010 in the state in which these studies were conducted [15]. The highest prevalence of obesity (not including overweight) was found in Barranquilla (24.6%).

Several limitations of this systematic review should be mentioned. First, the small number of studies does not allow identifying patterns that may be generalizable to Colombia. Second, the selected studies used different sampling frames and selection procedures which do not allow making robust comparisons between them and the last national nutrition survey of 2010. Finally, most of the studies in adult population were carried out in the largest Colombian cities.

Despite these limitations, this review shows that obesity and overweight seem to be a major health problem in Colombia. The findings of this review could provide information to guide policy actions in the area. In addition, the fact that the prevalence of overweight and obesity was higher in some of the regions in comparison to the last official measure in 2010, could be an indication that this problem is growing. This is not different from what the rest of Latin America has been experiencing now for a few decades, with a larger prevalence of overweight and obesity, particularly among the most disadvantaged populations, which is also one of the characteristics of the nutrition transition [28]. Similar shifts were seen in higher income nations, such as the United States, where the obesity epidemic is now one of the most significant public health crises of that country with an overwhelming societal and economic burden [29,30]. In this sense, and given the rising prevalence of overweight and obesity in the country, reviews such as this one are a call to action to implement policies and measures aimed at reducing the prevalence of these chronic conditions.

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References

1. The global BMI Mortality Collaboration (2016) Body mass index and all-cause mortality: individual-participant-data meta-analysis of 239 prospective studies in four continents. *Lancet* 388: 776-786.
2. Institute for Health Metrics and Evaluation (2016) GBD Compare Data Visualization. Institute for Health Metrics and Evaluation, Seattle, USA.
3. Wilson PW, D'Agostino RB, Sullivan L, Parise H, Kannel WB (2002) Overweight and obesity as determinants of cardiovascular risk: the Framingham experience. *Arch Intern Med* 162: 1867-1872.
4. Bogers RP, Bemelmans WJ, Hoogenveen RT, Boshuizen HC, Woodward M, et al. (2007) Association of overweight with increased risk of coronary heart disease partly independent of blood pressure and cholesterol levels: a meta-analysis of 21 cohort studies including more than 300 000 persons. *Arch Intern Med* 167: 1720-1728.
5. Kenchaiah S, Evans JC, Levy D, Wilson PW, Benjamin EJ, et al. (2002) Obesity and the risk of heart failure. *N Engl J Med* 347: 305-313.
6. Bell JA, Kivimaki M, Hamer M (2014) Metabolically healthy obesity and risk of incident type 2 diabetes: a meta-analysis of prospective cohort studies. *Obes Rev* 15: 504-515.
7. Renehan AG, Tyson M, Egger M, Heller RF, Zwahlen M (2008) Body-mass index and incidence of cancer: a systematic review and meta-analysis of prospective observational studies. *Lancet*: 371: 569-578.
8. Kelishadi R, Mirmoghtadaee P, Najafi H, Keikha M (2015) Systematic review on the association of abdominal obesity in children and adolescents with cardio-metabolic risk factors. *J Res Med Sci* 20: 294-307.
9. Sanders RH, Han A, Baker JS, Cogley S (2015) Childhood obesity and its physical and psychological co-morbidities: a systematic review of Australian children and adolescents. *Eur J Pediatr* 174: 715-746.
10. Viner RM, Code TJ (2005) Adult socioeconomic, educational, social, and psychological outcomes of childhood obesity: a national birth cohort study. *BMJ* 330: 1354.
11. Bjørge T, Engeland A, Tverdal A, Smith GD (2008) Body mass index in adolescence in relation to cause-specific mortality: a follow-up of 230,000 Norwegian adolescents. *Am J Epidemiol* 168: 30-37.
12. World Health Organization (2016) Global Health Observatory data repository. World Health Organization, Geneva, Switzerland.
13. Ng M, Fleming T, Robinson M, Thomson B, Graetz N, et al. (2014) Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013: A systematic analysis. *The Lancet* 384: 766-781.
14. Popkin BM, Slining MM (2013) New dynamics in global obesity facing low- and middle-income countries. *Obes Rev* 14: 11-20.
15. ICBF (2011) Encuesta Nacional de la Situación Nutricional en Colombia 2010. ICBF, Bogotá, Colombia.
16. Magliano ES, Guedes LG, Coutinho ES, Bloch KV (2013) Prevalence of arterial hypertension among Brazilian adolescents: systematic review and meta-analysis. *BMC Public Health* 13: 833.
17. World Health Organization (2016) SURE Guides for Preparing and Using Evidence-Based Policy Briefs. World Health Organization, Geneva, Switzerland.
18. Muthuri SK, Onyvera VO, Tremblay MS, Broyles ST, Chaput JP, et al. (2016) Relationships between Parental Education and Overweight with Childhood Overweight and Physical Activity in 9-11 Year Old Children: Results from a 12-Country Study. *PLoS One* 11.
19. Mockus I (2016) Nutritional status and cardiovascular risks in children of two schools in Bogotá, Colombia. *Archivos latinoamericanos de nutrición* 66: 26-33.

20. Galiano LP, Abril FM, Ernert A, Bau A (2012) The double burden of malnutrition and its risk factors in school children in Tunja. *Arch Latinoam Nutr* 62: 119-126.
21. Castaño LSA, Restrepo AE, Rueda JDG, Aguirre CC (2012) Análisis de datos antropométricos de la población menor de 18 años de Medellín usando los estándares de la Organización Mundial de la Salud y su adaptación para Colombia propuesta por el Ministerio de la Protección Social. *Perspectivas en Nutrición Humana* 14: 33-45.
22. Caballero LGR, Sánchez LZR, Delgado EMG (2004) Sobrepeso y obesidad en estudiantes universitarios colombianos y su asociación con la actividad física. *Nutrición Hospitalaria* 31: 629-636.
23. Ruiz AJ, Rondon MA, Franco OH, Cepeda M, Martínez PH, et al. (2016) The associations between sleep disorders and anthropometric measures in adults from three Colombian cities at different altitudes. *Maturitas* 94: 1-10.
24. Cataño-Bedoya JU, Duque-Botero J, Naranjo-Gonzalez CA, Rúa-Molina DC, Rosique-Gracia J, et al. (2015) Prevalencia de factores de riesgo cardiovascular en indígenas embera-chamí de Cristianía (Jardín), Antioquia. *IATREIA* 28.
25. Álvarez-Castaño LS, Restrepo AE, Rueda JD, Aguirre CC, López LPM, et al. (2013) The effects of socioeconomic status and short stature on overweight, obesity and the risk of metabolic complications in adults. *Colomb Med (Cali)* 44: 146-154.
26. Lechuga EN, Moranth RV (2012) Prevalence of obesity in adults in the municipality of Soledad (Atlántico, Colombia), 2010. *Salud Uninorte* 28: 49-64.
27. Rivera JA, Campos I, Barquera S, Gonzáles de Cossio T (2012) Epidemiología de la obesidad en México: Magnitud, distribución, tendencias y factores de riesgo. In: Rivera Dommarco J, Hernández-Ávila M, Aguilar-Salinas C, Vadillo-Ortega F, (ed.). *Obesidad en México. Recomendaciones para una política de Estado*. UNAM, Mexico, USA.
28. Rivera JA, de Cosio TG, Pedraza LS, Aburto TC, Sánchez TG, et al. (2014) Childhood and adolescent overweight and obesity in Latin America: a systematic review. *The Lancet Diabetes Endocrinol* 2: 321-332.
29. Ogden CL, Carroll MD, Lawman HG, Fryar CD, Kruszon-Moran D, et al. (2016) Trends in Obesity Prevalence Among Children and Adolescents in the United States, 1988-1994 Through 2013-2014. *JAMA* 315: 2292-2299.
30. Flegal KM, Kruszon-Moran D, Carroll MD, Fryar CD, Ogden CL (2016) Trends in Obesity Among Adults in the United States, 2005 to 2014. *JAMA* 315: 2284-2291.