



Effects of the nutrition transition in Argentinean children and adolescents: a narrative review of overweight and obesity prevalence between 2000 and 2021

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Background and Objective: Changes in body composition as a consequence of the nutritional transition result in an increasing trend of overweight and obesity in children and adolescents in Argentina. This shift represents an important risk factor for cardiometabolic diseases, becoming a challenging problem of great dimensions for public health. The aim of this review is to estimate the overweight and obesity prevalence of Argentine children and adolescents in the last 20 years.

Methods: We conducted a narrative review of articles published between January 2000 and December 2021, reporting the prevalence of overweight and obesity in children and adolescents. Academic databases PubMed, Scielo, Lilacs, and Scholar were used, in addition to consultations to the national nutrition surveys. For the analysis, data were grouped in two periods: 2000–2011 and 2012–2021. We obtained % prevalence (95% confidence interval) of overweight, obesity, and excess weight, by sex, period, geographic region, and age group. Proportional differences were calculated using the chi-square test.

Key Content and Findings: Thirty studies were analyzed (n=155,429). The prevalence of excess weight (overweight + obesity) had significant differences by sex (P=0.0008), by period (P<0.0001), region (P<0.0001), and age group (P<0.0001). The highest prevalence corresponded to males, from 2012 to 2021, in the Patagonia region, and age group 6–15 years.

Conclusions: The effects of the nutritional transition on overweight in Argentine children and adolescents are heterogeneous in relation to the regions of the country, with an increasing trend. Eight out of every hundred children had obesity in the last 20 years and 13 out of every hundred in the last decade.

Keywords: Nutrition transition; children; adolescents; obesity; Argentina

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Introduction

Nutritional transition, overweight and obesity

The replacement of traditional foods with processed and ultra-processed foods in the dietary habits of the population is a distinctive, although not exclusive, characteristic of

the nutritional transition (1,2). The nutritional transition is, in fact, a complex and multifactorial process that also involves sociocultural, economic and individual behavioral changes (3). This transition is accompanied by the demographic transition, which involves the change from a pattern of high fertility and mortality to one of lower

fertility and low mortality, and the epidemiological transition, which is described as the change from high prevalence of infectious diseases to one of high prevalence of chronic noncommunicable diseases (1).

This process that is happening in most countries is also being experienced by many Latin American countries (4,5), although with particular characteristics in each of them (6). It articulates at least three components: (I) food availability and cost, (II) demographic changes and (III) lifestyles, crossed by purchasing power (7). Changes in dietary patterns, together with the increasingly sedentary lifestyles of modern societies, results in a change in body composition. This change in body composition is associated with an energy imbalance between calories consumed and calories expended, resulting in an excessive accumulation of fat (obesity) that can be detrimental to health (8). The intake of hypercaloric foods, rich in fat, salt and sugars, and poor in vitamins and minerals, is increasing worldwide (9). Consequently, overweight and obesity are on the rise, especially in school-age children (8,10) and alarmingly so in Latin America (11). Thus, in the NCD Risk Factor Collaboration (NCD-RisC) report [2017] (12), it was possible to observe that the average body mass index (BMI) and obesity in children and adolescents aged 5 to 19 years has increased in most regions and countries. Despite this increase, there is also moderate and severe underweight, constituting the double burden of undernutrition in some countries, especially those of middle or lower-middle income such as those in the Americas region, Africa and Asia (13,14). In Latin America, overweight and obesity are increasing rapidly from an early age (15), and, although there are many factors that can lead to overweight, the nutritional transition is undoubtedly one of them.

Socioeconomic context and nutritional outlook in Argentina

Argentina has a population of more than 40 million inhabitants, of which 56.6% of the total is urban population concentrated in the metropolitan area of Buenos Aires and Greater Buenos Aires (16). Its territory is divided into 24 jurisdictions (23 provinces and one federal district), administratively integrated into 5 regions (16): Northwest (NOA); Northeast (NEA); Center; Cuyo; Patagonia. Regions within Argentina have marked asymmetries determined by a series of factors, including the extension of territory, the location of ports, the diversity of climates and cultures, and the distribution of natural and economic resources historically centralized in the humid pampas (17,18). These

regional asymmetries were compounded by the occurrence of numerous economic crises, approximately once every 10 years in 160 years [1860–2020], resulting in deterioration of real wages, increased unemployment, and poverty and indigence that impacted differently depending on the region (19). In this context, Argentina is going through a process of nutritional transition with particular characteristics and great heterogeneity within provinces and regions and deep interrelationships among its components (6). Changes in food consumption patterns, associated with low income and educational level, particularly affect the most vulnerable groups, in which the consumption of cheaper foods with high sugar, flour and fat content and low nutritional value has increased. In turn, the dietary pattern of children and adolescents has been shown to be less healthy than that of adults, mainly due to propaganda directed especially at this age group and obesogenic school environments (20).

The process of nutritional epidemiological transition in Argentina is characterized by the increase in the frequency of overweight and obesity, together with the reduction of other deficit malnutrition conditions, such as underweight and short stature. The coexistence of deficit and excess conditions, which were already described at the beginning of this century, occurs at the individual, family and population levels (21) that constitutes the so-called “double burden of malnutrition”. In 2005, all forms of malnutrition were related to socioeconomic and educational inequalities in Argentina (22), with overweight being one of the most prevalent conditions in children under five years of age. Of the total amount of children in this age range, 10.2% of them were obese and 31.5% were excess weight (overweight + obesity). The NEA and NOA regions had a prevalence of short stature higher than the national value. Obesity, on the other hand, having a higher prevalence than the national value in the Central region. A similar trend was observed in 2018, where overweight and obesity in children and adolescents were the most frequent forms of malnutrition at all income levels.

Excess malnutritive states constitute risk factors for chronic noncommunicable diseases and an increased likelihood of obesity and its consequences in adulthood. This is also an important determinant of cardiometabolic risk and metabolic syndrome strongly associated with an increased risk of mortality (23–25).

The control of childhood overweight and obesity, therefore, has become an emerging problem worldwide and represents a major challenge for public health (26). Intervention at an early age is essential to modify behaviors

and habits that favor the development of overweight and obesity, and consequently noncommunicable, but preventable, chronic diseases. It is relevant, therefore, to know the situation of excess malnutrition in Argentine children and adolescents, as well as its evolution since the beginning of the global obesity epidemic. Limited availability of national-level information that should integrate the dietary and nutritional information of the population is not well-connected with the dispersion and diversity of research studies carried out with variable techniques and methods. This lack of connection makes it difficult to interpret the global effect of the nutritional transition on child growth.

Based on the above, this paper proposes a narrative review of the literature with the aim of describing the

magnitude and evolution of overweight and obesity in children and adolescents in the last 20 years, as a consequence of the nutritional transition and its regional particularities. We present the following article in accordance with the Narrative Review reporting checklist (available at <https://jphe.amegroups.com/article/view/10.21037/jphe-22-36/rc>).

Materials and methods

A narrative review of the literature on the evidence of overweight and obesity in Argentine children and adolescents and its evolution in the last 20 years was carried out in the databases PubMed, Scielo, Lilacs and Scholar. The search was performed between February and May 2022, using different combinations of the search terms overweight, obesity, Argentina, childhood, adolescence, prevalence and nutritional transition. *Table 1* shows the search terms and their combinations. The search was performed by the authors of the review and was limited to papers published between 2000 and 2021. *Table 2* summarizes the search strategy.

Thirty articles were selected, of which 26 correspond to cross-sectional studies and 4 to cohort studies. Additionally, the national surveys 2nd National Nutrition and Health Survey (ENNyS) [2019] (20) and Global School Health Survey (EMSE) (2007, 2012 and 2018) (27-29) were consulted.

The 2nd ENNyS is a national survey that provides

Table 1 Search terms used

("overweight" [MeSH]) AND ("children" [MeSH])
("obesity" [MeSH]) AND ("children" [MeSH])
("prevalence" [MeSH]) AND ("obesity" [MeSH])
("prevalence" [MeSH]) AND ("overweight" [MeSH])
("nutritional transition") AND ("Argentina" [MeSH])
("nutritional transition") AND ("obesity" [MeSH])
("nutritional transition") AND ("overweight" [MeSH])
("nutritional assessment" [MeSH]) AND ("children" [MeSH])

Table 2 Search strategy summary

Items	Specification
Date of search	1 February–30 May 2022
Databases and other sources searched	PubMed, Scielo, Lilacs, Scholar
Search terms used	Overweight, obesity, Argentina, childhood, adolescence, prevalence, nutritional transition
Timeframe	2000–2021
Inclusion and exclusion criteria	Inclusion: refereed articles published between January 2000 and December 2021, in Spanish and English using internationally accepted classification criteria for overweight and obesity, with prevalence of overweight and obesity, aged 2 to 18 years Exclusion: (I) studies that did not provide information on overweight and obesity, (II) studies in languages other than English or Spanish, and (III) studies that did not provide information on how the sample was obtained
Selection process	The authors of the study made the selection
Any additional considerations, if applicable	National health and nutrition surveys and programs in Argentina were consulted Some articles were identified by reviewing the reference lists of relevant publications

Table 3 Characteristics of studies included

Characteristics	Studies	Children
Total	30	155,429
Study		
Cross-sectional	26	114,982
Cohort	4	40,447
Sample source		
School-based		
Public	23	96,318
Public and private	4	57,154
Population-based		
Household	2	668
Pediatric practice	1	1,289
Period		
2000–2011	12	83,059
2012–2021	18	72,370
Region		
All regions	1	1,289
Four region	1	15,011
NOA	8	90,382
NEA	3	3,499
Center	8	24,755
Cuyo	2	4,070
Patagonia	7	16,423

Source: own elaboration. NOA, northwest Argentina; NEA, northeast Argentina.

information on aspects related to numerous dimensions, including dietary habits, food intake, eating in school settings, and provides information on anthropometric indices. It is a representative survey of residents in localities of 5,000 inhabitants and more, with a probabilistic sample stratified by region and poly-staged in 4 phases of random selection, supervised by the National Ministry of Health and Social Development. The effective sample was 21,358 individuals between 0 and 17 years of age.

The EMSE aims to establish a baseline for the measurement of trends in the prevalence of risk and protective factors in the schooled adolescent population and to provide information for policy planning and evaluation. It is a self-administered survey, using two-stage cluster

sampling, with the participation of public and private schools, with national representativeness. In the first edition [2007], 1,980 students between 13 and 15 years of age from all over the country responded to the survey. The second and third edition (2012 and 2018), had national and provincial representativeness, with a response of 28,368 students in 2012 and 57,095 in 2018. In this last edition, the age range was extended from 13 to 17 years old.

Data analysis

The articles based on a single survey were grouped in two periods: 2000–2011 and 2012–2021; by geographical regions: NOA, NEA, Center, Cuyo and Patagonia; and by age group according to the ages considered in the articles: 2 to 18, 6 to 15 and 10 to 19.

Prevalence, % [95% confidence interval (CI)] of overweight, obesity and excess weight (overweight + obesity) were calculated and analyzed by sex, period, region and age group. The chi-square test was applied to analyze differences in proportions. Differences by age group were made only for two groups (6 to 15 and 10 to 19) corresponding to 12 and 10 studies, respectively, because the rest of the articles (9) included too wide an age range. Percentage differences were calculated in the cohort studies.

Results

Selected studies and characteristics

Table 3 shows the characteristics of the studies included in the review of the prevalence of overweight and obesity in Argentine children and adolescents between 2000 and 2021. It comprises a total of 155,429 individuals, from 26 cross-sectional studies and 4 cohort studies. Most of the published articles include children and adolescents of school and preschool age, whose data were collected in public schools. Twelve papers correspond to the period 2000–2011 and 18 to the period 2012–2021. One study is national, one is regional and the rest are from particular localities, mostly from the NOA, Central and Patagonia regions.

Table 4 lists the selected studies, according to study design and location, by period, region, age group and prevalence of overweight and obesity. The highest prevalence of overweight corresponded to children between 9 and 12 years of age in the town of Neuquén in the Patagonia region, while the highest percentage of obesity was recorded in children between 8 and 11 years of age in

Table 4 Studies selected according to research design, representation, province, age, overweight and obesity

Study design/period	Scope	First author, year	Province	Children	Age (years)	Overweight (%)	Obesity (%)					
Cross-sectional												
Period 2000–2011	National	Kovalskys, 2003, (30)	All provinces	1,289	10–19	21.4	5.6					
	Regional	Oyhenart, 2008, (31)	Six provinces	15,011	3–18	14.2	4.3					
		NOA	Bejarano, 2005, (32)	Jujuy	21,521	4–10	15.1	4.7				
	27,012				11–16	14.8	4.3					
	NEA	Romaguera, 2008, (33)	Jujuy	369	2–9	19.7	3.2					
				Poletti, 2007, (34)	Corrientes	2,507	10–15	17.1	4.5			
				Padula, 2010, (35)	Chaco	299	6–15	5.8	1.2			
	Center	Oyhenart, 2005, (37)	Buenos Aires	Zonta, 2011, (36)	Misiones	693	6–11	9.8	3.3			
				Cesani, 2010, (38)	Buenos Aires	989	3–14	15.8	7.2			
	Cuyo	Garraza, 2011, (39)	Mendoza	Dahinten, 2011, (40)	Mendoza	2,894	6–13	10.8	3.1			
				Patagonia	Chubut	2,464	6–13	25.6	13.8			
	Patagonia	Padilla, 2011, (41)	Santa Cruz			1,645	6–11	21.4	5.7			
				Period 2012–2021	NOA	Gotthelf, 2012, (42)	Salta	395	16–20	15.4	3.5	
	Meyer, 2013, (43)	Jujuy	3,095					5–6.9	15.2	6.3		
		Jujuy	4,130					11–12.9	21.6	8.8		
	Center	Martínez, 2018, (44)	Jujuy		232	12–17	12.8	3.3				
					Cordero, 2018, (45)	Tucumán	666	8–11.9	23.0	27.2		
							Cordero, 2019, (46)	Tucumán	1,948	8–11.9	12.3	18.2
					Center	Oyhenart, 2018, (47)	Buenos Aires	7,873	4–12	21.1	11.4	
Lázaro Cuesta, 2018, (48)								Buenos Aires	387	6–8	23.0	18.4
								Buenos Aires	909	9–14	25.2	18.5
Patagonia	Rodríguez Lopez, 2019, (49)	Córdoba	614		11–18	15.5	6.4					
			Oyhenart, 2021, (50)		Buenos Aires	3,696	3–14	24.6	18.2			
			Quintero, 2021, (51)		Buenos Aires	2,268	6–12	24.3	20.6			
			Patagonia		Berghtein, 2014, (52)	Tierra del Fuego	110	4	27.3	18.2		
							Ponce, 2014, (53)	Chubut	402	12–16	25.6	14.2
							Catalani, 2016, (54)	La Pampa	711	13	26.4	14.1
Patagonia	Santander, 2019, (55)	Neuquén	955	9–12.9	29.4	15.3						
			Neuquén	3,532	13–18.9	23.7	12.0					

Table 4 (continued)

Table 4 (continued)

Study design/period	Scope	First author, year	Province	Children	Age (years)	Overweight (%)	Obesity (%)
Cohort	NOA	Bustamante, 2021, (56)	Jujuy	1996=20,224	4–7	15.1	5.0
				2015=10,790		18.1	10.7
	Center	Guimarey, 2014, (57)	Buenos Aires	1969=1,772	4–12	14.5	3.8
				2005=1,059		17.0	6.8
	Patagonia	Navazo, 2018, (58)	Chubut	2001=2,040	6–11	27.2	11.2
				2016=1,696		26.9	23.1
		Orden, 2021, (59)	La Pampa	1990=1,314	6 and 12	13.1	1.8
				2007=935		17.4	6.8
		2016=1,366		19.7	12.4		

Source: own elaboration. NOA, northwest Argentina; NEA, northeast Argentina.

Table 5 Prevalence of overweight and obesity, 95% CI according to sex, period, region and age group of cross-sectional studies

Groups	Subgroups	Studies	Children	Prevalence, % (95% CI)	
				Overweight	Obesity
Total		26	114,982	17.9 (17.7, 18.1)	8.6 (8.5, 8.7)
Sex	Boys	25	53,752	17.6 (16.8, 18.3)	9.7 (9.5, 9.9)
	Girls	25	54,446	18.3 (17.5, 19.0)	8.1 (7.5, 8.6)
Period	Period 1	12	83,059	15.6 (15.3, 15.8)	4.9 (4.8, 5.1)
	Period 2	14	31,923	20.7 (20.5, 20.9)	13.1 (12.9, 13.2)
Region	NOA	7	59,368	14.9 (14.7, 15.1)	7.1 (7.0, 7.2)
	NEA	4	3,499	12.6 (12.3, 12.8)	2.9 (2.8, 3.0)
	Cuyo	3	7,213	11.8 (11.2, 12.4)	4.4 (4.0, 4.8)
	Center	7	21,926	19.4 (19.0, 19.7)	11.3 (11.2, 11.4)
	Patagonia	5	9,819	24.8 (24.6, 25.0)	11.8 (11.6, 11.9)
Age group (years)	2–18	9	57,854	18.2 (17.8, 18.5)	8.7 (8.5, 8.9)
	6–15	12	16,304	18.4 (17.8, 19.0)	11.4 (10.9, 11.9)
	10–19	10	40,824	19.4 (19.0, 19.7)	5.8 (5.6, 6.0)

Source: own elaboration. CI, confidence interval; NOA, northwest Argentina; NEA, northeast Argentina.

Tucumán, NOA region. In both cases, these prevalence were observed in the period 2012–2021.

Trend in the prevalence of overweight, obesity and overweight in Argentine children and adolescents according to cross-sectional studies

Table 5 shows the prevalence, % (95% CI) of overweight

and obesity in children aged 2 to 18 years in Argentina between 2000 and 2021. The total sample reaches 114,982 children and adolescents. The prevalence of overweight was 17.9% and that of obesity was 8.6%. Figure 1 shows the prevalence of excess weight (overweight + obesity) % (95% CI) calculated for the total cross-sectional studies, by sex, period, region and age group.

Table 6 shows the differences between sex, period, region

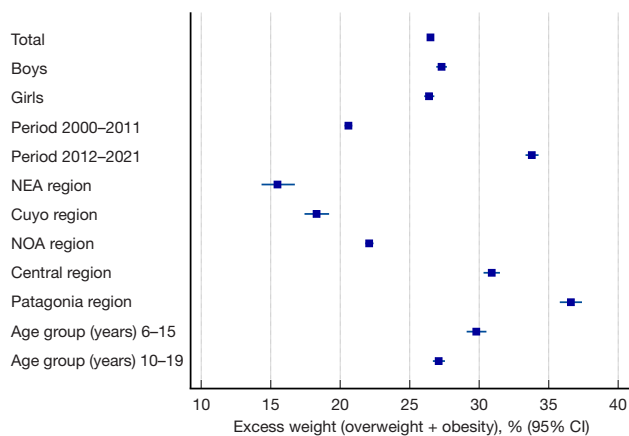


Figure 1 Prevalence of excess weight in total, and by sex, period, region and age group. Source: own elaboration. CI, confidence interval; NOA, northwest Argentina; NEA, northeast Argentina.

and age groups. Females had higher values of overweight and males of obesity and overweight ($P=0.0027$, $P<0.0001$ and $P=0.0008$ respectively). Regarding the comparison between periods both overweight and obesity and excess weight were higher in the period 2012–2021 ($P<0.0001$), with increases of 5.1% in overweight, 8.2% in obesity and 13.2% in excess weight. Comparison between regions yielded significant differences ($P<0.0001$), with the highest prevalence of excess malnutrition in Patagonia. The group aged 6 to 15 years resulted with the highest prevalence of obesity and excess weight ($P<0.0001$) and the group aged 10 to 19 years with the highest overweight ($P=0.0067$).

The socioeconomic condition of the households was analyzed in five articles, of which only one study, carried out in the province of Buenos Aires (Central region), reported significant differences. In this study, a greater probability of overweight was observed in children from households with unfavorable socio-environmental conditions and of obesity in favorable conditions (38).

In a study conducted in three cities (La Plata and Brandsen—Central region and General Alvear—Cuyo region), the authors reported differences in overweight and obesity associated with different urban complexity grouped into: large cities (La Plata), intermediate complexity (Brandsen) and lower complexity (General Alvear). Significant difference among these urban complexity groups was observed. Higher prevalence of overweight and obesity were observed in large cities and intermediate complexity, with lower prevalence of overweight and obesity in lower complexity. According to the authors, these differences are

related to different stages of nutritional transition (47).

The association with geographic altitude was analyzed in a study in the province of Jujuy (NOA region), finding a higher prevalence of overweight and obesity in children living at low altitudes compared to those living at high altitudes (43).

The consumption of fast food was analyzed in two studies, but only the study conducted in Santa Cruz (Patagonia region) reported that overweight and obesity conditions were associated with the frequency of high consumption of fast food and soft drinks (41). In the other study carried out in Corrientes (NEA region), no association was found with the consumption of high-fat foods.

The analysis of the association with sedentary lifestyle, areas of residence (urban or rural) and schools (public or private) did not show significant differences in any of the studies.

Evolution of overweight and obesity between 2000 and 2021

Table 7 shows the prevalence of overweight, obesity and overweight in cohort studies. Cohort studies were conducted in four cities in Argentina: La Plata (Buenos Aires), San Salvador de Jujuy (Jujuy), Santa Rosa (La Pampa) and Puerto Madryn (Chubut). In the four articles, increases have been observed since the last years of the last century. Overweight variations ranged from 0.5% to 4.3% increase and obesity variations ranged from 3% to 11.8%. The highest increase in overweight corresponded to Santa Rosa (4.3%) from 1990 to 2007 and that of obesity to Puerto Madryn (11.8%) from 2001 to 2016.

In the regions where it was possible to compare the two periods analyzed in the present study (NOA, Center, and Patagonia), there were increases in overweight ranging from 7.1% to 14.4% in the NOA and Central region, respectively, and 10.7% in the Patagonia region.

Increases were also found in children over 10 years old when comparing the two national health and nutrition surveys (2007 and 2019) and the three Global School Health Surveys (2007, 2012, and 2018).

Discussion

Overweight and obesity in Argentine children and adolescents between 2000 and 2021

This review presents prevalence of overweight and obesity in Argentine children and adolescents and their evolution in the last 20 years. The results show high prevalence of overweight and obesity with an increasing trend between 2000–2011 and

Table 6 Differences in the prevalence of overweight, obesity and excess weight by sex, period, region, and age group according to cross-sectional studies

Group	Prevalence (%)		
	Overweight	Obesity	Excess weight
Sex			
Boys	17.6	9.7	27.3
Girls	18.3	8.1	26.4
χ^2	9.033	85.483	11.130
P value	0.0027	<0.0001	0.0008
Period			
2000–2011	15.6	4.9	20.6
2012–2021	20.7	13.1	33.8
χ^2	484.836	2,566.475	2,482.060
P value	<0.0001	<0.0001	<0.0001
Region			
NEA	12.6	2.9	15.5
Cuyo	11.8	4.4	16.2
NOA	14.9	7.1	22.0
Center	19.4	11.3	30.7
Patagonia	24.8	11.7	36.5
χ^2	1,018.123	599.996	2,109.983
P value	<0.0001	<0.0001	<0.0001
Age group (years)			
6–15	18.4	11.4	29.8
10–19	19.4	5.8	27.1
χ^2	7.353	520.790	41.022
P value	0.0067	<0.0001	<0.0001

Source: own elaboration. NOA, northwest Argentina; NEA, northeast Argentina.

2012–2021. Overweight values reported in cross-sectional studies were lower than those of the last National Nutrition and Health Survey and the World School Health Survey, while the percentage of obesity was higher than that of this survey. In addition, differences in prevalence of overweight and obesity for different age ranges was observed, with younger children generally having higher prevalence of overweight and obesity. In Tierra del Fuego, for example, one in four 4-year-old children was overweight, and one in five were obese (52). The prevalence of overweight and obesity differed between regions, with higher values in Patagonia and Center and lower values in NOA, NEA and Cuyo. In

the comparison between periods, differences were observed in the combined prevalence of overweight and obesity that increased from 20.6% in the first period to 33.8% in the second. In contrast, the comparison in prevalence of overweight and obesity with the values reported by Kovalsky *et al.* (30) show negative differences in the NOA, NEA, Central and Patagonia regions for overweight and positive differences for obesity in all regions. These differences could be interpreted as a trend toward a stabilization of overweight and an increase in obesity in part of Argentina in the last 20 years. In a possible correlation with this trend, the results of the last nutrition and health survey showed very similar

Table 7 Percentage differences in overweight, obesity and excess weight according to cohort studies

First author, year	Region	Cohorts	Prevalence (%)			Difference (%)		
			Overweight	Obesity	Excess weight	Overweight	Obesity	Excess weight
Bustamante, 2021	NOA	1996–2001	15.1	5.0	20.1	–	–	–
		2010–2015	18.1	10.7	28.8	3.0	5.7	8.7
Orden, 2021	Patagonia	1990	13.1	1.8	14.9	–	–	–
		2005–2007	17.4	6.8	24.2	4.3	5.0	9.3
		2015–2016	19.7	12.4	32.1	2.3	5.6	7.9
Guimarey, 2014	Center	1969–1970	14.5	3.8	18.3	–	–	–
		2004–2005	17.0	6.8	23.8	2.5	3.0	5.5
Navazo, 2018	Patagonia	2001–2006	26.3	11.3	37.6	–	–	–
		2014–2016	26.8	23.1	49.9	0.5	11.8	12.3

Source: own elaboration. NOA, northwest Argentina.

prevalence of both states of malnutrition at the national level, slightly above 20% (20.7% and 20.4% overweight and obesity, respectively). Our study also recorded prevalence of overweight above 20% in the period 2011–2021 in the provinces of Buenos Aires, La Pampa, Neuquén, Chubut and Tierra del Fuego, although, in these cases, obesity was always lower than overweight. Similar results to those observed here were found in previous reviews conducted in children and adolescents in Latin America and the Caribbean between 2008 and 2013, with differences of 18.9% *vs.* 36.9% in children and 16.6% *vs.* 35.8% in adolescents. Many aspects are involved in the growing increase of overweight and obesity, although changes in eating habits and lifestyle are among the main causes. (60). More recently, overweight prevalence ranging from 23.3% *vs.* 39.9% in children and 32.3% *vs.* 35.3% in adolescents were observed in Spain during two periods (1999–2010; 2011–2021). The increase was observed especially in children from 2 to 6 years of age (61). This trend was also reported in South American countries, such as Brazil and Uruguay. In Brazil, three decades were compared (1990, 2000, 2010), finding increases in obesity from 6.5% in 1990 to 7.9% in 2000 and 12% in 2010, which were higher in more developed regions (62). Work carried out in Uruguay during the last 20 years, on the other hand, found prevalence of overweight and obesity of 15.0% and 8.3% respectively in the period 2000–2009 and 25.2% and 9.7% respectively for the period 2010–2018 (63). Although this trend has been observed in different countries, others reported a stabilization of overweight and an increase in the prevalence of overweight and obesity (64–67) or a

stabilization of both conditions (68). In any case, although the prevalence of overweight and obesity seems to be stabilizing in some countries, it is still high, which makes it an important public health problem.

This study finds that, in general, the percentages of overweight were higher than those of obesity, although in more recent articles this relationship seems to be reversed. Two surveys conducted in Tucumán in 2018 and 2019 in the NOA region found prevalence of obesity that exceed those of overweight (45,46). The NOA and NEA regions, which occupy a quarter of the national territory, were historically, and continue to be, the poorest in Argentina (69), with the highest percentage of rural population, lowest levels of total and per capita production, highest illiteracy, and population with unsatisfied basic needs (18). For this reason and in order to design public policies that could modify this asymmetrical situation with respect to the rest of the country, the Norte Grande Argentino was created in 1999 to integrate NOA and NEA (69). The high prevalence of overweight and obesity found in some localities of the Norte Grande would support the idea that unfavorable socioeconomic and environmental conditions may influence its development (45,46). Thus, in previous studies carried out in this macro-region, overweight was already evident as an emerging health problem, associated with indicators of indigence and unsatisfied basic needs (70,71). Likewise, the low prevalence of overweight in Puna and Quebrada de Humahuaca (Jujuy), high altitude Andean communities far from urban centers, could be interpreted in the context of the early stages of transition, as described by Romaguera

et al. (33). Similarly, in the NEA region, specifically in Aristóbulo del Valle (Misiones), very low prevalence of overweight and obesity were reported. It is evident, therefore, that within the Norte Grande macro-region there are marked asymmetries between urban centers and remote populations, especially those located in the Andean area and with indigenous ancestry that are reflected in the differences in the states of excess malnutrition. In the extreme south of the country, the Argentine Patagonia showed high prevalence of overweight (18.9% to 29.4%) that were always higher than obesity (5% to 18.2%). In this region, this would be related to more favorable environmental conditions that determine obesogenic environments (40,41,52-55). Conversely, in the Central region, particularly in the province of Buenos Aires that is the most populated and has the highest population density, has a diversity of urban and peri-urban environments with different socioeconomic characteristics, and greater access to goods and services, high prevalence of overweight and obesity were reported. These higher prevalence were associated with socio-environmental conditions of residence, especially in the most recent studies (38,47,48,50,51).

Nutritional transition and overweight and obesity trends in Argentine children and adolescents

The prevalence of overweight and obesity, as well as their evolution over time in the last 20 years, are associated with changes in dietary patterns and lifestyles that Argentina has been experiencing at least since the 1960s, mainly attributable to issues of food accessibility described in several studies (7,72). In the period between 1961 and 2011, for example, Silberman *et al.* (73) analyzed dietary patterns based on information from the Food and Agriculture Organization of the United Nations (FAO) food balance sheets and assessed the trend of overweight and obesity and concluded that changes in dietary patterns were in line with wage changes, coincided with the economic and political crises of the period, and were related to the increase in overweight and obesity. Another analysis based on information on apparent consumption or availability for home consumption between 1996 and 2013 showed a decrease in the consumption of beef, milk, fruits, and vegetables, a decrease in traditional foods, and an increase in industrialized foods (74). In line with these results, data collected in the Second National Nutrition and Health Survey show a trend toward consumption of less healthy foods that is likely to affect the most vulnerable groups

to a greater extent. According to Aguirre [2010] (75), the consumption of carbohydrates, fatty meats and sugars provides volume, satiety and flavor at a low cost with nutritional consequences, such as chronic malnutrition and obesity. In addition, it was also observed that the dietary pattern of adults is healthier than that of children and adolescents who are more prone to targeted food advertising and obesogenic school environments (20).

More recently, Neri *et al.* (76) evaluated the association between ultra-processed foods and dietary nutritional profile linked to obesity in children and adolescents in eight countries, including Argentina, using nationally representative data collected between 2004 and 2014. In the case of Argentina, the source used was the First National Nutrition and Health Survey. The percentage of ultra-processed foods in Argentina within all of Latin America was 27%, a percentage that was higher than in Colombia and Brazil but below the values for Mexico, Chile, Australia, the United States and the United Kingdom. In turn, ultra-processed foods were associated with a higher energy density, free sugars and a decrease in fiber, which would suggest a potential determinant of obesity in children and adolescents (76).

With respect to regional asymmetries, the latest CESNI report of 2021 on food in Argentina points out that the trend of dietary changes is similar overall, but with different magnitudes depending on the provinces and with marked differences in relation to household income. This report also states that food consumption has changed in the last two decades, with a decrease in the use of recommended foods and an increase in those that are not recommended due to their effects on health, such as ultra-processed foods, that add to the consumption of saturated fats, sugars, sodium, etc. (77). In Argentina, the diversity of environments, the diversity of regional, provincial and local cultures, and other sociodemographic factors may differentiate stages or profiles of this transition. Consequently, as observed in this review, will result in differences in the prevalence of overweight and obesity. In this sense, Tumas *et al.* (78) established three nutritional profiles, which group different provinces and are defined as (I) socio-nutritional delay, (II) incipient socio-nutritional improvement, and (III) double burden of malnutrition. These nutritional profiles are also approximately assimilated with a north-south gradient, thus coinciding with the results of previous studies (30,31) and those of this review.

In summary, the prevalence of overweight and obesity by region indicate a trend similar to that observed in previous studies, with the highest percentages in Patagonia and the

lowest in NEA, according to the following order: Patagonia > Center > NOA > Cuyo > NEA. Overweight and obesity in Argentine children and adolescents has highly prevalence and have been increasing in the last 20 years, representing a risk factor for other cardiometabolic pathologies that will require the implementation and/or rectification of new control and prevention strategies and action policies to reverse this growing trend.

Implications and future work

The consequences of the nutritional transition in Argentine children and adolescents allow us to think of generations of adults with excess weight associated with different risk factors for cardiometabolic diseases. It is necessary to deepen our knowledge of the effects of the nutritional transition and its different stages. It would be useful and valuable if future local and provincial studies were designed following the same diagnostic criteria and also collected data on diet and physical activity, as well as an exhaustive analysis of the obesogenic environments of children and adolescents. This, together with food education and nutritional epidemiological control of the population, will be the future challenges that will allow the design or rectification of differential public policies based upon regions and their cultural characteristics.

Limitations of the study

The present study has some limitations. Most of the works analyzed do not explore the factors that influence the development of obesity and overweight, and they use different diagnostic criteria for overweight and obesity. Also, the age range is highly variable, which makes it difficult to compare prevalence without context.

Conclusions

This review provides information on the effect of the nutritional transition in Argentine children and adolescents in relation to the trend of overweight and obesity in the last 20 years. More than eight out of every 100 children were obese in the period analyzed and more than thirteen in the last decade. Overweight was higher in women and obesity in men. The effects of the nutritional transition in Argentina are heterogeneous between and within provinces, with overweight and obesity increasing in all regions of the country, with higher prevalence in the southern provinces

of Argentina.

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References

1. Popkin BM. The nutrition transition in low-income

- countries: an emerging crisis. *Nutr Rev* 1994;52:285-98.
2. Laurentin A, Schnell M, Tovar J, et al. Nutrition transition. Amidst malnutrition and obesity. *Anales venezolanos de nutrición*. 2007;20(1). Available online: <https://www.analesdenutricion.org.ve/ediciones/2007/1/art-8/>
 3. López de Blanco M, Carmona A. Food and nutrition transition: A challenge in the XXI century. *Anales Venezolanos de Nutrición* 2005;18:90-104.
 4. Lourenço AE, Santos RV, Orellana JD, et al. Nutrition transition in Amazonia: obesity and socioeconomic change in the Suruí Indians from Brazil. *Am J Hum Biol* 2008;20:564-71.
 5. Arps S. Socioeconomic status and body size among women in Honduran Miskito communities. *Ann Hum Biol* 2011;38:508-19.
 6. Barría RM, Amigo H. Nutrition transition: a review of Latin American profile. *Arch Latinoam Nutr* 2006;56:3-11. Erratum in: *Arch Latinoam Nutr*. 2006 Jun;56(2):192 following 192.
 7. Lomaglio D. Nutrition transition and the impact on growth and body composition in northwestern Argentina (NOA). *Nutricion Clinica y Dietetica Hospitalaria* 2012;32:30-5.
 8. World Health Organization. 2016. Report of the Commission on Ending Childhood Obesity. 2016. Available online: <https://apps.who.int/>
 9. World Health Organization. Obesity and overweight. 2021 Available online: <https://www.who.int/es/news-room/fact-sheets/detail/obesity-and-overweight>
 10. FAO, FIDA, OMS, PMA y UNICEF. El estado de la seguridad alimentaria y la nutrición en el mundo. 2019. Available online: <https://www.fao.org/>
 11. Fisberg M, Kovalskys I, Gómez G, et al. Latin American Study of Nutrition and Health (ELANS): rationale and study design. *BMC Public Health* 2016;16:93.
 12. NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128.9 million children, adolescents, and adults. *Lancet* 2017;390:2627-42.
 13. Lobstein T. Prevalence and Trends Across The World. *EBook infantil de ECOG Adolesc Obes*. 2015. Available online: <https://ebook.ecog-obesity.eu/>
 14. Malo-Serrano M, Castillo MN, Pajita DD. Obesity in the world. *An Fac Med* 2017;78:173-8.
 15. Corvalán C, Garmendia ML, Jones-Smith J, et al. Nutrition status of children in Latin America. *Obes Rev* 2017;18 Suppl 2:7-18.
 16. National Institute of Statistics and Census. Available online: <https://www.indec.gov.ar/indec/>
 17. Vaca J, Cao H. Argentina, un país con asimetrías territoriales: Las políticas públicas para alcanzar un país multirregional. *Más Poder Local* 2013;(16):18-24.
 18. Cámara Argentina de Comercio y Servicios. Estudio sobre asimetrías regionales de Argentina. Report No. 33. 2019:1-18. Available online: <https://www.cac.com.ar/>
 19. Zícari J. Crisis Económicas Argentinas. De Mitre a Macri. Ediciones Continente, 2020:288.
 20. Second National Nutrition and Health survey (ENNyS). Ministry of Health and social development, Argentina. 2019. Available online: <https://fagran.org.ar/wp-content/uploads/2020/01/Encuesta-nacional-de-nutricion-y-salud.pdf/>
 21. Durán P. Transición epidemiológica nutricional o el “efecto mariposa”. *Archivos Argentinos de Pediatría* 2005;103:195-7.
 22. Zapata ME, Soruco AI, Carmuega E. Malnutrition in all its forms and socio-economic indicators in Argentina. *Public Health Nutr* 2020;23:s13-20.
 23. Calle EE, Thun MJ, Petrelli JM, et al. Body-mass index and mortality in a prospective cohort of U.S. adults. *N Engl J Med* 1999;341:1097-105.
 24. Figueroa Sobrero A, Evangelista P, Kovalskys I, et al. Cardio-metabolic risk factors in Argentine children. A comparative study. *Diabetes Metab Syndr* 2016;10:S103-9.
 25. Martín Castellanos Á, Martín Castellanos P, Martín E, et al. Abdominal obesity and myocardial infarction risk - We demonstrate the anthropometric and mathematical reasons that justify the association bias of the waist-to-hip ratio. *Nutr Hosp* 2021;38:502-10.
 26. World Health Organization. 2020. Noncommunicable diseases: Childhood overweight and obesity. Available online: <https://www.who.int/news-room/questions-and-answers/item/noncommunicable-diseases-childhood-overweight-and-obesity/>
 27. Global School Health Survey (EMSE). Ministry of Health, Argentina. 2007. Available online: <http://bancos.salud.gov.ar/>
 28. Second Global School Health Survey (EMSE). Ministry of Health, Argentina. 2012. Available online: <http://bancos.salud.gov.ar/>
 29. Global School Health Survey (EMSE). Ministry of Health and Social Development, Argentina. 2018. Available online: <http://bancos.salud.gov.ar/>
 30. Kovalskys I, Bay L, Rausch Herscovici C, et al. Prevalencia

- de obesidad en una población de 10 a 19 años en la consulta pediátrica. *Arch Argent Pediatr* 2003;101:441-7.
31. Oyhenart E, Dahinten S, Alba J, et al. Estado nutricional infantojuvenil en seis provincias de Argentina: Variación regional. *Rev Argent Antropol Biol* 2008;10:1-62.
 32. Bejarano I, Dipierri J, Alfaro E, et al. Evolución de la prevalencia de sobrepeso, obesidad y desnutrición en escolares de San Salvador de Jujuy. *Arch Argent Pediatr* 2005;103:101-9.
 33. Romaguera D, Samman N, Farfán N, et al. Nutritional status of the Andean population of Puna and Quebrada of Humahuaca, Jujuy, Argentina. *Public Health Nutr* 2008;11:606-15.
 34. Poletti O, Barrios L. Obesidad e hipertensión arterial en escolares de la ciudad de Corrientes, Argentina. *Arch Argent Pediatr* 2007;105:293-8.
 35. Padula G, Salceda S. Assessment of Estimated Prevalence of Overweight and Obesity in Children and Adolescents in the Chaco Region, with Two International. *Folia Histórica Nordeste* 2010;18:83-95.
 36. Zonta M, Garraza M, Castro L, et al. Poverty, nutritional status and child enteroparasitoses: a cross-sectional study in Aristóbulo del Valle, Misiones, Argentina. *Nutr Clin Dietética Hosp* 2011;31:48-57.
 37. Oyhenart E, Orden A, Forte L, et al. Transición nutricional en tres ciudades con diferente complejidad urbano ambiental. *Rev Argent Antropol Biol* 2005;7:35-46.
 38. Cesani MF, Luis MA, Torres MF, et al. Overweight and obesity in schoolchildren from Brandsen and its relationship with socio-environmental characteristics of residence. *Arch Argent Pediatr* 2010;108:294-302.
 39. Garraza M, Sugrañes N, Navone G, et al. Overweight and obesity in relation to socio environmental conditions of children residents in San Rafael, Mendoza. *Rev Argent Antropol Biol* 2011;13:19-28.
 40. Dahinten SL, Castro LE, Zavatti JR, et al. Growth of school children in different urban environments in Argentina. *Ann Hum Biol* 2011;38:219-27.
 41. Padilla IS. Prevalence of overweight/obesity and factors associated with the preventive-predictive value in schoolchildren aged 6 to 11 in Río Gallegos, Santa Cruz, Argentina. *Salud Colectiva* 2011;7:377-88.
 42. Gotthelf SJ, Fonseca MSD. Hipertensión arterial y su asociación con variables antropométricas en adolescentes escolarizados de la ciudad de Salta (Argentina). *Rev Fed Arg Cardiol* 2012;41:96-102.
 43. Meyer E, Carrillo R, Román EM, et al. Prevalence of overweight and obesity in students from different altitudinal zones of Jujuy according to three international references (IOTF, CDC and WHO). *Arch Argent Pediatr* 2013;111:516-22.
 44. Martínez J, Dipierri J, Bejarano I, et al. Body fat variation by anthropometry and bioimpedance in jujenean school children. *Rev Argent Antropol Biol* 2018;20:1-8.
 45. Cordero ML, Cesani MF. Overweight, obesity and perceived health in contexts of poverty in Tucumán, Argentina. *Salud Colect* 2018;14:563-78.
 46. Cordero ML, Cesani MF. Nutritional transition in schoolchildren from Tucumán, Argentina: A cross-sectional analysis of nutritional status and body composition. *Am J Hum Biol* 2019;31:e23257.
 47. Oyhenart EE, Torres MF, Luis MA, et al. Comparative study of the nutritional status of children living in four counties of the province of Buenos Aires (Argentina), in the context of nutrition transition. *Salud Colect* 2018;14:597-606.
 48. Lázaro Cuesta L, Rearte A, Rodríguez S, et al. Anthropometric and biochemical assessment of nutritional status and dietary intake in school children aged 6-14 years, Province of Buenos Aires, Argentina. *Arch Argent Pediatr* 2018;116:e34-46.
 49. Rodríguez Lopez S, Bajo J. Body proportions, general and abdominal obesity in adolescents from Córdoba, Argentina. *Rev Argent Antropol Biol* 2019;21:1-8.
 50. Oyhenart E, Luis M, Torres M, et al. The productive Peri-Urban areas of the city of La Plata. (Buenos Aires, Argentina). An area conducive to child and youth malnutrition. *Rev Argent Antropol Biol* 2021;23:1-14.
 51. Quintero F, Cesani M, Luis M, et al. Geographical distribution of high blood pressure in its relationship with excess weight in children living in the productive belt of La Plata (Buenos Aires, Argentina). *Rev Argent Antropol Biol* 2021;23:1-15.
 52. Berghtein IR. Obesity and sedentary lifestyles in four-years old children attending two pre-schools in the city of Río Grande, Tierra del Fuego, Argentina. *Arch Argent Pediatr* 2014;112:557-61.
 53. Ponce G, Quezada A, Rodríguez M, et al. Obesity by BMI and central obesity in adolescents from Comodoro Rivadavia, Patagonia Argentina. *Rev ALAD* 2014;4:14-21.
 54. Catalani F, Fraire J, Pérez N, et al. Underweight, overweight and obesity prevalence among adolescent school children in the Province of La Pampa, Argentina. *Arch Argent Pediatr* 2016;114:154-8.
 55. Santander MD, García GC, Secchi JD, et al. Physical fitness standards in students from province of Neuquén,

- Argentina. Physical Fitness Assessment Plan study. *Arch Argent Pediatr* 2019;117:e568-75.
56. Bustamante MJ, Alfaro EL, Dipierri JE, et al. Excess weight and thinness over two decades (1996-2015) and spatial distribution in children from Jujuy, Argentina. *BMC Public Health* 2021;21:196.
 57. Guimarey LM, Castro LE, Torres MF, et al. Secular changes in body size and body composition in schoolchildren from La Plata City (Argentina). *Anthropol Anz* 2014;71:287-301.
 58. Navazo B, Dahinten SL, Oyhenart EE. Malnutrition and structural poverty. Comparison of two schoolchildren cohorts from Puerto Madryn, Argentina. *Rev Salud Publica (Bogota)* 2018;20:60-6.
 59. Orden AB, Apezteguia MC, Mayer MA. Acceleration and stabilization: Disparity in obesity trend in schoolchildren from La Pampa, (Argentina) between 1990 and 2016. *Revista Argentina de Antropología Biológica* 2021;23:1-10.
 60. Rivera JÁ, de Cossío TG, Pedraza LS, et al. Childhood and adolescent overweight and obesity in Latin America: a systematic review. *Lancet Diabetes Endocrinol* 2014;2:321-32.
 61. Bravo-Saquicela DM, Sabag A, Rezende LFM, et al. Has the Prevalence of Childhood Obesity in Spain Plateaued? A Systematic Review and Meta-Analysis. *Int J Environ Res Public Health* 2022;19:5240.
 62. Ferreira CM, Reis NDD, Castro AO, et al. Prevalence of childhood obesity in Brazil: systematic review and meta-analysis. *J Pediatr (Rio J)* 2021;97:490-9.
 63. Delfino M, Rauhut B, Machado K. Prevalence of obesity and overweight in uruguayan children during the last 20 years: review of the national bibliography. *Arch Pediatr Urug* 2020;91:128-38.
 64. Salanave B, Peneau S, Rolland-Cachera MF, et al. Stabilization of overweight prevalence in French children between 2000 and 2007. *Int J Pediatr Obes* 2009;4:66-72.
 65. Stamatakis E, Zaninotto P, Falaschetti E, et al. Time trends in childhood and adolescent obesity in England from 1995 to 2007 and projections of prevalence to 2015. *J Epidemiol Community Health* 2010;64:167-74.
 66. Olds T, Maher C, Zumin S, et al. Evidence that the prevalence of childhood overweight is plateauing: data from nine countries. *Int J Pediatr Obes* 2011;6:342-60.
 67. de Wilde JA, Verkerk PH, Middelkoop BJ. Declining and stabilising trends in prevalence of overweight and obesity in Dutch, Turkish, Moroccan and South Asian children 3-16 years of age between 1999 and 2011 in the Netherlands. *Arch Dis Child* 2014;99:46-51.
 68. Olmedillas H, Vicente-Rodríguez G. Stabilization in the Prevalence of Overweight and Obesity in Spanish Children and Young Adolescents. *Rev Esp Cardiol (Engl Ed)* 2017;70:629-30.
 69. Bolsi A, Paolasso P. Geografía de la pobreza en el norte grande argentino. 1st edition. Tucumán: El Autor, 2009:296.
 70. Bolzán A. Evaluación nutricional antropométrica de la niñez pobre del norte argentino: Proyecto encuNa. *Arch Argent pediatr* 2005;103:545-55.
 71. Mercer R, Bolzán A, Ruiz V, et al. Encuesta de nutrición de la niñez del norte argentino: Proyecto encuNa Parte II: El estado nutricional y el contexto familiar y social. *Arch Argent Pediatría* 2005;103:556-65.
 72. Duran P, Caballero B, de Onis M. The association between stunting and overweight in Latin American and Caribbean preschool children. *Food Nutr Bull* 2006;27:300-5.
 73. Silberman M, Moreno-Altamirano L, Hernández-Montoya D, et al. Dietary patterns, overweight and obesity from 1961 to 2011 in the socioeconomic and political context of Argentina. *Int J Food Sci Nutr* 2017;68:104-16.
 74. Zapata ME, Roviroso A, Carmuega E. Changes in the food and beverage consumption pattern in Argentina, 1996-2013. *Salud Colect* 2016;12:473-86.
 75. Aguirre P. Ricos flacos y gordos pobres. La alimentación en crisis. Claves para Todos. Buenos Aires: Editorial Capital Intelectual, 2004.
 76. Neri D, Steele EM, Khandpur N, et al. Ultraprocessed food consumption and dietary nutrient profiles associated with obesity: A multicountry study of children and adolescents. *Obes Rev* 2022;23 Suppl 1:e13387.
 77. Roviroso A, Zapata M. La alimentación en Argentina. Una mirada desde distintas aproximaciones. 1st edition. Ciudad autónoma de Buenos Aires: CESNI; 2021. Available online: <https://cesni-biblioteca.org/>
 78. Tumas N, Rodríguez Junyent C, Aballay LR, et al. Nutrition transition profiles and obesity burden in Argentina. *Public Health Nutr* 2019;22:2237-47.

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