Impact of the economic crisis on children's health in Catalonia: a before-after approach

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Abbreviations:
CHIP: Child health and Illness Profile
HRQOL: health-related quality of life
SDQ: Strengths and Difficulties Questionnaire

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Abstract

Objectives: To analyze changes in the family living conditions of children in Catalonia between 2006 and the 2010-2012 period, and to study associations between these changes and health outcomes and healthcare service use in this population.

Design: A before-after analysis of two cross-sectional surveys

Setting: Population younger than 15 years old from Catalonia, Spain

Participants: Representative samples of children in the 2006 Catalan Health Survey (ESCA, baseline, before the crisis, n=2200) and the first 4 waves of ESCA 2010-12 (after start of the crisis, n=1967).

Main outcome measures: Overweight/obesity, health behavior, mental health, health-related quality of life (HRQOL), and use of healthcare services. Logistic regression and multiple linear regression models were used to analyze the influence of changes in family conditions on outcome measures, including interaction terms to describe the potential influence of the study period on the results.

Results: The percentage of unemployed families rose from 9·1% (2006) to 20·6% (2010-12), with inequalities by level of education. Overweight/obesity increased from 18.4% (95% CI 16.5-20.4) to 26.9% (24.6-29.2) in 2010-12, and inequalities related to maternal education and employment status persisted. Eating habits has improved in 2010-12 in disadvantaged families. An improvement in HRQOL was found in the second survey (Beta [B]= 6.07; 4.15 to 7.99), although children whose mothers had a primary education showed poorer HRQOL scores in this survey than in 2006 (B= -4.14; -7.17 to -1.12). In 2010-12, double healthcare coverage was associated with a higher likelihood of health visits.

Conclusions: Inequalities in childhood obesity and quality of life have increased with the economic crisis. Policy measures that fight against these inequalities should be urgently implemented to avoid their negative impact on the health of future generations of Catalans

1) Article focus

- The current economic and financial crisis have worsened children living conditions in Catalonia, Spain comparing 2006 and 2010-12
- Worsening of socioeconomic conditions associated with the crisis would more specifically affect the children of disadvantaged families
- An increase in unhealthy behavior and in inequalities related to obesity and mental health would also be expected.

2) Key messages

- There has been an increase in social inequalities with higher levels of unemployment in families with lower level of education in Catalonia.
- Although some health-related behaviors showed an improvement for the total population, inequalities in childhood obesity and quality of life according to the level of education increased with the economic crisis

3) Strengths and limitations

- The content of the questionnaire was similar in both surveys, data are consistent and proved to be valid and useful to analyze the impact of the crisis on child health
- It is not possible to directly attribute changes found in the present study to the impact of the crisis. Nevertheless, it is clear that children's living conditions have worsened in this 6-year study period, and this change has had impact on their health.
- The sample of the Catalan health interview survey 2010-12 were slightly younger and with higher maternal level of education than the previous sample of 2006. However, all these differences may mask even greater disparities.

Introduction

The current economic and financial crisis has affected the whole of Europe's economy, although the impact in each country depends on the starting point, mechanisms of social protection and social transfers, and the measures governments have adopted to fight the crisis.

A review of the evidence related to the impact of the crisis on the health of young people (15-24y) has found increasing levels of ill health, particularly with regard to sexually transmitted disease and substance abuse, and a general decline in the use of healthcare services.[1] A comprehensive review of the impact on neonatal outcomes has reported inconclusive results regarding low birth weight and neonatal mortality.[2] Some positive aspects have also been described.[3] A decrease in environmental pollution and traffic accidents is expected, and the crisis occurring in the 1990s had a positive impact on health in the Nordic countries.[4] In the current crisis even that effect varies between countries, a recent report from the UK has revealed a significant impact on the eating habits of children from families in poverty.[5] In the US, an association was reported between economic recession measured by unemployment rates and head injuries due to violence against children.[6]

In Spain, the government has significantly cut public health and education budgets, and has reduced aid to families with children in the lower socioeconomic strata. Spain's UNICEF report has analyzed the growth of poverty in children, which is higher than in the remainder of the population.[7] Another recent study emphasizes that the crisis has manifested in a particularly acute form in households with children, and has caused a greater decline and greater social exclusion than in households with no children.[8] However, there is little data comparing children's health before and after the crisis started.

In Catalonia, a northeastern region of Spain, the Catalan Health Survey (Enquesta de Salut de Catalunya, ESCA),[9] has provided the opportunity to analyze the effects of the crisis on the

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health of our children. The objectives of this study were to analyze changes in the family life conditions and socioeconomic status of children (0-14 y) in Catalonia between 2006 and the 2010-2012 period; to study the association of these changes with modifications in health-related behavior, physical and mental health, and health-related quality of life (HRQOL); and to describe the related changes in the pattern of healthcare service use. The main hypothesis was that worsening of socioeconomic conditions associated with the crisis would more specifically affect the children of disadvantaged families. An increase in unhealthy behavior and in inequalities related to obesity and mental health would also be expected. In contrast, no differences would be expected in HRQOL or in the pattern of healthcare service use between years 2006 and 2010-12.

Methods

The study design is a before-after analysis of data from representative samples of children in the 2006 ESCA (baseline, before the crisis) and the first 4 waves of ESCA 2010-12 (after start of the crisis).

Sampling selection and procedures

ESCA 2006 was undertaken from December 2005 to July 2006.[10] The survey consisted of a multistage probability sample representative of the non-institutionalized population, stratified by age, sex, and municipal size for each territorial health government within Catalonia.[11] The sample size of children 14 years of age and younger from ESCA 2006 was established at 2200 individuals. The sample was stratified according to the size of the municipalities, and the final stage consisted in random selection of individuals from the Catalonian population register for each selected municipality. 65% percent of interviews were carried out in the selected individuals, and 22% in the first substitute. Data for children ≤14 years old were obtained from proxy respondents (mainly mothers) by means of a structured interview.

Between the second half of 2010 and the first half of 2012, the fieldwork was performed for the first 4 waves of the continuous ESCA 2010-12.[9] The results are representative of the whole of Catalonia. Sample size was estimated at approximately 2500 interviews twice yearly, of which 1967 were addressed to the population ≤14 years old after the first 4 waves. ESCA 2010-12 was conducted following the same method of administration as the survey in 2006: 68% of proxy respondent interviews for children ≤14 years were carried out in the selected individuals, and 17% in the first substitute. Home interviews were conducted by trained interviewers in both periods.

Measures

Restriction of activities in the previous 12 months (yes/no) and reporting of chronic conditions (no chronic conditions/one/more than one) were collected. Overweight/obesity was based on

the body mass index (BMI) calculated through the parents' report of weight and height, and using specific cut-off points for Spain.[12]

Mental health was assessed using the parents' version of the Strengths and Difficulties Questionnaire (SDQ).[13, 14] The sum of the scores on 4 scales related to negative aspects yields the Total Difficulties Score (TDS-SDQ), with a range of 0 to 40. The higher the TDS-SDQ score, the poorer is the child's mental health. Evaluation of HRQOL used the shortest parent-reported version of the KIDSCREEN (KS) instrument, the KS-10 index.[15, 16] In the present study, the KS-10 was computed in keeping with the version used in the European Eurobarometer study.[17] The modified KS-10 scores were transformed to a scale of 0 to 100: the higher the score, the better the HRQOL.

The Junk food consumption (4 items), Physical activity (6 items), and Risk behavior (5 items) scales came from the parent version of the Child Health and Illness Profile (CHIP).[18, 19] Mean scores on these scales were standardized to a mean of 50 and 1 standard deviation (SD) = 10, according to the ESCA 2006 sample. Higher scores reflect less junk food consumption and risk behavior, and greater physical activity. The number of times per week a child had breakfast at home was collected in a single question with a 4-point Likert scale (recoded as never vs the remaining categories). The mean number of hours a day the child spent viewing TV, computers, etc. was collected as an indicator of sedentary behavior. Physical activity, risk behavior and KS-10 results were collected in children 6 years and older, SDQ included children from 4 years onward, time spent on screen, never having breakfast, and junk food consumption were collected from 3 years onward, and BMI was collected in children 2 years and older. The use of healthcare services was collected in the whole sample and included visits to the pediatrician or general practitioner (GP) in the last year (yes/no), any specialist visits in the last year (yes/no), visits to any healthcare professional in the last 15 days (yes/no), and visits to the dentist in the last year (yes/no).

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Sociodemographic variables included age, sex, and family socioeconomic status (SES). Educational level referred to the highest level of schooling completed by the mother, categorized into 3 groups: primary school or less, secondary school, and university degree. The family structure (single-parent family vs two-parent family), and child's origin (native vs immigrant, when both parents and/or the child were born in a developing country was also included. Family employment status was collected and coded as a dichotomous variable (unemployed vs employed, student, etc.) if at least one parent reported current unemployed status. The type of healthcare coverage was collected and recoded as only public (National Health Service, NHS) vs. double healthcare coverage if additional private healthcare insurance was declared.

Statistical analysis

The percentage (or mean) and 95% confidence interval (95% CI) was computed for each variable analyzed according to sociodemographic characteristics and study period.

The association between changes in family socioeconomic conditions and health-related factors, mental health, and HRQOL were analyzed by means of logistic regression or multiple linear regression models, depending on the nature of the dependent variable. All models included the study period as an independent variable (2006=0 and 2010-12=1). Interaction terms between SES, health-related factors, and study period were also explored to analyze the influence of changes in the study period on the outcome measures. Analyses were carried out using Stata 10.0, considering the complex sampling design by applying specific weights for each survey in the estimation of variance.

Results

The characteristics of the samples in ESCA 2006 and 2010-12 are shown in Table 1. Mean age

was 7.9y (standard deviation [SD] 0.08) in 2006 and 6.9y (0.08) in 2010-12. ESCA 2006 showed

a lower percentage of children from families with a maternal university degree (22.8%

vs.29.5%), families of immigrant origin (9.5% vs.20.1%), and unemployed families (9.1% vs.

20.6%).

Table 1 Sociodemographic characteristics of the sample. ESCA 2006 and 2010-12 (unweighted
data)

	2006		2010-12	
	N	%	N	%
Sex				
Girls	1064	48..5	970	49..3
Age				
Mean (SD)	2200	7.85 (0.08)	1967	6.93 (0.08)
0 – 4y	544	25.1	552	28.1
5 – 9y	842	38.5	899	45.7
10 – 14y	814	36.5	516	26.2
Maternal level of education				
Primary education	473	20.0	275	14.0
Secondary education	1227	57.2	1112	56.5
University degree	493	22.8	580	29.5
Type of family				
Single parent	199	9.0	193	9.8
Migration status				
Immigrant	209	9.5	395	20.1
Family employment status				
At least one unemployed	161	8.6	303	15.5
Both members unemployed	23	0.5	100	5.1
Healthcare coverage				
Double	494	22.5	520	26.5

Missing values 2006: level of education (7); family employment status (56); 2010-12: type of family (3);
family employment status (10); healthcare coverage (3). Source: Catalan Health Department. Catalan
Health Interview Survey.

The results of health behavior, obesity, HRQOL, and mental health, according to maternal

education level and family employment status are summarized in Table 2. Mean time spent on

screen was lower in 2010-12 (2.0 in 2006 vs 1.4 in 2010-2012). The prevalence of

overweight/obesity was 18.5% (16.5-20.4) in 2006 and 27.0% (24.6-29.2) in 2010-12. Obesity in

children increased from 23.2% (18.8- 27.6) to 35.5% (28.6-42.3) in families with a maternal

primary education, and from 13.1% (9.5- 16.5) to 21.4% (17.4-25.3) in those with a maternal

university degree. A higher percentage of obesity was also found in the last survey for children

of unemployed families in 2010-2012 (33.8%; 28.4-39.3). The KS-10 showed higher mean

scores (better) in 2010-12 (85.4; 84.4-86.0) compared to 2006 (81.0; 80.7-81.7), but lower

scores in children with a maternal primary education (82.4; 80.6-84.1) and unemployed

families (83.34; 81.89-84.9). Scores on the TDS-SDQ were slightly lower (better) in 2010-12,

but differences have remained in relation to maternal education and employment status.

Table 2 Health behaviors and health status characteristics by maternal level of education and family employment status. ESCA 2006 and 2010-12 (weighted data).

	2006		2010-12	
	%	*95% CI*	*%*	*95% CI*
Health behaviors				
Never having breakfast	4.9	3.8-6.0	5.4	4.8-6.7
Level of education				
Primary	5.9	3.4-8.4	7.7	3.6-11.8
Secondary	5.1	3.6-6.7	6.4	4.6-8.1
University degree	3.5	1.5-5.5	2.7	1.0-4.4
Employment				
Employed	4.3	3.2-5.5	5.6	4.2-7.1
Unemployed	8.8	2.3-13.3	4.4	2.0-6.9
	Mean	*95%CI*	*Mean*	*95%CI*
Time spent on screen (h/day)	2.03	1.98-2.07	1.41	1.35-1.47
Level of education				
Primary	2.16	2.08-2.25	1.73	1.5-1.95
Secondary	2.08	2.01-2.14	1.53	1.45-1.6
University degree	1.77	1.68-1.87	1.07	0.98-1.15
Employment				
Employed	2.01	1.96-2.06	1.36	1.29-1.43
Unemployed	2.06	1.92-2.21	1.62	1.48-1.76
Junk food consumption	50.24	49.74-50.74	52.34	51.92-52.76
Level of education				
Primary	47.46	46.36-48.55	50.14	49.0-51.27
Secondary	50.21	49.53-50.89	52.13	51.57-52.68
University degree	52.79	51.91-53.97	53.68	52.93-54.94
Employment				
Employed	50.35	49.84-50.87	52.7	52.23-53.16
Unemployed	50.25	48.41-52.01	51.04	50.06-52.02
Physical activity	50.14	49.52-50.76	48.23	47.59-48.87
Level of education				
Primary	50.62	49.21-52.03	46.53	44.7-48.33
Secondary	49.74	48.94-50.54	48.16	47.33-48.99
University degree	50.81	49.44-52.19	49.18	48.0-50.37
Employment				

Employed	50.26	49.61-50.92	48.23	47.62-49.04
Unemployed	48.23	46.1-50.37	47.83	46.35-49.31
Risk behaviors	50.52	49.93-51.12	51.74	51.19-52.29
Level of education				
Primary	50.37	49.25-51.48	50.91	49.48-52.34
Secondary	50.01	49.17-50.86	51.51	50.78-52.23
University degree	52.06	50.93-53.19	52.65	51.6-53.69
Employment				
Employed	50.59	49.95-51.23	52.07	51.44-52.69
Unemployed	50.44	48.59-52.3	50.5	49.31-51.7
Health status	***%***	***95% CI***	***%***	***95% CI***
Overweight/ obesity	18.49	16.5-20.4	26.96	24.6-29.2
Level of education				
Primary	23.15	18.75-27.55	35.46	28.64-42.29
Secondary	18.99	16.39-21.6	28.22	25.14-31.3
University degree	13.1	9.5-16.5	21.35	17.43-25.26
Employment				
Employed	18.16	16.13-20.2	25.26	22.74-27.78
Unemployed	20.58	14.19-26.96	33.8	28.35-39.25
	Mean	***95% CI***	***Mean***	***95% CI***
KIDSCREEN-10	81.03	80.70-81.7	85.39	84.35-86.04
Level of education				
Primary	80.55	79.15-81.24	82.35	80.62-84.07
Secondary	81.29	80.39-82.19	85.34	84.69-86.39
University degree	80.83	79.35-82.31	86.52	85.34-87.7
Employment				
Employed	81.24	80.53-81.96	85.89	85.18-86.6
Unemployed	79.26	77.11-81.42	83.38	81.88-84.88
TDS-SDQ	7.83	7.54-8.12	7.33	7.11-7.56
Level of education				
Primary	8.59	8.02-9.16	7.79	7.17-8.42
Secondary	8.27	7.87-8.68	7.57	7.26-7.88
University degree	6.03	5.52-6.664	6.67	6.28-7.06
Employment				
Employed	7.69	7.38-7.99	7.08	6.82-7.33
Unemployed	8.99	8.0-9.97	8.35	7.83-8.87

TDS-SDQ: Total Difficulties Score, Strengths and Difficulties Questionnaire. Overweight/obesity include children 2 years onward (n=3881); never having breakfast, time spent on screen, and junk food consumption include children 3 years onward (n=3682); TDS-SDQ include children 4 years and older (n= 3365); Risk behaviors, physical activity, and Kidscreen-10 include children 6 years and older (n= 2681). Source: Catalan Health Department. Catalan Health Interview Survey.

The percentage of visits to specialists and the dentist decreased in 2010-12, whereas children with double healthcare coverage reported more visits in the last 15 days to all healthcare professionals and also to specialist in the last year (Table 3).

Table 3 Use of healthcare services by maternal level of education and healthcare coverage**.** ESCA 2006 and 2010-12 (weighted data)

	2006		2010-12	
	%	95% CI	%	95% CI
Visits to Pediatrician	90.09	88.64-91.53	90.67	89.25-92.08
Level of education				
Primary	87.22	83.67-90.78	92.53	89.31-95.76
Secondary	90.22	88.28-92.15	89.26	87.25-91.27
University degree	92.23	89.58-94.87	92.41	90.03-94.8
Healthcare coverage				
Public	89.65	87.97-91-34	89.52	87.78-91.26
Double	91.46	88.63-94.29	93.62	91.3-95.3
Visits in the past 15 days	23.45	21.35-25.55	21.56	19.54-23.58
Level of education				
Primary	22.43	17.97-26.89	18.81	13.84-23.79
Secondary	22.58	19.82-25.34	23.02	20.26-25.78
University degree	26.66	22.0-31.32	20.88	16.45-23.71
Healthcare coverage				
Public	23.4	21.0-25.8	19.09	16.84-21.34
Double	23.6	19.24-27.95	27.72	23.51-31.94
Visits to a specialist	45.65	43.04-48.09	38.68	36.31-41.06
Level of education				
Primary	42.42	37.15-47.68	26.0	20.34-31.65
Secondary	45.06	41.79-48.73	38.82	35.66-41.99
University degree	48.88	44.72-55.04	43.88	39.33-48.22
Healthcare coverage				
Public	43.43	40.65-46.21	33.55	30.86-36.25
Double	52.69	47.59-57.78	51.29	46.6-55.98
Visits to the dentist	43.16	40.73-45.59	34.62	32.34-36.91
Level of education				
Primary	37.72	32.6-42.85	27.44	21.78-33.1
Secondary	42.77	39.53-46.01	35.55	32.48-38.62
University degree	48.81	43.65-53.97	35.99	31.79-40.19
Healthcare coverage				
Public	41.47	38.71-44.22	33.03	30.4-35.67
Double	48.55	43.45-53.65	38.18	33.7-42.66

Source: Catalan Health Department. Catalan Health Interview Survey.

The results of multivariate analysis of health behavior are shown in Table 4. Differences by maternal education level were found for junk food consumption and time spent on screen, and

by employment status in never having breakfast. Junk food consumption improved in 2010-12 in families with a maternal primary education level (beta, [B]= 2.85; 0.83 to 4.88, for the interaction term of survey by primary education level) and never having breakfast decreased in unemployed families in 2010-12 (odds ratio [OR]= 0·33; 0·13-0·80; for survey by employment status).

Table 4 Multivariate analysis of health behaviors. ESCA 2006 and 2010-12 (weighted data)

	Junk food consumption		Physical activity		Risk behaviors		Time spent on screen		Never having breakfast	
	B	95% CI	*B*	95% CI	*B*	95% CI	*B*	95% CI	OR	95% CI
Sex	0.53	-0.12 to1.18	**-4.74**	**-5.61 to-3.86**	**2.19**	**1.37/3.0**	0.23	-0.3 to 0.16	0.99	0.69-1.41
Age	**-0.3**	**-0.4t to-0.21**	0.07	-0.09 to 0.24	0.03	-0.12 to 0.19	**0.09**	**0.08 to 0.1**	**1.14**	**1.08-1.21**
Maternal education										
Primary	**-4.64**	**-6.07to -0.21**	-0.03	-1.99 to1.92	-1.5	-3.13 to 0.13	**0.3**	**0.17 to 0.43**	1.34	0.63-2.84
Secondary	**-2.25**	**-3.37 to -1.13**	-0.92	-2.51 to0.65	**-1.96**	**-3.4 to -0.52**	**0.26**	**0.15 to 0.36**	1.2	0.6-2.39
Survey	0.89	-0.27 to 2.06	-1.32	-3.16 to 0.5	0.78	-0.76 to 2.34	**-0.72**	**-0.84 to -0.59**	0.79	0.32-1.95
Employment	0.4	-1.45 to 2.27	-1.87	-4.1 to 0.36	0.18	-1.85 to 2.22	0.003	-0.13 to 0.14	**2.09**	**1.12-3.88**
Family type	-0.89	-2.92 to 1.13	1.71	-0.53 to 3.98	**-4.73**	**-7.33 to -2.14**	0.08	-0.08 to 0.25	0.79	0.32-1.91
Origin	**-3.93**	**-5.82 to -2.04**	-0.18	-2.6 to 2.22	1.7	-0.33 to 3.73	0.12	-0.02 to 0.27	1.19	0.53-2.64
Interaction terms										
Primary educ.* survey	**2.85**	**0.83 to4.88**	-1.77	-4.7 to 1.16	-0.17	-2.64 to2.3	0.14	-0.11 to 0.4	2.09	0.63-6.93
Secondary educ.*survey	1.22	-0.22 to2.67	0.08	-2.05 to 2.3	0.87	-1.04 to 2.78	0.10	-0.04 to 0.26	1.92	0.71-5.23
Employment*Survey									**0.33**	**0.13-0.8**
Origin*Survey							**0.23**	**0.002 to 0.45**	1.05	0.37-2.94
Family type* Survey	1.82	-0.55 to 4.2	-1.85	-4.78 to 1.08	2.77	-0.35 to 5.9	-0.005	-0.26 to 0.25	1.46	0.37-4.45

Reference category: sex: boys; maternal education level: university degree; survey: year 2006; employment: employee; family type: biparental family; origin: native. Source: Statistically significant coefficients are shown in bold. Catalan Health Department. Catalan Health Interview Survey.

The likelihood of overweight/obesity increased in 2010-12 (OR=1·81; 1·18-2·78) (Table 5).

Several factors were associated with overweight/obesity in the overall sample, whereas never

having breakfast before leaving home (OR=2·65; 1·11-6·31) was associated with increasing the

likelihood of obesity in 2010-12. An improvement in HRQOL was found in 2010-12 (B= 6·07;

4·15 to 7·99), although children with a maternal primary education showed lower (worse)

scores on the KIDSCREEN-10 index in this survey (B= -4.14; -7.17 to -1.12). Differences in

mental health were found in the overall sample according to the level of education and in

single parent families, while differences in TDS-SDQ scores according to maternal education

decreased in 2010-12.

Table 5 Multivariate analysis of health status variables (logistic regression model for overweight/obesity, and linear regression models of KIDSCREEN-10, and SDQ). ESCA 2006 and 2010-12 (weighted data)

	Overweight/obesity		KS-10		TDS-SDQ	
	OR	95% CI	B	95% CI	B	95% CI
Sex	0.88	0.73-1.06	0.67	-0.26 to 1.62	**-0.91**	**-1.27to -0.55**
Age	**0.91**	**0.88-0.94**	**-0.33**	**-0.52 to -0.14**	**-0.08**	**-0.13 to -0.02**
Maternal education						
Primary	**1.80**	**1.16-2.80**	0.29	-1.81 to 2.41	**2.28**	**1.52 to 3.03**
Secondary	**1.55**	**1.06-2.29**	0.87	-0.88 to 2.63	**2.02**	**1.38 to 2.65**
Survey	**1.81**	**1.18-2.78**	**6.07**	**4.15 to 7.99**	0.4	-0.14 to 1.1
Employment	1.20	0.77-1.89	-2.1	-4.41 to 0.21	0.85	-1.14 to 1.85
Family type	1.30	0.95-1.79	**-2.28**	**-4.02 to -0.55**	**1.1**	**0.41 to 1.78**
Origin	**1.67**	**1.28-2.19**				
Having breakfast	0.94	0.47-2.18				
Time on screen	1.05	0.95-1.16				
Junk food	**0.99**	**0.98-1.00**				
Restriction of activity (12m)			**-3.01**	**-5.33 to -0.69**	**0.9**	**0.07 to 1.77**
Chronic conditions						
One					1.12	0.72 to 1.52
More than one					**2.95**	**2.39 to 3.51**
Interaction terms						
Primary education* survey	0.82	0.45-1.50	**-4.14**	**-7.17 to-1.12**	**-1.23**	**-2.29 to -0.17**
Secondary educ.* survey	0.89	0.54-1.45	-1.6	-3.8 to 0.66	**-1.19**	**-1.99 to -0.4**
Unemployment * survey	1.05	0.61-1.81	0.07	-2.77 to 2.93	-0.1	-1.02 to 1.25
Having breakfast * survey	**2.65**	**1.11-6.31**				

KS-10: KIDSCREEN-10 Index; TDS-SDQ: Total Difficulties Score, Strengths and Difficulties Questionnaire. Reference category: sex: boys; maternal education level: university degree; survey: year 2006; employment: employee; family type: biparental family; origin: native; having breakfast before leaving home: some times to every day; no restriction of activities and no chronic conditions. Statistically significant coefficients are shown in bold. Source: Catalan Health Department. Catalan Health Interview Survey.

The multivariate analysis of healthcare service use is shown in Table 6. The likelihood of visits in the last 15 days (OR= 0.53; 0.37-0.78), and visits to specialists (OR=0.69; 0.5-0.96) decreased in 2010-12. Double healthcare coverage was associated with an increase in the likelihood of visits in the last 15 days in the second survey (OR= 1.66; 1.11-2.49, for the interaction of survey by coverage), and was at the limits of statistical significance in visits to specialists.

Table 6 Logistic regression models of the use of healthcare services. ESCA 2006 and 2010-12 (weighted data)

	Visits to Pediatrician /GP		Visit to Specialists		Visits in the last 15 days		Visits to the dentist	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Sex	0.96	0.75-1.23	0.98	0.84-1.15	0.96	0.81-1.14	1.04	0.88-1.21
Age	**0.8**	**0.78-0.83**	**1.13**	**1.11-1.16**	**0.92**	**0.9-0.95**	**1.26**	**1.24-1.29**
Maternal education								
Primary	0.7	0.42-1.18	**0.62**	**0.45-0.87**	0.81	0.55-1.2	**0.52**	**0.37-0.74**
Secondary	0.85	0.54-1.33	**0.69**	**0.53-0.9**	0.81	0.6-1.09	**0.69**	**0.53-0.9**
Survey	0.71	0.4-1.26	**0.69**	**0.5-0.96**	**0.53**	**0.37-0.78**	**0.68**	**0.49-0.95**
Employment	1.07	0.76-1.51	1.03	0.71-1.49	0.85	0.66-1.09	0.81	0.63-1.02
Origin	0.47	0.29-0.78	0.62	0.43-0.91	0.81	0.51-1.27	**0.62**	**0.4-0.95**
Healthcare coverage	0.99	0.55-1.22	**1.49**	**1.15-1.94**	0.9	0.67-1.21	1.3	0.99-1.69
Chronic conditions								
One	**1.37**	**1.03-1.81**	**2.37**	**1.99-2.83**	**1.26**	**1.03-1.55**	1.18	0.98-1.42
More than one	**1.73**	**1.26-2.51**	**5.03**	**4.09-6.18**	**1.98**	**1.59-2.46**	**1.35**	**1.1-1.67**
Restriction of activities	1.46	0.76-2.81	**2.04**	**1.49-2.81**	**1.57**	**1.14-2.18**	0.75	0.53-1.06
Interaction terms								
Primary education* survey	2.15	0.96-4.78	0.8	0.48-1.84	1.68	0.94-2.99	1.37	0.81-2.31
Secondary educ.* survey	1.05	0.57-1.95	1.12	0.78-1.61	**1.76**	**1.17-2.64**	1.2	0.84-1.73
Healthcare coverage* survey	1.5	0.8-2.8	1.42	0.99-2.04	**1.66**	**1.11-2.49**	0.99	0.69-1.42
Origin *survey	1.61	0.85-3.06	0.99	0.61-1.6	0.81	0.47-1.44	1.12	0.96-1.9

Reference category: sex: boys; maternal education level: university degree; survey: year 2006; employment: employee; family type: biparental family; origin: native; healthcare coverage: only public. Statistically significant coefficients are shown in bold. Source: Catalan Health Department. Catalan Health Interview Survey.

Discussion

This study shows that there has been an increase in social inequalities with higher levels of unemployment in families with lower level of education in Catalonia. Although certain behavior showed an improvement in disadvantaged families in 2010-12, like junk food consumption and having breakfast before leaving home, an alarming increase in overweight/ obesity was found. HRQOL was better in the second survey. Nevertheless, disparities appeared, with lower scores on HRQOL in children from families with a maternal primary education. Inequality has remained in mental health. The use of specialists and dentists has decreased, and double health coverage was a factor associated with an increase in the use of healthcare services.

Although it is not possible to directly attribute changes found in the present study to the impact of the crisis, it is clear that children's living conditions have worsened in this 6-year study period, and this change has had impact on their health.

According to the UNICEF report child poverty increased in Spain by 53% between 2007 and 2010.[7] This factor is associated with a reduction in family expenditure, changes in food habits, loss of housing, and rising inequality. In Catalonia, the Living Conditions Survey (LCS) [20]and the Household Budget Continuous Survey (HBS) [21]provide data on family living conditions and the risk of poverty. The percentage of children 16 years and younger at risk of poverty has increased from 20.6% in 2005 to 23.7% in 2010 after social transfers. The population younger than 17 years living in unemployed families has increased from 3.7% to 11.2%. The percentage of school dropouts decreased from 33% to 29% between 2005 and 2010, whereas unemployment in persons 16 to 24 years of age has increased more than 2.5-fold (15% to 40%).[22] In addition to reinforcing these figures, the results of this study include the impact on physical and mental health, and quality of life.

Some results of the present study, such as improving eating habits in children from disadvantaged families seem to contradict the great increase in obesity that was found in the

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study period. It is likely that this improvement has not been sufficient to overcome the negative impact of factors such as resource unavailability on family foods, the ability to cope with stress, and increased inequalities in HRQOL. The attributable risk of obesity was 26% for education level in ESCA 2010-12. Moreover, in this specific case, which showed a very important social gradient, certain measures taken by the Catalan government, such as restricting the use of food stamps, will increase the risk of inequalities in relation to obesity. These facts support the need for stronger protection mechanisms during the crisis to reduce the effect of deficits in the family and social resources related to healthy child development. Inequalities in children's mental health were described in Catalonia (ESCA 2006)[23] and Spain (Spanish Health Survey 2006)[24] Social inequalities according to maternal education level have persisted with the crisis. However, these previous studies did not report inequalities in quality of life. This is the first time this inequality has been found in relation to both education level and employment status in Catalonia, and it is likely a result of continuous exposure to stress in the most vulnerable population. The higher average HRQOL scores in the 2010-12 survey may be related, in part, to the younger age of the second sample.

The present study shows a reduction in the use of healthcare services and a higher percentage of visits among those children with double healthcare coverage. It is difficult to determine with the ESCA data whether the reduction of visits represents a saving of unnecessary interventions. Nevertheless, the healthcare cuts carried out in Catalonia in the last years would be a factor associated to a migration of higher classes to private healthcare.

Some limitations of the study deserve comments. Differences in the sample characteristics of the two surveys may have influenced the results. The ESCA 2010-12 sample was slightly younger and with more educated mothers. Differences in the percentage of children from immigrant families could be attributed to data collection in 2006, which was less exhaustive with respect to the variable parents' place of birth. For this reason, the results related to this variable should be interpreted with caution. However, all these differences may mask even

greater disparities. Moreover, the rest of the questionnaire was similar in both surveys, data are very consistent, and the results of the study are valid and useful to analyze the impact of the crisis on child health. The percentage of households with at least one unemployed member seems to be underestimated in ESCA 2010-12: in 11% of households all members were unemployed in 2010 according a previous mentioned survey[22] whereas in ESCA 2010-12 the figure was 5%. It is well recognized that proxy-reported weight and height may carry some bias compared to objective measures. However, there was no differential bias by educational level or any other variable analyzed; hence this does not invalidate the results regarding factors associated with overweight in children. Moreover, if other cut-off points were used different results in terms of percentages of overweight and obesity have been shown[25]. Finally, the duration of unemployment and whether the unemployed person was receiving a subsidy were not analyzed. An analysis of these factors might enable a more in-depth examination of the impact of unemployment, and should be addressed in future studies.

The Commission on Social Determinants of Health of the World Health Organization has proposed eliminating the health gap in one generation[26] and has emphasized that inequalities in early child development are one of the main factors contributing to create inequalities in adult health[27]. It should be noted that the living conditions of children have deteriorated and that inequalities in childhood obesity and quality of life have increased with the crisis. It is necessary to urgently implement policy measures that fight against these inequalities. Otherwise they will have a negative impact on the health of future generations of Catalans. It is also important to monitor and evaluate the impact of public policies aimed at overcoming the crisis.

Authors' contributions

Luis Rajmil and María-José Fernández de Sanmamed carried out the literature search. All authors participated in the study design. Antonia Medina Bustos and Anna Mompart Penina

participated in the data collection. Luis Rajmil analyzed the data. All authors contributed to the data interpretation and writing the manuscript.

Conflicts of interest
Authors report no conflicts of interest

References

1   Marcus R, Gavrilovic M. The Impacts of the Economic Crisis on Youth. Review of Evidence. London: Overseas Development Institute; 2010.

2   Margerison Zilko I. Economic contraction and birth outcomes: an integrative review. Human Reproduc Update 2010;**16**: 445–58.

3   Dávila-Quintana CD, González López-Valcarcel B. Crisis económica y salud. Gac Sanit 2009;**23**(4):261–5.

4   Bremberg S. Does an increase of low income families affect child health inequalities? A Swedish case study. J Epidemiol Community Health 2003; **57**:584–88

5   Withham G. Child poverty in 2012. It shouldn't happen here. London: Save the children; 2012.

6   Berger RP, Fromkin JB, Stutz H, Makoroff K, Scribano PB, Feldman K. Feldman, Tu LCh, Fabio A. Abusive Head Trauma During a Time of Increased Unemployment: A Multicenter Analysis. Pediatrics 2011;**128**:637-43.

7   González-Bueno G, Bellos A, Arias M. La infancia en España 2012-2013. El impacto de la crisis en los niños. Madrid: UNICEF España; 2012.

8   Navarro V, Clua-Losada M. El impacto de la crisis en las familias y en la infancia. Barcelona: Observatorio social de España; 2012.

9   Direcció General de Regulació, Planificació i Recursos Sanitaris. Departament de Salut, Generalitat de Catalunya. Enquesta de salut de Catalunya 2010-2014. Fitxa técnica. Generalitat de Catalunya; 2012. Available at: www.gencat.cat\salut\esca

10   Departament de Salut. La salut de la població infantil a Catalunya. Enquesta de salut de Catalunya. Barcelona: Generalitat de Catalunya, Departament de Salut, Direcció General de Planificació i Avaluació; 2009.

11   Mompart-Penina A, Medina-Bustos A, Guillén-Estany M, Alcañiz-Zanón M, Brugulat-Guiteras P. Características metodológicas de la Encuesta de Salud de Cataluña 2006. Med Clin (Barc) 2011;**137** Supl 2:S3-8.

12   Serra Majem L, Aranceta Bartrina J, Pérez Rodrigo C, Moreno Esteban B, Tojo Sierra R, Delgado Rubio A, Grupo colaborativo AEP-SENC-SEEDO. Dossier de Consenso. Curvas de Referencia para la Tipificación Ponderal. Población Infantil y Juvenil. Madrid: IM&C,2002: p.1–83.

13   SDQ. Information for researchers and professionals about the Strengths & Difficulties Questionnaires. Available at: www.sdqinfo.com. Accesed January 11, 2013.

14   Goodman R. The Strengths and Difficulties Questionnaire: a research note. J Child Psychol Psychiatry 1997;**38**:581-6.

15   The KIDSCREEN Group Europe. The KIDSCREEN questionnaires. Handbook. Lengerich, Germany: Pabst Science Publishers; 2006.

16   Ravens-Sieberer U, Erhart M, Rajmil L, et al. Reliability, construct and criterion validity of the KIDSCREEN-10 score: a short measure for children and adolescents' well-being and health-related quality of life. Qual Life Res 2010;**19**:1487-500.

17   Flash Eurobarometer. Parents views on the mental health of their child. Analytical report. Brussels: Eurobarometer; 2009.

18   Rajmil L, Serra-Sutton V, Alonso J, Herdman M, Riley A, Starfield B. Validity of the Spanish version of the child health and illness profile-adolescent edition (CHIP-AE). Med Care 2003;**41**:1153-63.

19   Estrada MD, Rajmil L, Serra-Sutton V, Tebé C, Alonso J, Herdman M, et al. Reliability and validity of the Spanish version of the Child Health and Illness Profile-Child Edition Parent Report Form (CHIP-CE/PRF). Health Qual Life Outcomes 2010;**8**:78.

20   Instituto Nacional de Estadística. The Living Conditions Survey. Madrid: INE; 2005. Available at: http://www.ine.es/en/daco/daco42/condivi/ecv_metodo_en.pdf.

21   Instituto Nacional de Estadística. The Houselhold Budget Survey. Madrid: INE; 2005. http://www.ine.es/en/daco/daco43/metodo_ecpf_trimestral_en.pdf

22   Rajmil L, Fernandez de Sanmamed MJ. Destruction of a less developed welfare state and impact on the weakest, the youths. BMJ 2012. Available at: http://www.bmj.com/content/343/bmj.d7973?tab=responses.

23   Rajmil L, López-Aguilà S, Mompart Penina A, Medina Bustos A, Rodríguez Sanz M, Brugulat Guiteras P. Socio-economic inequalities in children's mental health in Catalonia. An Pediatr (Barc) 2010;**73**:233-40.

24   Barriuso-Lapresa L, Hernando Arizaleta L, Rajmil L. Social inequalities in mental health and health-related quality of life in children in Spain. Pediatrics 2012;**130**:e528–35

25   Cole TJ, Bellizi MC, Flegal KM, Dietz WH. Establishing standard definition for child overweight and obesity: international survey. BMJ. 2002;**320**:1240-3.

26   World Health Organization (WHO) Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. Geneva: WHO; 2008.

27   Early Child Development Knowledge Network (ECDKN). Early child development: a powerful equalizer. Final report of the Early Child Development Knowledge Network of the Commission on Social Determinants of Health. Geneva: World Health Organization; 2007.

STROBE Statements—"**Impact of the economic crisis on children's health in Catalonia: a before-after approach**"

The study was based on two cross-sectional comparable surveys from the Catalan Health Interview Survey (ESCA). The ESCA Statistical Plan is part of the Government of Catalonia and is regulated by Decree 467/2004, of December 28, by approving the annual performance statistics from the year 2005. It is an official statistic, so selected individuals are prone to participate in the survey, and meets all these requirements, in particular respect the confidentiality of the information under statistical confidentiality. The ESCA is conducted by the Department of Health of the Autonomous Government of Catalonia. All analysis using ESCA data should be anonymized, so no individual information is identifiable.

	Item No	Recommendation	Checklist**
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	X
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	X
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	X
Objectives	3	State specific objectives, including any prespecified hypotheses	X
Methods			
Study design	4	Present key elements of study design early in the paper	X
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	X
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	
		Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls	
		Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants	X
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed	
		Case-control study—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	X

Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	X
Bias	9	Describe any efforts to address potential sources of bias	X
Study size	10	Explain how the study size was arrived at	X
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	X
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	X
		(*b*) Describe any methods used to examine subgroups and interactions	X
		(*c*) Explain how missing data were addressed	X
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed	X
		Case-control study—If applicable, explain how matching of cases and controls was addressed	
		Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	

Continued on next page

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	X
		(b) Give reasons for non-participation at each stage	X
		(c) Consider use of a flow diagram	**It was considered as not necessary**
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	X
		(b) Indicate number of participants with missing data for each variable of interest	X
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary	X

		measures	
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	**X**
		(*b*) Report category boundaries when continuous variables were categorized	**X**
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	**X**
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	**X**
Key results	18	Summarise key results with reference to study objectives	**X**
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	**X**
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	**X**
Generalisability	21	Discuss the generalisability (external validity) of the study results	**X**
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	**X**

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

** These marks indicate all relevant points included in the manuscript. Please let us know if it is necessary any additional information

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Impact of the economic crisis on children's health in Catalonia: a before-after approach

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Impact of the economic crisis on children's health in Catalonia: a before-after approach

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Short title: Impact of the economic crisis on children's health

Keywords: Child health disparities; inequities; economic crisis; health-related quality of life; obesity

Abbreviations:
CHIP: Child health and Illness Profile
HRQOL: health-related quality of life
SDQ: Strengths and Difficulties Questionnaire

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Table count: 5
References: 28

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Abstract

Objectives: To analyze changes in the family living conditions of children in Catalonia between 2006 and the 2010-2012 period, and to study associations between these changes and health outcomes.

Design: A before-after analysis of two cross-sectional surveys

Setting: Population younger than 15 years old from Catalonia, Spain

Participants: Representative samples of children in the 2006 Catalan Health Survey (ESCA, baseline, before the crisis, n=2200) and the first 4 waves of ESCA 2010-12 (after start of the crisis, n=1967).

Main outcome measures: Overweight/obesity, health behavior, mental health, and health-related quality of life (HRQOL). Logistic regression and multiple linear regression models were used to analyze the influence of changes in family conditions on outcome measures, including interaction terms to describe the potential influence of the study period on the results.

Results: The percentage of unemployed families rose from 9·1% (2006) to 20·6% (2010-12), with inequalities by level of education. Overweight/obesity increased from 18.4% (95% CI 16.5-20.4) to 26.9% (24.6-29.2) in 2010-12, and inequalities related to maternal education and employment status persisted. Eating habits have improved in 2010-12 in disadvantaged families (ie, junk food consumption improved in families with a maternal primary education level; beta [B]=2.85, 0.83-4.88, for the survey interaction by primary education level). An improvement in HRQOL was found in the second survey (B= 6.07; 4.15 to 7.99), although children whose mothers had a primary education showed poorer HRQOL scores in this survey than in 2006 (B= -4.14; -7.17 to -1.12). In 2010-12, double healthcare coverage was associated with a higher likelihood of health visits.

Conclusions: Although some health-related behavior improved during the study period, childhood obesity increased and inequalities in health-related quality of life appeared. Policy measures that fight against these inequalities should be urgently implemented to avoid their negative impact on the health of future generations of Catalans.

KEYWORDS: Child health disparities; inequities; economic crisis; health-related quality of life; obesity

1) Article focus

- The current economic and financial crises have worsened the living conditions of children in Catalonia, Spain, comparing 2006 and 2010-12

- Worsening of socioeconomic conditions associated with the crisis would more specifically affect the children of disadvantaged families

- An increase in unhealthy behavior and in inequalities related to obesity and mental health would also be expected.

2) Key messages

- An increase in social inequalities has occurred in Catalonia, with higher levels of unemployment in families with lower levels of education.
- Although some health-related behavior improved in the overall population in the period studied, disparities in childhood obesity remained and inequalities in health-related quality of life appeared according to the level of education.

3) Strengths and limitations

- The content of the questionnaire was similar in both surveys, data are consistent and proved to be valid and useful to analyze the impact of the crisis on child health
- It is not possible to directly attribute changes found in the present study to the impact of the crisis. Nevertheless, it is clear that children's living conditions have worsened in this 6-year study period, and this change has had an impact on their health.
- The sample in the 2010-12 Catalan health interview survey were slightly younger and with higher maternal education level than the 2006 sample. However, these differences may mask even greater disparities.

3

Introduction

The current economic and financial crisis has affected the whole of Europe's economy, although the impact in each country depends on the starting point, mechanisms of social protection and social transfers, and the measures governments have adopted to fight the crisis.

A review of the evidence related to the impact of the crisis on the health of young people (15-24y) has found increasing levels of ill health, particularly with regard to sexually transmitted disease and substance abuse, and a general decline in the use of healthcare services.[1] A comprehensive review of the impact on neonatal outcomes has reported inconclusive results regarding low birth weight and neonatal mortality.[2] Some positive aspects have also been described.[3] A decrease in environmental pollution and traffic accidents is expected, and the crisis occurring in the 1990s had a positive impact on health in the Nordic countries.[4] In the current crisis even that effect varies between countries, a recent report from the UK has revealed a significant impact on the eating habits of children from families in poverty.[5] In the US, an association was reported between economic recession measured by unemployment rates and head injuries due to violence against children.[6]

In Spain, the government has significantly cut public health and education budgets, and has reduced aid to families with children in the lower socioeconomic strata. Spain's UNICEF report has analyzed the growth of poverty in children, which is higher than in the remainder of the population.[7] Another recent study emphasizes that the crisis has manifested in a particularly acute form in households with children, and has caused a greater decline and greater social exclusion than in households with no children.[8] However, there is little data comparing children's health before and after the crisis started.

In Catalonia, a northeastern region of Spain, the Catalan Health Survey (Enquesta de Salut de Catalunya, ESCA),[9] has provided the opportunity to analyze the effects of the crisis on the

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health of our children. The objectives of this study were to analyze changes in the family life

conditions and socioeconomic status of children (0-14 y) in Catalonia between 2006 and the

2010-2012 period, and to study the association of these changes with modifications in health-

related behavior, physical and mental health, and health-related quality of life (HRQOL). The

main hypothesis was that worsening of socioeconomic conditions associated with the crisis

would more specifically affect the children of disadvantaged families. An increase in unhealthy

behavior and in inequalities related to obesity and mental health would also be expected. In

contrast, no differences would be expected in HRQOL between years 2006 and 2010-12.

5

Methods

 The study design is a before-after analysis of data from two separate cross-sectional

representative samples of children in the 2006 ESCA survey (baseline, before the crisis) and the

first 4 waves of ESCA 2010-12 (after the start of the crisis). The ESCA Statistical Plan is a part of

the Autonomous Government of Catalonia and is regulated by Decree 467/2004 of December

28, according to which the performance statistics have been approved yearly since 2005. It is

an official statistic, so selected individuals are likely to participate in the survey, which meets

all the regulatory requirements, in particular confidentiality of the data obtained. The ESCA is

conducted by the Department of Health of the Government of Catalonia. All analyses using

ESCA data must be anonymized, so that no individual information is identifiable.

Sampling selection and procedures

ESCA 2006 was undertaken from December 2005 to July 2006.[10] The survey consisted of a

multistage probability sample representative of the non-institutionalized population, stratified

by age, sex, and municipal size for each territorial health government within Catalonia.[11] The

sample size of children 14 years of age and younger from ESCA 2006 was established at 2200

individuals. The sample was stratified according to the size of the municipalities, and the final

stage consisted in random selection of individuals from the Catalonian population register for

each selected municipality. 65% percent of interviews were carried out in the selected

individuals, and 22% in the first substitute. Data for children ≤14 years old were obtained from

proxy respondents (mainly mothers) by means of a structured interview.

Between the second half of 2010 and the first half of 2012, the fieldwork was performed for

the first 4 waves of the continuous ESCA 2010-12.[9] The results are representative of the whole

of Catalonia. Sample size was estimated at approximately 2500 interviews twice yearly, of

which 1967 were addressed to the population ≤14 years old after the first 4 waves. ESCA 2010-

12 was conducted following the same method of administration as the survey in 2006. In this second survey, 68% of proxy respondent interviews for children ≤14 years were carried out in the selected individuals, and 17% in the first substitute. Home interviews were conducted by trained interviewers in both periods.

Measures

Restriction of activities in the previous 12 months (yes/no) and reporting of chronic conditions (no chronic conditions/one/more than one) were collected. Overweight/obesity was based on the body mass index (BMI) calculated through the parents' report of weight and height, and using specific cut-off points for Spain.[12]

Mental health was assessed using the parents' version of the Strengths and Difficulties Questionnaire (SDQ).[13, 14] The sum of the scores on 4 scales related to negative aspects yields the Total Difficulties Score (TDS-SDQ), with a range of 0 to 40. The higher the TDS-SDQ score, the poorer is the child's mental health. Evaluation of HRQOL used the shortest parent-reported version of the KIDSCREEN (KS) instrument, the KS-10 index.[15, 16] In the present study, the KS-10 was computed in keeping with the version used in the European Eurobarometer study.[17] The modified KS-10 scores were transformed to a scale of 0 to 100: the higher the score, the better the HRQOL.

The Junk food consumption (4 items), Physical activity (6 items), and Risk behavior (5 items) scales came from the parent version of the Child Health and Illness Profile (CHIP).[18, 19] Mean scores on these scales were standardized to a mean of 50 and 1 standard deviation (SD) = 10, according to the ESCA 2006 sample. Higher scores reflect less junk food consumption and risk behavior, and greater physical activity. The number of times per week a child had breakfast at home was collected in a single question with a 4-point Likert scale (recoded as never vs the remaining categories). The mean number of hours a day the child spent viewing TV, computers, etc. was collected as an indicator of sedentary behavior. Physical activity, risk

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behavior and KS-10 results were collected in children 6 years and older, SDQ included children from 4 years onward, time spent on screen, never having breakfast, and junk food consumption were collected from 3 years onward, and BMI was collected in children 2 years and older.

Sociodemographic variables included age, sex, and family maternal level of education as a measure of socioeconomic status (SES). Educational level referred to the highest level of schooling completed by the mother, categorized into 3 groups: primary school or less, secondary school, and university degree. The family structure (single-parent family vs two-parent family), and child's origin (native vs immigrant, when both parents and/or the child were born in a developing country was also included. Family employment status (unemployed) was collected and coded as a dichotomous variable (unemployed vs employed, student, etc.) if at least one parent reported current unemployed status.

Statistical analysis

The percentage (or mean) and 95% confidence interval (95% CI) was computed for each variable analyzed according to sociodemographic characteristics and study period.

The association between changes in family socioeconomic conditions and health-related factors, mental health, and HRQOL were analyzed by means of logistic regression or multiple linear regression models, depending on the nature of the dependent variable. All models included the study period as an independent variable (2006=0 and 2010-12=1). Interaction terms between SES, health-related factors, and study period were also explored to consider the possibility of changes over time in the effect of SES and health-related factors on the outcome measures. Analyses were carried out using Stata 10.0, considering the complex sampling design by applying specific weights for each survey in the estimation of coefficients and variance.

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Results

The characteristics of the samples in ESCA 2006 and 2010-12 are shown in Table 1. Mean age was 7.9y (standard deviation [SD] 0.08) in 2006 and 6.9y (0.08) in 2010-12 (p<0.01). ESCA 2006 showed a lower percentage of children from families with a maternal university degree (22.8% vs. 29.5%, p<0.01), families of immigrant origin (9.5% vs. 20.1%), and unemployed families (9.1% vs. 20.6%, p<0.01).

Table 1 Sociodemographic characteristics of the sample. ESCA 2006 and 2010-12 (unweighted data)

	2006		2010-12		*p*
	N	%	N	%	
Sex					
Girls	1064	48.5	970	49.3	0.55
Age					
Mean (SD)	2200	7.85 (0.08)	1967	6.93 (0.08)	<0.01
0 – 4y	544	25.1	552	28.1	
5 – 9y	842	38.5	899	45.7	
10 – 14y	814	36.5	516	26.2	<0.01
Maternal level of education					
Primary education	473	20.0	275	14.0	
Secondary education	1227	57.2	1112	56.5	
University degree	493	22.8	580	29.5	<0.01
Type of family					
Single parent	199	9.0	193	9.8	0.39
Migration status					
Immigrant	209	9.5	395	20.1	<0.01
Unemployed					
At least one unemployed	161	8.6	303	15.5	
Both members unemployed	23	0.5	100	5.1	<0.01

Missing values 2006: level of education (7); unemployed (56); 2010-12: type of family (3); unemployed (10). Source: Catalan Health Department. Catalan Health Interview Survey.

Table 2 shows changes in unemployment according to sociodemographic variables. The percentages of unemployed families have increased in ESCA 2010-12 (9.7%; 8.2-11.2 in ESCA 2006 and 20.7%; 18.8-22.7 in ESCA 2010-12). This change was particularly important in families with a maternal primary education (12.7%; 9.0-16.4 in 2006 to 36.3%; 30.0-42.6).

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Table 2. Changes in family employment status according to sociodemographic characteristics. ESCA 2006 and 2010-12 (weighted data).

	2006		2010-2012	
	% unemployed	95% CI	% unemployed	95% CI
Total	9.7	8.2-11.2	20.7	18.8-22.7
Age				
0-4 y	11.6	8.2-14.9	22.1	18.4-25.8
5-9 y	8.5	6.2-10.7	19.6	16.8-22.4
10-14 y	9.7	7.2-12.3	20.4	16.6-24.2
Sex				
Girl	9.7	7.5-11.8	22.6	19.6-25.5
Boy	9.8	7.6-11.9	19.0	16.4-21.7
Level of education				
Primary	12.7	9.0-16.4	36.3	30.0-42.6
Secondary	11.4	9.2-13.5	22.2	19.5-25.0
University degree	3.0	1.4-4.7	11.6	8.6-14.5
Type of family				
Biparental	9.6	8.0-11.1	19.9	17.8-21.9
Monoparental	11.6	5.6-17.6	27.8	20.9-34.7

Source: Catalan Health Department. Catalan Health Interview Survey.

The results of health behavior, obesity, HRQOL, and mental health, according to maternal education level and family employment status are summarized in Table 3 2. Mean time spent on screen was lower in 2010-12 (2.0 in 2006 vs 1.4 in 2010-2012). The prevalence of overweight/obesity was 18.5% (16.5-20.4) in 2006 and 27.0% (24.6-29.2) in 2010-12. Obesity in children increased from 23.2% (18.8- 27.6) to 35.5% (28.6-42.3) in families with a maternal primary education, and from 13.1% (9.5- 16.5) to 21.4% (17.4-25.3) in those with a maternal university degree. A higher percentage of obesity was also found in the last survey for children of unemployed families in 2010-2012 (33.8%; 28.4-39.3). The KS-10 showed higher mean scores (better) in 2010-12 (85.4; 84.4-86.0) compared to 2006 (81.0; 80.7-81.7), but lower scores in children with a maternal primary education (82.4; 80.6-84.1) and unemployed families (83.34; 81.89-84.9). Scores on the TDS-SDQ were slightly lower (better) in 2010-12, but differences have remained in relation to maternal education and employment status.

Table 3 Health behaviors and health status characteristics by maternal level of education and family employment status. ESCA 2006 and 2010-12 (weighted data).

	2006		2010-12	
	%	*95% CI*	*%*	*95% CI*
Health behaviors				
Never having breakfast	4.9	3.8-6.0	5.4	4.8-6.7
Level of education				
Primary	5.9	3.4-8.4	7.7	3.6-11.8
Secondary	5.1	3.6-6.7	6.4	4.6-8.1
University degree	3.5	1.5-5.5	2.7	1.0-4.4
Unemployed				
Employed	4.3	3.2-5.5	5.6	4.2-7.1
Unemployed	8.8	2.3-13.3	4.4	2.0-6.9
	Mean	*95%CI*	*Mean*	*95%CI*
Time spent on screen (h/day)	2.03	1.98-2.07	1.41	1.35-1.47
Level of education				
Primary	2.16	2.08-2.25	1.73	1.5-1.95
Secondary	2.08	2.01-2.14	1.53	1.45-1.6
University degree	1.77	1.68-1.87	1.07	0.98-1.15
Unemployed				
Employed	2.01	1.96-2.06	1.36	1.29-1.43
Unemployed	2.06	1.92-2.21	1.62	1.48-1.76
Junk food consumption	50.24	49.74-50.74	52.34	51.92-52.76
Level of education				
Primary	47.46	46.36-48.55	50.14	49.0-51.27
Secondary	50.21	49.53-50.89	52.13	51.57-52.68
University degree	52.79	51.91-53.97	53.68	52.93-54.94
Unemployed				
Employed	50.35	49.84-50.87	52.7	52.23-53.16
Unemployed	50.25	48.41-52.01	51.04	50.06-52.02
Physical activity	50.14	49.52-50.76	48.23	47.59-48.87
Level of education				
Primary	50.62	49.21-52.03	46.53	44.7-48.33
Secondary	49.74	48.94-50.54	48.16	47.33-48.99
University degree	50.81	49.44-52.19	49.18	48.0-50.37
Unemployed				
Employed	50.26	49.61-50.92	48.23	47.62-49.04
Unemployed	48.23	46.1-50.37	47.83	46.35-49.31
Risk behaviors	50.52	49.93-51.12	51.74	51.19-52.29
Level of education				
Primary	50.37	49.25-51.48	50.91	49.48-52.34
Secondary	50.01	49.17-50.86	51.51	50.78-52.23
University degree	52.06	50.93-53.19	52.65	51.6-53.69
Unemployed				
Employed	50.59	49.95-51.23	52.07	51.44-52.69
Unemployed	50.44	48.59-52.3	50.5	49.31-51.7
Health status	*%*	*95% CI*	*%*	*95% CI*
Overweight/ obesity	18.49	16.5-20.4	26.96	24.6-29.2
Level of education				

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	Mean	95% CI	Mean	95% CI
Primary	23.15	18.75-27.55	35.46	28.64-42.29
Secondary	18.99	16.39-21.6	28.22	25.14-31.3
University degree	13.1	9.5-16.5	21.35	17.43-25.26
Unemployed				
Employed	18.16	16.13-20.2	25.26	22.74-27.78
Unemployed	20.58	14.19-26.96	33.8	28.35-39.25
	Mean	*95% CI*	*Mean*	*95% CI*
KIDSCREEN-10	81.03	80.70-81.7	85.39	84.35-86.04
Level of education				
Primary	80.55	79.15-81.24	82.35	80.62-84.07
Secondary	81.29	80.39-82.19	85.34	84.69-86.39
University degree	80.83	79.35-82.31	86.52	85.34-87.7
Unemployed				
Employed	81.24	80.53-81.96	85.89	85.18-86.6
Unemployed	79.26	77.11-81.42	83.38	81.88-84.88
TDS-SDQ	7.83	7.54-8.12	7.33	7.11-7.56
Level of education				
Primary	8.59	8.02-9.16	7.79	7.17-8.42
Secondary	8.27	7.87-8.68	7.57	7.26-7.88
University degree	6.03	5.52-6.664	6.67	6.28-7.06
Unemployed				
Employed	7.69	7.38-7.99	7.08	6.82-7.33
Unemployed	8.99	8.0-9.97	8.35	7.83-8.87

TDS-SDQ: Total Difficulties Score, Strengths and Difficulties Questionnaire. Overweight/obesity includes children 2 years onward (n=3881); never having breakfast, time spent on screen, and junk food consumption include children 3 years onward (n=3682); TDS-SDQ includes children 4 years and older (n= 3365); Risk behaviors, physical activity, and Kidscreen-10 include children 6 years and older (n= 2681).

Source: Catalan Health Department. Catalan Health Interview Survey.

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The results of multivariate analysis of health behavior are shown in Table 4. Differences by

maternal education level were found for junk food consumption and time spent on screen, and

by employment status in never having breakfast. Junk food consumption improved in 2010-12

in families with a maternal primary education level (beta, [B]= 2.85; 0.83 to 4.88, for the

interaction term of survey by primary education level) and never having breakfast decreased

in unemployed families in 2010-12 (odds ratio [OR]= 0·33; 0·13-0·80; for survey by

employment status).

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Table 4 Multivariate analysis of health behaviors. ESCA 2006 and 2010-12 (weighted data)

	Junk food consumption		Physical activity		Risk behaviors		Time spent on screen		Never having breakfast	
	B	95% CI	*B*	95% CI	*B*	95% CI	*B*	95% CI	OR	95% CI
Sex										
Boys	Ref		Ref		Ref		Ref		Ref	
Girls	0.53	-0.12 to 1.18	**-4.74**	**-5.61 to -3.86**	**2.19**	**1.37 to 3.0**	**-0.23**	**-0.3 to 0.16**	0.99	0.69-1.41
Age	**-0.3**	**-0.4t to -0.21**	0.07	-0.09 to 0.24	0.03	-0.12 to 0.19	**0.09**	**0.08 to 0.1**	**1.14**	**1.08-1.21**
Maternal education										
Primary	**-4.64**	**-6.07 to -0.21**	-0.03	-1.99 to 1.92	-1.5	-3.13 to 0.13	**0.3**	**0.17 to 0.43**	1.34	0.63-2.84
Secondary	**-2.25**	**-3.37 to -1.13**	-0.92	-2.51 to 0.65	**-1.96**	**-3.4 to -0.52**	**0.26**	**0.15 to 0.36**	1.2	0.6-2.39
University degree	Ref		Ref		Ref		Ref		Ref	
Survey										
2006	Ref		Ref		Ref		Ref		Ref	
2010-12	0.89	-0.27 to 2.06	-1.32	-3.16 to 0.5	0.78	-0.76 to 2.34	**-0.72**	**-0.84 to -0.59**	0.79	0.32-1.95
Employed										
Employed	Ref		Ref		Ref		Ref		Ref	
Unemployed	0.4	-1.45 to 2.27	-1.87	-4.1 to 0.36	0.18	-1.85 to 2.22	0.003	-0.13 to 0.14	**2.09**	**1.12-3.88**
Family type										
Biparental	Ref		Ref		Ref		Ref		Ref	
Monoparental	-0.89	-2.92 to 1.13	1.71	-0.53 to 3.98	**-4.73**	**-7.33 to -2.14**	0.08	-0.08 to 0.25	0.79	0.32-1.91
Origin										
Native	Ref		Ref		Ref		Ref		Ref	
Immigrant	**-3.93**	**-5.82 to -2.04**	-0.18	-2.6 to 2.22	1.7	-0.33 to 3.73	0.12	-0.02 to 0.27	1.19	0.53-2.64
Interaction terms										
Primary educ.* survey	**2.85**	**0.83 to 4.88**	-1.77	-4.7 to 1.16	-0.17	-2.64 to 2.3	0.14	-0.11 to 0.4	2.09	0.63-6.93
Secondary educ.*survey	1.22	-0.22 to 2.67	0.08	-2.05 to 2.3	0.87	-1.04 to 2.78	0.10	-0.04 to 0.26	1.92	0.71-5.23
Employment*Survey									**0.33**	**0.13-0.8**
Origin*Survey							**0.23**	**0.002 to 0.45**	1.05	0.37-2.94
Family type* Survey	1.82	-0.55 to 4.2	-1.85	-4.78 to 1.08	2.77	-0.35 to 5.9	-0.005	-0.26 to 0.25	1.46	0.37-4.45

Statistically significant coefficients are shown in bold. All models are adjusted by the remaing variables in the equation. Source: Catalan Health Department. Catalan Health Interview Survey.

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The likelihood of overweight/obesity increased in 2010-12 (OR=1·81; 1·18-2·78) (Table 5).

Several factors were associated with overweight/obesity in the overall sample, whereas never

having breakfast before leaving home (OR=2·65; 1·11-6·31) was associated with increasing the

likelihood of obesity in 2010-12. An improvement in HRQOL was found in 2010-12 (B= 6·07;

4·15 to 7·99), although children with a maternal primary education showed lower (worse)

scores on the KIDSCREEN-10 index in this survey (B= -4.14; -7.17 to -1.12). Differences in

mental health were found in the overall sample according to the level of education and in

single parent families, while differences in TDS-SDQ scores according to maternal education

decreased in 2010-12.

Table 5 Multivariate analysis of health status variables (logistic regression model for overweight/obesity, and linear regression models of KIDSCREEN-10, and SDQ). ESCA 2006 and 2010-12 (weighted data)

	Overweight/ obesity		KS-10		TDS-SDQ	
	OR	95% CI	B	95% CI	B	95% CI
Sex						
Boys	Ref		Ref		Ref	
Girls	0.88	0.73-1.06	0.67	-0.26 to 1.62	**-0.91**	**-1.27to -0.55**
Age	**0.91**	**0.88-0.94**	**-0.33**	**-0.52 to -0.14**	**-0.08**	**-0.13 to -0.02**
Maternal education						
Primary	**1.80**	**1.16-2.80**	0.29	-1.81 to 2.41	**2.28**	**1.52 to 3.03**
Secondary	**1.55**	**1.06-2.29**	0.87	-0.88 to 2.63	**2.02**	**1.38 to 2.65**
University degree	Ref		Ref		Ref	
Survey						
2006	Ref		Ref		Ref	
2010-12	**1.81**	**1.18-2.78**	**6.07**	**4.15 to 7.99**	0.48	-0.14 to 1.1
Unemployed						
Employed	Ref		Ref		Ref	
Unemployed	1.20	0.77-1.89	-2.1	-4.41 to 0.21	0.85	-1.14 to 1.85
Family type						
Biparental	Ref		Ref		Ref	
Monoparental	1.30	0.95-1.79	**-2.28**	**-4.02 to -0.55**	**1.1**	**0.41 to 1.78**
Origin						
Native	Ref					
Immigrant	**1.67**	**1.28-2.19**				
Having breakfast						
Sometimes /every day	Ref					
Never	0.94	0.47-2.18				
Time on screen	1.05	0.95-1.16				
Junk food	**0.99**	**0.98-1.00**				
Restriction of activity (12m)						
No			Ref		Ref	
Yes			**-3.01**	**-5.33 to -0.69**	**0.92**	**0.07 to 1.77**
Chronic conditions						
No chronic conditions					Ref	
One					**1.12**	**0.72 to 1.52**

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More than one					**2.95**	**2.39 to 3.51**
Interaction terms						
Primary education* survey	0.82	0.45-1.50	**-4.14**	**-7.17 to-1.12**	**-1.23**	**-2.29 to -0.17**
Secondary educ.* survey	0.89	0.54-1.45	-1.6	-3.8 to 0.66	**-1.19**	**-1.99 to -0.4**
Unemployment * survey	1.05	0.61-1.81	0.07	-2.77 to 2.93	-0.11	-1.02 to 1.25
Having breakfast * survey	**2.65**	**1.11-6.31**				

KS-10: KIDSCREEN-10 Index; TDS-SDQ: Total Difficulties Score, Strengths and Difficulties Questionnaire. Statistically significant coefficients are shown in bold. All models are

adjusted by the remaining variables in the equation. Source: Catalan Health Department. Catalan Health Interview Survey

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Discussion

This study shows that there has been an increase in social inequalities in Catalonia with higher

levels of unemployment in families with lower level of education. Certain behavior patterns

improved in disadvantaged families in 2010-12, such as junk food consumption and having

breakfast before leaving home. Nevertheless, an alarming increase in overweight/obesity in

the total population was found during the study period. HRQOL was better in the second

survey. Nevertheless, disparities appeared, with lower HRQOL scores in children from families

with a maternal primary education. Inequality has remained in mental health.

Although it is not possible to directly attribute changes found in the present study to the

impact of the crisis, it is clear that children's living conditions have worsened in this 6-year

study period, and this change has had impact on their health.

According to the UNICEF report child poverty increased in Spain by 53% between 2007 and

2010.[7] This factor is associated with a reduction in family expenditure, changes in food habits,

loss of housing, and rising inequality. In Catalonia, the Living Conditions Survey (LCS) [20]and the

Household Budget Continuous Survey (HBS) [21]provide data on family living conditions and the

risk of poverty. The percentage of children 16 years and younger at risk of poverty has

increased from 20.6% in 2005 to 23.7% in 2010 after social transfers. The population younger

than 17 years living in unemployed families has increased from 3.7% to 11.2%. The percentage

of school dropouts decreased from 33% to 29% between 2005 and 2010, whereas

unemployment in persons 16 to 24 years of age has increased more than 2.5-fold (15% to

40%).[22] In addition to reinforcing these figures, the results of this study include the impact on

physical and mental health, and quality of life.

Some results of the present study, such as improving eating habits in children from

disadvantaged families seem to contradict the great increase in obesity that was found in the

study period. It is likely that this improvement has not been sufficient to overcome the

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negative impact of factors such as resource unavailability on family foods, the ability to cope

with stress, and increased inequalities in HRQOL. The attributable risk of obesity was 26% for

education level in ESCA 2010-12. Moreover, in this specific case, which showed a very

important social gradient, certain measures taken by the Catalan government, such as

restricting the use of food stamps, will increase the risk of inequalities in relation to obesity.

These facts support the need for stronger protection mechanisms during the crisis to reduce

the effect of deficits in the family and social resources related to healthy child development.

Inequalities in children's mental health were described in Catalonia (ESCA 2006) [23] and Spain

(Spanish Health Survey 2006) [24] Social inequalities according to maternal education level have

persisted with the crisis. However, these previous studies did not report inequalities in quality

of life. This is the first time this inequality has been found in relation to both education level

and employment status in Catalonia, and it is likely a result of continuous exposure to stress in

the most vulnerable population. The higher average HRQOL scores in the 2010-12 survey may

be related, in part, to the younger age of the second sample.

Some limitations of the study deserve comments. Differences in the characteristics of the

sample in the two surveys may have influenced the results. The ESCA 2010-12 sample was

younger and mothers were more educated. The results on education level reflect true

differences in the general population of Catalonia. According to the census data[25], the

percentage of women with university degrees increased between 2005 and 2010. These

changes could be reflected in the better HRQOL found in the overall 2010-12 sample of the

present study, although the figures could also be associated with secular trends. The

percentage of unemployed households seems to be underestimated in ESCA 2010-12: in 11%

of households all members were unemployed in 2010 according a previously mentioned

survey[22], whereas in ESCA 2010-12, the figure was 5%. These results may underestimate the

impact of the crisis on inequalities in children's health. Differences in the percentage of

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children from immigrant families could be attributed to data collection in 2006, which was less exhaustive with respect to the variable *parents' place of birth.* For this reason, the results related to this variable should be interpreted with caution. However, all these differences may mask even greater disparities. Moreover, the rest of the questionnaire was similar in both surveys, data are very consistent, and the results of the study are valid and useful to analyze the impact of the crisis on child health. It is well recognized that proxy-reported weight and height may carry some bias compared to objective measures. However, there was no differential bias by educational level or any other variable analyzed; hence this does not invalidate the results regarding factors associated with overweight in children. Moreover, if other cut-off points were used different results in terms of percentages of overweight and obesity have been shown [26]. Finally, the duration of unemployment and whether the unemployed person was receiving a subsidy were not analyzed. An analysis of these factors might enable a more in-depth examination of the impact of unemployment, and should be addressed in future studies.

The Commission on Social Determinants of Health of the World Health Organization has proposed eliminating the health gap in one generation[27] and has emphasized that inequalities in early child development are one of the main factors contributing to create inequalities in adult health[28]. It should be noted that the living conditions of children have deteriorated and that inequalities in childhood obesity and quality of life have increased with the crisis. It is necessary to urgently implement policy measures that fight against these inequalities. Otherwise they will have a negative impact on the health of future generations of Catalans. It is also important to monitor and evaluate the impact of public policies aimed at overcoming the crisis.

Authors' contributions

Luis Rajmil and María-José Fernández de Sanmamed carried out the literature search. All authors participated in the study design. Antonia Medina Bustos and Anna Mompart Penina participated in the data collection. Luis Rajmil analyzed the data. All authors contributed to the data interpretation and writing the manuscript.

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Conflicts of interest
Authors report no conflicts of interest

Data sharing

The data comes from the Health Interview Survey of Catalonia, an official survey. We did not used any other unpublished additional data

References

1   Marcus R, Gavrilovic M. The Impacts of the Economic Crisis on Youth. Review of Evidence. London: Overseas Development Institute; 2010.

2   Margerison Zilko I. Economic contraction and birth outcomes: an integrative review. Human Reproduc Update 2010;**16**: 445–58.

3   Dávila-Quintana CD, González López-Valcarcel B. Crisis económica y salud. Gac Sanit 2009;**23**(4):261–5.

4   Bremberg S. Does an increase of low income families affect child health inequalities? A Swedish case study. J Epidemiol Community Health 2003; **57**:584–88

5   Withham G. Child poverty in 2012. It shouldn't happen here. London: Save the children; 2012.

6   Berger RP, Fromkin JB, Stutz H, et al. Abusive Head Trauma During a Time of Increased Unemployment: A Multicenter Analysis. Pediatrics 2011;**128**:637-43.

7   González-Bueno G, Bellos A, Arias M. La infancia en España 2012-2013. El impacto de la crisis en los niños. Madrid: UNICEF España; 2012.

8   Navarro V, Clua-Losada M. El impacto de la crisis en las familias y en la infancia. Barcelona: Observatorio social de España; 2012.

9   Direcció General de Regulació, Planificació i Recursos Sanitaris. Departament de Salut, Generalitat de Catalunya. Enquesta de salut de Catalunya 2010-2014. Fitxa técnica. Generalitat de Catalunya; 2012. Available at: www.gencat.cat\salut\esca

10   Departament de Salut. La salut de la població infantil a Catalunya. Enquesta de salut de Catalunya. Barcelona: Generalitat de Catalunya, Departament de Salut, Direcció General de Planificació i Avaluació; 2009.

11   Mompart-Penina A, Medina-Bustos A, Guillén-Estany M, et al. Características metodológicas de la Encuesta de Salud de Cataluña 2006. Med Clin (Barc) 2011;**137** Supl 2:S3-8.

12   Serra Majem L, Aranceta Bartrina J, Pérez Rodrigo C, et al. Dossier de Consenso. Curvas de Referencia para la Tipificación Ponderal. Población Infantil y Juvenil. Madrid: IM&C,2002: p.1–83.

13   SDQ. Information for researchers and professionals about the Strengths & Difficulties Questionnaires. Available at: www.sdqinfo.com. Accesed January 11, 2013.

14   Goodman R. The Strengths and Difficulties Questionnaire: a research note. J Child Psychol Psychiatry 1997;**38**:581-6.

15   The KIDSCREEN Group Europe. The KIDSCREEN questionnaires. Handbook. Lengerich, Germany: Pabst Science Publishers; 2006.

16   Ravens-Sieberer U, Erhart M, Rajmil L, et al. Reliability, construct and criterion validity of the KIDSCREEN-10 score: a short measure for children and adolescents' well-being and health-related quality of life. Qual Life Res 2010;**19**:1487-500.

17   Flash Eurobarometer. Parents views on the mental health of their child. Analytical report. Brussels: Eurobarometer; 2009.

18   Rajmil L, Serra-Sutton V, Alonso J, et al. Validity of the Spanish version of the child health and illness profile-adolescent edition (CHIP-AE). Med Care 2003;**41**:1153-63.

19   Estrada MD, Rajmil L, Serra-Sutton V, et al. Reliability and validity of the Spanish version of the Child Health and Illness Profile-Child Edition Parent Report Form (CHIP-CE/PRF). Health Qual Life Outcomes 2010;**8**:78.

20   Institut d'Estadística de Catalunya (IDESCAT). Taxa de risc de pobresa. Available at: http://www.idescat.cat/territ/BasicTerr?TC=5&V0=3&V1=3&V3=1782&V4=1839&ALLINFO=TRUE&PARENT=25&CTX=B

21   Institut d'Estadística de Catalunya (Idescat). Enquesta de pressupostos familiars. Available at: http://www.idescat.cat/cat/societat/qualitat/edcl.html

22   Rajmil L, Fernandez de Sanmamed MJ. Destruction of a less developed welfare state and impact on the weakest, the youths. BMJ 2012. Available at: http://www.bmj.com/content/343/bmj.d7973?tab=responses.

23   Rajmil L, López-Aguilà S, Mompart Penina A, et al. Socio-economic inequalities in children's mental health in Catalonia. An Pediatr (Barc) 2010;**73**:233-40.

24   Barriuso-Lapresa L, Hernando Arizaleta L, Rajmil L. Social inequalities in mental health and health-related quality of life in children in Spain. Pediatrics 2012;**130**:e528–35

25   Catalan Institute of Statistics (Idescat). Registration office. Accessed 06/21/2013. Available at: www.idescat.catIDESCAT

22

26   Cole TJ, Bellizi MC, Flegal KM, et al. Establishing standard definition for child overweight and obesity: international survey. BMJ. 2002;**320**:1240-3.

27   World Health Organization (WHO) Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. Geneva: WHO; 2008.

28   Early Child Development Knowledge Network (ECDKN). Early child development: a powerful equalizer. Final report of the Early Child Development Knowledge Network of the Commission on Social Determinants of Health. Geneva: World Health Organization; 2007.

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Impact of the economic crisis on children's health in Catalonia: a before-after approach

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Abbreviations:
CHIP: Child health and Illness Profile
HRQOL: health-related quality of life
SDQ: Strengths and Difficulties Questionnaire

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Abstract

Objectives: To analyze changes in the family living conditions of children in Catalonia between 2006 and the 2010-2012 period, and to study associations between these changes and health outcomes ~~and healthcare service use in this population~~.

Design: A before-after analysis of two cross-sectional surveys

Setting: Population younger than 15 years old from Catalonia, Spain

Participants: Representative samples of children in the 2006 Catalan Health Survey (ESCA, baseline, before the crisis, n=2200) and the first 4 waves of ESCA 2010-12 (after start of the crisis, n=1967).

Main outcome measures: Overweight/obesity, health behavior, mental health, and health-related quality of life (HRQOL)~~, and use of healthcare services~~. Logistic regression and multiple linear regression models were used to analyze the influence of changes in family conditions on outcome measures, including interaction terms to describe the potential influence of the study period on the results.

Results: The percentage of unemployed families rose from 9·1% (2006) to 20·6% (2010-12), with inequalities by level of education. Overweight/obesity increased from 18.4% (95% CI 16.5-20.4) to 26.9% (24.6-29.2) in 2010-12, and inequalities related to maternal education and employment status persisted. Eating habits have improved in 2010-12 in disadvantaged families (ie, junk food consumption improved in families with a maternal primary education level; beta [B]=2.85, 0.83-4.88, for the survey interaction by primary education level). An improvement in HRQOL was found in the second survey (~~Beta~~[B]= 6.07; 4.15 to 7.99), although children whose mothers had a primary education showed poorer HRQOL scores in this survey than in 2006 (B= -4.14; -7.17 to -1.12). In 2010-12, double healthcare coverage was associated with a higher likelihood of health visits.

Conclusions: ~~Inequalities in childhood obesity and quality of life have increased with the economic crisis.~~ Although some health-related behavior improved during the study period, childhood obesity increased and inequalities in health-related quality of life appeared. Policy measures that fight against these inequalities should be urgently implemented to avoid their negative impact on the health of future generations of Catalans.

KEYWORDS: Child health disparities; inequities; economic crisis; health-related quality of life; obesity

1) Article focus

- The current economic and financial crises have worsened the living conditions of children in Catalonia, Spain, comparing 2006 and 2010-12

- Worsening of socioeconomic conditions associated with the crisis would more specifically affect the children of disadvantaged families

- An increase in unhealthy behavior and in inequalities related to obesity and mental health would also be expected.

2) Key messages

- An increase in social inequalities has occurred in Catalonia, with higher levels of unemployment in families with lower levels of education.
- Although some health-related behavior improved in the overall population in the period studied, ~~inequalities~~ disparities in childhood obesity remained and inequalities in health-related quality of life appeared according to the level of education. ~~increased with the economic crisis~~

3) Strengths and limitations

- The content of the questionnaire was similar in both surveys, data are consistent and proved to be valid and useful to analyze the impact of the crisis on child health
- It is not possible to directly attribute changes found in the present study to the impact of the crisis. Nevertheless, it is clear that children's living conditions have worsened in this 6-year study period, and this change has had an impact on their health.
- The sample in the 2010-12 Catalan health interview survey were slightly younger and with higher maternal education level than the 2006 sample. However, these differences may mask even greater disparities.

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Introduction

The current economic and financial crisis has affected the whole of Europe's economy, although the impact in each country depends on the starting point, mechanisms of social protection and social transfers, and the measures governments have adopted to fight the crisis.

A review of the evidence related to the impact of the crisis on the health of young people (15-24y) has found increasing levels of ill health, particularly with regard to sexually transmitted disease and substance abuse, and a general decline in the use of healthcare services.[1] A comprehensive review of the impact on neonatal outcomes has reported inconclusive results regarding low birth weight and neonatal mortality.[2] Some positive aspects have also been described.[3] A decrease in environmental pollution and traffic accidents is expected, and the crisis occurring in the 1990s had a positive impact on health in the Nordic countries.[4] In the current crisis even that effect varies between countries, a recent report from the UK has revealed a significant impact on the eating habits of children from families in poverty.[5] In the US, an association was reported between economic recession measured by unemployment rates and head injuries due to violence against children.[6]

In Spain, the government has significantly cut public health and education budgets, and has reduced aid to families with children in the lower socioeconomic strata. Spain's UNICEF report has analyzed the growth of poverty in children, which is higher than in the remainder of the population.[7] Another recent study emphasizes that the crisis has manifested in a particularly acute form in households with children, and has caused a greater decline and greater social exclusion than in households with no children.[8] However, there is little data comparing children's health before and after the crisis started.

In Catalonia, a northeastern region of Spain, the Catalan Health Survey (Enquesta de Salut de Catalunya, ESCA),[9] has provided the opportunity to analyze the effects of the crisis on the

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health of our children. The objectives of this study were to analyze changes in the family life conditions and socioeconomic status of children (0-14 y) in Catalonia between 2006 and the 2010-2012 period, and to study the association of these changes with modifications in health-related behavior, physical and mental health, and health-related quality of life (HRQOL); and to describe the related changes in the pattern of healthcare service use. The main hypothesis was that worsening of socioeconomic conditions associated with the crisis would more specifically affect the children of disadvantaged families. An increase in unhealthy behavior and in inequalities related to obesity and mental health would also be expected. In contrast, no differences would be expected in HRQOL or in the pattern of healthcare service use between years 2006 and 2010-12.

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Methods

 The study design is a before-after analysis of data from two separate cross-sectional representative samples of children in the 2006 ESCA survey (baseline, before the crisis) and the first 4 waves of ESCA 2010-12 (after the start of the crisis). The ESCA Statistical Plan is a part of the Autonomous Government of Catalonia and is regulated by Decree 467/2004 of December 28, according to which the performance statistics have been approved yearly since 2005. It is an official statistic, so selected individuals are likely to participate in the survey, which meets all the regulatory requirements, in particular confidentiality of the data obtained. The ESCA is conducted by the Department of Health of the Government of Catalonia. All analyses using ESCA data must be anonymized, so that no individual information is identifiable.

Sampling selection and procedures

ESCA 2006 was undertaken from December 2005 to July 2006.[10] The survey consisted of a multistage probability sample representative of the non-institutionalized population, stratified by age, sex, and municipal size for each territorial health government within Catalonia.[11] The sample size of children 14 years of age and younger from ESCA 2006 was established at 2200 individuals. The sample was stratified according to the size of the municipalities, and the final stage consisted in random selection of individuals from the Catalonian population register for each selected municipality. 65% percent of interviews were carried out in the selected individuals, and 22% in the first substitute. Data for children ≤14 years old were obtained from proxy respondents (mainly mothers) by means of a structured interview.

Between the second half of 2010 and the first half of 2012, the fieldwork was performed for the first 4 waves of the continuous ESCA 2010-12.[9] The results are representative of the whole of Catalonia. Sample size was estimated at approximately 2500 interviews twice yearly, of which 1967 were addressed to the population ≤14 years old after the first 4 waves. ESCA 2010-

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12 was conducted following the same method of administration as the survey in 2006. In this second survey, 68% of proxy respondent interviews for children ≤14 years were carried out in the selected individuals, and 17% in the first substitute. Home interviews were conducted by trained interviewers in both periods.

Measures

Restriction of activities in the previous 12 months (yes/no) and reporting of chronic conditions (no chronic conditions/one/more than one) were collected. Overweight/obesity was based on the body mass index (BMI) calculated through the parents' report of weight and height, and using specific cut-off points for Spain.[12]

Mental health was assessed using the parents' version of the Strengths and Difficulties Questionnaire (SDQ).[13, 14] The sum of the scores on 4 scales related to negative aspects yields the Total Difficulties Score (TDS-SDQ), with a range of 0 to 40. The higher the TDS-SDQ score, the poorer is the child's mental health. Evaluation of HRQOL used the shortest parent-reported version of the KIDSCREEN (KS) instrument, the KS-10 index.[15, 16] In the present study, the KS-10 was computed in keeping with the version used in the European Eurobarometer study.[17] The modified KS-10 scores were transformed to a scale of 0 to 100: the higher the score, the better the HRQOL.

The Junk food consumption (4 items), Physical activity (6 items), and Risk behavior (5 items) scales came from the parent version of the Child Health and Illness Profile (CHIP).[18, 19] Mean scores on these scales were standardized to a mean of 50 and 1 standard deviation (SD) = 10, according to the ESCA 2006 sample. Higher scores reflect less junk food consumption and risk behavior, and greater physical activity. The number of times per week a child had breakfast at home was collected in a single question with a 4-point Likert scale (recoded as never vs the remaining categories). The mean number of hours a day the child spent viewing TV, computers, etc. was collected as an indicator of sedentary behavior. Physical activity, risk

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behavior and KS-10 results were collected in children 6 years and older, SDQ included children

from 4 years onward, time spent on screen, never having breakfast, and junk food

consumption were collected from 3 years onward, and BMI was collected in children 2 years

and older. ~~The use of healthcare services was collected in the whole sample and included visits~~

~~to the pediatrician or general practitioner (GP) in the last year (yes/no), any specialist visits in~~

~~the last year (yes/no), visits to any healthcare professional in the last 15 days (yes/no), and~~

~~visits to the dentist in the last year (yes/no).~~

Sociodemographic variables included age, sex, and ==family maternal level of education as a==

==measure of== socioeconomic status (SES). Educational level referred to the highest level of

schooling completed by the mother, categorized into 3 groups: primary school or less,

secondary school, and university degree. The family structure (single-parent family vs two-

parent family), and child's origin (native vs immigrant, when both parents and/or the child

were born in a developing country was also included. Family employment status ==(unemployed)==

was collected and coded as a dichotomous variable (unemployed vs employed, student, etc.) if

at least one parent reported current unemployed status. ~~The type of healthcare coverage was~~

~~collected and recoded as only public (National Health Service, NHS) vs. double healthcare~~

~~coverage if additional private healthcare insurance was declared.~~

Statistical analysis

The percentage (or mean) and 95% confidence interval (95% CI) was computed for each

variable analyzed according to sociodemographic characteristics and study period.

The association between changes in family socioeconomic conditions and health-related

factors, mental health, and HRQOL were analyzed by means of logistic regression or multiple

linear regression models, depending on the nature of the dependent variable. All models

included the study period as an independent variable (2006=0 and 2010-12=1). Interaction

terms between SES, health-related factors, and study period were also explored to ==consider==

==the possibility== ~~analyze the influence~~ of changes ==over time== in the ==effect of SES and health-==

==related factors== ~~study period~~ on the outcome measures. Analyses were carried out using Stata

10.0, considering the complex sampling design by applying specific weights for each survey in

the estimation of ==coefficients== ==and== variance.

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Results

The characteristics of the samples in ESCA 2006 and 2010-12 are shown in Table 1. Mean age was 7.9y (standard deviation [SD] 0.08) in 2006 and 6.9y (0.08) in 2010-12 (p<0.01). ESCA 2006 showed a lower percentage of children from families with a maternal university degree (22.8% vs. 29.5%, p<0.01), families of immigrant origin (9.5% vs. 20.1%), and unemployed families (9.1% vs. 20.6%, p<0.01).

Table 1 Sociodemographic characteristics of the sample. ESCA 2006 and 2010-12 (unweighted data)

	2006		2010-12		*p*
	N	%	N	%	
Sex					
Girls	1064	48.5	970	49.3	0.55
Age					
Mean (SD)	2200	7.85 (0.08)	1967	6.93 (0.08)	<0.01
0 – 4y	544	25.1	552	28.1	
5 – 9y	842	38.5	899	45.7	
10 – 14y	814	36.5	516	26.2	<0.01
Maternal level of education					
Primary education	473	20.0	275	14.0	
Secondary education	1227	57.2	1112	56.5	
University degree	493	22.8	580	29.5	<0.01
Type of family					
Single parent	199	9.0	193	9.8	0.39
Migration status					
Immigrant	209	9.5	395	20.1	<0.01
Unemployed					
At least one unemployed	161	8.6	303	15.5	
Both members unemployed	23	0.5	100	5.1	<0.01

Missing values 2006: level of education (7); ~~family~~ unemployed ~~status~~ (56); 2010-12: type of family (3); ~~family~~ unemployed ~~status~~ (10). Source: Catalan Health Department. Catalan Health Interview Survey.

Table 2 shows changes in unemployment according to sociodemographic variables. The percentages of unemployed families have increased in ESCA 2010-12 (9.7%; 8.2-11.2 in ESCA 2006 and 20.7%; 18.8-22.7 in ESCA 2010-12). This change was particularly important in families with a maternal primary education (12.7%; 9.0-16.4 in 2006 to 36.3%; 30.0-42.6).

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Table 2. Changes in family employment status according to sociodemographic characteristics. ESCA 2006 and 2010-12 (weighted data).

	2006		2010-2012	
	% unemployed	95% CI	% unemployed	95% CI
Total	9.7	8.2-11.2	20.7	18.8-22.7
Age				
0-4 y	11.6	8.2-14.9	22.1	18.4-25.8
5-9 y	8.5	6.2-10.7	19.6	16.8-22.4
10-14 y	9.7	7.2-12.3	20.4	16.6-24.2
Sex				
Girl	9.7	7.5-11.8	22.6	19.6-25.5
Boy	9.8	7.6-11.9	19.0	16.4-21.7
Level of education				
Primary	12.7	9.0-16.4	36.3	30.0-42.6
Secondary	11.4	9.2-13.5	22.2	19.5-25.0
University degree	3.0	1.4-4.7	11.6	8.6-14.5
Type of family				
Biparental	9.6	8.0-11.1	19.9	17.8-21.9
Monoparental	11.6	5.6-17.6	27.8	20.9-34.7

Source: Catalan Health Department. Catalan Health Interview Survey.

The results of health behavior, obesity, HRQOL, and mental health, according to maternal education level and family employment status are summarized in Table 3 2. Mean time spent on screen was lower in 2010-12 (2.0 in 2006 vs 1.4 in 2010-2012). The prevalence of overweight/obesity was 18.5% (16.5-20.4) in 2006 and 27.0% (24.6-29.2) in 2010-12. Obesity in children increased from 23.2% (18.8- 27.6) to 35.5% (28.6-42.3) in families with a maternal primary education, and from 13.1% (9.5- 16.5) to 21.4% (17.4-25.3) in those with a maternal university degree. A higher percentage of obesity was also found in the last survey for children of unemployed families in 2010-2012 (33.8%; 28.4-39.3). The KS-10 showed higher mean scores (better) in 2010-12 (85.4; 84.4-86.0) compared to 2006 (81.0; 80.7-81.7), but lower scores in children with a maternal primary education (82.4; 80.6-84.1) and unemployed families (83.34; 81.89-84.9). Scores on the TDS-SDQ were slightly lower (better) in 2010-12, but differences have remained in relation to maternal education and employment status.

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Table 2 3 Health behaviors and health status characteristics by maternal level of education and family employment status. ESCA 2006 and 2010-12 (weighted data).

	2006		2010-12	
	%	**95% CI**	**%**	**95% CI**
Health behaviors				
Never having breakfast	4.9	3.8-6.0	5.4	4.8-6.7
Level of education				
Primary	5.9	3.4-8.4	7.7	3.6-11.8
Secondary	5.1	3.6-6.7	6.4	4.6-8.1
University degree	3.5	1.5-5.5	2.7	1.0-4.4
Unemployed				
Employed	4.3	3.2-5.5	5.6	4.2-7.1
Unemployed	8.8	2.3-13.3	4.4	2.0-6.9
	Mean	***95%CI***	***Mean***	***95%CI***
Time spent on screen (h/day)	2.03	1.98-2.07	1.41	1.35-1.47
Level of education				
Primary	2.16	2.08-2.25	1.73	1.5-1.95
Secondary	2.08	2.01-2.14	1.53	1.45-1.6
University degree	1.77	1.68-1.87	1.07	0.98-1.15
Unemployed				
Employed	2.01	1.96-2.06	1.36	1.29-1.43
Unemployed	2.06	1.92-2.21	1.62	1.48-1.76
Junk food consumption	50.24	49.74-50.74	52.34	51.92-52.76
Level of education				
Primary	47.46	46.36-48.55	50.14	49.0-51.27
Secondary	50.21	49.53-50.89	52.13	51.57-52.68
University degree	52.79	51.91-53.97	53.68	52.93-54.94
Unemployed				
Employed	50.35	49.84-50.87	52.7	52.23-53.16
Unemployed	50.25	48.41-52.01	51.04	50.06-52.02
Physical activity	50.14	49.52-50.76	48.23	47.59-48.87
Level of education				
Primary	50.62	49.21-52.03	46.53	44.7-48.33
Secondary	49.74	48.94-50.54	48.16	47.33-48.99
University degree	50.81	49.44-52.19	49.18	48.0-50.37
Unemployed				
Employed	50.26	49.61-50.92	48.23	47.62-49.04
Unemployed	48.23	46.1-50.37	47.83	46.35-49.31
Risk behaviors	50.52	49.93-51.12	51.74	51.19-52.29
Level of education				
Primary	50.37	49.25-51.48	50.91	49.48-52.34
Secondary	50.01	49.17-50.86	51.51	50.78-52.23
University degree	52.06	50.93-53.19	52.65	51.6-53.69
Unemployed				
Employed	50.59	49.95-51.23	52.07	51.44-52.69
Unemployed	50.44	48.59-52.3	50.5	49.31-51.7
Health status	**%**	**95% CI**	**%**	**95% CI**
Overweight/ obesity	18.49	16.5-20.4	26.96	24.6-29.2
Level of education				

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	Mean	95% CI	Mean	95% CI
Primary	23.15	18.75-27.55	35.46	28.64-42.29
Secondary	18.99	16.39-21.6	28.22	25.14-31.3
University degree	13.1	9.5-16.5	21.35	17.43-25.26
Unemployed				
Employed	18.16	16.13-20.2	25.26	22.74-27.78
Unemployed	20.58	14.19-26.96	33.8	28.35-39.25
	Mean	*95% CI*	*Mean*	*95% CI*
KIDSCREEN-10	81.03	80.70-81.7	85.39	84.35-86.04
Level of education				
Primary	80.55	79.15-81.24	82.35	80.62-84.07
Secondary	81.29	80.39-82.19	85.34	84.69-86.39
University degree	80.83	79.35-82.31	86.52	85.34-87.7
Unemployed				
Employed	81.24	80.53-81.96	85.89	85.18-86.6
Unemployed	79.26	77.11-81.42	83.38	81.88-84.88
TDS-SDQ	7.83	7.54-8.12	7.33	7.11-7.56
Level of education				
Primary	8.59	8.02-9.16	7.79	7.17-8.42
Secondary	8.27	7.87-8.68	7.57	7.26-7.88
University degree	6.03	5.52-6.664	6.67	6.28-7.06
Unemployed				
Employed	7.69	7.38-7.99	7.08	6.82-7.33
Unemployed	8.99	8.0-9.97	8.35	7.83-8.87

TDS-SDQ: Total Difficulties Score, Strengths and Difficulties Questionnaire. Overweight/obesity includes children 2 years onward (n=3881); never having breakfast, time spent on screen, and junk food consumption include children 3 years onward (n=3682); TDS-SDQ includes children 4 years and older (n= 3365); Risk behaviors, physical activity, and Kidscreen-10 include children 6 years and older (n= 2681).

Source: Catalan Health Department. Catalan Health Interview Survey.

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The percentage of visits to specialists and the dentist decreased in 2010-12, whereas children with double healthcare coverage reported more visits in the last 15 days to all healthcare professionals and also to specialist in the last year (Table 3).

Table 3 Use of healthcare services by maternal level of education and healthcare coverage. ESCA 2006 and 2010-12 (weighted data)

	2006		2010-12	
	%	95% CI	%	95% CI
Visits to Pediatrician	90.09	88.64-91.53	90.67	89.25-92.08
Level of education				
– Primary	87.22	83.67-90.78	92.53	89.31-95.76
– Secondary	90.22	88.28-92.15	89.26	87.25-91.27
– University degree	92.23	89.58-94.87	92.41	90.03-94.8
Healthcare coverage				
– Public	89.65	87.97-91.34	89.52	87.78-91.26
– Double	91.46	88.63-94.29	93.62	91.3-95.3
Visits in the past 15 days	23.45	21.35-25.55	21.56	19.54-23.58
Level of education				
– Primary	22.43	17.97-26.89	18.81	13.84-23.79
– Secondary	22.58	19.82-25.34	23.02	20.26-25.78
– University degree	26.66	22.0-31.32	20.88	16.45-23.71
Healthcare coverage				
– Public	23.4	21.0-25.8	19.09	16.84-21.34
– Double	23.6	19.24-27.95	27.72	23.51-31.94
Visits to a specialist	45.65	43.04-48.09	38.68	36.31-41.06
Level of education				
– Primary	42.42	37.15-47.68	26.0	20.34-31.65
– Secondary	45.06	41.79-48.73	38.82	35.66-41.99
– University degree	48.88	44.72-55.04	43.88	39.33-48.22
Healthcare coverage				
– Public	43.43	40.65-46.21	33.55	30.86-36.25
– Double	52.69	47.59-57.78	51.29	46.6-55.98
Visits to the dentist	43.16	40.73-45.59	34.62	32.34-36.91
Level of education				
– Primary	37.72	32.6-42.85	27.44	21.78-33.1
– Secondary	42.77	39.53-46.01	35.55	32.48-38.62
– University degree	48.81	43.65-53.97	35.99	31.79-40.19
Healthcare coverage				
– Public	41.47	38.71-44.22	33.03	30.4-35.67
– Double	48.55	43.45-53.65	38.18	33.7-42.66

Source: Catalan Health Department. Catalan Health Interview Survey.

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The results of multivariate analysis of health behavior are shown in Table 4. Differences by

maternal education level were found for junk food consumption and time spent on screen, and

by employment status in never having breakfast. Junk food consumption improved in 2010-12

in families with a maternal primary education level (beta, [B]= 2.85; 0.83 to 4.88, for the

interaction term of survey by primary education level) and never having breakfast decreased

in unemployed families in 2010-12 (odds ratio [OR]= 0·33; 0·13-0·80; for survey by

employment status).

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Table 4. Multivariate analysis of health behaviors. ESCA 2006 and 2010-12 (weighted data)

	Junk food consumption		Physical activity		Risk behaviors		Time spent on screen		Never having breakfast	
	B	95% CI	*B*	95% CI	*B*	95% CI	*B*	95% CI	OR	95% CI
Sex	0.53	-0.12 to1.18	**-4.74**	**-5.61 to-3.86**	**2.19**	**1.37/3.0**	**-0.23**	**-0.3 to-0.16**	0.99	0.69-1.41
Age	**-0.3**	**-0.4t to-0.21**	0.07	-0.09 to 0.24	0.03	-0.12 to 0.19	**0.09**	**0.08 to 0.1**	**1.14**	**1.08-1.21**
Maternal education										
— Primary	**-4.64**	**-6.07 to-0.21**	-0.03	-1.99 to1.92	-1.5	-3.13 to 0.13	**0.3**	**0.17 to 0.43**	1.34	0.63-2.84
— Secondary	**-2.25**	**-3.37 to-1.13**	-0.92	-2.51 to0.65	**-1.96**	**-3.4 to -0.52**	**0.26**	**0.15 to 0.36**	1.2	0.6-2.39
Survey	0.89	-0.27 to 2.06	-1.32	-3.16 to 0.5	0.78	-0.76 to 2.34	**-0.72**	**-0.84 to-0.59**	0.79	0.32-1.95
Employment	0.4	-1.45 to 2.27	-1.87	-4.1 to 0.36	0.18	-1.85 to 2.22	0.003	-0.13 to 0.14	**2.09**	**1.12-3.88**
Family type	-0.89	-2.92 to 1.13	1.71	-0.53 to 3.98	**-4.73**	**-7.33 to -2.14**	0.08	-0.08 to 0.25	0.79	0.32-1.91
Origin	**-3.93**	**-5.82 to-2.04**	-0.18	-2.6 to 2.22	1.7	-0.33 to 3.73	0.12	-0.02 to 0.27	1.19	0.53-2.64
Interaction terms										
Primary educ.* survey	**2.85**	**0.83 to4.88**	-1.77	-4.7 to 1.16	-0.17	-2.64 to2.3	0.14	-0.11 to 0.4	2.09	0.63-6.93
Secondary educ.*survey	1.22	-0.22 to2.67	0.08	-2.05 to 2.3	0.87	-1.04 to 2.78	0.10	-0.04 to 0.26	1.92	0.71-5.23
Employment*Survey									**0.33**	**0.13-0.8**
Origin*Survey							**0.23**	**0.002 to 0.45**	1.05	0.37-2.94
Family type* Survey	1.82	-0.55 to 4.2	-1.85	-4.78 to 1.08	2.77	-0.35 to 5.9	-0.005	-0.26 to 0.25	1.46	0.37-4.45

Reference category: sex: boys; maternal education level: university degree; survey: year 2006; employment: employee; family type: biparental family; origin: native. Source: Statistically significant coefficients are shown in bold. Catalan Health Department. Catalan Health Interview Survey.

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Table 4 Multivariate analysis of health behaviors. ESCA 2006 and 2010-12 (weighted data)

	Junk food consumption		Physical activity		Risk behaviors		Time spent on screen		Never having breakfast	
	B	95% CI	*B*	95% CI	*B*	95% CI	*B*	95% CI	OR	95% CI
Sex										
Boys	Ref		Ref		Ref		Ref		Ref	
Girls	0.53	-0.12 to 1.18	**-4.74**	**-5.61 to -3.86**	**2.19**	**1.37 to 3.0**	**-0.23**	**-0.3 to 0.16**	0.99	0.69-1.41
Age	**-0.3**	**-0.4t to -0.21**	0.07	-0.09 to 0.24	0.03	-0.12 to 0.19	**0.09**	**0.08 to 0.1**	**1.14**	**1.08-1.21**
Maternal education										
Primary	**-4.64**	**-6.07 to -0.21**	-0.03	-1.99 to 1.92	-1.5	-3.13 to 0.13	**0.3**	**0.17 to 0.43**	1.34	0.63-2.84
Secondary	**-2.25**	**-3.37 to -1.13**	-0.92	-2.51 to 0.65	**-1.96**	**-3.4 to -0.52**	**0.26**	**0.15 to 0.36**	1.2	0.6-2.39
University degree	Ref		Ref		Ref		Ref		Ref	
Survey										
2006	Ref		Ref		Ref		Ref		Ref	
2010-12	0.89	-0.27 to 2.06	-1.32	-3.16 to 0.5	0.78	-0.76 to 2.34	**-0.72**	**-0.84 to -0.59**	0.79	0.32-1.95
Employed										
Employed	Ref		Ref		Ref		Ref		Ref	
Unemployed	0.4	-1.45 to 2.27	-1.87	-4.1 to 0.36	0.18	-1.85 to 2.22	0.003	-0.13 to 0.14	**2.09**	**1.12-3.88**
Family type										
Biparental	Ref		Ref		Ref		Ref		Ref	
Monoparental	-0.89	-2.92 to 1.13	1.71	-0.53 to 3.98	**-4.73**	**-7.33 to -2.14**	0.08	-0.08 to 0.25	0.79	0.32-1.91
Origin										
Native	Ref		Ref		Ref		Ref		Ref	
Immigrant	**-3.93**	**-5.82 to -2.04**	-0.18	-2.6 to 2.22	1.7	-0.33 to 3.73	0.12	-0.02 to 0.27	1.19	0.53-2.64
Interaction terms										
Primary educ.* survey	**2.85**	**0.83 to 4.88**	-1.77	-4.7 to 1.16	-0.17	-2.64 to 2.3	0.14	-0.11 to 0.4	2.09	0.63-6.93
Secondary educ.*survey	1.22	-0.22 to 2.67	0.08	-2.05 to 2.3	0.87	-1.04 to 2.78	0.10	-0.04 to 0.26	1.92	0.71-5.23
Employment*Survey									**0.33**	**0.13-0.8**
Origin*Survey							**0.23**	**0.002 to 0.45**	1.05	0.37-2.94
Family type* Survey	1.82	-0.55 to 4.2	-1.85	-4.78 to 1.08	2.77	-0.35 to 5.9	-0.005	-0.26 to 0.25	1.46	0.37-4.45

Statistically significant coefficients are shown in bold. All models are adjusted by the remaing variables in the equation. Source: Catalan Health Department. Catalan Health Interview Survey.

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The likelihood of overweight/obesity increased in 2010-12 (OR=1·81; 1·18-2·78) (Table 5).

Several factors were associated with overweight/obesity in the overall sample, whereas never

having breakfast before leaving home (OR=2·65; 1·11-6·31) was associated with increasing the

likelihood of obesity in 2010-12. An improvement in HRQOL was found in 2010-12 (B= 6·07;

4·15 to 7·99), although children with a maternal primary education showed lower (worse)

scores on the KIDSCREEN-10 index in this survey (B= -4.14; -7.17 to -1.12). Differences in

mental health were found in the overall sample according to the level of education and in

single parent families, while differences in TDS-SDQ scores according to maternal education

decreased in 2010-12.

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Table 5 Multivariate analysis of health status variables (logistic regression model for overweight/obesity, and linear regression models of KIDSCREEN-10, and SDQ). ESCA 2006 and 2010-12 (weighted data)

	Overweight/obesity		KS-10		TDS-SDQ	
	OR	*95% CI*	*B*	*95% CI*	*B*	*95% CI*
Sex	0.88	0.73-1.06	0.67	-0.26 to 1.62	**-0.91**	**-1.27 to -0.55**
Age	**0.91**	**0.88-0.94**	**-0.33**	**-0.52 to -0.14**	**-0.08**	**-0.13 to -0.02**
Maternal education						
— Primary	**1.80**	**1.16-2.80**	0.29	-1.81 to 2.41	**2.28**	**1.52 to 3.03**
— Secondary	**1.55**	**1.06-2.29**	0.87	-0.88 to 2.63	**2.02**	**1.38 to 2.65**
Survey	**1.81**	**1.18-2.78**	**6.07**	**4.15 to 7.99**	0.48	-0.14 to 1.1
Employment	1.20	0.77-1.89	-2.1	-4.41 to 0.21	0.85	-1.14 to 1.85
Family type	1.30	0.95-1.79	**-2.28**	**-4.02 to -0.55**	**1.1**	**0.41 to 1.78**
Origin	**1.67**	**1.28-2.19**				
Having breakfast	0.94	0.47-2.18				
Time on screen	1.05	0.95-1.16				
Junk food	**0.99**	**0.98-1.00**				
Restriction of activity (12m)			**-3.01**	**-5.33 to -0.69**	**0.92**	**0.07 to 1.77**
Chronic conditions						
— One					1.12	0.72 to 1.52
— More than one					**2.95**	**2.39 to 3.51**
Interaction terms						
Primary education* survey	0.82	0.45-1.50	**-4.14**	**-7.17 to 1.12**	**-1.23**	**-2.29 to -0.17**
Secondary educ.* survey	0.89	0.54-1.45	-1.6	-3.8 to 0.66	**-1.19**	**-1.99 to -0.4**
Unemployment * survey	1.05	0.61-1.81	0.07	-2.77 to 2.93	-0.11	-1.02 to 1.25
Having breakfast * survey	**2.65**	**1.11-6.31**				

KS-10: KIDSCREEN-10 Index; TDS-SDQ: Total Difficulties Score, Strengths and Difficulties Questionnaire. Reference category: sex: boys; maternal education level: university degree; survey: year 2006; employment: employee; family type: biparental family; origin: native; having breakfast before leaving home: some times to every day; no restriction of activities and no chronic conditions. Statistically significant coefficients are shown in bold. Source: Catalan Health Department. Catalan Health Interview Survey.

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	Overweight/ obesity		KS-10		TDS-SDQ	
	OR	95% CI	B	95% CI	B	95% CI
Sex						
Boys	Ref		Ref		Ref	
Girls	0.88	0.73-1.06	0.67	-0.26 to 1.62	-0.91	-1.27to -0.55
Age	0.91	0.88-0.94	-0.33	-0.52 to -0.14	-0.08	-0.13 to -0.02
Maternal education						
Primary	1.80	1.16-2.80	0.29	-1.81 to 2.41	2.28	1.52 to 3.03
Secondary	1.55	1.06-2.29	0.87	-0.88 to 2.63	2.02	1.38 to 2.65
University degree	Ref		Ref		Ref	
Survey						
2006	Ref		Ref		Ref	
2010-12	1.81	1.18-2.78	6.07	4.15 to 7.99	0.48	-0.14 to 1.1
Unemployed						
Employed	Ref		Ref		Ref	
Unemployed	1.20	0.77-1.89	-2.1	-4.41 to 0.21	0.85	-1.14 to 1.85
Family type						
Biparental	Ref		Ref		Ref	
Monoparental	1.30	0.95-1.79	-2.28	-4.02 to -0.55	1.1	0.41 to 1.78
Origin						
Native	Ref					
Immigrant	1.67	1.28-2.19				
Having breakfast						
Sometimes /every day	Ref					
Never	0.94	0.47-2.18				
Time on screen	1.05	0.95-1.16				
Junk food	0.99	0.98-1.00				
Restriction of activity (12m)						
No			Ref		Ref	
Yes			-3.01	-5.33 to -0.69	0.92	0.07 to 1.77
Chronic conditions						
No chronic conditions					Ref	
One					1.12	0.72 to 1.52

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More than one					**2.95**	**2.39 to 3.51**
Interaction terms						
Primary education* survey	0.82	0.45-1.50	**-4.14**	**-7.17 to-1.12**	**-1.23**	**-2.29 to -0.17**
Secondary educ.* survey	0.89	0.54-1.45	-1.6	-3.8 to 0.66	**-1.19**	**-1.99 to -0.4**
Unemployment * survey	1.05	0.61-1.81	0.07	-2.77 to 2.93	-0.11	-1.02 to 1.25
Having breakfast * survey	**2.65**	**1.11-6.31**				

KS-10: KIDSCREEN-10 Index; TDS-SDQ: Total Difficulties Score, Strengths and Difficulties Questionnaire. Statistically significant coefficients are shown in bold. All models are adjusted by the remaining variables in the equation. Source: Catalan Health Department. Catalan Health Interview Survey

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The multivariate analysis of healthcare service use is shown in Table 6. The likelihood of visits in the last 15 days (OR= 0.53; 0.37-0.78), and visits to specialists (OR=0.69; 0.5-0.96) decreased in 2010-12. Double healthcare coverage was associated with an increase in the likelihood of visits in the last 15 days in the second survey (OR= 1.66; 1.11-2.49, for the interaction of survey by coverage), and was at the limits of statistical significance in visits to specialists.

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Table 6 Logistic regression models of the use of healthcare services. ESCA 2006 and 2010-12 (weighted data)

	Visits to Pediatrician /GP		Visit to Specialists		Visits in the last 15 days		Visits to the dentist	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Sex	0.96	0.75-1.23	0.98	0.84-1.15	0.96	0.81-1.14	1.04	0.88-1.21
Age	**0.8**	**0.78-0.83**	**1.13**	**1.11-1.16**	**0.92**	**0.9-0.95**	**1.26**	**1.24-1.29**
Maternal education								
– Primary	0.7	0.42-1.18	**0.62**	**0.45-0.87**	0.81	0.55-1.2	**0.52**	**0.37-0.74**
– Secondary	0.85	0.54-1.33	**0.69**	**0.53-0.9**	0.81	0.6-1.09	**0.69**	**0.53-0.9**
Survey	0.71	0.4-1.26	**0.69**	**0.5-0.96**	**0.53**	**0.37-0.78**	**0.68**	**0.49-0.95**
Employment	1.07	0.76-1.51	1.03	0.71-1.49	0.85	0.66-1.09	0.81	0.63-1.02
Origin	0.47	0.29-0.78	0.62	0.43-0.91	0.81	0.51-1.27	**0.62**	**0.4-0.95**
Healthcare coverage	0.99	0.55-1.22	**1.49**	**1.15-1.94**	0.9	0.67-1.21	1.3	0.99-1.69
Chronic conditions								
– One	**1.37**	**1.03-1.81**	**2.37**	**1.99-2.83**	**1.26**	**1.03-1.55**	1.18	0.98-1.42
– More than one	**1.73**	**1.26-2.51**	**5.03**	**4.09-6.18**	**1.98**	**1.59-2.46**	**1.35**	**1.1-1.67**
Restriction of activities	1.46	0.76-2.81	**2.04**	**1.49-2.81**	**1.57**	**1.14-2.18**	0.75	0.53-1.06
Interaction terms								
Primary education* survey	2.15	0.96-4.78	0.8	0.48-1.84	1.68	0.94-2.99	1.37	0.81-2.31
Secondary educ.* survey	1.05	0.57-1.95	1.12	0.78-1.61	**1.76**	**1.17-2.64**	1.2	0.84-1.73
Healthcare coverage* survey	1.5	0.8-2.8	1.42	0.99-2.04	**1.66**	**1.11-2.49**	0.99	0.69-1.42
Origin *survey	1.61	0.85-3.06	0.99	0.61-1.6	0.81	0.47-1.44	1.12	0.96-1.9

Reference category: sex: boys; maternal education level: university degree; survey: year 2006; employment: employee; family type: biparental family; origin: native; healthcare coverage: only public. Statistically significant coefficients are shown in bold. Source: Catalan Health Department. Catalan Health Interview Survey.

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Discussion

This study shows that there has been an increase in social inequalities in Catalonia with higher levels of unemployment in families with lower level of education. ~~Although~~ Certain behavior patterns improved in disadvantaged families in 2010-12, such as junk food consumption and having breakfast before leaving home. Nevertheless, an alarming increase in overweight/obesity in the total population was found during the study period. HRQOL was better in the second survey. Nevertheless, disparities appeared, with lower HRQOL scores in children from families with a maternal primary education. Inequality has remained in mental health. ~~The use of specialists and dentists has decreased, and double health coverage was a factor associated with an increase in the use of healthcare services.~~

Although it is not possible to directly attribute changes found in the present study to the impact of the crisis, it is clear that children's living conditions have worsened in this 6-year study period, and this change has had impact on their health.

According to the UNICEF report child poverty increased in Spain by 53% between 2007 and 2010.[7] This factor is associated with a reduction in family expenditure, changes in food habits, loss of housing, and rising inequality. In Catalonia, the Living Conditions Survey (LCS) [20]and the Household Budget Continuous Survey (HBS) [21]provide data on family living conditions and the risk of poverty. The percentage of children 16 years and younger at risk of poverty has increased from 20.6% in 2005 to 23.7% in 2010 after social transfers. The population younger than 17 years living in unemployed families has increased from 3.7% to 11.2%. The percentage of school dropouts decreased from 33% to 29% between 2005 and 2010, whereas unemployment in persons 16 to 24 years of age has increased more than 2.5-fold (15% to 40%).[22] In addition to reinforcing these figures, the results of this study include the impact on physical and mental health, and quality of life.

Some results of the present study, such as improving eating habits in children from disadvantaged families seem to contradict the great increase in obesity that was found in the

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study period. It is likely that this improvement has not been sufficient to overcome the negative impact of factors such as resource unavailability on family foods, the ability to cope with stress, and increased inequalities in HRQOL. The attributable risk of obesity was 26% for education level in ESCA 2010-12. Moreover, in this specific case, which showed a very important social gradient, certain measures taken by the Catalan government, such as restricting the use of food stamps, will increase the risk of inequalities in relation to obesity. These facts support the need for stronger protection mechanisms during the crisis to reduce the effect of deficits in the family and social resources related to healthy child development. Inequalities in children's mental health were described in Catalonia (ESCA 2006)[23] and Spain (Spanish Health Survey 2006)[24] Social inequalities according to maternal education level have persisted with the crisis. However, these previous studies did not report inequalities in quality of life. This is the first time this inequality has been found in relation to both education level and employment status in Catalonia, and it is likely a result of continuous exposure to stress in the most vulnerable population. The higher average HRQOL scores in the 2010-12 survey may be related, in part, to the younger age of the second sample.

~~The present study shows a reduction in the use of healthcare services and a higher percentage of visits among those children with double healthcare coverage. It is difficult to determine with the ESCA data whether the reduction of visits represents a saving of unnecessary interventions. Nevertheless, the healthcare cuts carried out in Catalonia in the last years would be a factor associated to a migration of higher classes to private healthcare.~~

Some limitations of the study deserve comments. Differences in the characteristics of the sample in the two surveys may have influenced the results. The ESCA 2010-12 sample was ~~slightly~~ younger and mothers were more educated. The results on education level reflect true differences in the general population of Catalonia. According to the census data[25], the percentage of women with university degrees increased between 2005 and 2010. These changes could be reflected in the better HRQOL found in the overall 2010-12 sample of the

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present study, although the figures could also be associated with secular trends. The percentage of unemployed households seems to be underestimated in ESCA 2010-12: in 11% of households all members were unemployed in 2010 according a previously mentioned survey,[22] whereas in ESCA 2010-12, the figure was 5%. These results may underestimate the impact of the crisis on inequalities in children's health. Differences in the percentage of children from immigrant families could be attributed to data collection in 2006, which was less exhaustive with respect to the variable *parents' place of birth.* For this reason, the results related to this variable should be interpreted with caution. However, all these differences may mask even greater disparities. Moreover, the rest of the questionnaire was similar in both surveys, data are very consistent, and the results of the study are valid and useful to analyze the impact of the crisis on child health. It is well recognized that proxy-reported weight and height may carry some bias compared to objective measures. However, there was no differential bias by educational level or any other variable analyzed; hence this does not invalidate the results regarding factors associated with overweight in children. Moreover, if other cut-off points were used different results in terms of percentages of overweight and obesity have been shown[25 26]. Finally, the duration of unemployment and whether the unemployed person was receiving a subsidy were not analyzed. An analysis of these factors might enable a more in-depth examination of the impact of unemployment, and should be addressed in future studies.

The Commission on Social Determinants of Health of the World Health Organization has proposed eliminating the health gap in one generation[26 27]and has emphasized that inequalities in early child development are one of the main factors contributing to create inequalities in adult health[27 28]. It should be noted that the living conditions of children have deteriorated and that inequalities in childhood obesity and quality of life have increased with the crisis. It is necessary to urgently implement policy measures that fight against these inequalities. Otherwise they will have a negative impact on the health of future generations of

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Catalans. It is also important to monitor and evaluate the impact of public policies aimed at

overcoming the crisis.

Authors' contributions

Luis Rajmil and María-José Fernández de Sanmamed carried out the literature search. All authors participated in the study design. Antonia Medina Bustos and Anna Mompart Penina participated in the data collection. Luis Rajmil analyzed the data. All authors contributed to the data interpretation and writing the manuscript.

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References

1   Marcus R, Gavrilovic M. The Impacts of the Economic Crisis on Youth. Review of Evidence. London: Overseas Development Institute; 2010.

2   Margerison Zilko I. Economic contraction and birth outcomes: an integrative review. Human Reproduc Update 2010;**16**: 445–58.

3   Dávila-Quintana CD, González López-Valcarcel B. Crisis económica y salud. Gac Sanit 2009;**23**(4):261–5.

4   Bremberg S. Does an increase of low income families affect child health inequalities? A Swedish case study. J Epidemiol Community Health 2003; **57**:584–88

5   Withham G. Child poverty in 2012. It shouldn't happen here. London: Save the children; 2012.

6   Berger RP, Fromkin JB, Stutz H, Makoroff K, Scribano PB, Feldman K. Feldman, Tu LCh, Fabio A. Abusive Head Trauma During a Time of Increased Unemployment: A Multicenter Analysis. Pediatrics 2011;**128**:637-43.

7   González-Bueno G, Bellos A, Arias M. La infancia en España 2012-2013. El impacto de la crisis en los niños. Madrid: UNICEF España; 2012.

8   Navarro V, Clua-Losada M. El impacto de la crisis en las familias y en la infancia. Barcelona: Observatorio social de España; 2012.

9   Direcció General de Regulació, Planificació i Recursos Sanitaris. Departament de Salut, Generalitat de Catalunya. Enquesta de salut de Catalunya 2010-2014. Fitxa técnica. Generalitat de Catalunya; 2012. Available at: www.gencat.cat\salut\esca

10 Departament de Salut. La salut de la població infantil a Catalunya. Enquesta de salut de Catalunya. Barcelona: Generalitat de Catalunya, Departament de Salut, Direcció General de Planificació i Avaluació; 2009.

11 Mompart-Penina A, Medina-Bustos A, Guillén-Estany M, Alcañiz-Zanón M, Brugulat-Guiteras P. Características metodológicas de la Encuesta de Salud de Cataluña 2006. Med Clin (Barc) 2011;**137** Supl 2:S3-8.

12 Serra Majem L, Aranceta Bartrina J, Pérez Rodrigo C, Moreno Esteban B, Tojo Sierra R, Delgado Rubio A, Grupo colaborativo AEP-SENC-SEEDO. Dossier de Consenso. Curvas de Referencia para la Tipificación Ponderal. Población Infantil y Juvenil. Madrid: IM&C,2002: p.1–83.

13 SDQ. Information for researchers and professionals about the Strengths & Difficulties Questionnaires. Available at: www.sdqinfo.com. Accesed January 11, 2013.

14 Goodman R. The Strengths and Difficulties Questionnaire: a research note. J Child Psychol Psychiatry 1997;**38**:581-6.

15 The KIDSCREEN Group Europe. The KIDSCREEN questionnaires. Handbook. Lengerich, Germany: Pabst Science Publishers; 2006.

16 Ravens-Sieberer U, Erhart M, Rajmil L, et al. Reliability, construct and criterion validity of the KIDSCREEN-10 score: a short measure for children and adolescents' well-being and health-related quality of life. Qual Life Res 2010;**19**:1487-500.

17 Flash Eurobarometer. Parents views on the mental health of their child. Analytical report. Brussels: Eurobarometer; 2009.

18 Rajmil L, Serra-Sutton V, Alonso J, Herdman M, Riley A, Starfield B. Validity of the Spanish version of the child health and illness profile-adolescent edition (CHIP-AE). Med Care 2003;**41**:1153-63.

19 Estrada MD, Rajmil L, Serra-Sutton V, Tebé C, Alonso J, Herdman M, et al. Reliability and validity of the Spanish version of the Child Health and Illness Profile-Child Edition Parent Report Form (CHIP-CE/PRF). Health Qual Life Outcomes 2010;**8**:78.

20 Institut d'Estadística de Catalunya (IDESCAT). Taxa de risc de pobresa. Available at: http://www.idescat.cat/territ/BasicTerr?TC=5&V0=3&V1=3&V3=1782&V4=1839&ALLINFO=TRUE&PARENT=25&CTX=B

21 Institut d'Estadística de Catalunya (Idescat). Enquesta de pressupostos familiars. Available at: http://www.idescat.cat/cat/societat/qualitat/edcl.html

22 Rajmil L, Fernandez de Sanmamed MJ. Destruction of a less developed welfare state and impact on the weakest, the youths. BMJ 2012. Available at: http://www.bmj.com/content/343/bmj.d7973?tab=responses.

23 Rajmil L, López-Aguilà S, Mompart Penina A, Medina Bustos A, Rodríguez Sanz M, Brugulat Guiteras P. Socio-economic inequalities in children's mental health in Catalonia. An Pediatr (Barc) 2010;**73**:233-40.

29

24   Barriuso-Lapresa L, Hernando Arizaleta L, Rajmil L. Social inequalities in mental health and health-related quality of life in children in Spain. Pediatrics 2012;**130**:e528–35

25   Catalan Institute of Statistics (Idescat). Registration office. Accessed 06/21/2013. Available at: www.idescat.catIDESCAT

256   Cole TJ, Bellizi MC, Flegal KM, Dietz WH. Establishing standard definition for child overweight and obesity: international survey. BMJ. 2002;**320**:1240-3.

267   World Health Organization (WHO) Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. Geneva: WHO; 2008.

278   Early Child Development Knowledge Network (ECDKN). Early child development: a powerful equalizer. Final report of the Early Child Development Knowledge Network of the Commission on Social Determinants of Health. Geneva: World Health Organization; 2007.

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STROBE Statements—**"Impact of the economic crisis on children's health in Catalonia: a before-after approach"**

The study was based on two cross-sectional comparable surveys from the Catalan Health Interview Survey (ESCA). The ESCA Statistical Plan is part of the Government of Catalonia and is regulated by Decree 467/2004, of December 28, by approving the annual performance statistics from the year 2005. It is an official statistic, so selected individuals are prone to participate in the survey, and meets all these requirements, in particular respect the confidentiality of the information under statistical confidentiality. The ESCA is conducted by the Department of Health of the Autonomous Government of Catalonia. All analysis using ESCA data should be anonymized, so no individual information is identifiable.

	Item No	Recommendation	Checklist**
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	**X**
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	**X**
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	**X**
Objectives	3	State specific objectives, including any prespecified hypotheses	**X**
Methods			
Study design	4	Present key elements of study design early in the paper	**X**
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	**X**
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	**X**
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	**X**
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	**X**
Bias	9	Describe any efforts to address potential sources of bias	**X**
Study size	10	Explain how the study size was arrived at	**X**
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	**X**
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for	**X**

		confounding	
		(*b*) Describe any methods used to examine subgroups and interactions	X
		(*c*) Explain how missing data were addressed	X
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed	X
		Case-control study—If applicable, explain how matching of cases and controls was addressed	
		Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	X
		(b) Give reasons for non-participation at each stage	X
		(c) Consider use of a flow diagram	It was considered as not necessary
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	X
		(b) Indicate number of participants with missing data for each variable of interest	X
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	X
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	X
		(*b*) Report category boundaries when continuous variables were categorized	X
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	X
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	X
Key results	18	Summarise key results with reference to study objectives	X
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	X
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	X
Generalisability	21	Discuss the generalisability (external validity) of the study results	X
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	X

Continued on next page

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

** These marks indicate all relevant points included in the manuscript. Please let us know if it is necessary any additional information