

# Downward trends in the prevalence of childhood overweight in two pilot towns taking part in the VIASANO community-based programme in Belgium: data from a national school health monitoring system

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## Summary

**Background:** Multilevel approaches involving environmental strategies are considered to be good practice to help reduce the prevalence of childhood overweight.

**Objectives:** The objective of this study was to evaluate the effects of VIASANO, a community-based programme using the EPODE methodology, on the prevalence of overweight in two pilot towns in Belgium.

**Methods:** We analysed data from a national school health monitoring system to compare changes in the prevalence of overweight and obesity over a 3-year period (2007–2010) in children aged 3–4 and 5–6 years in the pilot towns with those of children of the same ages from the whole French-speaking community of Belgium. Heights and weights of all participants were measured by trained school nurses using a standardized method.

**Results:** The prevalence of overweight (–2.1%) and overweight + obesity (–2.4%) decreased in the pilot towns, but remained stable in the comparison population (+0.1% and +0.2%, respectively). After adjustment for lack of homogeneity between the study populations, there was a trend towards a decrease in overweight ( $P = 0.054$ ) and overweight + obesity ( $P = 0.058$ ) in the pilot towns compared with the general population.

**Conclusions:** These results suggest that a community-based programme, such as VIASANO, may be a promising strategy for reducing the prevalence of childhood overweight even over a short period of time.

**Keywords:** Childhood overweight, community-based intervention, EPODE, prevention, obesity.

**Abbreviations:** BMI, body mass index; CI, confidence interval; EPODE, Ensemble Prévenons l'Obésité Des Enfants

## Introduction

During the past 20 years, the prevalence of obesity, and of childhood obesity in particular, has increased throughout Europe and indeed most of the world (1–3), making this condition one of the main public health challenges of the 21st century. Although this trend seems to be stabilizing in some countries (4,5), prevalences overall remain unacceptably high.

Childhood obesity can cause social, psychological and health problems (6), and is linked to obesity in adulthood (7), with considerable long-term health and economic burden (8). Because reversal of obesity is difficult, prevention is crucially important (9,10). Nevertheless, data suggest that focusing on individual behavioural change by modifying cognitive determinants alone, without broader social, cultural, physical, economic and political perspectives, is not effective (11,12). Although evidence from

controlled studies is inconclusive (13), multilevel and community-based approaches to childhood obesity prevention (11,12,14,15) are considered to be good practice (16,17).

The EPODE ('Ensemble Prévenons l'Obésité Des Enfants') methodology was developed in 2004 in France as a community-based programme that included broad environmental strategies to stimulate long-term, sustainable behavioural change and prevent childhood obesity (18–20). The effects of using this approach in France appear promising (21,22) and this strategy has since been adopted by many other countries in Europe and further afield (<http://www.epode-international-network.com>). Adoption of the EPODE methodology in Belgium resulted in the creation of the VIASANO programme (<http://www.viasano.be>). Starting with two towns in 2006, VIASANO now involves 19 towns in the French-speaking and Flemish communities of Belgium.

Given the paucity of reports on the effectiveness of community-based programmes to prevent obesity, especially in young children (23,24), it is important to evaluate the effects of VIASANO on the prevalence of overweight and obesity. Here we report some initial results, comparing cross-sectional data on changes in body mass index (BMI) from children in two pilot VIASANO towns situated in the French-speaking part of Belgium, with data from children in the whole of the French-speaking community of Belgium. Using this large community database as the comparison population we aimed to avoid any potential bias introduced by selection of a small number of control towns.

## Participants and methods

### Towns

The two pilot VIASANO towns were Mouscron, an urban town of 54 651 inhabitants, and Marche-en-Famenne, a rural town of 17 175 inhabitants, both within the French-speaking community of Belgium. These towns were selected for the present analysis because they had been in the programme for at least 3 years<sup>1</sup> and full data (heights and weights of 3–6-year-old children) were available. The pilot towns had similar socio-economic demographics to each other and to the rest of the French-speaking community (Supporting Information Table S1).

### The VIASANO project

In line with the EPODE methodology (19), VIASANO operates from a dual perspective: (i) targeting the local population via social-marketing techniques using local communication channels and (ii) targeting the environment or community in collaboration with local actors. Some examples of social-marketing campaigns that have been targeted at the local populations are shown in the

<sup>1</sup>Other French-speaking towns started later, and administrative issues for obtaining BMI data for the children of the participating Flemish towns were not completely resolved at the time of writing.

Supporting Information Table S2. The number of participants exposed to these actions varies according to the target group, from 20 to 30 for school classes or health professionals, up to 500 people for actions targeted at the general public. A rough estimate based on the nature and the number of these actions multiplied by the mean number of participants suggests that about 30 000 people were reached between 2007 and 2010.

Actions targeting the environment/community have ranged from renovation of a dilapidated residential area initiated by the local population in collaboration with the local authorities, collaboration with local police to make active commuting to schools safer, using local media to change social norms, or discussing the incorporation of health issues into school or company policies.

The number of events targeting children and families ( $n = 116$ ) is approximately the same as the number of actions that have targeted the environment/community ( $n = 127$ ). Between 2007 and 2010, the number of events taking place in Mouscron and Marche-en-Famenne increased every year (Supporting Information Figure S1).

### Participants

For the present analysis, all children aged 3–4 (first-year preschool) and 5–6 (third-year preschool) years old who were living in Mouscron and Marche-en-Famenne in the years 2007 and 2010 were included. The comparison population consisted of children of the same ages and in the same school years from the whole French-speaking community in Belgium (thus also including those from the two pilot towns) in 2007 ( $N = 76\,864$ ) and 2010 ( $N = 79\,602$ ).

### Measurements

Data for the analysis were derived from the school health community surveillance registry (<http://www.sante.cfwb.be>), which records all children's weights and heights, independently measured at school by nurses working for the promotion of health in schools, a service of the French Community of Belgium. The nurses are trained to perform the measurements according to a specific measurement protocol (25). Weight is measured in light clothes (without shoes) to the nearest 0.1 kg using electrical digital scales (SECA, Hamburg, Germany). Standing height (without shoes) is measured to the nearest 0.5 cm by a ruler fixed to the wall. BMI is calculated as weight in kg divided by the square of the height in m ( $\text{kg}/\text{m}^2$ ). For the two pilot towns, the raw data (height, weight, BMI) were available, but for the whole French community, because of administrative restrictions, only data on percentages of overweight and obesity were available.

### Statistical methods

The proportions of overweight and obese children were calculated for each study town, each period and each age

group, using Flemish growth curves (26).<sup>2</sup> Similar percentages were obtained for the comparison population. Overweight and obesity were defined as values above the 85th and 97th percentiles, respectively.

For analysis of changes in the prevalence of overweight and obesity between 2007 and 2010, the two studied age groups were combined. Chi-square tests were used to compare the proportions of overweight, obese, and overweight + obese children in 2007 and 2010, and to compare the distributions of BMI categories between the pilot towns and the comparison population. The differences in the proportions between the two study periods were calculated and their 95% confidence intervals (CI) computed. A z-test (27) was used to compare the crude differences and the differences adjusted for sex and school grade in the pilot towns and in the comparison population. All analyses were performed using STATA v12.1 (StataCorp LP, College Station, TX, USA).

## Results

A total of 1300 children were included from the two pilot towns for 2007 and 1484 children for 2010. Taking the two towns together, 9.5% of the children were overweight and 4.1% obese in 2007; in 2010, these proportions had decreased to 7.4% (−2.1%) and 3.8% (−0.3%), respectively (Table 1). The prevalence of overweight + obesity decreased from 13.6 to 11.2% (−2.4%, 95% CI −4.9 to 0.0%) (Table 2, Fig. 1). In the pilot towns, the proportion of children attending the 1<sup>st</sup> pre-school year was higher in 2010 than in 2007 (732/1484 [49%] vs. 559/1300 [43%], Table 1); this finding may have influenced the results because the proportion of normal weight children was lower in the third preschool year. After adjustment for sex and school grade, the prevalence of overweight had decreased by 2% ( $P = 0.060$ ), of obesity by 0.2% ( $P = 0.80$ ) and of overweight + obesity by 2.2% ( $P = 0.082$ ) (Table 2).

In the comparison population, there were 76 864 and 79 602 children for the school years 2007 and 2010, respectively. In 2007, 9.5% of these children were overweight and 6.3% obese; in 2010, these proportions were stable at 9.6% and 6.4%, respectively.

There was a trend to a reduction in the prevalence of overweight (−2% vs. +0.1%,  $P = 0.054$ ) and overweight + obesity (−2.2% vs. +0.2%,  $P = 0.058$ ) in the pilot towns compared with the control population (Table 3).

The chi-squared test showed a difference in the categories of BMI in the pilot towns and the comparison population: in 2007, there were significantly fewer obese children in the pilot towns than in the comparison population (4.1%

vs. 6.3%,  $P = 0.004$ ); in 2010, the gap had increased with even fewer obese children in the pilot towns compared with the comparison population (3.8% vs. 6.4%;  $P < 0.0001$ ).

## Discussion

The aim of this study was to analyse trends in the prevalence of childhood overweight and obesity over a 3-year period to gain early insight into the effectiveness of the VIASANO obesity prevention programme in two pilot towns. Given the methodological challenges of evaluating complex public health interventions and the difficulty of randomly assigning entire communities in community-based programmes (15,23,28), we adopted a pragmatic approach to evaluate this intervention. Instead of comparing the prevalence of obesity with selected control towns, we chose to examine trends across the whole of the region, using data from a community surveillance programme for comparison (<http://www.sante.cfwb.be>). This approach, which can be viewed as a quasi experimental design (23), provides a more robust analysis and benefits from the fact that weights and heights were measured using the same standardized method by independent observers in the study and comparison populations. Our results show a trend to a reduction in the prevalence of overweight and in the prevalence of overweight + obesity in the participating communities, which was not present in the comparison population.

These results can be compared with those reported in the EPODE pilot towns, in which there was a significant decrease in the proportion of overweight and obese children (from 20.6% to 18.8%,  $P < 0.0001$ ) during a 5-year intervention period (29). This reduction (−1.8%), although smaller in absolute value than that reported in the present study (−2.4%), was significant in the EPODE study but not in VIASANO, possibly because of the longer intervention period, the larger sample sizes involved or differences in the ages of the children assessed.

For the reasons explained in the methods section, our analysis is based on Flemish growth curves, rather than international IOTF curves. The Flemish community of Belgium developed its own growth curves for children in order to have a better tool to define obesity and overweight in this part of the Belgian population. There are few socio-cultural differences between the two main Belgian communities (Flemish and French-speaking) and there are no equivalent curves specifically for the French-speaking part of Belgium, so the French community decided to use the Flemish growth curves. However, the cut-off points for the definitions of overweight and obesity are lower on the Flemish curves than on the IOTF curves; hence, estimations of the prevalence of overweight and obesity would be expected to be higher when using the Flemish curves than with the IOTF curves (30). Nevertheless, because the same definitions were used for the pilot towns and the comparison population, our comparisons remain valid.

The results of the present study provide evidence of early promise for this community-based intervention, but should

<sup>2</sup>Because specific growth curves for the French-speaking population are not available, the French Community uses Flemish growth curves to calculate proportions of overweight and obese children. Because of administrative constraints, we had no access to raw data for this population, so we also used the Flemish growth curves to calculate proportions of overweight and obesity in the pilot towns in order to be able to compare the different sets of data.

**Table 1** Proportions of overweight, obese and overweight + obese children for each population, period and school level

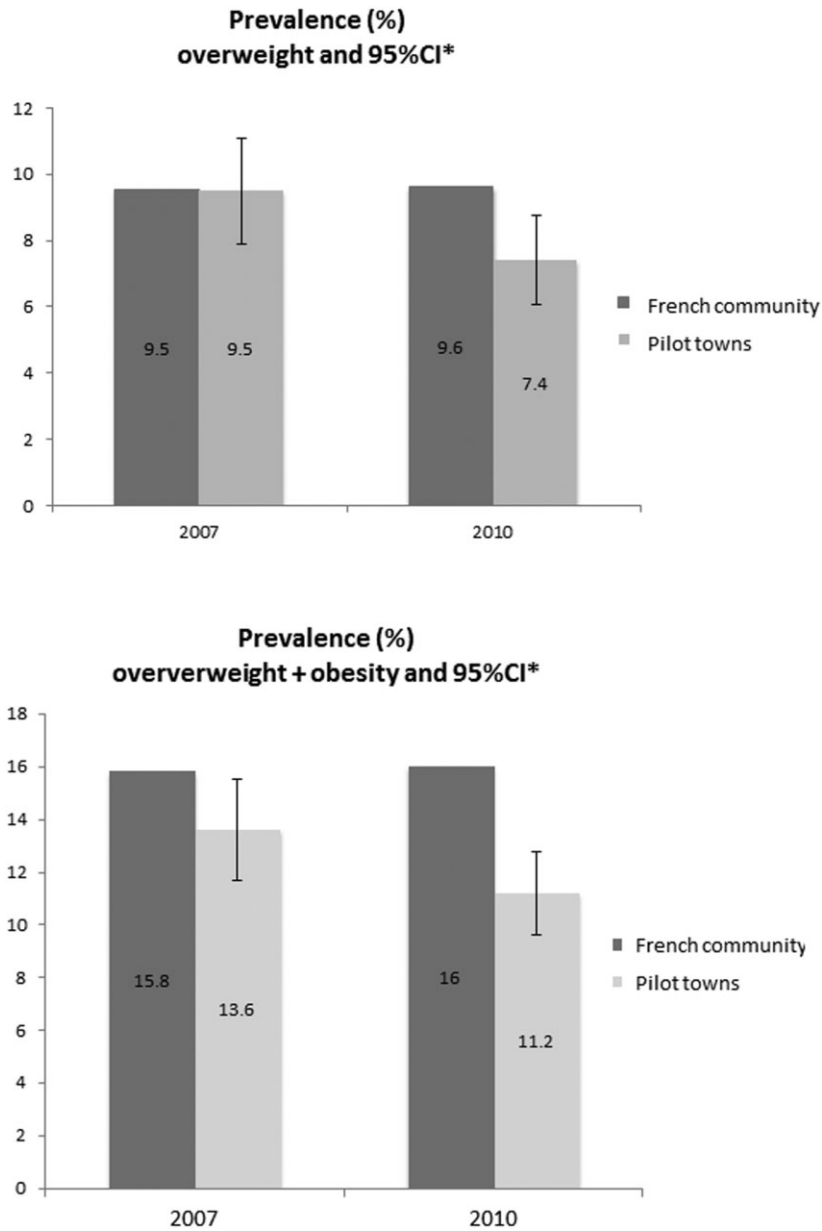
Region	2007					2010						
	N	Mean age in months (SD)	Boys (%)	Overweight (%)	Obesity (%)	Overweight + Obesity (%)	Total N	Mean age in months (SD)	Boys (%)	Overweight (%)	Obesity (%)	Overweight + Obesity (%)
Mouscron												
First-year year pre-school, age 3–4	414	46.8 (3.9)	45.9	9.7	2.2	11.8	576	46.3 (3.5)	49.7	7.3	3.1	10.4
Third-year pre-school, age 5–6	558	68.3 (4.5)	51.6	10.0	5.6	15.6	586	68.9 (4.5)	47.6	8.4	4.3	12.6
Marche-en-Famenne												
First-year pre-school, age 3–4	145	46.9 (3.6)	49.7	6.9	3.4	10.3	156	46.8 (3.6)	48.7	5.1	3.2	8.3
Third-year pre-school, age 5–6	183	67.9 (4.8)	50.8	9.3	4.4	13.7	166	65.9 (4.9)	49.4	6.6	4.8	11.4
Mouscron + Marche-en-Famenne												
First-year pre-school, age 3–4	559	46.8 (3.8)	46.9	8.9	2.5	11.4	732	46.4 (3.5)	49.5	6.8	3.1	10.0
Third-year pre-school, age 5–6	741	68.2 (4.6)	51.4	9.9	5.3	15.1	752	68.2 (4.7)	48.0	8.0	4.4	12.3
First and third-years pre-school	1300	59.0 (11.4)	49.5	9.5	4.1	13.6	1484	57.5 (11.7)	48.7	7.4	3.8	11.2
Comparison population (French Community)												
First- + third-year pre-school	76864	NA	51.5	9.5	6.3	15.8	79602	NA	51.1	9.6	6.4	16.0

NA, not available; SD, standard deviation.

**Table 2** Comparison of changes in proportions of obesity and overweight between 2007 and 2010 in Marche-en-Famenne + Mouscron (pilot towns)

Marche-en-Famenne + Mouscron (pilot towns)	Difference (95% CI) between 2007 and 2010	Adjusted difference (95% CI) between 2007 and 2010*	P-value
Overweight	-2.1 (-4.1 to 0.0)%	-2.0 (-4.0 to 0.0)%	0.060
Obesity	-0.3 (-1.7 to +1.1)%	-0.2 (-1.6 to +1.3)%	0.80
Overweight + obesity	-2.4 (-4.9 to 0.0)%	-2.2 (-4.6 to +0.3)%	0.082

\*Adjusted for sex and school grade. CI, confidence interval.



**Figure 1** Evolution of the prevalence of overweight (upper panel) and overweight + obesity (lower panel) in the pilot towns and the comparison population (French Community). \*95% confidence interval (CI) computed only for the pilot towns (Marche and Mouscron).



**Table 3** Comparison of changes in proportions of obesity and overweight between 2007 and 2010 in Marche-en-Famenne + Mouscron (pilot towns) with changes in the comparison population (French Community)

	Adjusted difference (95% CI) between 2007 and 2010 (pilot towns)	2007 % in comparison population	2010 % in comparison population	Difference between 2007 and 2010 in comparison population	P-value
Overweight	-2.0 (-4.0 to 0.0)%	9.5	9.6	+0.1%	0.054
Obesity	-0.2 (-1.6 to +1.3)%	6.3	6.4	+0.1%	0.69
Overweight + obesity	-2.2 (-4.6 to +0.3)%	15.8	16.0	+0.2%	0.058

CI, confidence interval.

be interpreted with caution for several reasons. First, because of the non-randomized nature of our study, our results may be subject to observational bias in the measurements of height and weight. However, measurement techniques were standardized in the pilot towns and the comparison population, performed by the same staff, using the same methods in both settings.

Second, at baseline in 2007, there were fewer obese children in the pilot towns than in the comparison population, which may explain some of the observed differences with a lower prevalence of overweight + obesity at the end of the 3-year period in the pilot towns than in the overall population. However, it is notable that in the pilot towns, although the prevalence of obesity was initially lower than in the comparison population, it decreased further over this short period, increasing the gap between the pilot towns and the whole community.

Third, there were differences in the sex and school-grade distributions between the pilot towns and the comparison population. In the pilot towns, there were more 1st pre-school year children in 2010 than in 2007 (732 vs. 559), whereas the numbers were similar (752 vs. 741) for 3rd pre-school year children. This could potentially have influenced the results because the proportion of healthy weight children was lower in the 3<sup>rd</sup> pre-school year. To account for this possibility, we, therefore, adjusted for sex and school grade in our analysis.

Many factors need further evaluation, including longer-term effects and whether similar trends can be confirmed in other participating towns. If so, it would be interesting to try and determine which elements of the programme contribute most strongly to the observed results, e.g., what changes in behaviour are associated with better results or with specific aspects of the programme, what variables can be linked to different outcomes in different towns, and whether this provides indications as to how to help individual towns achieve better results.

In conclusion, the results of this first evaluation are encouraging and provide further evidence that community-based programmes, such as VIASANO, may play a role in the prevention of childhood overweight, although further analyses are needed to confirm these preliminary findings.

## Conflicts of Interest Statement

The VIASANO project is partly sponsored by private partners: Carrefour Belgium, Ferrero, Orangina-Schweppes, Unilever. The role of the private partners is regulated via an ethical charter (Supporting Information Appendix S1) in order to exclude any influence on the content of actions. These partners have no influence on the content of the VIASANO programme and played no role in the data analysis or in the writing of this paper. JB, NJ, MR, MD and CDL have received payment from Protein Health Communications, who coordinate VIASANO. The other authors declare that they have no conflicts of interest.

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The weight and height data were provided by the General Health Direction (Fédération Wallonie-Bruxelles). JV and J-MB designed the study. JB collected the data and wrote the first draft of the paper. MD performed the statistical analyses. CB, NJ, MR, SJ, MD, CDL and JN reviewed and revised the paper. All authors read and approved the final version of the paper for publication.

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## Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

**Figure S1.** Number of actions per year.

**Table S1.** Basic socio-economic data for the pilot towns and the comparison whole French-speaking community.

**Table S2.** List of topics used in some of the early VIASANO campaigns and examples of actions that have targeted the local population.

**Appendix S1.** Partners Charter in the VIASANO Programme.