

Childhood Obesity in France: Interventions Employed to Combat the Obesity Epidemic in French Elementary Schools

by

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AN ABSTRACT OF THE THESIS OF

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The prevalence of childhood obesity and overweight has grown significantly in France in the past twenty years. Obesity is associated with many diseases such as metabolic syndrome, diabetes mellitus, cardiovascular disease, hypertension, cancer, and depression. These diseases once confined to adults are increasingly being observed in children. Thus there are an increasing number of prevention programs being evaluated. Two such examples in France are Fleurbaix-Laventie Ville Santé (1992-present) and Ensemble, Prévenons L'Obésité Des Enfants (EPODE) (2004-present). Both programs emphasize prevention in elementary-school aged children by the creation of local programs involving schools, health professionals, community leaders and even businesses through the development and distribution of simplistic nutrition and physical activity messages. Fleurbaix-Laventie Ville Santé has been proven highly successful at decreasing the prevalence of childhood overweight from 17.5% to 8.8%. EPODE is a growing community-based preventative program currently in 167 French towns as well as pilot projects in both Belgium and Spain.

Bachelor of Arts in International Studies in Nutrition
Thesis of Tara R. Ridinger
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Approved:

Thesis Advisor (Major Department)

Head or Chair (Major Department)

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Tara R. Ridinger, Author

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Background/Literature Survey

Definition of Childhood Obesity

To understand the problem of childhood obesity, it is first necessary to create a definition of what childhood obesity is. Within the scope of this thesis, three tools were used: body mass index (BMI), adipose tissue rebound, and growth charts. The calculation of body mass index is essential to the definition of obesity. Body mass index is calculated by dividing an individual's weight in kilograms by their height in meters squared. It is widely accepted as a strong clinical reflection of percentage body fat. There are different ranges of BMI based on gender and age that are used in determining if a child is obese (see y axes on figures 5 and 6 in appendix) (1).

Another measure of childhood obesity is reflected in adipose tissue rebound. A child's BMI decreases from age one until the rebound between the ages of four to six (see black line on figures 5 and 6 in appendix). The rebound is observed on the child's growth chart. The earlier the adipose tissue rebound occurs, the more likely the child will become obese by the time they reach adulthood (2).

Growth charts are the standard for determining whether a child is considered obese, overweight, or normal weight. It allows the physician or other medical professional to see the evolution of adiposity over a period of time (2). Plots are charted using the child's BMI, and age, with separate charts for boys and girls. The 97th percentile and above on the French growth charts are considered obese. The 90th-96th percentiles on the French growth charts are considered overweight (3). In France, two degrees of childhood obesity have been established; they are noted on the growth chart by the dotted line (see figures 5 and 6 in appendix). The first degree of obesity, below the dotted line, is still considered obese according to French standards. As a point of reference, the second degree of obesity, above the dotted line, is the reference point established by the International Obesity Task Force as the international definition of obese. The

International Obesity Task Force is a think tank associated with the International Association for the Study of Obesity founded in 1986 that has created an international standard definition of childhood obesity (4). Therefore the second degree of obesity is considered obese by both French and international standpoints.

BMI, adipose tissue rebound and growth charts are key tools used to establish the definition of childhood obesity. They are all tremendously interrelated. A child's BMI is calculated and plotted on the growth chart. The adipose tissue rebound which reflects a child's increase in BMI will be observed on the growth chart. Finally, the growth chart is what officially classifies a child as obese.

Rate of Childhood Obesity

Childhood obesity has increased at an alarming rate in France over the past several decades. A study by the Etude Nationale Nutrition Santé in 2006 revealed that 3.5% of children were obese. This same study found that 18% are considered overweight or obese (5). By comparison, only 3% of children were considered obese or overweight in 1965. The number of obese and overweight children in France has increased by threefold since 1980 (6). Figure 1 shows the increase in the rate of childhood obesity from 1960 through 2000.

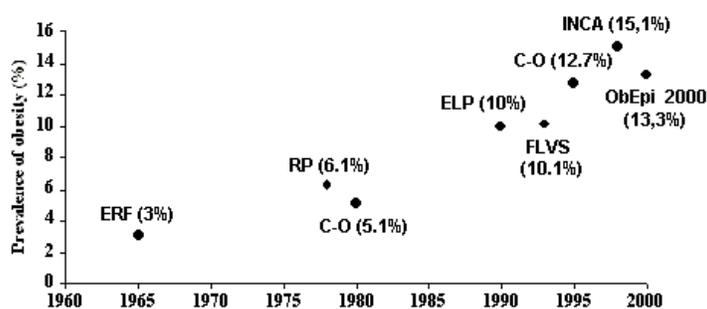


Figure 1: Prevalence of childhood obesity (French definition) in France since 1965 in children 5 to 12 years of age. (ERF: French Reference Study; RP: Paris area Study; C-O: Center and West of France Study, ELP: Parisian Longitudinal Study; FLVS: Fleurbaix-Laventie Ville Santé Study; INCA: Individuals and National Survey of Food Intake). Citation: de Lauzon B, Charles M. Childhood Obesity: Influences of Socioeconomic Factor. Danone Institute. 2004. Available at: http://www.danoneinstitute.org/objective_nutrition_newsletter/on73.php. Accessed May 9, 2009.

The rate varies significantly throughout France. Each region has its own cuisine as well as lifestyles which may contribute to the observed differences in obesity rates. The areas of high rates of childhood obesity include the Mediterranean at 3.5% in 2000, the Southwest at 3.2% in 2000, the

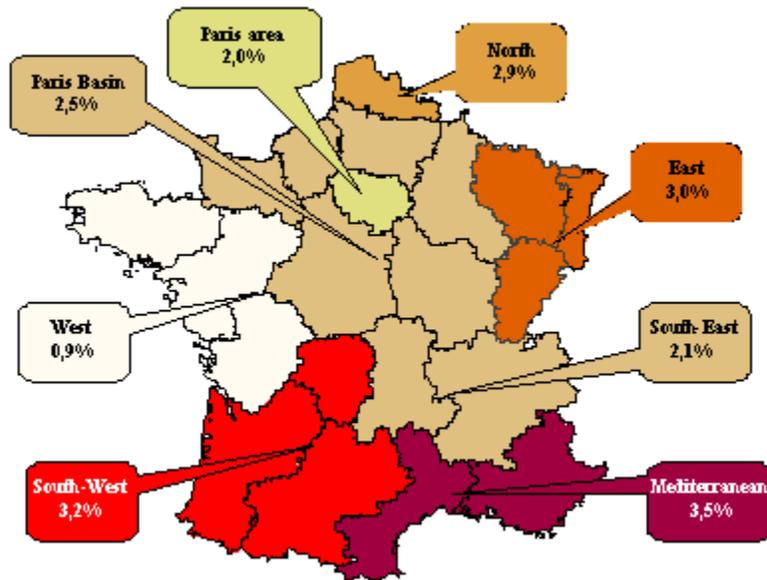


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East at 3% in 2000, and the North at 2.9% in 2000. The areas of lower rates of childhood obesity are the West at 0.9% in 2000, the Paris area at 2% in 2000, the Southeast at 2.1% in 2000, and the Paris basin at 2.5% in 2000 (6). Figure 2 demonstrates the prevalence of childhood obesity in the various regions.

In comparison, the United States has also experienced a significant increase in the rate of childhood obesity. In 2003, 17.6% of children between the aged two to nineteen were considered obese or overweight by the U.S. definition. By contrast, in 1971, only 5% of children were considered obese or overweight (7).

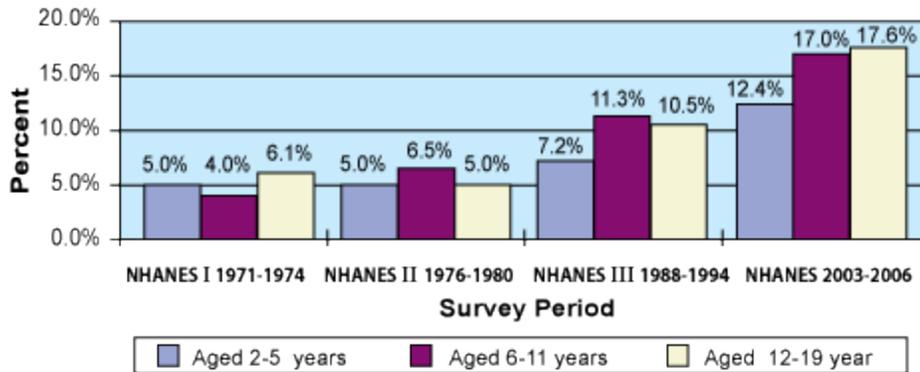


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A similar trend in the rise of the rate of childhood obesity and overweight can be observed in both France and the United States. This suggests there may be similar circumstances contributing to the increase prevalence of childhood overweight and obesity observed in both countries.

Causes of Obesity

There is no one cause of obesity; it is often a combination of factors reflecting food choices, physical activity, family history, and socio-economic level. For the purposes of this thesis, the focus will be on nutrition, physical activity, and socio-economic status as family history is beyond the scope of the data available for review.

A primary cause of obesity is excessive caloric intake (8). In France, as in many other western societies, there is an excessive and near constant amount of food available. If one consumes more kilocalories than required by the body, this will result in a positive energy balance and eventually weight gain.

Physical activity is another major component affecting obesity. Today, children watch television and snack as leisure activities and parents often limit outdoor activities fearing for their children’s safety. These two factors have led to a significant decrease in physical activity (8). As

activity decreases, there is a sharp decrease in caloric expenditure leading to a positive energy balance and weight gain. Additionally, there is an inverse relationship between BMI and physical activity. As physical activity decreases and food intake remains the same or increases, there will be predictably an increase in BMI.

There is a strong socio-economic correlation to obesity. Figure 4 illustrates the difference

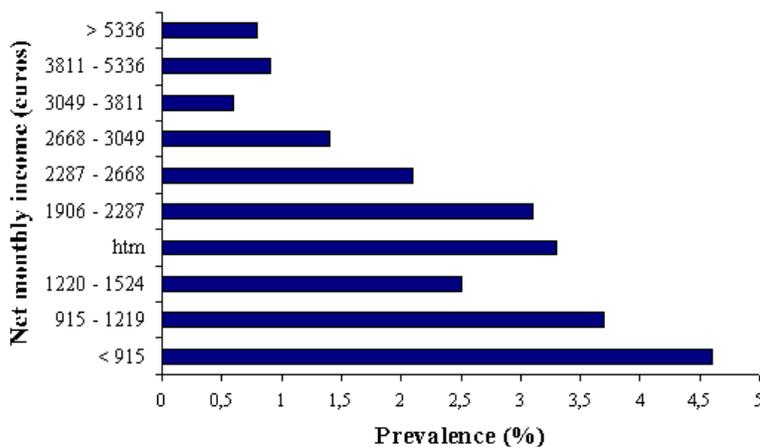


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of prevalence in children of a variety of socio-economic levels. Children whose net family income was less than 915 euros (approximately \$1,292) per month had nearly a 30% higher rate of prevalence of obesity compared to children’s whose net family income was above 1524-1906 euros (approximately \$2152 to \$2691) per month (6). This represents a remarkable difference of the rate of childhood obesity which only increases as the disparity in income increases. This clearly demonstrates a correlation between income and obesity. Those with less income have fewer resources which can lead to poorer food choices as food high in fat and calories are generally cheaper than healthier foods. Additionally, they are less likely to afford to pay for their children to join a sports team or live in neighborhoods without safety concerns.

Negative Effects of Obesity

Obesity is correlated to numerous health problems from physical to psychological including metabolic syndrome, diabetes mellitus, cardiovascular disease, hypertension, some cancers, negative self-image, and depression. While these health problems used to be confined to adults, they can now be found in children.

Metabolic syndrome is now recognized as a risk factor for cardiovascular disease, diabetes, hypertension and some forms of cancer. It is often associated with obesity. Its symptoms include elevated blood glucose levels, dyslipidemia, hypertension and abdominal obesity (8).

Diabetes Mellitus is a disease marked by a fasting glucose level of above 126 mg/dl or greater than 7.0 mmol/L. Obesity is a risk factor for the development of Type 2 Diabetes, particularly in children. While Type 2 Diabetes was once a disease only found in older adults, it is now found in children corresponding with an increase of childhood obesity (8).

Poor diet and obesity are the prime lifestyle related causes of cardiovascular disease. A higher BMI is correlated with a higher risk of cardiovascular disease. With extra body fat comes many other risk factors for cardiovascular disease including hypertension, inflammatory markers, glucose intolerance, dyslipidemia, prothrombotic state, endothelial dysfunction, and obstructive sleep apnea (8).

Hypertension is another disease associated with obesity. There exists a strong relationship between BMI and hypertension regardless of race, gender, and age. High blood pressure is two to six times higher in overweight persons compared to normal weight persons (8).

Some cancers have been associated with obesity including colorectal, breast and endometrial cancers have the most evidence as being related to obese. Oral, esophageal cancers may also be related to obesity. Obesity also appears to increase the risk of cancer reoccurrence

as well as decrease the survival rate. BMI during adolescence is another predictor for cancer mortality later in life (8).

Not only do obese children face a greater risk of developing the medical conditions discussed above, at present and in the future, their risk for psychosocial problems also increases. These obese children face increased discrimination from peers, teachers, and health care providers. Additionally, obesity affects the proper development of a positive self-image in children and there is an increased risk for developing depression. They also experience a decreased socialization (8). These are serious psychosocial issues that are consequences of childhood obesity and problems that can affect children for life.

Obesity can result in the onset of many serious diseases including metabolic syndrome, diabetes mellitus, cardiovascular disease, hypertension, some cancers, and depression. These problems illustrate why prevention is the key to addressing the alarming statistics for obesity.

Methods

The goal of the thesis was to explore two interventions for preventing childhood obesity in elementary school students in France and their effectiveness. Fleurbaix-Laventie Ville Santé and Ensemble, Prévenons L'Obésité Des Enfants (Together, Let's Prevent Childhood Obesity) or EPODE were selected as the two case studies. Fleurbaix-Laventie Ville Santé was selected because of the long duration of the intervention. EPODE was selected because EPODE is an intervention based on Fleurbaix-Laventie Ville Santé. It is worth noting that EPODE is now employed in hundreds of towns in France as well as being responsible for creating affiliated programs in Spain and Belgium. EPODE is basically about creating similar results to Fleurbaix-Laventie Ville Santé but on a very wide-spread, non-research setting. Evaluating EPODE allows us to look at a greater level of application of these anti-obesity interventions.

This thesis is based on secondary research. The paper aimed to collect accurate data by using a variety of sources from journal articles, public health government websites from France and the United States, selected non-governmental organizations websites, and a textbook.

Medline was the only data base used to find journal articles. Medline is respected as one of the best data bases in the nutrition and medical field. Journals on Medline are peer-reviewed. This ensures that the journals are acceptable as credible sources.

Public health government websites from both the United States and France were used. These governments' public health organizations are considered relatively trustworthy. The information was generally limited to statistics, and national program information.

Various other organizations' websites were used. These programs/organizations are World Health Organization, the Danone Institute and EPODE, which are respected and trusted by the international community.

One textbook source was used, Krause's Food and Nutrition Therapy. This is a highly-respected and popular book for those in the nutrition field. The edition used is the latest ensuring the most accurate information at the time.

There are some limitations in this research. The United States and France do not have the same classification for childhood obesity which leads limits comparison between the two countries. Additionally, it is important to note that often overweight and obesity are terms that are used interchangeably. This paper has attempted to use the standard definition of overweight and obesity as defined in the previous section. However, some sources used did use the terms interchangeably.

Expansion/Development of Core Ideas

Fleurbaix-Laventie Ville Santé

Fleurbaix-Laventie Ville Santé is study conducted in northern France that started in 1992 and is still continuing. There have been three parts of the study known as FLVS I, FLVS II, and FLVS III. Each had separate interventions. FLVS I was an intervention study with children directly. FLVS II was an observational study involving families residing in Fleurbaix and Laventie. FLVS III was an observational and intervention study in high-risk adults. As a separate measure to the studies, children's BMI was monitored in 1992, 2000, 2002, 2003, and 2004 in the intervention and control towns.

Fleurbaix and Laventie are both small towns in northern France. They are situated in semi-rural communities. In 1990, there were 4,410 inhabitants with 1,323 households in Laventie. In Fleurbaix in 1990, there were 2,221 inhabitants with 714 households. Each town has a young population. In Laventie, thirty five percent of the population was less than twenty years old. In Fleurbaix, thirty two percent of the population was less than twenty years old. Sixty percent of those residing in Laventie were born there with nearly half living in the same lodging since birth (9). This region has a two-fold higher rate of obesity compared to other regions in France. People in this area have a high consumption of calories from fat at nearly forty two percent of their total caloric intake (10).

There were two control towns involved in the study. Bois-Grenier and Violaines were selected in 1992. These towns have a similar socio-economic level as Fleurbaix and Laventie. In these towns, no information programs or interventions related to nutrition or physical activity were given during the time period of 1992-2005 (11).

Each study (FLVS I, FLVS II, FLVS III) used different subject profiles. The first study, FLVS I, the subjects were all children aged six to twelve in the two towns were involved (10). In FLVS II, the subjects consisted of 294 families living in Fleurbaix and Laventie. The third study, FLVS III, subjects ranged from year to year. In 1992, 805 children's data was collected. In 2000, 607 children's data was collected (3). In 2002, 515 children's data was collected. In 2003, 592 children's data was collected. Finally, in 2004, 633 children's data was collected. Between 95-98% of eligible individuals participated. In the two comparison towns, 349 children participated in 2004 which was 98% of the towns' school population (11).

The study design monitoring BMI was repeated in all years that the data was collected. Data was collected in the following years: 1992, 2000, 2002, 2003, and 2004 (12). It was a cross-sectional, school-based survey in five schools in Fleurbaix and Laventie (3). In 2004, the same type of assessment was made in two control towns that were in the same region with a similar socio-economic status. These towns had not had any nutrition intervention prior to 2004. The nutritional education program was administered to all classes from maternelle (kindergarten) to CM2 (5th grade) as well as up until 3^{ème} (9th grade) (12).

During the interventions, the intervention community witnessed many changes. Starting in 1999, an increasing amount of community support was observed. Two dietitians were employed to perform interventions in school, associations, and at various meetings in the town for both children and adults. The town councils supported physical activity. New sporting facilities were constructed and a sports educator was employed to promote physical activity in primary schools. This intervention also included walk to school days and family activities organized to promote physical activity (11).

There was significant press coverage during the period from 1992 to 2007 in an effort to support the project. There were three newsletters per year published. One press release was

published each year. There was also a variety of other media coverage. One hundred and ninety articles appeared in the medical press. Two hundred and twelve articles appeared in local newspapers and two hundred and eight articles were in the national press. There were twenty five television reports and seventy five radio reports. As shown, the media interest was very high (11).

The first part of the study known as FLVS I officially took place from 1992 to 1997. The goal was to apply an information oriented approach aimed at increasing the knowledge of nutrition and food, healthy eating habits, food processing and labeling. The study was led by teachers who were first trained by dietitians and nutritionists. The pedagogical method was under control of the Regional Board of Education. There was no focus on physical activity. Enjoyable, affordable and diverse intake of food was promoted. Cooking classes were offered (11). The children visited farms, factories, farmers markets and supermarkets. Family breakfasts were organized by schools and supervised by dietitians to teach the children to choose foods to create a healthy meal and vary nutrient intake (12). Discovery meals in the school cafeteria took place (11). At the end of the five year period, the knowledge and dietary habits of the children were assessed in the two intervention and two control towns. This assessment had a series of specific questions on the nutritional education program as well as a questionnaire on the biology program as a controllable measure (10). This intervention was supposed to last five years but it is still continues in all of the schools (11).

In 1997, the results from FLVS I were completed. There was a follow-up written test on the nutritional education program including food composition and equivalencies, food choices in various scenarios and healthy diet and biology program a control measure. The tests were given in the intervention towns of Fleurbaix and Laventie as wells as the control towns of Bois-Grenier and Violaines. The results of the nutrition program portion of the test showed a higher score in the intervention group compared to the control group. The control had 42.2% correct, 53.7% wrong

and 4.7% missing. The intervention group in comparison had 53.1% correct, 45.6% wrong, and 2.3% missing. The results of the biology portion of the assessment showed similar scores between the two groups. The control group obtained a score of 43.2% correct, 41.8% wrong and 15.3% missing. The intervention group received a score of 44.3% correct, 42.4% wrong, and 13.5% missing (10).

The second part of the study, FLVS II, was an epidemiological study designed to examine the determinants of weight and body fat mass changes from 1997-2000. Every two years, 294 families had a clinical examination and filled out questionnaires about food habits, eating behavior, and physical activity. It was originally designed as an observational study. However FLVS I continued with an increasing commitment and support of the community eventually creating intervention address both children and adults (11). This resulted in the study not being purely observational.

The third part of the study, FLVS III, was a two part study from 2002 to 2007. In 2003, there was a health check-up that took place at the 3,000 participants' homes. It included a fasting blood sample, a clinical examination and a questionnaire aimed at screening unhealthy habits including alcohol consumption, physical inactivity, and smoking. In 2004, the subjects were identified based on a preliminary check-up. These subjects were individuals who were overweight, had high blood pressure, high level of sedentary behavior, unhealthy eating habits, dyslipidemia, and smokers. They were presented with a family oriented approach on how to improve dietary habits and increase physical activity by a dietitian who referred them to a general practitioner in the cases of identified health problems (11).

The prevalence of overweight children was monitored from 1992 to 2004. From the period of 1992 to 2000, an increase in BMI was observed. There was a particular increase in overweight and obesity prevalence using the French definitions in girls. In 1992, 21.7% of girls were overweight

compared to 29.4% of girls in 2000. Additionally, the rate of obesity went up from 12.8% of girls in 1992 to 17.2% of girls in 2000. In boys, an increase in prevalence of overweight and obesity using the French definitions was also observed. In 1992, 13.8% of boys were overweight compare to 20% of boys in 2000. The rate of obesity rose from 7.8% of boys in 1992 to 8.9% of boys in 2000. The overall prevalence in both genders of overweight was 17.5% in 1992 and 24.6% in 2000. The prevalence of obesity in both genders was 10.2% in 1992 and 13% in 2000 (11).

However during the intervention years from 2000 to 2004, there was a decrease of overweight prevalence. In 2002, there was a 13.2% prevalence in both genders of overweight with a 9.5% prevalence in boys and a 17.1% prevalence in girls. In 2003, there was a 10.5% prevalence in both genders with a 7.7% prevalence in boys and a 13.6% prevalence in girls. Finally, in 2004, there was an 8.8% prevalence in both genders with a 7.4% prevalence in boys and 10.4% prevalence in girls. The control towns had a significantly higher prevalence of overweight in both boys and girls at 17.8% compared to 8.8% prevalence of overweight in boys and girls in the intervention towns of Fleurbaix and Laventie (11).

EPODE

EPODE, or Ensemble, Prévenons L'Obésité Des Enfants, was created in January 2004. The English translation of the name is "Together, Let's Prevent Childhood Obesity". It is a community based initiative. The program was based on the guidelines from the National Health Program recommendations (AFPA, INSERM, AFSSA, and APOP) (13).

EPODE was created by the Observatoire des Habitudes Alimentaires et du Poids (Dietary Habits and Weight Observatory) and L'Association pour la Prévention et la Prise en charge de l'Obésité et Pédiatrie (Association for the Prevention and Treatment of Pediatric Obesity). This program was developed based on the effectiveness observed from the Fleurbaix-Laventie Ville

Santé Study showing a decrease of childhood obesity rate. A national committee of experts from a variety of health fields including nutrition, pediatrics, psychology, sociology and pedagogy worked together to produce actions and tools based on Fleurbaix-Laventie Ville Santé process, ensure that the initiatives of the program are implemented, runs the EPODE towns' network and creates media coverage. This national coordination is called Protéines (13).

EPODE is under high sponsorship by the French Ministry of Health, Family and the Handicapped, the French Ministry of Youth, National Education and Research, the French Ministry of Sports, the French Minister of Cities and Urban Renovation, the French Ministry of Agriculture, Food, Fishing, and Rural Affairs, the French Ministry representing Small and Medium Companies, Trade, and Liberal Professions and Consumption, and the Association of French Mayors. It is under general sponsorship of the French Association of Ambulatory Pediatrics, the French National Academy of Medicine, and the French Pediatric Society (12). EPODE also has private partners including "Health Prevention Insurers" APS, NESTLE, the group Ferrero, the International Carrefour Foundation, and local partners (14). These partners finance the program at the cost of one euro per year per inhabitant, which is half of the total program cost of two euros per year per inhabitant. Private partners sign a partnership charter preventing them from involvement in the campaign with their products, intervening in the program contents and putting into practice an institutional communication solely assigned to initiatives. They do receive corporate communications media coverage on the process of involvement of EPODE (13). This represents tremendous support from both public and private sectors.

EPODE started as a pilot project in these ten towns Asnières-sur-Seine, Beauvais, Béziers, Evreux, Meyzieu, Roubaix, Royan, Saint-Jean, Thiers, and Vitré. These towns are in all

different regions of France. In 2008, 167 towns in France are part of EPODE. EPODE affects more than 1,200,000 people in France. There have also been pilot projects in five towns in Spain called THAO, and eight towns in Belgium called VIASANO (13).

EPODE’s goal is to prevent childhood with a five-year intervention plan. There are two designated levels of intervention, primary and secondary. The primary action is aimed at prevention of excessive weight gain in children who are not overweight or obese while the secondary action is aimed at decreasing weight gain in children who are overweight or obese (13).

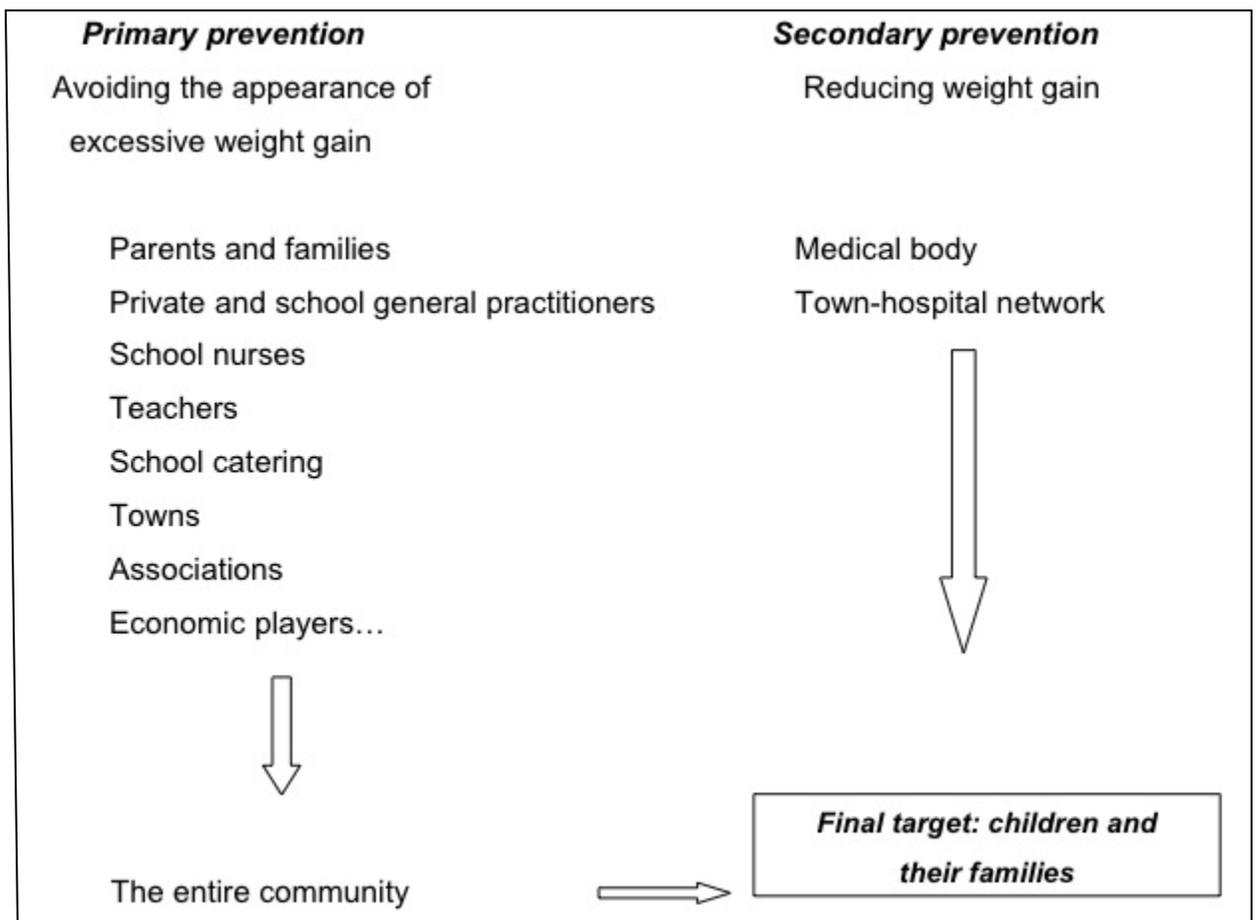


Figure 5: Flow Chart Showing EPODE’s Two Targeted Ways of Prevention. Found at: “Dossier de presse de lancement du programme version anglaise” at epode.fr/presse/index.html

In the primary prevention, the aim is to prevent excess weight gain in children who are overweight or obese. Local players including business owners, community leaders and practitioners in the nutrition domain are organized. Incentives programs for physical activity are created and promoted. The preventative action is targeted towards families, teachers, associative and economic partners. The mayor selects a project lead who coordinates all interventions. There are three essential steps to this part of the program (13).

The first step is to ensure that community leaders, health professionals, teachers, and families in the community are aware and educated about the obesity problem. Information is disturbed at town meetings, brochures, posters and media coverage (13).

The second step is to train the participants. Health professionals such as school nurses and general practitioners are given education regarding how to diagnosis and treat childhood obesity. Teachers will be given special information regarding nutrition. Local medical experts that have already received the proper training take charge of educating and training these health professionals. The experts have access to facilities to organize these educational meetings for health professional as well as for informational meetings to explain further educational tools for teachers (13).

The third step in the program to start the action in the school and town. Education materials are developed for teachers aimed at offering to those interested in incorporating the nutrition education into their lessons. These lessons are based on balanced and varied diet, while avoiding making very strict recommendations or over criticizing weight or dietary habits. Physical exercise is encouraged during recess lasting from fifteen to thirty minutes per day. School catering experiences improvement. It will prepare the students for the meals and

monitor them. There are themed play learning spaces created with collaboration with dietitians to teach children how to cook fruits and vegetables and host tasting workshops (13).

In addition, there is a nutrition and exercise week organized every year in each town called SNAPS (Semaine de la Nutrition et de l'Activité Physique et Sportive, Week of Nutrition and Physical Activity). This week emphasizes the fun of exercise and a balanced diet with enjoyable, social events that are organized (13).

A "The Taste of the Seasons" is part of the program where every three months a different kind of food is promoted. The food is promoted with simple messages such as for vegetables and fruits: five per day, starchy foods: one starchy food per meal, and milk and dairy: three times per day with recommendations appropriated by the PNNS (Program National Nutrition Santé). Shop owners, producers, retailers, restaurant owners and schools caterers are involved in the campaign. There are visits to shops, supermarkets, and farmers markets organized. In one town, a farm was set up in shopping center so children can learn to milk cows and goats. They also learned yogurt making and had a cheese tasting. Restaurants and school catering include the food in their menu. General practitioners are given nutrition-medical news related to the food. Parents and children receive recipes related to the food. Teachers receive educational programs and create lessons for their classroom promoting the food. For example, children taste vegetables and learn the differences between canned, frozen, and fresh food. Additionally, towns put information in the local newspapers (13).

"Walking to School" is another program established. There are so-called pedestrian buses that are organized by parents who take turns walking with groups of children to school. There are also other initiatives to promote recreational exercise with the help of local sports associations (13).

EPODE is promoting of the discontinuation of the traditional ten o'clock snack at schools (13). This snack is traditionally a high-calorie food such as biscuits, croissant or pain au chocolat. Some EPODE towns such as Béziers and Roubaix are organizing school breakfasts with dietitians present to teach children how to create a balanced breakfast which eliminates the need for the mid-morning snack (14).

The secondary prevention of the program is aimed at reducing the BMI of children who have been identified as overweight or obese. Health professionals are the leaders of this action. There are two main goals of this intervention. Training to help with treatment is one important component. The parents of the children are also encouraged to make an appointment with their general practitioner. Telephone consultants with dietitians is a method of treatment employed (13).

An evaluation of the program is made by annually recording children's BMIs. All children are weighted and measured by doctors and nurses. With that information, their BMI is calculated and recorded on a weight chart. This chart is commented on and sent home to the parents. Overweight, obese and at-risk children's parents are highly encouraged to see their general practitioner (13).

So far, there are limited results for EPODE. EPODE is not an official scientific study but rather a community initiative. Only the initial rates of obesity of the pilot towns have been released as shown in the above table (14). A major report is due to be release in 2009 detailing the evolution of the rates of obesity in the ten pilot towns. However, some results are available. In the town, Asnières sur Seine, the rate of obesity fell 1% between 2004 and 2006. In Beauvais, a 3% reduction of obesity was seen. In Saint Jean, there was a 5.5% decrease

between 2004 and 2005. However, these results could be inaccurate due to inaccuracies in collecting data the first year and a short time frame (14).

Town	Percent of Children Overweight/Obese in 2004
Vitré	10%
Royan	17%
Saint Jean	19%
Evreux	19%
Roubaix	23%
Beauvais	22%
Asinière sur Seine	21.5%
Meyzieu	25%
Béziers	19%
Thiers	25%

Analysis/Conclusion

Discussion of Results

The results from Fleurbaix-Laventie Ville Santé show that it is possible to stabilize and eventually decrease the rate of childhood overweight and obesity. The rate of childhood overweight in both genders went from 17.5% in 1992 to 8.8% in 2004 (3, 11). This represents a decrease of almost 50%. Furthermore, it shows that this type of intervention is very successful.

During the intervention, there was a rise of the rate of childhood overweight and obesity from 1992 to 2000 (3). The rise could be due to several reasons. There was not as much community support for the intervention until 1999. This indicates the essentialness of community support in the prevention of childhood obesity. Additionally, there were not many programs targeting families until 1999/early 2000s. This shows that education of other family members can affect the rate of childhood obesity. Finally, this could show that it is easier to prevent childhood obesity than correct it.

	1992	2000	2002	2003	2004
% of children overweight in Fleurbaix and Laventie	17.5%	24.6%	13.2%	10.5%	8.8%

Additionally, results of FLVS I from the follow-up written nutrition test in 1997 show increased nutritional knowledge from students in the intervention towns compared to the control towns (10).

Follow-up Nutrition Test Results	% Correct	% Wrong	% Missing
Intervention Towns (Fleurbaix and Laventie)	53.1%	45.6%	2.3%
Control Towns (Bois-Grenier and Violaines)	42.2%	53.7%	4.7%

Later in 2009 additional results are expected from the EPODE study showing five year follow-up data. Initial results from the some of the pilot towns after the first year of intervention suggest a decrease of the rate of childhood obesity (13). However, even after the results of the first five years of the intervention have been released, there may not be a decreased trend in childhood obesity. For example, in Fleurbaix-Laventie, only after ten years of intervention was there a decrease in childhood overweight and obesity. So results could be similar with EPODE depending on the conditions of the towns.

Limitations

Fleurbaix-Laventie Ville Santé was not a controlled setting. The setting was in two towns where not all factors could be controlled. Exact protocols for the interventions may not have been followed and outside influence was inevitable.

EPODE does not have any long term data available at present. The results released showing trends after the first year of intervention are too early for any sort of a trend to be established. The towns are located in many different regions and do not follow the exact same protocol so it is essential that more research is done and released to determine the overall results of EPODE.

Approaches Contributing to the Success

There were several approaches that contributed to the success of preventing of childhood obesity that these two programs have demonstrated.

The first approach was the creation of simplistic nutrition related messages. Developing simple to follow nutritional messages, for example a recommendation such as “Five Fruits and Vegetables a Day”, was essential for the program to succeed. This kind of message is very easy

for the general public to understand and it also represents a reasonable and realistic goal. These messages were used to provide simple solutions to achieving the programs nutritional goals and conveyed via distribution of posters, flyers, handouts, and local media (See Figures 10 and 11 in appendix for examples).

The second approach was involving schools in the communication of nutrition and physical activity messages. School involvement increased the promotion of the nutritional messages to be distributed. Schools used several methods to give the children both first and second hand knowledge of the nutrition and physical activity messages. Examples include visits organized to farms and farmers markets so that children can learn about food, and physical activity promotion through increased recess time and “walk to school” days were organized. Additionally, there were nutrition lessons added to different course subjects’ curricula. School menus reflected the nutritional messages allowing the children to taste the food.

The third approach was the creation of local programs and community support. Local leaders were involved and motivated to make a change in the community. As demonstrated in Fleurbaix and Laventie, only after the creation of local programs and increased community support, was there a decrease in the prevalence of overweight and obesity in children. While nutrition needs are universal, each community must decide what specific measures to organize. What motivates people to learn and change in one community may not work everywhere. Additionally, not all communities have the same resources so it is important for each community to determine what they can do with their given resources.

The fourth approach was cooperation between health professionals. General Practitioners, School Nurses and Dietitians all played a role in the prevention of childhood obesity. It was critical that these professionals consistently made referrals in order for the

treatment of overweight and obese children to succeed. General Practitioners and School Nurses were responsible for identifying children who are overweight and obese by measuring and monitoring the children's BMI. Dietitians played a two-part role in prevention. They educated all children, staff and community members about food, and nutrition. They also counseled overweight and obese children and their parents to help them achieve a healthier weight.

Cost

Fleurbaix-Laventie Ville Santé and EPODE are very cost effective programs. Each cost two euros (approximately \$2.83) per inhabitant (13). This is particularly true in comparison to the cost of treatment of diseases caused by obesity. In addition, EPODE had tremendous financial support from a variety of sources. EPODE is supported by many national government agencies as well as by private enterprises. The financial support by the program sponsors further reduces the cost of the program to the actual towns involved. This makes these programs very affordable.

Conclusions

As the prevalence of childhood obesity has dramatically increased in France, there have been several programs created in response to this growing trend. Fleurbaix-Laventie Ville Santé and EPODE are two such examples of programs creating interventions against childhood obesity. It appears from these examples that school-based community interventions that mobilize the community to respond to the growing problem of childhood obesity not only be successful at decreasing the rate of childhood obesity but also be cost-effective in the short and long term.

Fleurbaix-Laventie Ville Santé shows that the trend of increased prevalence of childhood obesity can not only be stopped, but the rate can be decreased by 50% in a period of 12 years. This is important due to the rapidly increasing prevalence of childhood obesity in France. EPODE has demonstrated how the principal techniques of a successful study can be put into place in many different communities. With more than 167 towns in France involved, EPODE has created a successful network devoted to decreasing the prevalence of childhood obesity in the involved towns and is currently expanding outside of France to Belgium and Spain.

This thesis has identified four important approaches of preventing childhood obesity demonstrated by Fleurbaix-Laventie Ville Santé and EPODE:

1. The creation of simple, easy to follow nutrition and physical activity related message
2. Involvement of schools in the communication of nutrition and physical activity messages
3. The creation of local programs and community support for those programs
4. Cooperation between General Practitioners, School Nurses and Dietitians

Fleurbaix-Laventie Ville Santé and EPODE are successful program examples on what can be created in response to the childhood obesity epidemic. Each program has continued to expand since its creation showing increasing commitment to the cause of preventing childhood obesity. With EPODE being exported to other European countries, it seems that this could be the program to combat the childhood obesity epidemic. By learning more about how these two programs have become successful, other countries could adopt similar tactics to reverse the trend of increased prevalence of childhood obesity. It is only through wide-spread interventions can the prevalence of childhood obesity decrease.

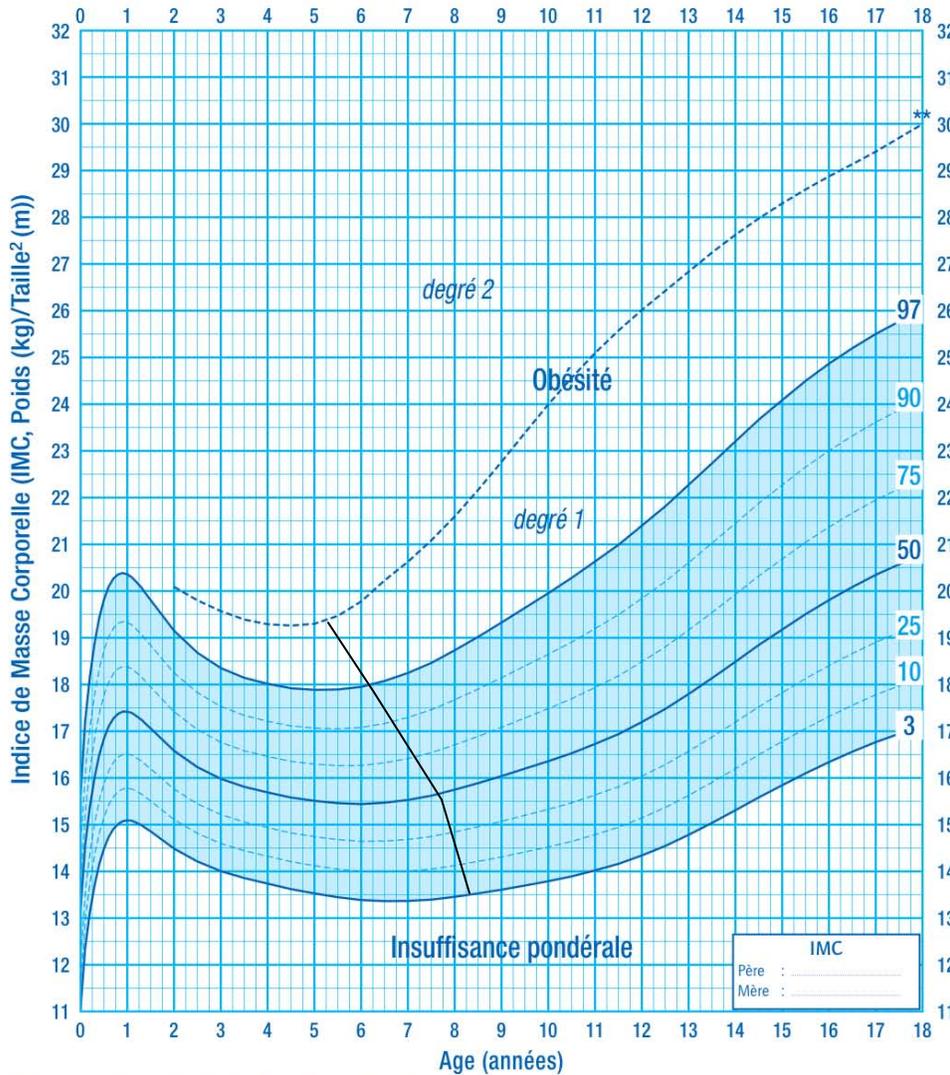
Appendix

French Growth Chart for Boys (Courbe de Corpulence chez les garçons)



Courbe de Corpulence chez les garçons de 0 à 18 ans*

Nom : _____ Prénom : _____ Date de naissance : _____



Pour chaque enfant, le poids et la taille doivent être mesurés régulièrement.

• L'Indice de Masse Corporelle (IMC) est alors calculé et reporté sur la courbe de corpulence disponible sur www.sante.fr. Il se calcule soit avec un disque de calcul, soit avec une calculatrice, en divisant le poids (en kg) par la taille au carré (en mètre) soit :
$$\frac{\text{poids(Kg)}}{\text{taille (m) x taille (m)}}$$

• L'IMC est un bon reflet de l'adiposité. Il varie en fonction de l'âge. L'IMC augmente au cours de la première année de vie, diminue jusqu'à 6 ans puis augmente à nouveau. La remontée de la courbe, appelée rebond d'adiposité, a lieu en moyenne à 6 ans.

• Tracer la courbe de corpulence pour chaque enfant permet d'identifier précocement les enfants obèses ou à risque de le devenir :

- lorsque l'IMC est supérieur au 97^{ème} percentile, l'enfant est obèse.
- plus le rebond d'adiposité est précoce plus le risque d'obésité est important.
- un changement de "couloir" vers le haut est un signe d'alerte.

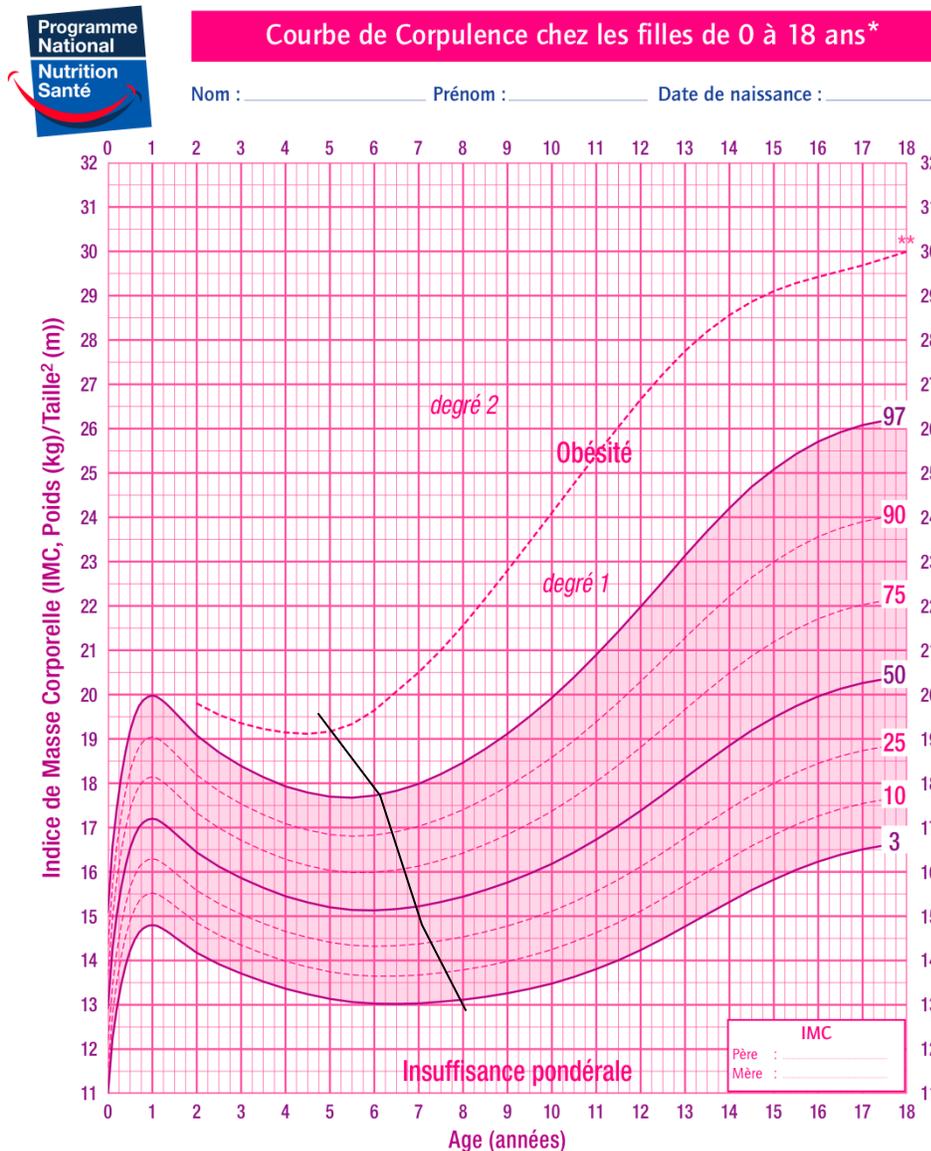
Courbe graduée en percentiles, établie en collaboration avec MF Rolland-Cachera (INSERM) et l'Association pour la Prévention et la prise en charge de l'Obésité en Pédiatrie (APOPE) et validée par le Comité de Nutrition (CN) de la Société Française de Pédiatrie (SFP).

* Données de l'étude séquentielle française de la croissance du Centre International de l'Enfance (Pr Michel Sempé) - Rolland-Cachera et coll. Eur J Clin Nutr 1991; 45:13-21
** Seuil établi par l'International Obesity Task Force (IOTF) - Cole et coll. BMJ 2000;320:1240-3



Figure 6: French Growth Chart for Boys. This demonstrates the two degrees of obesity as well as normal weight curves and underweight curves.

French Growth Chart for Girls (Courbe de Corpulence chez les filles)



Pour chaque enfant, le poids et la taille doivent être mesurés régulièrement.

• L'Indice de Masse Corporelle (IMC) est alors calculé et reporté sur la courbe de corpulence disponible sur www.sante.fr. Il se calcule soit avec un disque de calcul, soit avec une calculatrice, en divisant le poids (en kg) par la taille au carré (en mètre) soit : $\frac{\text{poids(Kg)}}{\text{taille (m)} \times \text{taille (m)}}$

- L'IMC est un bon reflet de l'adiposité. Il varie en fonction de l'âge. L'IMC augmente au cours de la première année de vie, diminue jusqu'à 6 ans puis augmente à nouveau. La remontée de la courbe, appelée rebond d'adiposité, a lieu en moyenne à 6 ans.
- Tracer la courbe de corpulence pour chaque enfant permet d'identifier précocement les enfants obèses ou à risque de le devenir :
 - lorsque l'IMC est supérieur au 97^{ème} percentile, l'enfant est obèse.
 - plus le rebond d'adiposité est précoce plus le risque d'obésité est important.
 - un changement de "couloir" vers le haut est un signe d'alerte.

Courbe graduée en percentiles, établie en collaboration avec MF Rolland-Cachera (INSERM) et l'Association pour la Prévention et la prise en charge de l'Obésité en Pédiatrie (APOP) et validée par le Comité de Nutrition (CN) de la Société Française de Pédiatrie (SFP).

* Données de l'étude séquentielle française de la croissance du Centre International de l'Enfance (Pr Michel Sempé) - Rolland-Cachera et coll. Eur J Clin Nutr 1991; 45:13-21

** Seuil établi par l'International Obesity Task Force (IOTF) - Cole et coll. BMI 2000;320:1240-3



Figure 7: French Growth Chart for Girls.

EPODE Organizational Chart

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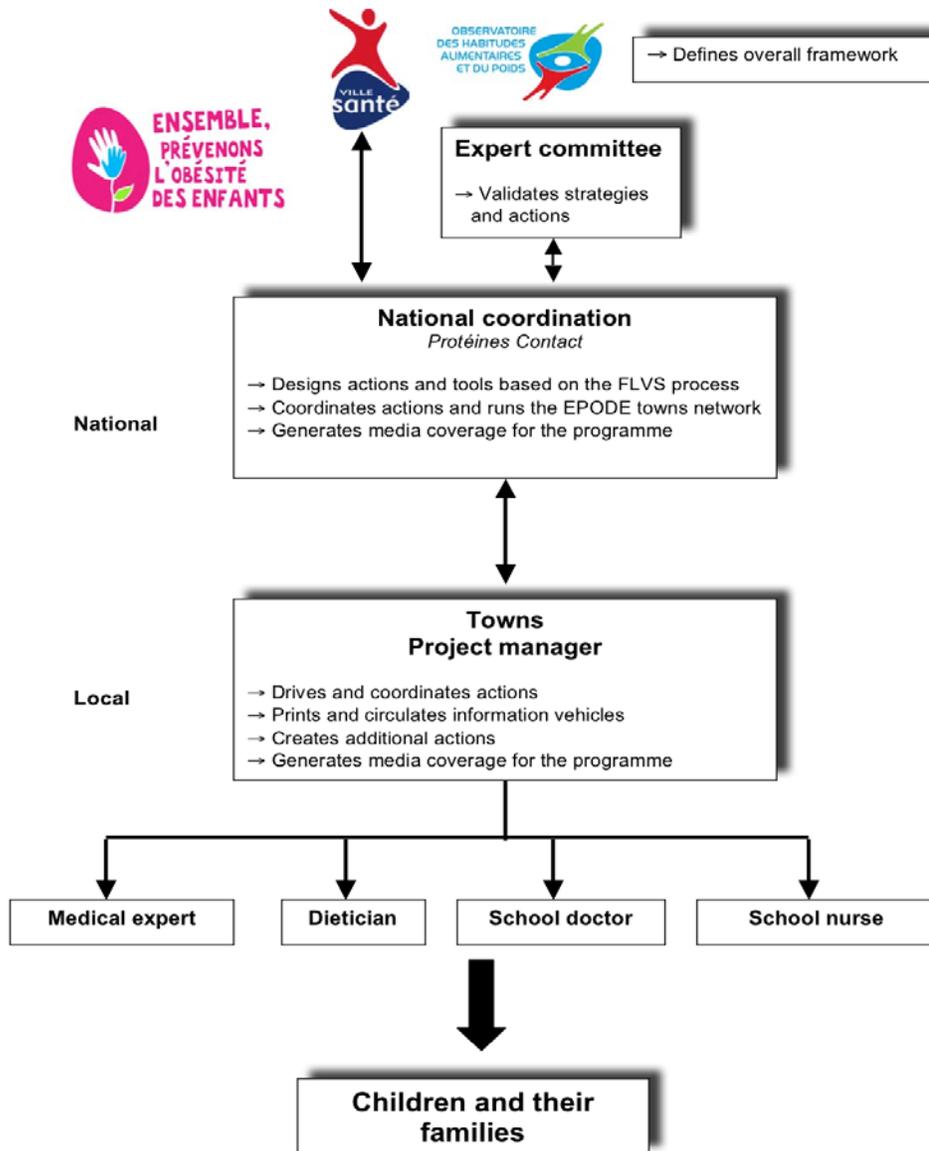


Figure 8: Structure of EPODE, found at "Dossier de Presse, EPODE un an après " at epode.fr/presse/index.html

EPODE Handout Example 1: “Cook! It’s Easy: Let Your Imagination Express Itself!”

**CUISINEZ !
C'EST FACILE :
LAISSEZ VOTRE IMAGINATION
S'EXPRIMER !**

**MANGER
SIMPLE, SAIN
ET PAS CHER ?
ÇA SE CUISINE !**

Pour cuisiner simple au quotidien :

- Profitez de tous les produits à votre disposition : frais, surgelés, conserves...
- Testez de nouvelles cuissons : micro-ondes, four, papillote, vapeur...
- Mariez les saveurs : épices, herbes aromatiques...

ENSEMBLE, PRÉVENONS L'OBESITÉ DES ENFANTS

www.epode.fr

The poster features a central image of a young girl with braids, focused on using a manual citrus squeezer over a green bowl. Three circular inset images show a person chopping vegetables, a woman in a kitchen, and a bowl of fresh tomatoes. The background is a vibrant purple with white text. At the bottom, there is a row of logos from various French organizations and the EPODE website address.

Figure 9: Example handout from EPODE about eating simply, easily and not expensive. Found at: epode.fr

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