

# Obesity and asthma: two pathologies whose prevalence among children is growing, surveyed through school medical examinations

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***Children entering primary school have to undergo a medical examination performed by the doctors and nurses of France's Education Ministry.***

***According to a survey carried out in 1999-2000 among a sample of 30,000 pupils who'd just undergone their medical examination, 14% of 6 year old children were overweight, including 4% who were obese and 10% who were moderately overweight.***

***Children living in big cities and priority education areas (zones d'éducation prioritaires - ZEP) are more likely to be overweight than those living in rural communities.***

***Asthma affects between 6 and 12% of children with various degrees of severity, and is more common among boys than girls.***

**T**he state of the health of young children was until recently only monitored in connection with the most serious pathologies or those that gave rise to acute phases, as

well as via general statistical sources (population interview surveys, hospital data, data on long-term afflictions, mortality data). However, these sources do not lend themselves to a study of

those pathologies such as obesity and asthma whose incidence has been increasing in a worrying manner over recent years. In order to enhance our knowledge of such pathologies, the medical

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staff working for the schools medical service that carries out periodic health checks were roped in as part of a three-year cycle of surveys in schools (see box 1). The survey carried out among children in the last year of nursery school (see box 2), which is discussed in this article, was the first in this cycle.

### Survey of the medical examinations performed prior to entry into primary school

One of the main tasks of the schools medical service is to perform systematic health checks prior to children's entry into primary school. The aim of these checks is to detect and if need be notify parents of any health problems. The clinical examination can show up any growth irregularities or chronic pathologies that require specific treatment or monitoring, the aim being to ensure that each child is able to benefit optimally from his or her schooling experience. The Ministry of Education has taken various measures to enhance the way children and teenagers affected by long-term health troubles (chronic illnesses, general allergies and food allergies) are treated.

The survey is based on the examinations performed as part of these health checks, plus a number of questions that are specific to the survey, focusing on salient public health concerns. Thus for this first survey, the emphasis was placed on pathologies such as asthma and obesity whose increasing incidence is a cause of concern for the public health authorities.

### The growing prevalence of obesity among children

Being overweight means having an excessive proportion of body fat. Individuals who are severely overweight are said to be obese.

Otherwise, they are said to be "mildly" or "moderately" overweight. From a clinical point of view, obesity is defined as an excessive amount of body fat stored in adipose tissue in the form of triglycerides. As it is not possible to accurately measure the proportion of such body fat

#### Box 1

##### A triennial cycle of surveys carried out in schools

This is a series of surveys carried out with the help of the doctors and nurses of the schools medical service among three generations of children in their last year in nursery school, in fifth grade and in 9<sup>th</sup> grade, commissioned in 1999 by the Ministry of Employment (General Health department and Drees department), and the Ministry of Education, Research and Technology (Education department and Planning and Development department DPD) and in collaboration with *Institut de veille*

*sanitaire* [the health watch institute].

The first survey was carried out during the 1999-2000 school year among a sample of pupils in their last year of nursery school; the second, in 2000-2001, involved 9<sup>th</sup> grade students, and the third, carried out in the 2001-2002 school year, involved 5<sup>th</sup> grade students. A new, identical three-year cycle is due to begin from next year, ensuring that data on children's health is regularly updated.

#### Box 2

##### The 1999-2000 survey of health checks performed on 6 year olds involved a substantial sample of 30,000 pupils

A sample of 1,675 schools was drawn at random by DPD, the planning and development department of the Ministry of Education from the entire stock of state and private schools in mainland France and the French Overseas Territories.

The survey was carried out by drawing schools at random within a departemental stratification; all the pupils in their last year of nursery school / first year of primary school at the chosen schools were surveyed, giving a total sample of around 30,000 pupils, i.e. 4.5% of the total number of children in those years at state and private schools in mainland France and the French Overseas Territories. The children were surveyed either at the end of nursery

school or at the start of primary school. They were aged between five and six and a half years old (average age: five years and eight months).

The no response rate resulting from the failure of some children to attend medical examinations was low (5%). The large size of the sample and the low no response rate result in a low error probability. For instance, it has been estimated that the incidence of asthma or weight problems, both in the region of 10%, were assessed with an accuracy of  $\pm 0.3\%$ . Over 95% of children brought their health certificates to the medical examinations and 90% were accompanied by at least one parent, which is a further factor of reliability of the data collected.

as part of the overall body make-up, various indirect techniques are used to assess obesity, including the Quételet index, better known as the Body Mass Index (or BMI). This is the ratio of weight/height<sup>2</sup> (kg/m<sup>2</sup>). Adults with a body mass index of 25 or more are considered to be overweight. If their BMI reaches or exceeds 30, they are considered as obese. In the case of children, the problem of assessing these conditions is more difficult given the changes that are bound to occur over the years to the ratio of a growing child's weight versus its height. There is therefore the need for a number of age-related thresholds to determine whether a child is overweight or obese. A new definition has now

been devised by a workgroup operating under the aegis of the World Health Organisation. Separate thresholds have also been established for boys and girls. The French Institute of Health and Medical Research (Inserm) has carried out a detailed collective survey of the merits and justifications of this index (see figure 1).

A child's body mass index normally rises during its first year, before declining steadily until the age of 6. At that age, it starts to increase once again, in what is referred to as the "adiposis rebound". The earlier this rebound occurs, the more likely a child is to become obese. Even though a large proportion of children who

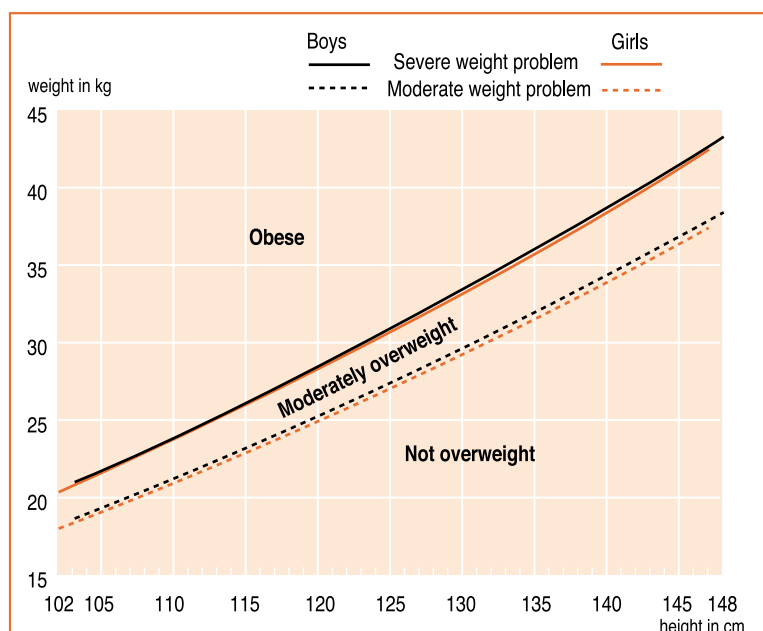
are overweight will not remain so when they become adults, childhood obesity constitutes a predictive factor for adult obesity. It is important to detect it early on, both because of its consequences on the child's quality of life, and because of the fact that it constitutes a risk factor at a later age (particularly for cardiovascular troubles).

Over the past ten years there has been an increase in the prevalence of weight problems in general and of obesity in particular. According to interview data, between 1991 and 2001, the proportion of people aged 18 and above who had a body mass index of more than 30 kg/m<sup>2</sup> rose from 7% to 11% among men and from 7.6% to 10.2% among women. This trend towards increasing obesity is all the more worrying as it affects ever younger people.

### 14% of 6 year old children are moderately or severely overweight

As part of the health checks, anthropometric data (height and weight) is collected. In this way it is possible to detect weight problems and obesity at a very early age. Among the children who were examined, 14% were found to be overweight, including 4% who were obese and 10% moderately overweight. At this age, girls are more likely to be overweight than boys: 4.4% of them were obese as opposed to only 3.3% of boys, and 11.5% of girls were moderately overweight, compared with 8.8% of boys. The probability of being overweight was particularly high among only children or those who did not live with their siblings (12% of such children were

Figure 1 – Moderate / severe weight problem thresholds at age 6



This diagram should be read as follows : the data shows the proportion of children who are moderately overweight or obese. Given individual differences in the pace at which any given child puts on weight during its first years of life, one must take into consideration all the longitudinal data of that child's growth curve. For instance, in terms of body mass index, for a boy of 6 whose height is 120 cm, the BMI threshold for being overweight is 17.55, which corresponds to a weight of 25.27 kg. Above this level, such a child will be deemed to be overweight (moderately overweight). For the same child, the BMI threshold for obesity is 19.78, which corresponds to a weight of 28.48 kg. A girl of the same age and height will be considered moderately overweight at 24.98 kg and obese at 28.30 kg.

Source : Drees based on the thresholds defined in Cole and coll., *British medical journal* 2000, 320 (see 'For further information').

moderately overweight and 5% were found to be obese), and was higher than average for first-born children in general. A high weight at birth was also found to increase the probability of a child being overweight at the age of 6: 17.3% of children whose

weight at birth exceeded 3,500 grams were overweight, versus 12.3% of those whose weight was under this threshold.

The prevalence of weight problems was found to increase with urban density (see figures 2 and 3),

contrary to the trend for previous male generations gleaned from conscription data. Children who live in large cities and particularly those living in the Paris region are more likely to be overweight than their peers who live in rural communities (16.6% of the city's children are overweight, versus 12.8% of children living in the country, and 5% are obese versus 3.6%). This data appears to reflect substantial differences in lifestyle (eating habits, physical exercise) related to urban density. This first study does not afford an opportunity to validate assumptions as to the exogenous risk factors (apart from genetic factors) of being overweight. Future surveys will however involve questioning parents on a number of common lifestyle choices: time spent in front of the television or playing video games, eating habits, etc.

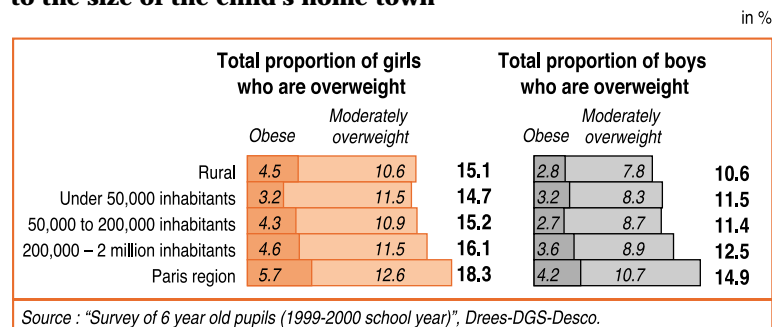
**Figure 2 – Proportion of overweight children according to urban density<sup>1</sup>**

Size of town	Priority education (ZEP) area			Non-ZEP area		
	Not overweight	Moderately overweight	Obese	Not overweight	Moderately overweight	Obese
Under 50,000 inhabitants	87.0	8.8	4.3	86.8	10.1	3.1
Between 50,000 and 200,000 inhabitants	81.4	14.0	4.6	88.0	8.8	3.2
Between 200,000 and 2 million inhabitants	83.8	10.9	5.3	86.2	10.0	3.8
Paris region	78.9	14.1	7.0	85.3	10.6	4.1

1. Rural communities have not been taken into account owing to the near absence of ZEP areas in such communities.

Source: "Survey of 6 year olds (1999-2000 school year)", Drees-DGS-Desco.

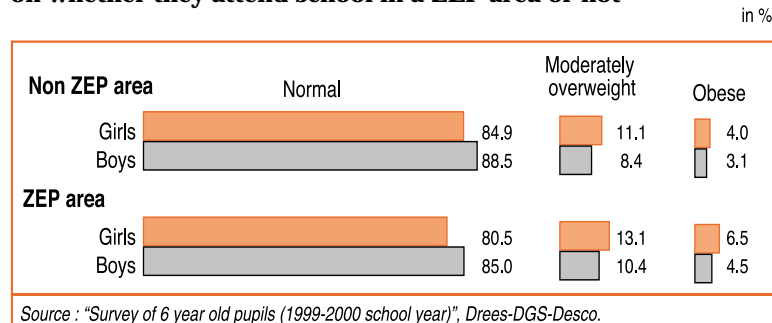
**Figure 3 – Weight problems among boys and girls according to the size of the child's home town**



Successive analyses based on all other things being equal links between being overweight and the urban density in which a child's home is located, the fact of being a girl or whether it is the eldest in the family.

### Weight problems are most common in ZEP areas

**Figure 4 – Proportion of overweight children depending on whether they attend school in a ZEP area or not**



The proportion of overweight children is markedly higher in priority education (ZEP) areas, where 17.3% of 6 year old children are overweight compared with 13.3% of children in all other areas. This applies to both moderate and severe weight problems (see figure 4).

This difference does not result solely from the fact that ZEP areas are most often located in

densely populated areas. It prevails even when one compares ZEP areas with other urban areas with similar population density or when one carries out analyses with all other things being equal. The figures are particularly high for ZEP areas located in the greater Paris region. The gap between boys and girls being identical in and outside ZEP

areas, this means that one in every five girls in ZEP areas is overweight.

Given the socio-economic characteristics of the ZEP areas, one is tempted to draw a parallel with the effect of social inequality on eating habits and lifestyles and with the way in which this may translate at children's level (see box 3).

## Asthma affects between 6% and 12% of children aged 6 years old to varying degrees of severity

Asthma, which in physiological terms results from bronchial hyperactivity, is an affliction that has many causes. Respiratory allergies are major instigators, especially in the case of children. Depending on its severity, asthma may be intermittent, triggered by specific circumstances (physical exertion, allergy, etc.), or it may be persistent. Symptoms vary widely from mere respiratory difficulties to crises characterised by a sensation of suffocation. In its most severe forms, the pathology can seriously affect a sufferer's quality of life. Three out of ten adult asthmatics claim that their condition restricts the scope of their physical or professional activities. In children, poorly controlled asthma may result in recurrent absenteeism and may eventually cause sufferers to fall behind academically. There are a number of effective symptomatic and causal treatments, but it seems that these are not prescribed systematically enough. An audit carried out among general practitioners in Toulouse has revealed that the severity of asthma was underestimated in 12% of cases and insufficiently treated in 16% of cases. Poor patient compliance with treatment is also to blame, with causal therapy often neglected owing to the fact that patients and their families are not sufficiently informed or aware of the benefits.

It seems that most asthmatics develop their illness during childhood, most often an allergy-related asthma. The illness affects boys more than girls, whereas among adults, according to

### Box 3

#### Priority education (ZEP) areas

The only socio-economical indicator incorporated into the survey was the consideration whether the school was located within a priority education area (zone d'éducation prioritaire - ZEP). Of course, this indicator conceals different realities for the populations involved. The absence of detailed information about each of the pupils surveyed, such as their parents' profession, inevitably make this a very sweeping generalisation. However, the fact that educational establishments are located in ZEP areas does correspond to a marked social differentiation in the socio-economic make-up of such areas.

At the start of the 1999 school year, 14.7% of pupils in primary schools in mainland France (1<sup>st</sup> - 5<sup>th</sup> grades) attended schools in a ZEP area. The proportion of pupils in ZEP areas ranges from 3.5% for the regional education authority of Rennes and 6.4% for that of Poitiers and that of Limoges, to 27.5% for that of Paris and 28.2% for that of Créteil. In France's Overseas Territories, the percentage is 26.2%.

The breakdown of pupils in terms of gender is identical in ZEP and non-ZEP areas; their age distribution is also very close, with ZEP area pupils being on average one month older. Thus there are no gender or age differences that are likely to generate gaps between ZEP and non-ZEP areas in connection with the health indicators. However, the proportion of pupils in ZEP areas increases with urban

density. It is very low in rural areas, given that support for deficient areas in rural environments is provided via other mechanisms. But in towns with over 50,000 inhabitants, the proportion of pupils in ZEP areas can amount to almost 20%, and it rises to over 25% in the Paris region. Given that some health phenomena or behaviours vary with urban density, the differences between ZEP and non-ZEP areas have been compared for differing sizes of urban areas.

The social differences in the socio-economic composition of these areas can be appreciated based on the data gathered from a survey panel of 9,600 primary school pupils run by the Planning and Development Department of the Ministry of Education. Looking at the occupation of the adult in charge of the child (mother or father depending on the family situation), we see that in ZEP areas, 3.7% are executives, 8.4% are intermediate employees and 56.7% are blue-collar workers. Outside ZEP areas, the corresponding figures are 17.5%, 18.7% and 34.2%. The economic situation of families living in ZEP areas is harder: 12.6% of fathers and 13.8% of mothers are unemployed versus only 3.4% and 7.4% respectively in other areas. This economic hardship is even more pronounced in the case of single parent families, for in ZEP areas, 16% of mothers bring up their children alone, compared with 9.6% outside ZEP areas.



CreDES' *Santé et protection sociale* [health and social protection] survey, asthma affects women more than men. Upon puberty, the illness appears to regress and sometimes even disappear among boys, whereas girls become more susceptible to the disease than boys towards the age of 12 (7.5% versus 6.5%). In 1998, 2,000 people died from predominantly asthma-related causes, including 10 to 20 children aged under 15. There has been an increasing trend for sufferers needing hospitalisation. Various national and international surveys also report an increase in the prevalence of this pathology; this is why a module on asthma and asthmatic symptoms was introduced systematically into the triennial cycle of school surveys.

Special measures designed to care for asthmatic and allergy-prone children and teenagers in the school environment have recently been introduced by the Ministry of Education. These measures include simplifying access to first aid facilities, fostering the administration of drugs orally, via inhalers and self-injection in emergencies, and enabling children who suffer from food-related allergies to bring packed lunches into school

canteens. The aim is to enable all children to benefit from a normal schooling experience and to avoid discriminatory situations.

The survey carried out in conjunction with the health checks performed during the last year of nursery school by the schools medical service does not afford a means of directly assessing the severity of asthmatic pathologies, but it does enable us to survey already diagnosed or treated asthma conditions and to distinguish them from latent asthmatic symptoms. The definitions that are used to distinguish between positively diagnosed asthmatic sufferers and those who merely display latent asthma-related symptoms were established based on a series of questions drawn from the ISAAC (International Study of Asthma and Allergies in Childhood) questionnaire. Children were considered as asthmatic by the examining doctor if their parents declared that they had been diagnosed as asthmatic by a doctor or if the children had used inhaled bronchial dilators or corticosteroids at some point during the previous 12 months. Any children who had experienced at least two of the following symptoms at least three times over the previous 12 months – wheezing or wheezing

bronchitis, nocturnal breathing difficulties including difficulties in emptying their lungs, coughing fits caused by cold air or in the early morning – were deemed to have latent asthmatic symptoms.

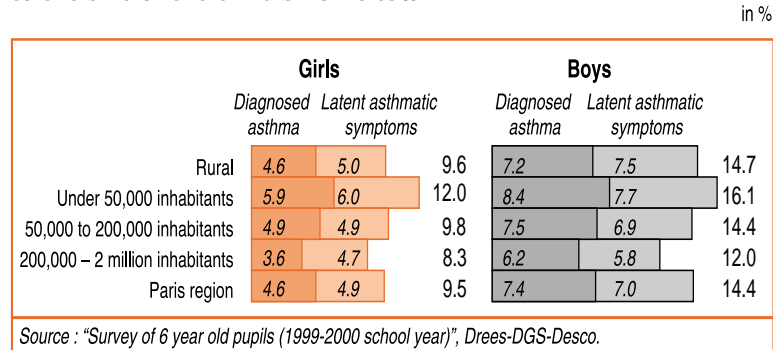
Asthma tends to affect boys more than girls since out of an overall prevalence of 6.2% for diagnosed asthma, the rate is 7.4% for boys and 4.8% for girls. The same applies to children having exhibited latent asthmatic symptoms over the last twelve months (7% of boys and 5.4% of girls).

An analysis of the prevalence of both asthma and latent asthmatic symptoms according to the urban density reveals that overall, their incidence is slightly higher in areas of lower urban density (see figure 5).

The proportions of pupils in whom asthma was diagnosed before the medical examinations were roughly identical in ZEP areas (5.9%) and other areas (6.2%). Given that the prevalence of asthma and latent asthmatic symptoms is slightly higher in areas of lower urban density and given that ZEP areas tend to be urban areas, one might be tempted to conclude that the lack of a substantial difference is due to structural effects. However, the result persists when one restricts the comparison to purely urban areas.

The proportion of children who exhibit latent asthmatic symptoms is furthermore markedly lower in ZEP areas. This result may however be caused by a bias due to the survey protocol, given that certain categories of parents, who are more numerous in ZEP areas, might find it difficult to answer the questions as to their children's symptoms. ■

**Figure 5 – Asthma among boys and girls aged 6 according to the size of the child's home town**



### For further information

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