Prevalence of overweight and obesity in 7-9-year-old children in primary schools in France

Survey protocol based on protocol proposed by the European Childhood Obesity Group (ECOG)

Survey carried out in collaboration with the Ministry of Education, General Direction of School Teaching

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Presentation

Ten years ago, the European Childhood Obesity Group (ECOG) established a protocol for conducting surveys on the prevalence of childhood obesity in various countries (1). The strength of this protocol lays in its simplicity. In addition, the participation of schools' personal in the organization of the study and collection of measurements (as is the case in France) reduces the cost of the project.

The original protocol proposed that anthropometric measurements (weight, height and various circumferences) be collected, along with gender and age as well as information on social status, lifestyle, diet and physical activity. Depending on the possibilities of the research team, data collection might include only some of these topics (i.e. dietary information collection necessitates a more complete interview). Nevertheless, it could include measurements such as skinfolds and impedance and could be extended to other ages.

A study on childhood obesity was carried out in France in 2000 (2). A protocol for its practical application has been described in detail:
(available in French at : http://www.invs.sante.fr/publications/2004/obesite_enfants/index.html).

In the French protocol, some variables were collected in addition to anthropometric measurements. Variables included social category, physical activities, time spent watching television and information extracted from health booklets (breastfeeding, weight and length at birth). Questions regarding physical activity and sedentary lifestyle have not yet been validated. They are based on simple indicators that do not enable a precise evaluation of activities; rather, they are proxies. Such data have been studied for their relationship with overweight and obesity.

The aim of the French survey, carried out in 2000, was to estimate the overweight and obesity prevalence at the time when the National Programme on Nutrition and Health (3) was implemented; the repetition of this survey in 2007 enabled estimating the impact of such a public health plan. Analyses concerned the overweight and obesity prevalence according to various definitions (3, 5), changes in prevalence between 2000 and 2007 (4) and analysis of factors related to overweight and obesity (6).

Prevalence studies were conducted in other countries using the ECOG protocol (7-9) and further analysis of these data (10-13) have been published.

The protocol we present here is a useful guide for survey implementation following ECOG recommendations. It was used in surveys conducted in France in 2000 (2) and 2007 (4). It can be used as a model, but each country should adapt it according to their specific conditions.

Translation into other languages will be useful for practical purposes in the field and may also be presented on this website. Countries which wish to translate the protocol into their own language should contact us at: mf.cachera@uren.smbh.univ-paris13.fr. Indeed, further carrying out of such a survey according to this protocol is desirable in order to enable geographic comparisons in Europe as well as on other continents.

1. Objectives

The main objective of this study is to describe the prevalence of overweight and obesity in 7-9-year-old children in primary school (elementary levels 1 and 2[1]) in France.

Additional objectives are:

- To describe physical activity and sedentary lifestyle;

- To describe overweight and obese children according to their sociodemographic characteristics and behaviors (physical activity and sedentary lifestyle).

2. Methods

According to ECOG protocol (1), the choice of the 7-9-year-old age range is justified by the fact that this age range follows the time of adiposity rebound which occurs at around 6 years of age, after the nadir of the body mass index (BMI) curve (15). Prior to the age of 6, individual BMI values over the reference curve are often transitional. After 6 years, overweight and obesity have a more accurate predictive value for adult adiposity (16). In addition, this age range precedes puberty and its confounding effects. Finally, in France, as in other European countries, almost all children in this age group are schooled.

2.1. Sample size

Sample size is calculated so as to estimate, with 5% precision (i) and 5% alpha, the prevalence of overweight in boys and girls at each elementary level (i.e. 4 groups). The national prevalence of overweight (p) can be estimated at 20%, equally distributed in boys and girls, and in theory, at each elementary level. Therefore, a minimum of 246 children [$n = 1.96^2 \times p \times (1-p) / i^2$] should be included in each of the 4 groups.

A cluster effect is taken into account by multiplying by 2 the initial sample size, i.e. 492 children in each of the 4 groups. In order to account for inclusion or measurement errors, 10% of this sample size is added on, i.e. a minimum of 540 children are included in each group (2,160 children included totally).

Mainland France is divided into 96 administrative districts ("départements"). Sampling design comprises a random selection of one primary school in each administrative district, including a

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[1] *At level 1, most children are aged 7-8 years; at level 2, they are aged 8-9 years.*

minimum of 15 children at each elementary level. A complementary school is randomly selected in case the minimum number of children in the school cannot be reached.

2.2. Measurements and data collection

Choice of the collected data, in addition to objectives related to child BMI and physical activity assessment, is based on known risk factors for childhood overweight and obesity, such as parental characteristics (BMI, socioeconomic conditions) and early life information (breastfeeding, birth anthropometry).

Collected data include:

- Current anthropometry: weight, height and circumferences;

- Physical activity and sedentary lifestyle;

- Parental occupation, educational level, weight and height;

- Weight and height at birth, breastfeeding and its duration, if applicable.

Anthropometric measurements should be performed by physicians and nurses from the Education Ministry. The detailed procedure is provided on the measurement sheet, established according to WHO recommendations (appendix 1).[2]

Other information is to be collected using a self-administered questionnaire filled in by the parents.

2.3. Practical organization

Initial contact is made with the school physician from each administrative district in order to present survey aims and to request that he/she contributes to data collection.

When agreement is received for participation, documents necessary for data collection are sent to the physician; these include:

1. The complete protocol of the survey;

2. Procedures and forms for anthropometric measurements (appendix 1);

3. Questionnaires to be sent to the parents (appendix 2);

4. Letters accompanying parents' self-questionnaire (appendix 3);

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[2] A video is also available in English, Spanish and French on the WHO website (www.who.int/childgrowth/en/), following "multimedia help" link

5. List of included children, by class (appendix 4).

The random sampling of schools is made by the study's investigators on the basis of lists available at the Education Ministry.

Physicians should randomly sample at least one class from each elementary level (1 and 2) in the selected school using the lists of classes available in each school. In case of refusal by the school principal, the survey will be carried out in another school.

A minimum of 15 children per elementary level and school should be included.

If one of the selected classes includes less than 15 children:

- Either another class from the same school will be selected and all children from both classes will be included;

- Or, if the number of 15 children cannot be reached at a given level for a given school, one or more classes at the same level will be selected in the complementary school (all children from these classes in the complementary school will be included in addition to children from the initial school).

Once the selection of classes has been completed, physicians will inform the Principal and teachers about how to carry out the survey, the classes selected to be included in the survey and dates scheduled for performing anthropometric measurements.

One envelope is given to each child and includes the self-administered questionnaire to be filled out by his/her parents (appendix 2), the information letter (appendix 3) and another envelope with the name of the child (this envelope will be used by parents to send back the completed questionnaire). The sealed envelope containing the questionnaire will then be given to the physician or nurse when he/she comes in to perform anthropometric measurements.

He/she will open the envelope without showing it to the teacher, verify that the questionnaire has been correctly filled in and, if necessary, complete it with the child at this time.

Anthropometric information is noted on the questionnaire on the basis of measurements performed by the physician or nurse (appendix 1). For children who are absent from school on the day of the visit by the physician/nurse, and for children whose parents refused participation, the age, gender and the reason for absence or refusal, if known, will be collected using the list of included children (appendix 4).

Once data is collected, questionnaires are sent to the investigators of the study. In addition, data on each selected school must be collected in order to calculate sampling weights such as: number of

classes at each level in each selected school, total number of children at each level in each selected school and number of primary schools in the whole country (by district if necessary).

2.4. Statistical analyses

Children whose age is not within the requested range (7.0 years – 9.9 years) will be excluded from analyses, as will those whose parents refuse participation. Children for whom age, gender, weight and height data are complete (basis sample) will be analyzed for estimation of overweight and obesity prevalence. Children are to be grouped into "overweight (including obesity)" and "obesity" categories according to the International Obesity Task Force (IOTF) reference (17) and into the "thinness" categories according to Cole et al. references (18).

In order to enable comparisons with studies which do not use such references, or to compare estimates with studies published prior to publication of these references, results will also be presented according to other references (2,5), including those of Must et al. (19) (previously recommended by the WHO (20)), Centers for Disease Control (21) and French references (22). The new WHO references, published in 2007 (23), will also be used.[3]

Data are described as means (+/-SD) or percentages when applicable. Overweight and obesity frequencies are described across gender and age groups, and an overall description is also given..

Weight and length/height collected in the health booklet can be analyzed using WHO software (www.who.int/childgrowth/en/).

2.2. Authorizations

Authorizations are required from parents, the data board committee, and the ethics committee depending on the collected variables, as well as from the Education Ministry (or others).[4]

Finally, this study will determine the thinness, overweight and obesity prevalence in 7-9-year-old school children. When repeated several years apart, changes across time can be evaluated. It will also describe risk factors and changes in these factors across time.

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[3] ECOG recommendations for body mass categories and their labels are currently being published (24).
[4] The types of authorizations may vary according to the country and its legislation.

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Appendixes

Forms provided here may serve as examples. They have been elaborated for the French survey and should therefore be adapted to each country.

Appendix 1: Procedures and form for taking anthropometric measurements

Appendix 2: Questionnaire to be completed by parents

Appendix 3: Information letter along with the questionnaire to be completed by parents

Appendix 4: List of included children, by class

Appendix 1 : Procedures and anthropometric measurement form

MEASUREMENT FORM FOR PHYSICIANS AND NURSES

Institution: :

STUDY ON THE NUTRITIONAL STATUS OF FRENCH CHILDREN

Child's first name: **Last name**:   **Gender** : Male ❏   Female❏
(the name will not be registered in the computer file)

Date of birth : └─┴─┘ └─┴─┘ └─┴─┴─┴─┘   **School** :   **Class :**

                                                   Date of measurement: └─┴─┘ └─┴─┘ └─┴─┴─┴─┘

Do not fill in this frame

School : └─┴─┴─┘   **Participant N°** :   └─┴─┴─┴─┘

ANTHROPOMETRIC MEASUREMENTS (following WHO 1995 recommendations)
Whenever possible, the measurement is repeated and recorded twice after excluding any clearly erroneous value

Measurements will be preferably performed in the morning. The subject is barefoot or wears thin socks and wears little clothing.

1 – STATURE   └─┴─┴─┘ , └─┘ *cm*

The subject stands on a flat surface, and his or her weight is distributed evenly on both feet, and the head positioned so that the line of vision is perpendicular to the body. The arms hang freely by the sides, and the head, back, buttocks and heels are in contact with the vertical board. The subject is asked to inhale deeply and maintain a fully erect position without altering the load of the heels. The movable headboard is brought into the most superior point on the head with sufficient pressure to compress the hair. Height is recorded to the nearest 0.1 cm.

2- WEIGHT   └─┴─┴─┘ , └─┘ *kg*

 The subject stands over the center of the platform with the body weight evenly distributed between both feet. Weight is recorded to the nearest 100g.

3 - CIRCUMFERENCES
Measurement of body circumference requires a flexible but inelastic (non-stretchable) graduate tape measure. It is taken in a horizontal plane without the tape compressing the skin. It is recorded to the nearest 0.1 cm.

3.1. Arm circumference
(left side, equidistant from olecranon and acromion)   └─┴─┘ , └─┘ *cm*

The subject stands erect, with the arms hanging freely at the sides of the trunk, the palms towards the thighs. The circumference is measured at the midpoint between the acronion and the olecranon.

3.2. – Waist circumference
(midway between iliac crest and lowest rib margin)   └─┴─┘ , └─┘ *cm*

The subject stands erect comfortably, with his or her weight evenly distributed between both feet and the feet slightly spaced. The measurement is taken midway between the inferior margin of the last rib and the crest of the ilium. The measurement should be taken at the end of a normal expiration

3.1

3.2
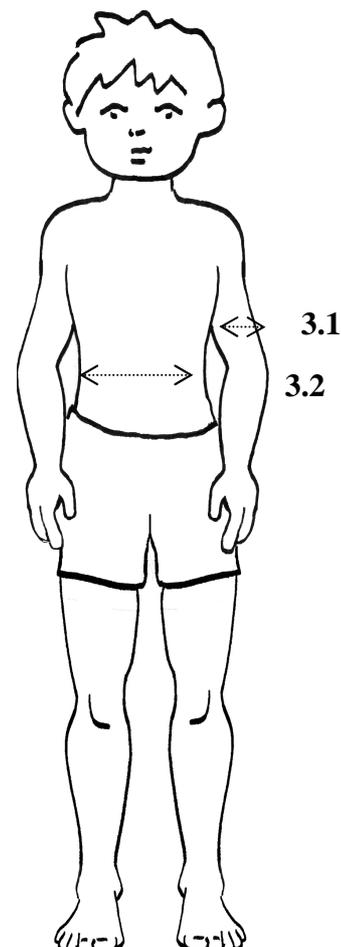
Appendix 2: Questionnaire to be completed by parents

THE QUESTIONNAIRE INTENDED FOR THE FAMILY MUST BE GIVEN BACK TO THE SCHOOL IN A SEALED ENVELOPE ADDRESSED TO THE SCHOOL PHYSICIAN

School N°: /__/__/__/   Class level :   ❑ CE1   ❑ CE2
Pupil N°: /__/__/   Class name : _____

▶Date of birth of the child : /__/__/____/   Male ❑   Female ❑

▶The child is currently living with:
(Check several boxes in case of joint custody)
- ❑   Parents (father + mother)
- ❑   Mother only
- ❑   Father only
- ❑   Mother + companion
- ❑   Father + companion
- ❑   Other : _____

▶**Professional or social situation** of the adult with whom the child is currently living

	Mother *or* _____	Father *or* _____
If child is not living with biological parents,, *please give further details (i.e.,grandparent, uncle, etc.) :*		
▶**Present occupational status (one answer per adult)**		
1 - Employed	❑	❑
2 - Student, pupil, trainee	❑	❑
3 - Unemployed	❑	❑
4 - Homemaker	❑	❑
5 - Retired	❑	❑
6 – Inactive (included disabled persons)	❑	❑
7 – Other	❑	❑
8 – Do not know	❑	❑
▶**Occupation (present or most recent):** *Please be as precise as possible*	_____ _____ _____	_____ _____ _____

	Mother *or* _____	**Father** *or* _____
If child is not living with biological parents,, *please give further details (i.e.,grandparent, uncle, etc.) :*		
►**Highest school level (one answer per adult)**		
1 - None	❑	❑
2 - Primary school	❑	❑
3 - Secondary school	❑	❑
4 - High school	❑	❑
5 - University	❑	❑
6 - Other	❑	❑
7 – Do not know	❑	❑
8 - Refuse to answer	❑	❑
►**Age**	/__/__/ **years**	/__/__/ **years**
►**Weight**	/__/__/__/ **kg**	/__/__/__/ **kg**
►**Height**	/__/__/__/ **cm**	/__/__/__/ **cm**

►How many children has the mother had, including the child participating in the study?   /__/__/

►What is the birth rank order of the child (1st, 2nd, 3rd, 4th,etc.) ?   /__/__/ [st, nd, rd, th]

►What is the child's regular means of transport to school   ?

❑ on foot, by bicycle, scooter, roller skates, skateboard ❑ motor vehicle, bus?

If not on motor vehicule, how much time is spent daily on transport?   /__/__/__/ **min**

►How much time does the child spend in front of a TV or computer screen ?

TV :   School days : /__/__/ **h** /__/__/ **min**   Non-school days : /__/__/ **h** /__/__/ **min**

Video games / computer   School days : /__/__/ **h** /__/__/ **min**   Non-school days : /__/__/ **h** /__/__/ **min**

►Does your child belong to a sports team or practice outdoor activities after school or on weekends?

❑ Yes   ❑ No

►How many times a week does your child play outdoors after school or on weekends ?

School days : ❑ less than once/week ❑ 1-2 times/week ❑ 3 or more times/week
(Monday, Tuesday, Thursday, Friday)

Non-school days : ❑ less than once/week   ❑ 1-2 times/week   ❑ 3 or more times/week
(Wednesday, Saturday, Sunday)

►Is your child regularly active (skating, cycling, running, etc.) ?   ❑ Yes   ❑No

Use the child's health booklet or past medical documents to fill out this questionnaire

▶Duration of pregnancy of the mother?   /__/__/ **weeks of pregnancy**

▶Child's birth weight   /__/__/__/__/ **grams**

▶Child's birth length   /__/__/ **cm**

▶Was the child breastfed (even for a few days)?   ❑ Yes   ❑ No

▶If yes, how old was she/he at the time of weaning?   /__/__/ **months**
                    (quote 00 if breastfed less than 1 month).

Please give weight and length/height since birth if this information is known

Date of measurements	Weight	Length / height

Thank you for your participation.
Here you may add   information that could explain weight variations :

Appendix 3: Information letter to the parents

Name and logo of the responsible organization

Dear Sir, Madam,

Growth surveillance in children is important for evaluating health status of the individual as well as of the population. The data obtained in this study will enable carrying out public health actions whenever necessary. To do so, however, we need to collect accurate data on children's nutritional status, especially by measuring their weight and height.

The current survey is being coordinated by ………………………………(name of the organization) and is being directed by …………………………………… (name of the person responsible).

The main objective of this survey is to describe body mass in pupils in primary schools in our country. Simple anthropometric measurements (weight, height, circumferences) will be collected by school health services. All you have to do is fill out the enclosed questionnaire.

Data collected here will remain confidential and anonymous. The information you provide on the self-questionnaire will be read only by the school physician, who will then transmit all anonymous questionnaires to …………………………… (name of the organization).

Statistical analyses will be performed on an overall basis (rather than at the individual level). If you do not wish your child to be included in the survey, please inform the school principal.

PLEASE FILL IN THE ENCLOSED QUESTIONNAIRE AS ACCURATELY AS POSSIBLE AND RETURN IT TO THE <u>ATTENTION</u> OF THE SCHOOL PHYSICIAN IN THE ENCLOSED ENVELOPE AFTER HAVING CAREFULLY SEALED IT.

If you would like additional information on the survey, please contact the persons responsible at ……………………………………………………………

In accordance with the law "Computer science and individual rights" of January, 6th 1978, automatic treatment of individual data within this survey has been declared to the "Commission nationale de l'informatique et des Libertés" and enables you to exercise your right of access and modification. You have the possibility of verifying data accuracy and their final destruction.

Thank you for your participation!

Appendix 4: List of included children

List of included children, by class

School n°: /__/__/__/   **Level:** ❑ 1   ❑ 2

Total number of children in the class: /__/__/   Check this box in the case of an additional class: ❑

Child n°	*Check at least one column corresponding to the child's situation regarding the study*				*To be filled in ONLY in case of refusal or absence*		
	Measure ments taken	Questionnaire filled in	Pupil absent	Parental refusal	Age (y)	Sex (M/F)	Reason for absence or refusal

NB: The table must be filled in by the principal of the selected school and verified by the school physician.