What do growth curves and body mass index means?

During appointments with the paediatrician, children are weighed and measured, and the doctor then records these measurements on a growth curve in their health record. The aim is to compare them with established averages. These charts help doctors detect shifts in growth patterns, which may indicate health or nutritional concerns. For parents, growth curves offer a visual tool to better understand their child's development. But how do you read and interpret this data?

Overview "Growth curves and BMI"

What's behind the body mass index?

Context
Everyday life
Health and care

Cognitive processes
Processing information
Reasoning
Critical thinking

Content
Quantity and number
Data and chance
Pattern, relationships and change

Target group (incl. necessary prior skills and competences)

Adults with basis in numeracy

Dispositions
Self-confidence
Motivation
Positive (self-)beliefs

Outcomes and results

Reading and interpreting a graphic representation

Co-funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

Main information

Content	Quantity and number Graphical representation of data
Target group	All learners who know the basics of numeracy
Learning intention	Numeracy for personal issues
Duration	1 lesson
Material and resources	Learners' health records or models of curves from the health record
Group size	6 to 10 learners
Problem statement	Monitoring children's growth, particularly their body mass index, is a public health issue, particularly to prevent the risk of obesity. Growth charts are included in children's health record books, and are added to as paediatric examinations are carried out. But these curves are complex, and can give cause for concern if you don't know how to read and/or interpret them. Developing these numeracy skills is therefore a key factor in empowering parents.
Working questions	- What data are shown on these curves? - What are the units? - What are the relationships? - How do I enter and extract data? - How can I compare my child's situation with the expected average?
Learning outcomes and results	- Identify data on a complex graph - Reading and interpreting data in relation to an average

Working plan

Time	Description of content/activities	Material	Methodical and didactic information[1]
15’	**Introduction** The teacher projects the image in Appendix 1, and asks the learners what these images remind them of, each separately and the 2 together. *The ideas to come up with are: measurements, height, weight, kg, cm, curve, graph, increase, etc. and perhaps overweight/obesity.* The teacher then shows the images in Appendix 2. Does this mean anything to the learners? Do they have a health record, for themselves or for their children? What's in it, what's it for? Is there a link between the 2 appendixes? What is it? The health record is used to record children's height and weight during paediatric check-ups, and together we're going to find out how these curves work.	Appendix 1 Appendix 2	Questioning Discussing
45’	**Exploration** The teacher forms 2 sub-groups, distributing appendix 3 to one and appendix 4 to the other. The first task is to identify the data shown on the tables, both lexical and numerical. Each sub-group identifies them and tries to explain them. With regard to the curves themselves, the trainer will be careful to observe the construction of the graphs: starting point, maximum values, graduations and "implicit" values, etc. He/she will encourage each sub-group to put forward hypotheses about the construction of the curves: the significance of the ‘M line’ and the dotted-lines in particular. Each sub-group then presents its graph and explains its hypotheses. The trainer, if necessary, completes, rephrases and	Appendix 3 Appendix 4	Collaborative learning Discussing

[1] for description and explanation of kinds of tasks, HITS and other background information please consult the teacher’s/user’s guide

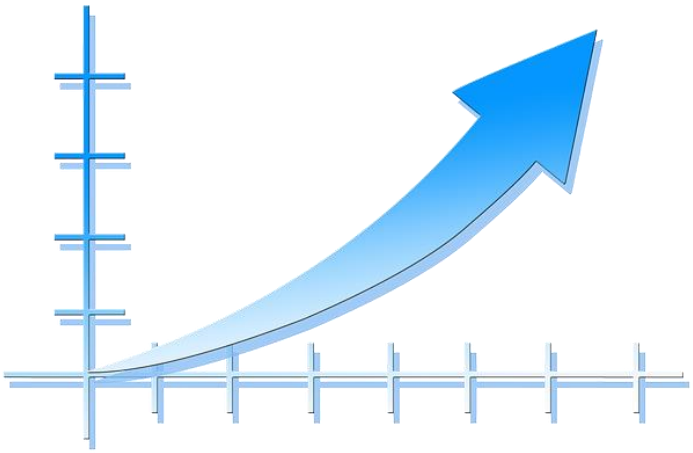
	clarifies the data, both the units used and the meanings of “median value” and percentages for weight curves. He/she makes sure that all the participants have understood the principle and then distributes the other appendix to each sub-group, inviting participants to “hunt for differences”. These are then discussed in the large group, and clarified if necessary. Finally, by projecting one or other of the appendices, the trainer asks the participants to read the data, for example “what is the average weight of an 18-month-old boy?”; “if a girl is 80cm tall at 13 months, is she average?” It is therefore very important to return to the notion of the average, and to the precautions to be taken when reading these graphs: they are used to take account of the child's development, but this does not mean that you should always 'stick' to the “M line”. On the other hand, significant deviations should be seen as warning signs.		
30’	**Integration** Each learner is given the 2 appendices individually. The trainer gives each learner a different list of 4 height and weight measurements for different children, boys and girls, and asks them to transfer them to the grid. The trainer checks with each to identify any difficulties or errors, noting them for himself but not correcting them. When this phase is over, the participants form pairs, each having to read to the other the data they have plotted on the curve. The 2 must also agree whether the child appears to be within, below or above the average growth rate. In the event of disagreement, the pair identifies whether it is a reading or reporting error, and corrects itself accordingly. If the 2 participants cannot agree, they may ask the trainer to mediate. The trainer will then call on the group to come to a decision.	Appendix 3 Appendix 4	Individual Collaborative learning

45’	**Increasingly complex!** When everyone has successfully completed the previous stage, the trainer reconstitutes 2 sub-groups, and distributes appendix 5 to one and appendix 6 to the other. As with the first curves, trainees will need to identify the data and explain the construction of the graphical representations. Everyone then presents their work to the large group, with the teacher looking at the following questions: How does this differ from the first session? How did we manage to represent both height and weight on the same graph? Why the white separation? Finally, the trainer gives each sub-group the second appendix, with another "hunt for differences" followed by a pooling of the results. To make sure everyone understands, the trainer distributes the appendixes to everyone and asks them to note down the average height and weight of a boy/girl at a given age.	Appendix 5 Appendix 6	Collaborative learning Discussing
30’	**Body mass index** The participants are now ready to tackle the final graphic representation. The trainer first asks the participants if they know the body mass index. The trainer collects the answers, completes and clarifies if necessary. He/she emphasised the informative nature of this index, and, as with growth curves, indicates that only significant deviations should give cause for alarm. He/she then hands out appendix 7 or 8 to the participants, asking them to find the BMI formula, to identify the limits of the different states (‘normal’, ‘thin’, ‘overweight’, ‘obese’), and so on. Finally, he/she invites the participants to calculate their own BMI, and presents them with the diagram in Appendix 9, which represents the IMS in a different form.	Appendix 7 Appendix 8 Appendix 9	Discussing Individual
15’	**Transfer** As well as perhaps feeling more at ease at paediatric appointments, or in relation to their own situation, learners are now able to read graphic representations of data. During this final discussion period, it may be useful to identify and list other graphs that learners come across in their daily or professional lives: price curves, production curves, temperature readings from a cold room, etc.		Discussing Self-reflexing

Appendix 1

Some pictures

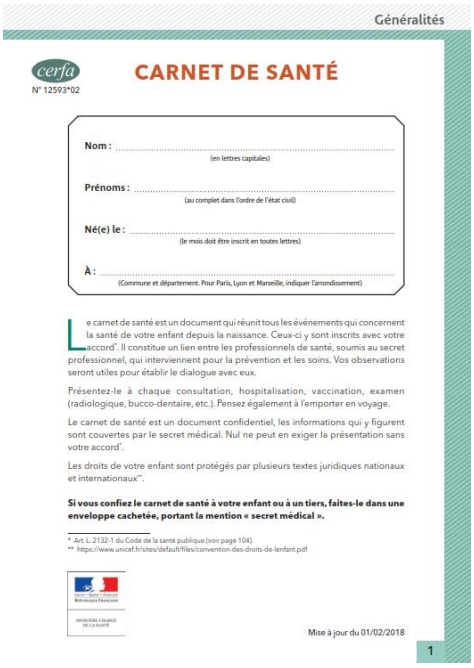
Kalhh @pixabay.com

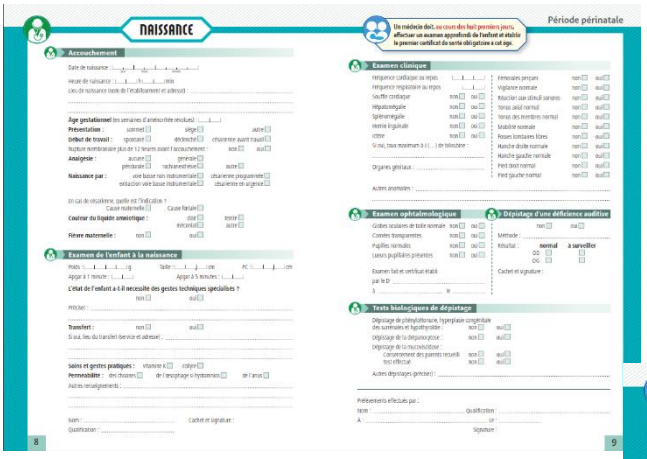


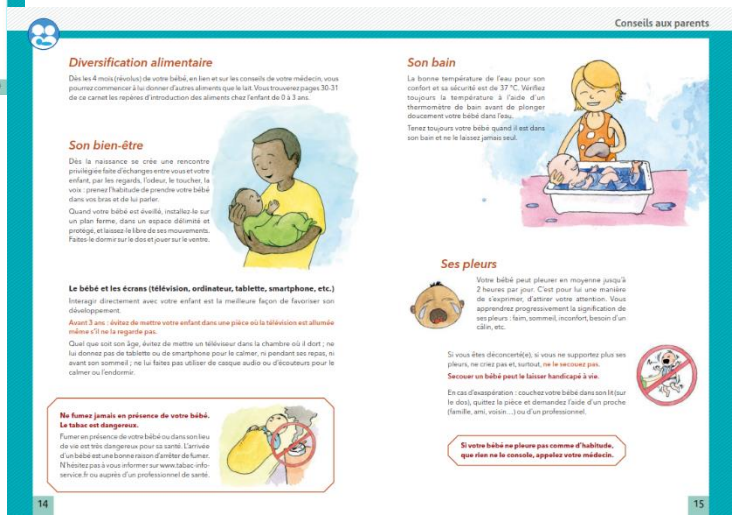
Geralt @pixabay.com

Appendix 2

Example of a health booklet for children

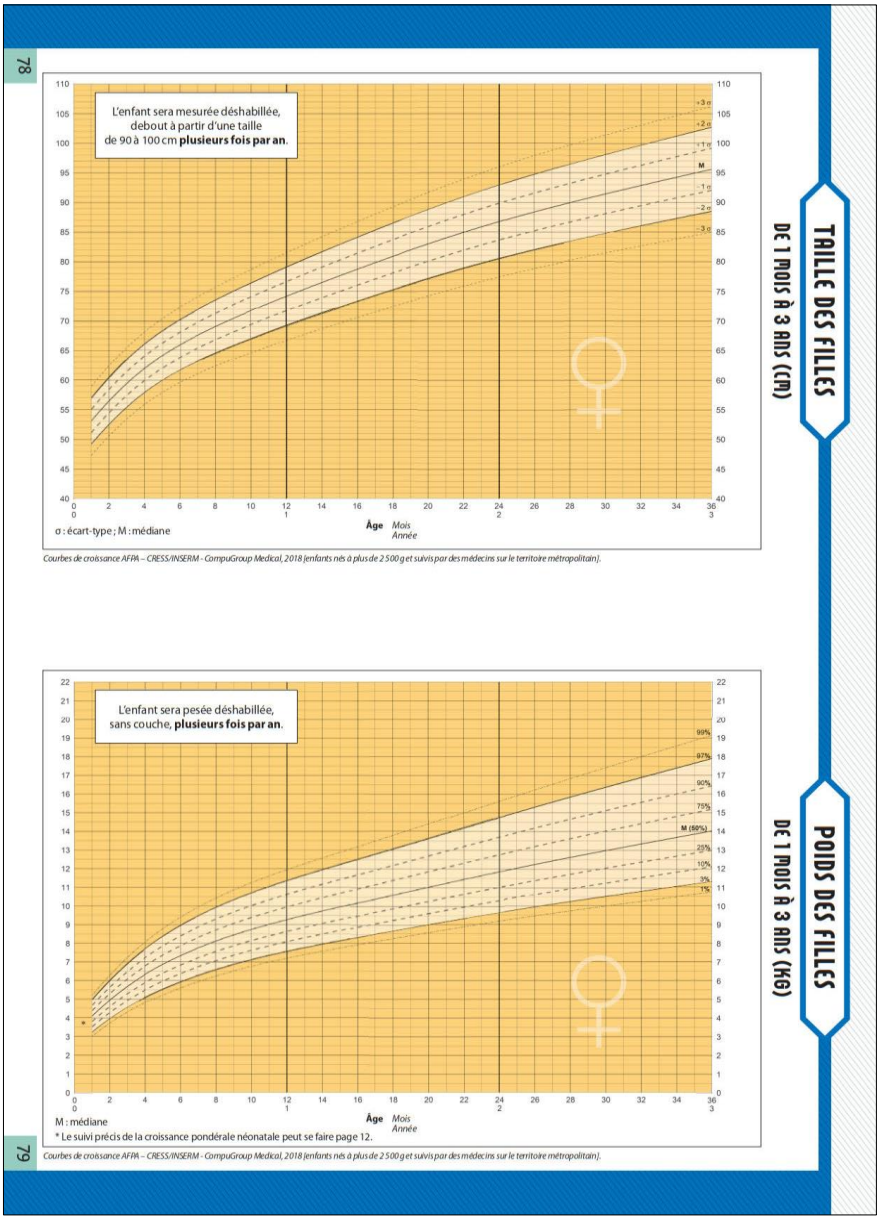




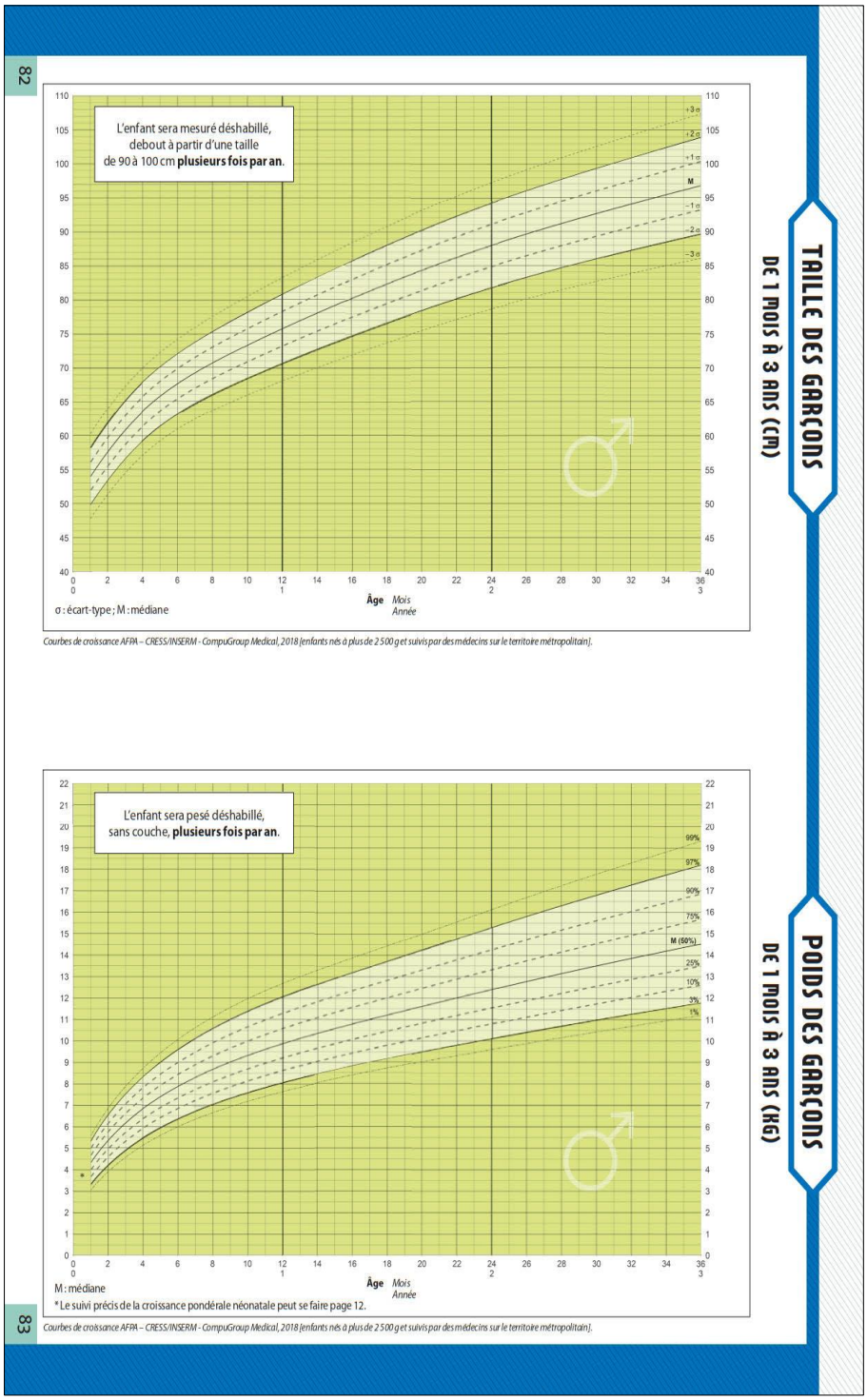


https://sante.gouv.fr/prevention-en-sante/sante-des-populations/enfants/carnet-de-sante

Appendix 3



Appendix 4



Appendix 5

TAILLE (CM) ET POIDS (KG) DES FILLES

DE 1 À 18 ANS

(taille mère ☐ cm + taille père ☐ cm – 13) / 2 = **Taille cible**

Au moins une fois par an, l'enfant sera mesurée et pesée déshabillée, et le suivi pubertaire sera assuré par une **inspection des organes génitaux externes**.

Reporter ici la **taille cible****

L'interprétation des mesures est basée sur une **analyse conjointe** de la **taille**, du **poids** et de l'**indice de masse corporelle**, et tient compte des **tailles des parents**, des mesures antérieures et du **stade pubertaire**.

Stade de Tanner S2*
Stade de Tanner P2*

Âge *Année*

σ : écart-type ; M : médiane ; S2 : apparition des seins ; P2 : apparition de la pilosité pubienne
* Les **stades S2** et **P2** apparaissent physiologiquement entre 8 et 13 ans.
** 80 % des enfants en bonne santé auront une taille finale comprise entre la taille cible – 6 cm et + 6 cm.

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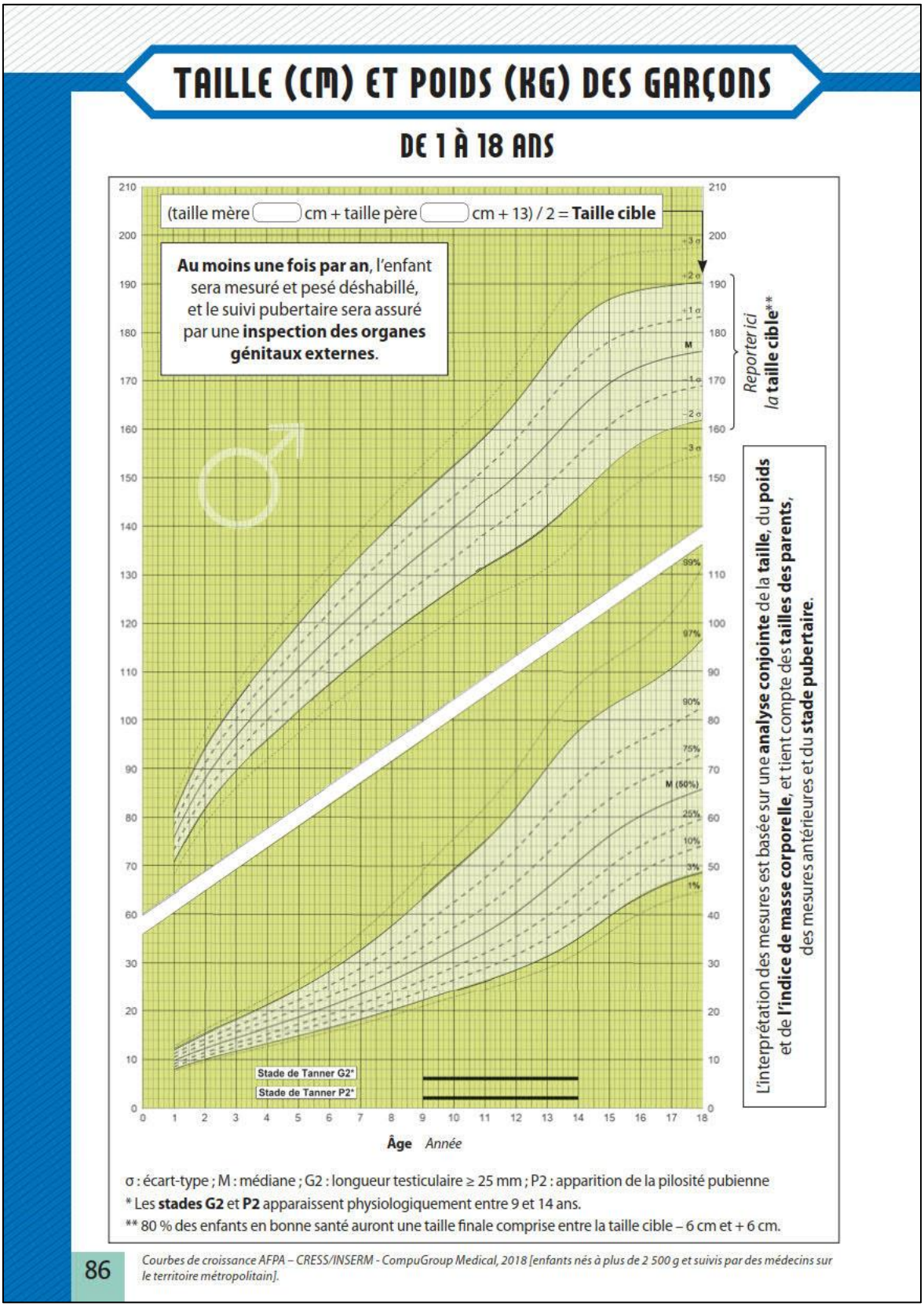
Courbes de croissance AFPA – CRESS/INSERM - CompuGroup Medical, 2018 [enfants nés à plus de 2 500 g et suivis par des médecins sur le territoire métropolitain].

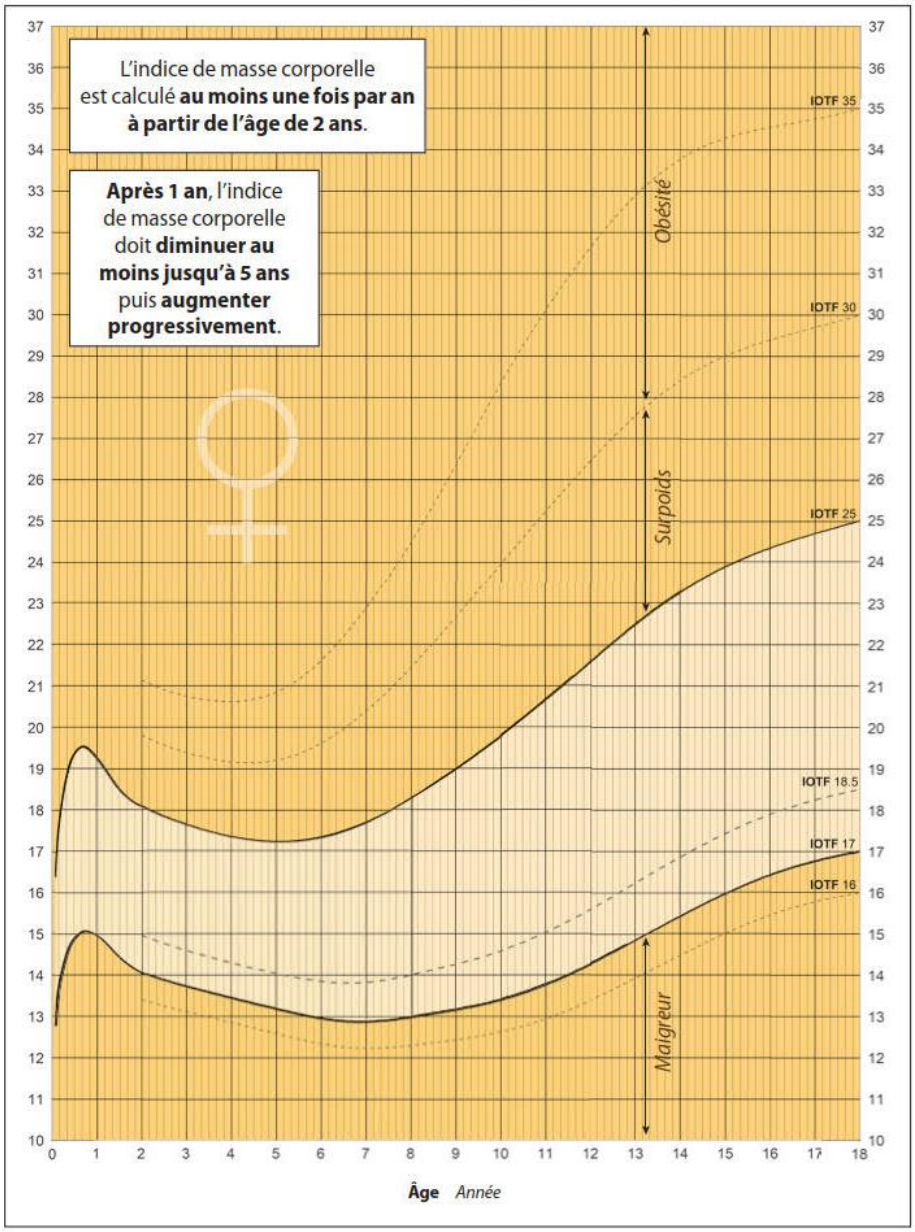
Appendix 6



Appendix 7

INDICE DE MASSE CORPORELLE DES FILLES

DE 1 MOIS À 18 ANS (KG/M²)



Après 2 ans : *courbes de l'International Obesity Task Force (IOTF). Cole TJ, Lobstein T. Pediatric Obesity 2012.*
Avant 2 ans : *courbes actualisées d'enfants nés à plus de 2 500 g suivis par des médecins de France métropolitaine. Courbes AFPA – CRESS/INSERM – CompuGroup Medical, 2018.*

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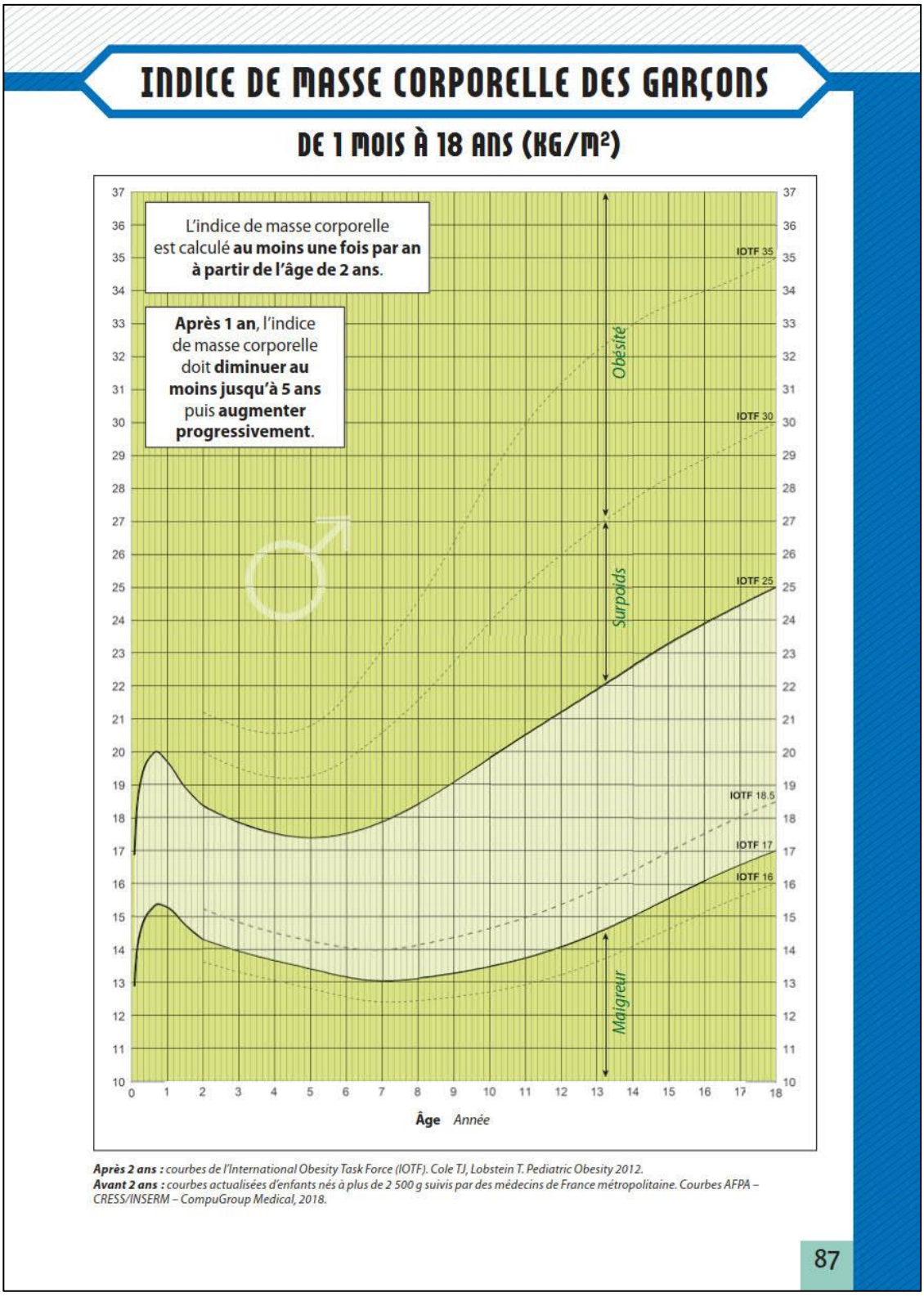
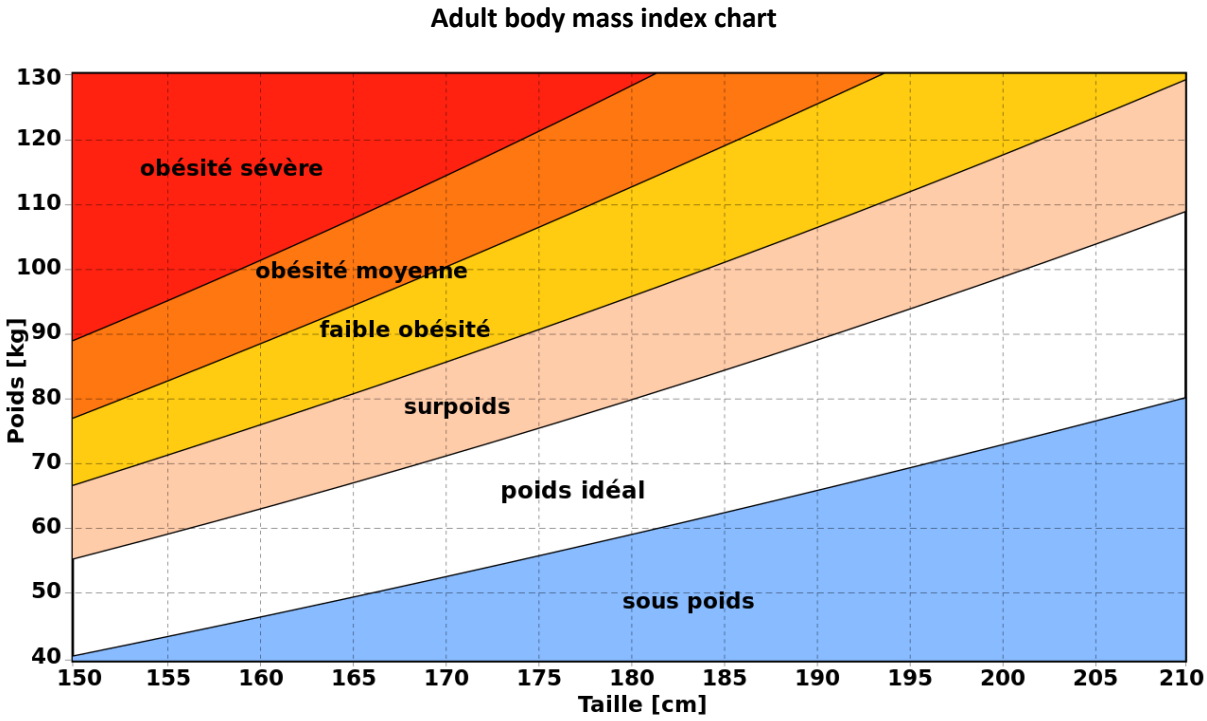
Appendix 8



Après 2 ans : *courbes de l'International Obesity Task Force (IOTF). Cole TJ, Lobstein T. Pediatric Obesity 2012.*
Avant 2 ans : *courbes actualisées d'enfants nés à plus de 2 500 g suivis par des médecins de France métropolitaine. Courbes AFPA – CRESS/INSERM – CompuGroup Medical, 2018.*

Appendix 9



Par Sarang — Travail personnel basé sur : BMI en.svg de Bibi Saint-Pol, Domaine public, https://commons.wikimedia.org/w/index.php?curid=114347950

This material was produced in the Erasmusplus project **Numeracy in Practice**, projectnumber 2021-1-NL01-KA220-ADU-000 026 292. In this project, 11 partners in 11 countries worked together in designing, evaluating and improving the materials. All materials can be found on the website (www.cenf.eu).