Wachstum von Kindern – Child Growth

Körperliche Entwicklung

Die Ernährungssituation von Kleinkindern, also zwischen dem Säuglingsalter und dem Schuleintritt, lässt sich am besten durch die körperliche Entwicklung beschreiben. Dazu gibt es internationale Referenzwerte. Diese sind für den europäischen Rahmen durch die Weltgesundheitsorganisation zusammengestellt. Seit kurzem gibt es auch neueste Zusammenstellung durch die Euro-Growth Study Group, an denen das Dortmunder Forschungsinstitut für Kinderernährung beteiligt war. Dieses bietet auch die umfassenden Informationen in diesem Bereich (http://www.fke.uni-dortmund.de/, Journal of Pediatric Gastroenterology and Nutrition 2000). Wie bei Säuglingen sind auch bei Kleinkindern Biopsie-Materialien wie Blut und Harn möglich, werden aber aus verschiedenen Gründen, nicht zuletzt ethischer Art, nur selten durchgeführt.

WHO – Child Growth Standards

www.who.int./nutrition
http://www.who.int/childgrowth/en/
National Health and Nutrition Examination Survey
http://www.cdc.gov/growthcharts
Wachstum von Kindern
http://www.tfh-berlin.de/~akmi/tfh/ss00/kinder/docu/normwachs/normwachstext1.html#Anker_3

Wachstum und Entwicklung von Kindern

Web-Projekt
http://www.tfh-berlin.de/~akmi/tfh/ss00/kinder/

The Euro-Growth Study: why, who, and how.

van't Hof MA, **Haschke F**.

Department of Medical Statistics, Nijmegen University, The Netherlands.

BACKGROUND: Assessment of growth is important in health management of infants and children. Evaluation of growth performance requires anthropometric measurements, with proper interpretation depending on the use of appropriate references. Europe-specific growth references have not been available. The purpose of the present study was to generate such references for infants and children from birth to 3 years of age. The study was further intended to assess the influence of nutrition and lifestyle factors on growth. METHODS: The Euro-Growth Study was designed as a multicenter longitudinal cohort study. This report describes the study design, the sample (cohort), and the methods used. Quality control

measures included standardized measurement techniques with ongoing cross-sectional and longitudinal consistency checks. Selectivity in participation and discontinuation and reproducibility of data over time were evaluated. RESULTS: Of 2,245 infants who were enrolled in the study at 22 study sites in 11 countries, 1,746 (78%) provided longitudinal data until 12 months of age, 1,205 (57%) until 24 months of age, and 1071 (48%) until 36 months of age. Anthropometric measurements were performed on 21,773 occasions. As a result of cross-sectional and longitudinal data checks, 209 data points (0.09% of all data points) were rejected. Comparison of participants's demographic data with those of nonparticipating local subjects indicated that the cohort was selective in maternal age (higher), maternal education level (higher), household location, and family structure. The withdrawal rate during the study was low (24%), and withdrawals occurred at random. Analysis of reproducibility over time resulted in the elimination of the data from one study site. CONCLUSION: The Euro-Growth Study provided longitudinal growth data from a large cohort of normal European children. Because of the chosen sampling method, the study cohort ws somewhat selective relative to the local background population. Internal validity was satisfactory in that the reproducibility of anthropometric measurements was high in 21 sites and the withdrawal rate was low and random.

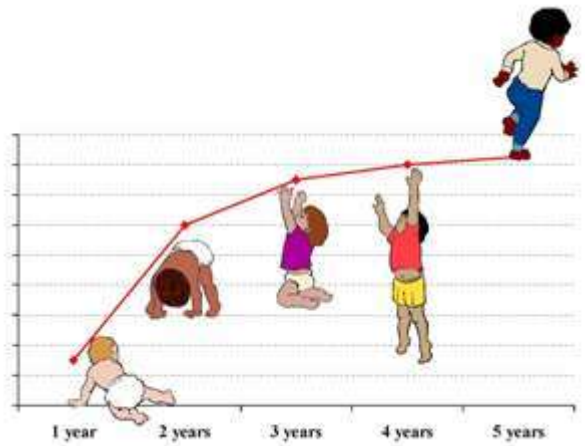
http://www.ncbi.nlm.nih.gov/pubmed/10896086

WHO – Child Growth Standards

www.who.int./nutrition
http://www.who.int/childgrowth/en/

The WHO Child Growth Standards

This web site presents the WHO Child Growth Standards. These standards were developed using data collected in the WHO Multicentre Growth Reference Study. The site presents documentation on how the physical growth curves and motor milestone windows of achievement were developed as well as application tools to support implementation of the standards.



Related links

:: Media page
:: WHO Department of Nutrition for Health and Development
:: WHO Department of Child and Adolescent Health and Development
:: WHO Global Database on Child Growth and Malnutrition
:: Multimedia help

Child growth standards

The WHO Multicentre Growth Reference Study (MGRS)

The WHO Multicentre Growth Reference Study (MGRS) was undertaken between 1997 and 2003 to generate new growth curves for assessing the growth and development of infants and young children around the world.

The MGRS collected primary growth data and related information from approximately 8500 children from widely different ethnic backgrounds and cultural settings (Brazil, Ghana, India, Norway, Oman and the USA).

The new growth curves are expected to provide a single international standard that represents the best description of physiological growth for all children from birth to five years of age and to establish the breastfed infant as the normative model for growth and development.

History of the MGRS

The 47th World Health Assembly, in May 1994, requested the Director-General,"To complete, in cooperation with selected research institutions, collection of revised reference data and the preparation of guidelines for their use and interpretation, so as to assess the growth of breast-fed infants".

An information document on the implementation of this resolution was distributed at the 105th session of the WHO Executive Board, November 1999.

English [pdf 22 kb] | Arabic | Chinese | Español | Français | Russian

Details on the study methodology have been published in a supplement of the Food and Nutrition Bulletin.

Full list of articles in English | Artículos en español

A documentary video of this study, "A growth curve for the 21st century" can be downloaded or viewed using the links below. The video is available in English, French and Spanish.

This video describes the approach taken to select the sample, the methodology, study organization and field logistics, and provides an overview of the implementation of the study in the six participating countries.

To view "MGRS - A Growth Curve for the 21st Century" [streaming wmv 29 minutes] | To download [wmv 52.7Mb]
Pour regarder " Une courbe de croissance pour le XXIeme siècle " [streaming wmv 27 minutes] | Pour télécharger [wmv 54.3Mb]
Para mirar "EMPC Una curva de crecimiento para el siglo XXI" [streaming wmv 27 minutes] | Para cargar [wmv 51.6Mb]

A copy of the video as DVD or VHS (in NTSC or PAL format) can also be ordered from

the following address:

Dr Mercedes de Onis
World Health Organization
Department of Nutrition
1211 Geneva 27
Switzerland

Fax: +41 22 791 4156

The WHO Multicentre Growth Reference Study (MGRS): Rationale, planning, and implementation

Mercedes de Onis (WHO), Cutberto Garza (UNU), Cesar G. Victora (Brazil), Maharaj K. Bhan (India), and Kaare R. Norum (Norway), guest editors

Food and Nutrition Bulletin 2004;25(supplement 1):S3-S84.

List of articles with full text links

A. J. Mohamed, and D. Alasfoor, for the WHO Multicentre Growth Reference Study Group

United States [pdf 78kb]
Implementation of the WHO Multicentre Growth Reference Study in the United States —K. G. Dewey, R. J. Cohen, L. A. Nommsen-Rivers, and M. J. Heinig, for the WHO Multicentre Growth Reference Study Group

World Health Organization/Programme of Nutrition WHO Global Database on Child Growth and Malnutrition

"We are guilty of many errors and many faults, but our worst crime is abandoning the children, neglecting the foundation of life. Many of the things we need can wait. The child cannot. Right now is the time his bones are being formed, his blood is being made and his senses are being developed. To him we cannot answer "Tomorrow". His name is "Today"."
Gabriela Mistral, 1948

Description

Summary

The Global Database is a standardized compilation of child growth and malnutrition data from nutritional surveys conducted around the world since 1960. Scientists have been using growth

assessment because it best defines the health and nutritional status of children while serving as a useful indirect measurement of a population's overall socioeconomic status. These are among the basic underlying assumptions leading to the establishment, in 1986, of the World Health Organization's global surveillance system for monitoring patterns and trends in child growth and malnutrition.

The present detailed account of aggregated and disaggregated data on child growth and malnutrition as measured by the traditional indicators underweight, stunting, wasting and overweight comprises over 1700 nutritional surveys. Nationally representative data on child growth and malnutrition are available from countries which, together, cover more than 80% of the world's under-five population. Moreover the data and references are being updated on a regular basis; the date of the last update is clearly indicated on the footer of each data and reference page.

The international community's goal—reducing, by 2000, severe and moderate protein-energy malnutrition in preschool children to half of 1990 prevalence levels—has been endorsed in numerous forums. The WHO Global Database on Child Growth and Malnutrition permits monitoring progress towards achieving this goal and provides an accurate picture of child growth and malnutrition as a basis for making intercountry and interregional comparisons, and to facilitate monitoring of national, regional and global trends.

The Global Database will be of interest to national and international health authorities, particularly for planning and evaluating nutrition-related public health interventions. The information also serves as a baseline on child nutritional status worldwide for all involved in protecting and promoting optimal child growth. The continual effort to update this database will hopefully stimulate the gathering and sharing of new information, particularly in those countries and regions thus far scarcely investigated.

Introduction

Malnutrition is frequently part of a vicious cycle that includes poverty and disease. These three factors are interlinked in such a way that each contributes to the presence and permanence of the others. Socioeconomic and political changes that improve health and nutrition can break the cycle; as can specific nutrition and health interventions. The WHO Global Database on Child Growth and Malnutrition seeks to contribute to the transformation of this cycle of poverty, malnutrition and disease into a virtuous one of wealth, growth and health.

Malnutrition usually refers to a number of diseases, each with a specific cause related to one or more nutrients, for example protein, iodine, vitamin A or iron. In the present context malnutrition is synonymous with protein-energy malnutrition, which signifies an imbalance between the supply of protein and energy and the body's demand for them to ensure optimal growth and function. This imbalance includes both inadequate and excessive energy intake; the former leading to malnutrition in the form of wasting, stunting and underweight, and the latter resulting in overweight and obesity.

Malnutrition in children is the consequence of a range of factors, that are often related to poor food quality, insufficient food intake, and severe and repeated infectious diseases, or frequently some combinations of the three. These conditions, in turn, are closely linked to the overall standard of living and whether a population can meet its basic needs, such as access to food, housing and health care. Growth assessment thus not only serves as a means for evaluating the health and nutritional status of children but also provides an indirect measurement of the quality of life of an entire population.

The WHO Global Database on Child Growth and Malnutrition illustrates malnutrition's enormous challenge and provides decision-makers and health workers alike with the baseline information necessary to plan, implement, and monitor and evaluate nutrition and public health intervention programmes aimed at promoting healthy growth and development. Since

the Global Database is a dynamic surveillance system and new information is continually being collected, screened and entered, data collection can never be considered complete. Despite the considerable effort made to compile all available information, gaps in knowledge are inevitable. Users are therefore encouraged to send additional information to the following address:

WHO Global Database on Child Growth and Malnutrition
Programme of Nutrition/ World Health Organization
CH - 1211 Geneva 27

Methods and standardized data presentation

The information included in the WHO Global Database on Child Growth and Malnutrition complies with the following standardized format:

- systematic use of the NCHS/WHO international reference population (1);
- display of growth retardation prevalence for under-5-year-olds, as measured by the proportion of weight-for-age, height-for-age and weight-for-height below -2 and -3 standard deviations (SDs) (Z-scores);
- display of the prevalence of overweight, as measured by the proportion of children with weight-for-height above +2 Z-scores;
- display of Z-score means and SDs for the three indices; and
- stratification of the results according to age, sex, region, and rural/urban strata.

The required criteria for entering surveys in the database are:

- A clearly defined population-based sampling frame, permitting inferences to be drawn about an entire population;
- A probabilistic sampling procedure involving at least 400 children (allowing for an estimation of prevalence with a random error of ≤5% at a confidence level of 95%);
- Use of appropriate equipment and standard measurement techniques (1);
- Presentation of results as Z-scores in relation to the NCHS/WHO reference population.
- For those surveys where results are presented using a different classification system, reference population, or prevalence cut-offs, the principal investigators are contacted and encouraged to re-analyze their data sets following WHO standardized presentation or, otherwise, to provide the raw data to the WHO Programme of Nutrition for re-analysis. Survey results are systematically checked for inconsistencies and these are brought to the attention of the investigators, with a request for clarification. A hard copy of the survey documentation, together with any corrigendum or additional item of information received from the authors is filed under the survey reference number. The aim is to keep the database as fully documented and comprehensive as possible, so that queries concerning compiled data can be answered quickly.

Child growth indicators and their interpretation

In children the three most commonly used anthropometric indices to assess their growth status are weight-for-height, height-for-age and weight-for-age. These anthropometric indices can be interpreted as follows:

Low weight-for-height: Wasting or thinness indicates in most cases a recent and severe process of weight loss, which is often associated with acute starvation and/or severe disease. However, wasting may also be the result of a chronic unfavourable condition. Provided there is no severe food shortage, the prevalence of wasting is usually below 5%, even in poor countries. The Indian subcontinent, where higher prevalences are found, is an important exception. A prevalence exceeding 5% is alarming given a parallel increase in mortality that soon becomes apparent (2). On the severity index, prevalences between 10-14% are regarded

as serious, and above or equal 15% as critical. Typically, the prevalence of low weight-for-height shows a peak in the second year of life. Lack of evidence of wasting in a population does not imply the absence of current nutritional problems: stunting and other deficits may be present (3).

High weight-for-height: "Overweight" is the preferred term for describing high weight-for-height. Even though there is a strong correlation between high weight-for-height and obesity as measured by adiposity, greater lean body mass can also contribute to high weight-for-height. On an individual basis, therefore, "fatness" or "obesity" should not be used to describe high weight-for-height. However, on a population-wide basis, high weight-for-height can be considered as an adequate indicator of obesity, because the majority of individuals with high weight-for-height are obese. Strictly speaking, the term obesity should be used only in the context of adiposity measurements, for example skinfold thickness.

Low height-for-age: Stunted growth reflects a process of failure to reach linear growth potential as a result of suboptimal health and/or nutritional conditions. On a population basis, high levels of stunting are associated with poor socioeconomic conditions and increased risk of frequent and early exposure to adverse conditions such as illness and/or inappropriate feeding practices. Similarly, a decrease in the national stunting rate is usually indicative of improvements in overall socioeconomic conditions of a country. The worldwide variation of the prevalence of low height-for-age is considerable, ranging from 5% to 65% among the less developed countries (4). In many such settings, prevalence starts to rise at the age of about three months; the process of stunting slows down at around three years of age, after which mean heights run parallel to the reference. Therefore, the age of the child modifies the interpretation of the findings: for children in the age group below 2-3 years, low height-for-age probably reflects a continuing process of "failing to grow" or "stunting"; for older children, it reflects a state of "having failed to grow" or "being stunted". It is important to distinguish between the two related terms, length and stature: length refers to the measurement in recumbent position, the recommended way to measure children below 2 years of age or less than 85 cm tall; whereas stature refers to standing height measurement. For simplification, the term height is used all throughout the database to cover both measurements.

Low weight-for-age: Weight-for-age reflects body mass relative to chronological age. It is influenced by both the height of the child (height-for-age) and his or her weight (weight-for-height), and its composite nature makes interpretation complex. For example, weight-for-age fails to distinguish between short children of adequate body weight and tall, thin children. However, in the absence of significant wasting in a community, similar information is provided by weight-for-age and height-for-age, in that both reflect the long-term health and nutritional experience of the individual or population. Short-term change, especially reduction in weight-for-age, reveals change in weight-for-height. In general terms, the worldwide variation of low weight-for-age and its age distribution are similar to those of low height-for-age.

The international reference population

The designation of a child as having impaired growth implies some means of comparison with a "reference" child of the same age and sex. Thus, in practical terms, anthropometric values need to be compared across individuals or populations in relation to an acceptable set of reference values. This need has made the choice of a growth reference population an important issue that has received considerable attention in the last decades (5).

The database uses as a basis for comparison across countries the National Center for Health Statistics (NCHS) growth reference, the so-called NCHS/WHO international reference population. The international reference growth curves were formulated in the 1970s by combining growth data from two distinct data sets, which were originally planned to serve as

a reference for the USA. The reference for ages 0 to 23 months is based on a group of children in the Ohio Fels Research Institute Longitudinal Study which was conducted from 1929 to 1975. The height curves for this part of the reference are based on recumbent length measurements. The reference from 2 to 18 years of age is based on data of three cross-sectional USA representative surveys conducted between 1960 and 1975. The height curves for this part of the reference are based on standing height measurements. All samples consisted of healthy well-nourished US children. A detailed account of the historical background of the NCHS/WHO growth charts can be found elsewhere (5, 6).

The World Health Organization adopted the reference curves of the NCHS for international use in the late 1970s (7) based on the then growing evidence that the growth patterns of well-fed, healthy preschool children from diverse ethnic backgrounds are very similar (8). Differences of genetic origin are evident for some comparisons; however, these variations are relatively minor compared with the large worldwide variation in growth related to health and nutrition (9).

The adoption by WHO of the NCHS-based growth curves resulted in their wide international dissemination. Throughout the 1980s, several microcomputer-based software versions of the NCHS/WHO international growth reference were developed and supported by CDC and WHO (6). These software-based references have contributed to the wide acceptance of the concept of the international growth reference because they simplified the handling of anthropometric data from surveys, surveillance, and clinical studies.

Although the NCHS/WHO international growth curves have served many useful purposes throughout these years, because of a number of serious drawbacks, the suitability of these curves for international purposes has recently been challenged (5, 10). Work supported by WHO has demonstrated that the current international reference is sufficiently flawed as to interfere with the sound health and nutritional management of infants and young children. These flaws arise from both technical and biological considerations. In particular, the current reference may lead to the early introduction of complementary foods in exclusively breast-fed infants, which often has adverse consequences for the health and nutritional well-being of infants (11, 12). As a result, an international effort is currently underway to develop a new international growth reference (13). Until the new reference is developed, the NCHS/WHO growth reference curves will remain the reference values recommended for international use.

General issues that need to be considered when using international reference values are discussed elsewhere (10). One essential consideration is the appropriate use of the reference data. The way in which a reference is interpreted and the clinical and public health decisions that will be based upon it are often more important than the choice of reference. The reference should be used as a general guide for screening and monitoring and not as a fixed standard that can be applied in a rigid fashion to individuals from different ethnic, socioeconomic, and nutritional and health backgrounds. For clinical or individual-based application, reference values should be used as a screening tool to detect individuals at greater risk of health or nutritional disorders; and they should not be viewed as a self-sufficient diagnostic tool. For population-based application, the reference values should be used for comparison and monitoring purposes. In a given population, a high prevalence of anthropometric deficit will be indicative of significant health and nutritional problems, however, it is not only those individuals below the cut-off point who are at risk; the entire population is at risk, and the cut-off point should be used only to facilitate the application of the indicator.

The Z-score or standard deviation classification system

There are three different systems by which a child or a group of children can be compared to the reference population: Z-scores (standard deviation scores), percentiles, and percent of median. For population-based assessment—including surveys and nutritional surveillance—

the Z-score is widely recognized as the best system for analysis and presentation of anthropometric data because of its advantages compared to the other methods (5). At the individual level, however, although there is substantial recognition that Z-score is the most appropriate descriptor of malnutrition, health and nutrition centers (e.g. supplementary feeding programmes in refugee camps) have been in practice reluctant to adopt its use for individual assessment. A detailed description of the three systems, including a discussion of their strengths and weaknesses, can be found elsewhere (5, 14).
In this database, weight-for-height, height-for-age and weight-for-age are interpreted by using the Z-score classification system. The Z-score system expresses the anthropometric value as a number of standard deviations or Z-scores below or above the reference mean or median value. A fixed Z-score interval implies a fixed height or weight difference for children of a given age. For population-based uses, a major advantage is that a group of Z-scores can be subjected to summary statistics such as the mean and standard deviation. The formula for calculating the Z-score is (5):

Z-score (or SD-score) =	observed value - median value of the reference population / standard deviation value of reference population

Interpreting the results in terms of Z-scores has several advantages:
(1) The Z-score scale is linear and therefore a fixed interval of Z-scores has a fixed height difference in cm, or weight difference in kg, for all children of the same age. For example, on the height-for-age distribution for a 36-month-old boy, the distance from a Z-score of -2 to a Z-score of -1 is 3.8 cm. The same difference is found between a Z-score of 0 and a Z-score of +1 on the same distribution. In other words, Z-scores have the same statistical relation to the distribution of the reference around the mean at all ages, which makes results comparable across ages groups and indicators.
(2) Z-scores are also sex-independent, thus permitting the evaluation of children's growth status by combining sex and age groups.
(3) These characteristics of Z-scores allow further computation of summary statistics such as means, standard deviations, and standard error to classify a population's growth status.

Cut-off points and summary statistics

For population-based assessment, there are two ways of expressing child growth survey results using Z-scores. One is the commonly used cut-off-based prevalence; the other includes the summary statistics of the Z-scores: mean, standard deviation, standard error, and frequency distribution.
Prevalence-based reporting:
For consistency with clinical screening, prevalence-based data are commonly reported using a cut-off value, often <-2 and >+2 Z-scores. The rationale for this is the statistical definition of the central 95% of a distribution as the "normal" range, which is not necessarily based on the optimal point for predicting functional outcomes.
The WHO Global Database on Child Growth and Malnutrition uses a Z-score cut-off point of <-2 SD to classify low weight-for-age, low height-for-age and low weight-for-height as moderate and severe undernutrition, and <-3 SD to define severe undernutrition. The cut-off point of >+2 SD classifies high weight-for-height as overweight in children.
The use of -2 Z-scores as a cut-off implies that 2.3% of the reference population will be classified as malnourished even if they are truly "healthy" individuals with no growth impairment. Hence, 2.3% can be regarded as the baseline or expected prevalence. To be precise the reported values in the surveys would need to subtract this baseline value in order

to calculate the prevalence above normal. It is important to note, however, that the 2.3% figure is customarily not subtracted from the observed value. In reporting underweight and stunting rates this is not a serious problem because prevalences in deprived populations are usually much higher than 2.3%. However, for wasting, with much lower prevalence levels, not subtracting this baseline level undoubtedly affects the interpretation of findings.

Summary statistics of the Z-scores:

A major advantage of the Z-score system is that a group of Z-scores can be subjected to summary statistics such as the mean and standard deviation. The mean Z-score, though less commonly used, has the advantage of describing the nutritional status of the entire population directly without resorting to a subset of individuals below a set cut-off. A mean Z-score significantly lower than zero—the expected value for the reference distribution—usually means that the entire distribution has shifted downward, suggesting that most, if not all, individuals have been affected. Using the mean Z-score as an index of severity for health and nutrition problems results in increased awareness that, if a condition is severe, an intervention is required for the entire community, not just those who are classified as "malnourished" by the cut-off criteria (15).

The observed SD value of the Z-score distribution is very useful for assessing data quality. With accurate age assessment and anthropometric measurements, the SDs of the observed height-for-age, weight-for-age, and weight-for-height Z-score distributions should be relatively constant and close to the expected value of 1.0 for the reference distribution. An SD that is significantly lower than 0.9 describes a distribution that is more homogenous, or one that has a narrower spread, compared to the distribution of the reference population. If the surveyed standard deviation of the Z-score ranges between 1.1 and 1.2, the distribution of the sample has a wider spread than the reference. Any standard deviation of the Z-scores above 1.3 suggests inaccurate data due to measurement error or incorrect age reporting. The expected ranges of standard deviations of the Z-score distributions for the three anthropometric indicators are as follows (5):

- height-for-age Z-score: 1.10 to 1.30
- weight-for-age Z-score: 1.00 to 1.20
- weight-for-height Z-score: 0.85 to 1.10

Available means and SDs of Z-scores of survey data are being included in the Global Database. However, as these summary statistics have been available only for a number of surveys, they do not appear on the website. Given the importance of the mean and SD of Z-scores, it is hoped that an increasing number of survey reports will include them in the future.

'Trigger-levels' as a basis of public health decisions

Experience with surveillance has contributed to emphasizing the usefulness of identifying prevalence ranges to assess the severity of a situation as the basis for making public health decisions. For example, when 10% of a population is below the -2SD cut-off for weight-for-height, is that too much, too little, or average? The intention of the so-called 'trigger-levels' is to assist in answering this question by giving some kind of guideline for the purpose of establishing levels of public health importance of a situation. Such classifications are very helpful for summarizing prevalence data and can be used for targeting purposes when establishing intervention priorities.

The prevalence ranges shown in Table 1 are those currently used by WHO to classify levels of stunting, underweight, and wasting. It should be borne in mind, however, that this classification is largely arbitrary and simply reflects a convenient statistical grouping of prevalence levels worldwide. Moreover, the designations of a prevalence as "low" or "medium" should be interpreted cautiously and not be taken as grounds for complacency. Since only 2.3% of the children in a well-nourished population would be expected to fall below the cut-off, the "low" weight-for-age group, for example, includes communities with up

to four times that expected prevalence, and the "medium" group communities with up to an eightfold excess.

Table 1

Classification for assessing severity of malnutrition by prevalence ranges among children under 5 years of age

Indicator	Severity of malnutrition by prevalence ranges (%)			
	Low	Medium	High	Very high
Stunting	<20	20-29	30-39	≥40
Underweight	<10	10-19	20-29	≥30
Wasting	< 5	5-9	10-14	≥15

From reference (5)

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How to read the data

The data printouts are structured in tabular form with a top row bearing the name of the country and 11 columns containing the following information:

Column 1 Administrative level. Country data are specified as ***national, regional, province, district*** or ***local,*** depending on where the survey took place and for which administrative level it is representative:

National: A nationally representative sample.
Regional: The survey covers several sub-national levels.
Province: The survey was performed in a province or state (name presented in the **Notes** column).
District: The survey is representative of a district (name presented in the **Notes** column).
Local: A community, a village or a town was surveyed (name presented in the **Notes** column).

Column 2 Dates of survey. This column gives the month and year during which the survey took place.

Column 3 Area. ***URBAN*** and ***RURAL*** specify the setting. If no specification is given, data refer to both urban and rural areas.

Column 4 Sex. Male is signified as ***M*** and female as ***F***. If no specification is given, data refer to both sexes.

Column 5 Age group (years). Every data entry refers to a specific age group, specified in years using the decimal system, i.e. the month ranges have been transformed into the decimal system and are presented in years with two decimals. The following age groups appear in the printouts:

0. -4.99 years meaning 0-59 completed months;
0.00-0.49 years meaning 0-5 completed months;
0.50-0.99 years meaning 6-11 completed months;
0.00-0.99 years meaning 0-11 completed months;
1 year meaning 12-23 completed months;
2 years meaning 24-35 completed months;
3 years meaning 36-47 completed months;
4 years meaning 48-59 completed months;

5 years meaning 60-71 completed months.

Several survey reports contain also smaller age group breakdowns, e.g.:

0.00-0.24 years meaning 0-2 completed months;

0.25-0.49 years meaning 3-5 completed months.

Column 6 Sample size. This column contains the sample sizes for all disaggregations of the data presented.

Column 7 Percentage below/above the median: WEIGHT/HEIGHT. Prevalence for the cut-offs below -3 SD, below -2 SD (including the % below -3 SD) and above +2 SD are presented. Prevalence data for the three nutritional indicators are presented as percentages with one decimal.

Column 8 Percentage below the median: HEIGHT/AGE. Prevalence for the cut-offs below -3 SD and below -2 SD (including the % below -3 SD) are presented.

Column 9 Percentage below the median: WEIGHT/AGE. Prevalence for the cut-offs below -3 SD and below -2 SD (including the % below -3 SD) are presented.

Column 10 Notes. Any additional information or clarification of the data are presented.

Column 11 Ref.No. Which stands for ***reference number,*** is used to identify data sources, which are listed in the reference sections following each country's data table.

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How to read the references

Data are derived from a variety of sources, e.g. published articles in the scientific press, government health statistics, and survey reports from international and non governmental organizations. To complement the scarce nutritional information from some countries data from national surveillance systems, e.g. Chile, Uruguay and Zimbabwe, are also included. For a few countries, e.g. Ecuador and South Africa, height censuses of school children have been included because little other data are available to describe the child growth status. When the data source is either a surveillance system or a height census, this is stated in the NOTES column of the data printout.

Data references follow immediately after the country data table, providing the user with the necessary information to easily trace data sources. Within each country's list of reference there are two separate sections: 1) "data references", i.e. those related to the data included in the data table, and 2) "additional references", i.e. those that provide supplementary information about status of child growth in the country. These "additional references" contain nutritional data that do not fulfill the database entry criteria but which might, nevertheless, provide relevant information for interested researchers.

Finally, whenever survey data have been reanalysed, either by responsible national authorities or by WHO, this is clearly indicated in the reference section by the words **"and additional analysis"**.

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(2) Toole MJ, Malkki RM. Famine-affected refugee and displaced populations: Recommendations for public health issues. *Morbidity and Mortality Weekly Report* 1992;41:1-25.

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WHO receives US$ 6.5 million Gates Foundation grant to develop new growth standards for children in partnership with UN University

04 AUGUST 2004 | GENEVA -- The World Health Organization (WHO) has received a six year, US$ 6.5 million grant from the Bill & Melinda Gates Foundation to support the development of new growth standards for infants and young children. The project will be conducted in partnership with the United Nations University's Food and Nutrition Program (UNU-FNP). The new standards will provide scientifically more robust tools to assess child growth, and a basis for improved advocacy on behalf of the world's children.

The new standards will allow more accurate estimates of malnutrition, while enabling identification of children in the process of becoming undernourished or overweight, rather than postponing diagnosis of risk until after either state has been reached. They will also be linked to motor development assessments, underscoring the important message that normal physical growth, while an essential element of normal development, is insufficient by itself.

"Growth standards are the most commonly used tools for assessing the general well-being of individuals, groups of infants and children, and the communities in which they live, and for tracking progress in reaching a range of health and social equity goals," says Professor Cutberto Garza from the UNU and Cornell University's Division of Nutritional Sciences, which hosts the UNU-FNP coordination centre.

The grant supports a new approach to the development of growth standards. "The selection of children for the new standards included a prescription of health behaviours - such as

breastfeeding norms, standard paediatric care and non-smoking requirements - that are linked to desirable health outcomes. This makes the new standards fundamentally different from the traditional references which merely describe how children grow at a specific time and place," says Dr. Mercedes de Onis, of the WHO's Department of Nutrition for Health and Development, the project's coordinator.
Dr. de Onis says the work was undertaken because of the inadequacies of the present international reference, which fails to depict physiological growth. "Its weaknesses interfere with the appropriate management of children's health and do not support international health goals, e.g. regarding breastfeeding. Moreover, its reliance on a single country's data encourages acceptance of growth discrepancies as inevitable, rather than a consequence of inadequate investment in children."
These conclusions were evident from the project's first phase, which began 14 years ago with an evaluation of the current international growth reference, resulting in a plan for new standards. The second phase, which ended in December 2003, focused on collection of growth and related data. The project follows the growth and development of some 8500 children in Brazil, Ghana, India, Norway, Oman, and the USA.
"We welcome the Gates Foundation's support for this important issue," says Dr Denise Costa Coitinho, WHO's Director of Nutrition for Health and Development. The grant will be used for the project's third and fourth phases, including data analyses, production of the standards, development of related training materials, implementation of training programmes, and worldwide dissemination of the new standards. "This project has been a model example of cooperation and collaboration within the UN family and with its external bilateral partners and civil society," adds the Rector of the United Nations University, Professor Hans van Ginkle.
Ninety-nine countries now use the current international reference. The project's goal is that, by 2010, most of these countries will be using, or have initiated the transition to using, the new standards. The shift to these standards will be exploited to improve links between growth assessments and growth promotion activities, such as the Millennium Development Goals.
"WHO's international normative responsibilities, the UNU's role as the UN's academic arm, and both agencies' worldwide networks make them ideal partners to lead this international effort," says Dr Catherine Le Galès-Camus, WHO Assistant-Director General, Noncommunicable Diseases & Mental Health. "The new standards are important for WHO's work across the entire spectrum of nutritional health problems, from malnutrition to obesity."

http://www.who.int/mediacentre/news/releases/2004/pr52/en/

constraints on **growth**, and specification **...** the USA, as well as UNICEF and **UNU**. **...**
www.who.int/nut/research2.htm - 44k - Im Cache - Ïnliche Seiten
[PDF] Globalization and health: results and options
Dateiformat: PDF/Adobe Acrobat - HTML-Version
... The problem of GDP volatility is especially pronounced in developing countries, with **standard** deviations of annual GDP **growth** of around 5%, as opposed to 2.8 **...**
www.who.int/docstore/bulletin/ pdf/2001/issue9/bu1312.pdf - Ïnliche Seiten
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... have been breastfed by non-smoker mothers, and they must receive a high **standard** of health care. "This way they can reach their best **growth** potential because **...**
www.who.int/entity/bulletin/ volumes/82/9/en/who_news.pdf - Ïnliche Seiten
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... agencies, eg, FAO, UNICEF, UNHCR, **UNU**, and WFP **...** complementary feeding, micronutrients
and child **growth** is also **...** Lack of a common measurement **standard** (eg, >85th **...**
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[PDF] NUTRIENT ADEQUACY OF EXCLUSIVE BREASTFEEDING FOR THE TERM INFANT **...**
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www.who.int/nut/documents/ nut_adequacy_of_exc_bfeeding_eng.pdf - Ïnliche Seiten
[PDF] WORLD HEALTH ORGANIZATION Collaboration within the United Nations **...**
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... statement on the right to the highest attainable **standard** of health **...** investment in health, enhancing human productivity and economic **growth**, globalization and **...**
www.who.int/gb/ebwha/pdf_files/WHA54/ea5432.pdf - Ïnliche Seiten
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... feeding, non- smoking and other lifestyle circumstances that promote physiological **growth**). **...** Emphasis should initially be given to **standard** measures of physical **...**
www.who.int/gb/ebwha/pdf_files/EB113/eeb11344a1.pdf - Ïnliche Seiten

The long awaited UN child growth standards will be published this month, on 20 April[13,14]. They have been more than 10 years in the making[15]

13 WHO Child Growth Standards [April special issue]. Acta Paediatrica 2006; in press.

14 World Health Organization (WHO). Child Growth Standards. Geneva: WHO, 2006; in press. As from 20 April 2006, available at http://www.who.int

15 De Onis M, Garza C, Victora C, Bhan M, Norum K, eds. The WHO Multicentre Growth Reference Study: rationale, planning and implementation. Food and Nutrition Bulletin 2004; 25(1): S1–89.

http://www.who.int/nutrition/areas_of_work/en/index.html

The work involves the development, testing and global introduction of the WHO Child Growth Standard. This particular project has involved several years of collaborative work with Member States and partners, and will culminate in the development of a prescriptive tool for monitoring child growth globally. This innovative tool will facilitate growth monitoring and this data will be used as one of the primary indicators for assessing the outcome of this most important MDG to the eradicate extreme poverty and hunger.

The work has involved providing technical leadership in the design of growth reference protocols and studies and the development of relevant assessment tools and the supporting databases. Later stages involved comprehensive analysis of the data for the construction of growth curves, testing, and field implementation. Next steps involve plans for the development of adolescence and adult growth standards and related data collection providing a complete picture of global growth and malnutrition.

A major dimension of the work has been the development of the surveillance strategy and related tools and databases such as the WHO Global Database on Child Growth and Nutrition. The logical next step is to plan and develop a comprehensive surveillance strategy for the Department.

WHO | The **WHO Child Growth Standards** - [Diese Seite übersetzen]

The **WHO Child Growth Standards**. This site provides information on the history of the standards for child growth and motor development, **...**
www.who.int/childgrowth/en/ - 18k - Im Cache - Ähnliche Seiten

WHO | The **WHO Child Growth Standards** - [Diese Seite übersetzen]

The first set of the **WHO child growth standards** (0-60 months) will be released in April 2006 for the following indicators:. Length/height-for-age **...**
www.who.int/entity/childgrowth/standards/en/ - 18k - Im Cache - Ähnliche Seiten
[Weitere Ergebnisse von www.who.int]

The Pan American Health Organization Promoting Health in the **...** - [Diese Seite übersetzen]

Promotion of the New **WHO Child Growth Standards** The regional consultation, the first in the Region and as part of a worldwide process, was organized by the **...**
www.paho.org/common/Display.asp?Lang=E&RecID=8119 - 8k - Im Cache - Ähnliche Seiten

Caribbean Workshop on the WHO/UNICEF Global Strategy for Infant **...** - [Diese Seite übersetzen]

New **WHO Child Growth Standards** (Power Point file 26407 KB). 6. Guiding Principles for Complementary Feeding of the Breastfed Child (Power Point file 14155 **...**
www.paho.org/english/ad/fch/ca/MeetingGSIYCF.htm - 16k - Im Cache - Ähnliche Seiten
[Weitere Ergebnisse von www.paho.org]

National Health and Nutrition Examination Survey

http://www.cdc.gov/growthcharts

2000 CDC Growth Charts: United States

Background
Introduction
Frequently Asked Questions

Growth Charts
Clinical Growth Charts
(Now available in Spanish and French)
WIC Version
Individual Growth Charts
Power Point files-charts

Data Tables
Selected percentiles and LMS Parameters
Selected Z-score values
1977 NCHS Growth Chart Equations

Educational Materials
Power Point presentation about the charts
Use and Interpretation
Tools to calculate BMI

Interactive training modules

Overview

Using BMI-for-age

Overweight

Related Maternal and Child Health Bureau Modules
Topics include Accurate Measuring, Equipment and Techniques; Using the Growth Charts with Various Populations such as Adolescents, Children with Special Needs and Others

Computer programs
EpiInfo's Nutrition program, NutStat
SAS code for calculating percentiles and Z-scores

Reports
2000 CDC Growth Charts for the United States: Methods and Development. Series Report 11, No. 246. 201 pp
View/download PDF 10 MB
CDC Growth Charts: United States. 28 pp. (PHS) 2000-1250.
View/download PDF 407 KB
Growth chart revision workshop reports

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National Center for Education in Maternal and Child Health

- **Screening Growth and Development of Preschool Children: A Guide for Test Selection** by Sharon R. Stangler, Cathee J. Huber, Donald K. Routh

Author(s) of Review: Patricia A. Motz
The American Journal of Nursing, Vol. 82, No. 1 (Jan., 1982), pp. 181-182
doi:10.2307/3462783
This article consists of 2 page(s).
(Buch Willhöft Gruppe gegeben am 09.08.2007)

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Technische Fachhochschule Berlin (TFH): Web-Projekt des Ergänzungsstudienganges Medizinische Informatik: Wachstum von Kindern http://www.tfh-berlin.de/~akmi/tfh/ss00/kinder/index.html
http://www.tfh-berlin.de/~akmi/tfh/ss00/kinder/docu/normwachs/normwachstext1.html#Anker_3

Das Kind ist kein kleiner Erwachsener, was jedem beim Umgang mit Kindern gegenwärtig sein sollte.
Wachstum, worunter vor allem die Zunahme von Körperlänge, Körpergewicht, Kopfumfang und die Veränderungen der Körperproportion verstanden wird, aber auch die Entwicklung komplexer motorischer, geistiger und sozialer Funktionen und Fähigkeiten, gehört zu den wichtigen Themen der Kinderheilkunde.
Wachstumsvorgänge, die zur Ausbildung der spezifisch menschliche Erscheinung führen, haben eine genetische Basis.
Wachstum und Entwicklung zu beurteilen, ist eine allgemeinärztliche Aufgabe, die im Rahmen der Vorsorgeuntersuchungen für Kinder erfolgen soll.

Kriterien für normales Wachstum

Das Wachstum eines Kindes, d.h. die strukturelle Veränderung seines Körpers mit dem Alter, kann postnatal objektiv durch Messen von Körperlänge, Körpergewicht und Kopfumfang, um nur die wichtigsten Parameter zu nennen, bestimmt werden.

Die zugehörigegen altersentschprechenden Normwerte und Normbreiche lassen sich aus Tabellen und Kurven entnehmen, wobei geschlechtsspezifische Unterscheide berücksichtigt werden müssen.
In den vergangenen Jahrzenhnten ist es zur Beschleunigung der Entwicklungsgeschwindigkeit mit Zunahme des Längenwachstum bei beiden Geschlechten gekommen. Schulkinder sind rund 8 cm grösser als um um die Jahrhundertwende, auch die Pubertät beginnt früher.

Körpergewicht

Das Gewicht muss immer in Relation zur Körperlänge gesehen werden, die entsprechenden Perzentilen können miteinander verglichen werden.
Der Verlauf der Gewichtszunahme wird üblicherweise als wesentlicher Indikator für das körperliche Gediehen eines Kindes angesehen.
Zu beachten ist dabei aber, das beim Neugeborenen zuerst eine vorübergehende Gewichtsabnahme von bis zu 10% des Geburtsgewichts erfolgen kann.

Körperlänge

Das Körperwachstum verlauft sehr individuell, wobei ein genügendes Nahrungsangebot und Hormonstatus Voraussetzung sind.
Die Grösse des Kindes hängt von der Grösse der Eltern ab und lässt sich mit einer einfachen Schätzung berechnen.
Bei der Geburt sind Knaben im Durchschnitt um 1 cm länger als Mädchen.
Dies bleibt so ungefähr bis zum 10. Lebensjahr. Von da an bis zum 14. Lebensjahr ist die Wachstumgeschwindigkeit bei den Mädchen vorübergehend grösser.

Skelettreife

Aus einer Röntgenaufnahme der Hand läst sich die Entwicklung der Knochenkerne ablesen und daraus das Knochenalter bestimmen.
Dabei muss berücksichtigt werden, dass die normale Skelettreife in einem bestimmten Alter bei Mädchen weiter fortgeschritten ist als bei Jungen.

Kopfwachstum

Im Alter von 1 Jahr hat der Kopfumfang schon etwa 80% des Wertes von Erwachsenen erreicht, die Körpergrösse etwa 40%, das Körpergewicht lediglich etwa 15%. Die Zunahme des Kopfumfang ist ein guter Indikator für das Wachstum des Gehirns und vor allem der Hirnentwicklung im 1. Lebensjahr.

Pubertät

Die Pubertät ist der Übergang von der Kindheit zum Erwachsenenalter und stellt eine der wichtigsten Umbruchphase im menschlichen Leben dar.
Sie entwickelt sich unter der Wirkung der Sexuallhormonen, die ihrerseits von übergeordneten Hormonen gesteuert werden.

ulrike herrmann über Non-Profit

Normiert, aber nicht Norm

Meine Beine sind schön und können stundenlang joggen. Aber für die meisten Jeans sind sie zu kurz

Wenn ich schlechte Laune habe und nicht weiß, warum, dann gehe ich in einen Jeansladen und nerve die Verkäufer. Hinterher bin ich zwar noch deprimierter, aber wenigstens nicht mehr grundlos. Ich fange harmlos an: "Haben Sie Hosen in der Länge 28?" Es kommt, wie es immer kommt: "Natürlich, bei den Karotten." Und ich weiß auch schon, wohin der professionelle Zeigefinger zeigen wird: auf das Regal ganz oben, ganz hinten. Unerreichbar für alle, die Hosenlänge 28 haben. Es ist also zwingend zu fragen: "Könnten Sie mir einen Hocker bringen?" Während die Verkäuferin grummelt und im Lagerraum verschwindet, bereite ich mich auf meine nächste Anmerkung vor, die auch immer die gleiche ist: "Warum sortieren Sie Ihre Hosen nicht um - die langen nach oben für die Großen, die kurzen nach unten für die Kleinen? Dann kommt jeder ran." Spätestens jetzt verfliegt das professionelle Lächeln: "Das ist überall so." Was stimmt. Dieser Punkt geht stets an die Verkäufer. Irgendwo muss ein Monopol-Jeansladen-Einrichter sitzen, der es schick findet, dass kurzbeinige Kunden die Hosenregale hochkrabbeln müssen und an ihnen kleben wie ein Käfer am Baumstamm.

Pause. Obwohl ich weiß, dass es sinnlos sein wird, ziehe ich mich in eine Kabine zurück, um die Karotte anzuprobieren. Wie erwartet kann ich die Verkäuferin danach schon wieder mit einer Frage belästigen: "Finden Sie nicht, dass die Hose beult? Wie ein Sack." Nein, das findet das junge Mädchen mit dem bauchfreien Kurzpulli gar nicht. "Sie steht Ihnen." Würde ich auch sagen, wenn ich Verkäuferin wäre und mich als nervige Kundin hätte. Sicherheitshalber stelle ich also auf stur, Karotte kommt nicht in Frage. "Wenigstens eine einzige gerade Hose in 28 müssen Sie doch haben?!" Aber nein, alles, was attraktiv ist, ist mindestens 30 lang. Der bauchfreie Kurzpulli versucht, konstruktiv zu bleiben: "Sie können die Hose gern abschneiden lassen." - "Dann sieht sie aber abgeschnitten aus!" Dieses tautologische Argument ist immer unschlagbar. Auch diesmal. Langsam gräbt sich Ratlosigkeit in das Gesicht der jungen Verkäuferin. Der gepiercte Bauchnabel wippt vor Empörung, als sie hervorstößt: "Dafür kann ich auch nichts!"

Wie zutreffend. Sie kann tatsächlich nichts dafür, dass ich 162 Zentimeter groß bin. Wenn überhaupt, dann sind meine Eltern verantwortlich. Mutter 162, Vater 168 - statistisch wahrscheinlich hätte ich sogar nur auf 159 Zentimeter anwachsen dürfen. (Wer seine Bekannten und Verwandten auch mal vermessen will: www.tfh-berlin.de/~akmi/tfh/ss00/kinder/docu/normwachs/schaetzung.html) Aber meine drei Zusatzzentimeter nutzen im Jeansladen gar nichts. Und es nutzt auch nichts, dass ich meine Beine schön finde, dass sie auf hohe Berge steigen und stundenlang joggen können. Sie bleiben zu kurz für die Länge 30, die aus den Hosenregalen quillt. "Beschweren Sie sich doch beim Hersteller", mault der gepiercte Bauch.

Diese Idee kenne ich schon. Schließlich habe ich gerade erst mit dem Chefeinkäufer von Tchibo telefoniert. Denn in den Filialen gibt es Damen-Skihosen, sensationell günstig - aber nicht in S. Nur in M, L und XL. Meine telefonische Rüge hat Tchibo allerdings nicht aus der Ruhe gebracht. Wozu gibt es denn "die Gesetze des Marktes", wenn nicht, um Querulanten zu belehren: "Wie Sie vielleicht wissen, arbeiten Handelsunternehmen gewinnorientiert." Freundliche Pause. "Tut uns Leid, dass wir nicht für Sie da sein können." Ich lohne nicht, bin Minderheit, so die finale Botschaft.

Das stellt die Deutsche Industrienorm DIN 33402 über die "Körpermaße des Menschen" übrigens auch fest, die das biologisch Faktische mit normativer Kraft versieht. Nur 20 Prozent aller deutschen Frauen haben noch kürzere Beine als ich, entnehme ich den Tabellen. So bin ich zwar normiert - aber nicht Norm, bin das offiziell Unnormale am Normalen.

Aber deswegen muss man ja nicht gleich klein beigeben im Jeansladen. Der freie Bauchnabel wendet sein allerletztes Mittel an, um mich endlich loszuwerden: "Versuchen Sies doch nebenan!"
Nebenan ist die Kinderabteilung von H & M. Ich würde es dem gepiercten Bauch zwar nie gestehen, aber sie hatte Recht. Angenommen, ich wäre 11 bis 12 Jahre alt, dann hätte ich die Idealfigur. Jede Hose passt mir - wenn auch nicht unbedingt zu mir. Für einen Schlag so weit, wie der Schuh lang ist, fühle ich mich doch zu wenig Kind. Aber die erste unauffällige Hose, 10 Mark!, kaufe ich gleich zweimal.
Die Kassierin scheint mich wissend anzublicken, zu wissend.
"Zwillinge!", beeile ich mich.
Sie nickt beeindruckt, ist überhaupt die allererste Verkäuferin, die mich je beeindruckt angesehen hat.
P. S. Der zuständige taz-Fotoredakteur lässt ausrichten, dass sehr lange Beine auch in jedem Jeansladen verzweifeln.

Fragen zu Non-Profit?
kolumne@taz.de

taz Nr. 6626 vom 14.12.2001, Seite 13, 172 Zeilen (Kommentar), Ulrike Herrmann

Wachstum von Kindern
http://www.tfh-berlin.de/~akmi/tfh/ss00/kinder/docu/normwachs/normwachstext1.html#Anker_3

Wachstum und Entwicklung von Kindern

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http://www.tfh-berlin.de/~akmi/tfh/ss00/kinder/

Y Wang, JQ Wang: A comparison of international references for the assessment of child and adolescent overweight and obesity in different population.s Europ. J clin Nutrition 56(10) 973-982 (2002) – aus internet downloaden ? / **wichtige Lit Stelle**
NHANES III data; auch International Obesity Task Force – OITF
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Chin, S., Rona, RJ: Prevalence and trends in overweight and obesity in thress cross sectional studies of British children. Brit. Med J. 322: 24-26 (2001)

Cole, TJ, Beillizzi, MC, Flegal, KM, Dietz, WH: Establishing a standard definition for child overweight and obesity world wide: international survey Brit Med. J. 320: 1240-1243 (2000)

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NCHS/WHO reference data for the weight and height of children

In 1975 a WHO working group recommended the use of the National Center for Health Statistics for international use in assessing nutritional status in child populations.
The files below enable the users to download the international reference data tables for each indicator commonly used, i.e. weight-for-height (wasting), height-for-age (stunting), and weight-for-age (underweight).
The tables present the reference data by sex (M=male; F=female), for children up to 10 years of age (i.e. 119 months). Centile distributions are given for the 3rd, 50th and 97th centiles followed by the lower and upper standard deviations (SD). The next columns

present the cut-offs of the recommended z-score classification system: -4, -3, -2, -1, the median and +1, +2, +3 and +4 SD.
The reference data can be downloaded in "comma separate values" -format for WINDOWS, DOS, and MAC users.

WINDOWS	DOS	MAC
* weight-for-height	* weight-for-height	* weight-for-height
* height-for-age	* height-for-age	* height-for-age
* weight-for-age	* weight-for-age	* weight-for-age

References:

Dibley MJ, Goldsby JB, Staehling NW, Trowbridge FL. Development of normalized curves for the international growth reference: historical and technical considerations. Am J Clin Nutr 1987 Nov;46(5):736-48.

Dibley MJ, Staehling NW, Nieburg P, Trowbridge FL. Interpretation of Z-score anthropometric indicators derived from the international growth reference. Am J Clin Nutr 1987 Nov;46(5):749-62.