Growth

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Section 6: Growth monitoring and action

Aim: **To accurately monitor and interpret growth assessments to identify any deviations from normal which require support and intervention.**

Key points

Table 1: Key points
• A holistic assessment should be used in conjunction with growth assessment tools for child development and growth.
• From 2014, all infants born in WA will have their measurements plotted onto the WHO 0-5 growth charts. All other children will continue to have their measurements plotted on their existing CDC growth charts.
• Exclusively breastfed infants follow a different growth trajectory in comparison to formula fed infants until 24 months.
• There is not a 'right height and weight' for children at different ages because a healthy weight for a child depends on length/height, body build and health, not just age. It is individual for each child.
• Concern should be raised when the direction of growth falls downwards or tracks upwards within or across a percentile.

Overview

Developmental assessment is an integral part of the health care of a child, as normal growth and development are key indicators of a child's health and well-being. It includes an evaluation of physical growth, neuro-developmental maturation, and cognitive and psychosocial development. Community child health nurses (CCHN) play an important role in the assessment and monitoring of growth, and in the provision of preventive strategies and early intervention in order to promote the best outcomes for infants and children.[1]

When evaluating growth and development, it is essential to consider the multiplicity of both modifiable and non-modifiable influences.

Modifiable influences may include physical and psycho-social environmental factors such as freedom from constraint in relation to:

- nutrition
- fear and stress
- illness and infection
- space to play
- availability of developmentally appropriate toys and activities.

- opportunities to develop motor abilities.
- timing and quality of education.

Non-modifiable influences may include:

- cultural beliefs and practices in regard to child-rearing.
- the nature and capacity of parent/infant attachment, including the interaction between the temperament of the child and that of the parent or carer.
- certain heritable factors.[1]

These are taken into account against the background of the biological principles of human growth and development.[1]

Human growth and development follows well-defined and consistent patterns, regardless of the child's physical or cultural environment. These include Cephalocaudal, Proximal to distal, Simple to complex, Predictable sequence and Variable rate of growth development.[1] Many of the features of these patterns affect the child's capacity to achieve optimal growth, and the timing and combination of strategies that may be utilised in prevention or early intervention by families and community health professionals (CHPs).

Recommendations for practice

The relationship between the CCHN and the family plays an important role in promoting healthy outcomes for children. Assessing infants and children in collaboration with their parent/s at key developmental stages as part of the Universal child health contact schedule enables the CCHN to:

- Conduct serial growth measurements and developmental assessments to monitor growth patterns important in identification of healthy growth trends.
- Recognise variations in growth at an earlier stage, thus facilitating earlier interventions with potential improvement of long term outcomes for the child.
- Support parents to be actively involved in their child's growth and development, thus improving parent satisfaction in their role.
- Provide information to parents in response to specific concerns.
- Provide opportunities to increase parent awareness and knowledge of their child's growth and development through delivery of key messages about childhood growth, parenting strategies and promotion of health.
- Promote positive parent-infant attachment and parent/infant/child interaction.

It should be emphasised that growth monitoring and early detection of deviation from normal expectations is not based solely on screening tools or limited to one point of time, rather it should form part of a continual growth and developmental surveillance program and involve holistic assessment and observation of all relevant available information about a child.

Growth monitoring of infants and young children should be conducted as an integral component of the universal child health schedule as outlined within the Community Health Policy, Procedures and Guidelines manual.

Universal serial growth assessment should be undertaken at key critical developmental stages with the aim of confirming healthy growth, and for the early detection and prompt attention to any deviation from normal expectations.

Targeted growth assessment should be undertaken more regularly where there is parental or professional concern regarding growth or development, or any identified risk. Along with measurements the child should be assessed according to their overall health, wellbeing, treatment plan and progress at each schedule.

Key points for growth monitoring

- Obtain accurate physical measures.
- Select the appropriate percentile growth chart and accurately plot these measures.
- Record other contributing factors to physical development. Growth assessment is only one of a range of tools available to assess infant health and well-being. Growth charts are not intended to be used as sole diagnostic or screening instruments.
- Correctly interpret percentile growth charts to parents.
- Follow any assessment with appropriate actions:
    - Motivate, support and/or reinforce positive parental practices.
    - Provide appropriate brief interventions.
    - Refer children where deviations are of concern to appropriate health practitioners.
    - Treat and/or counsel the family on managing identified health issues.

Normal growth patterns

Normal weight patterns

It is normal for a newborn infant to have a weight loss of up to 10% within the first week of life and by 4 – 6 days old the infant usually begins to regain the weight. By 2 weeks of age, weight has usually returned to the birth weight. [2]

In infancy the general growth trend is a rapid increase in growth within the first 4 – 6 months of life followed by a gradual tapering of growth velocity. Growth velocity estimation offers an objective measure of nutrition and any factors which interfere with it which may range from emotional neglect to illness. Velocity is estimated in grams per week, or centimetres in length gain per month for 0-12 months and yearly from 1-6 years.

It is noted that normal variations in weight, height and head circumference are considerable. There is not a "right height, weight or head circumference" for children at different ages because a healthy growth depends on many factors, so it is individual for each child. The following tables reflect average values only.

Average weight gain in infants is generally calculated on a 4 week basis. The average weight gain from birth to 6 years is shown in Table 2 below, however, all babies grow differently and these are just general guidelines.

Table 2: Average weight gain [3]

Age	Average weight gain
0-3 months	150 - 200 g/week
3-6 months	100 - 150 g/week
6-12 months	70 - 90 g/week
Birth – 1 year	Birth weight doubles (or more)
1-2 years	2-3 kg/year
2-5 years	2 kg/year

Minor fluctuations in weight should not cause alarm as factors such as passing of a stool, urine or a recent feed can cause weight changes. This is more applicable to an infant who is requiring weight assessment on a frequent basis. Cause for further assessment would be static weight or suspected weight loss over several days.

Exclusively breastfed (BF) infants follow a different growth trajectory in comparison to formula fed (FF) infants.[2] By the age of 12 months BF babies are leaner and slightly shorter than FF babies but by the age of 24 months these differences are less apparent at a population level. The implications for life-long cardiovascular health of these differences in body composition are as yet unknown. [4, 5]

Normal linear (length and height) growth patterns

Recumbent length should be measured in children under the age of 2 years rather than standing height because of the large observer error and the high degree of variability in the way the child will stand when held upright. Most children under 2 will not cooperate or be able to stand long enough to obtain an accurate standing height. A standing height should be obtained where the child is older than 2 years of age.

The average length/height gain from birth to 6 years is shown in Table 3 below.

Table 3: Average length/height gain[3]

Age	Height ***Average monthly length gain in centimetres (cm)***
0-3 months	3.5 cm
3-6 months	2.0 cm
6-12months	1.2-1.5 cm
	Average yearly length/height gain in centimetres
1-3 years	12 cm
3-6 years	3-7 cm

Normal head circumference patterns

The head circumference measurement should fall between the lowest and highest percentiles on the growth charts, with growth velocity consistent with the child's previous measurements and be comparable with the child's height and weight percentile measurements.[1]

Table 4 below shows the average rate of interval growth in head circumference from infancy through to 6 years of age.

Table 4: Average head circumference gain[3]

Age	**Head circumference** ***Average monthly gain in centimetres (cm)***
0-3 months	2.0 cm
3-6 months	1.0 cm
6-12months	0.5 cm
	Average yearly gain in centimetres (cm)
1-3 years	3.0 cm
3-6 years	1.0 cm

For parents, growth assessment can be an encouraging reinforcement of positive parenting practices if their child is gaining weight steadily. However, reassurance is important where increased monitoring is required, to allay parental anxiety.[6]

Growth charts are frequently used to educate parents about their children's growth. CHPs are encouraged to ensure parental understanding of growth chart data and involve them in decisions on the management of altered growth patterns.[7, 8]

Factors affecting growth

Childhood growth is significantly influenced by a variety of genetic, biological and environmental factors. See Figure 1.

Poor growth in-utero and early childhood is associated with short and long term effects including increased rate of childhood infection, and the development of life-style diseases including coronary heart disease, high blood pressure and diabetes.[9,10]

Over-nutrition and obesity are also linked to poorer health outcomes.[11] Both infant body size during the early years of life and infant growth velocity are associated with risk of later overweight and obesity in childhood and adulthood.[12]

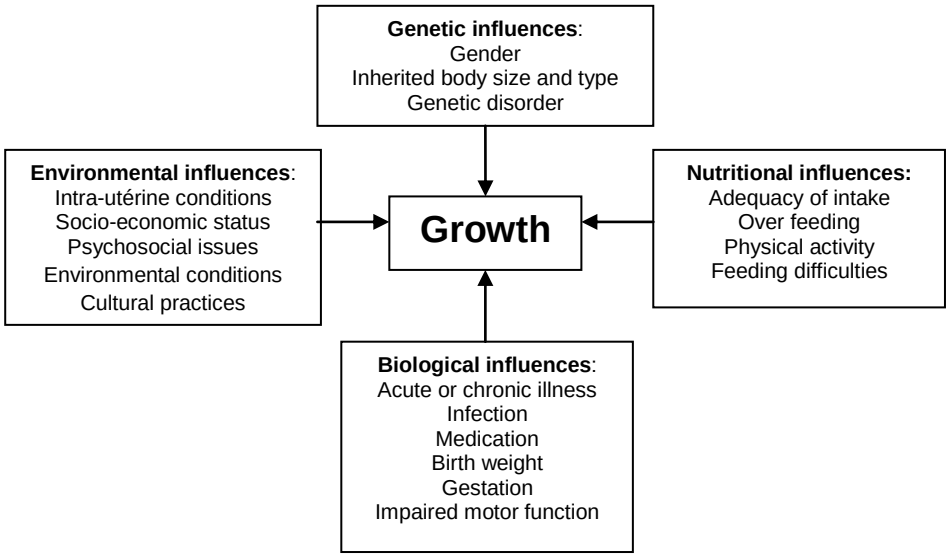

Figure 1: Influences on growth

Genetics

Parental size has a direct influence on a child's growth potential and the predicted adult height. The father's height has a minor influence on birth length (only 5% of variance), and this influence is not expressed until the start of the transition phase from the infancy to the childhood phase of growth. Although this familial effect on height is not fully expressed until the age of three years, its effect is evident by the age of two years.[13] A child with short stature may be of concern because of possible illness or poor nutrition, but a short child with short parents may possibly be genetically small. A child whose stature is still less than expected should be investigated further.[13] Three percent of all children will grow below the 3rd percentile on height for age charts and still be healthy. Genetic disorders and chromosomal abnormalities can also have the potential to alter children's growth e.g. Trisomy 2, Prader-Willi syndrome and others.

Ethnicity

Previously it was believed that different ethnic groups showed different patterns of growth; African-Caribbean groups were believed to be taller and heavier, and Asian and Chinese groups shorter and lighter when compared with North Europeans.[14] However the World Health Organization (WHO) Multicentre Growth Reference Study (MGRS) has refuted this belief, showing that variability in infant growth was greater within population groups than between the different country groups.[15]

Birth weight

Birth weight is universally measured making it one of the most accessible and reliable indicators of not only the infant's health but subsequent health risk in adulthood.[16] In general, lower birth weight is associated with higher risk or morbidity.[17] A baby's weight at birth is strongly associated with mortality risk during the first year, with developmental problems in childhood and risk of diseases in adulthood, including cardiovascular disease and some cancers.[18] Asthma, lower developmental outcomes and hypertension have all been reported to be more common among small birth weight infants.[17]

Gestational age and influences

Babies born prematurely (before 37 weeks completed gestation) or who are born small for gestational age may also be at increased risk of cardiovascular diseases, suggesting that foetal under-nutrition may increase susceptibility to diseases occurring later in life. Evidence from animal studies suggests that the foetus may adapt to an adverse intrauterine environment by slowing down growth and metabolism, and that large birth size may predict increased risk of obesity, diabetes and some cancers.[18] Anomalies in circulating hormones such as growth hormone, insulin-like growth factor, testosterone, oestrogen, thyroid hormone, cortisol and insulin can affect birth weight and growth. For example, children who are large for gestational age at birth following exposure to an intrauterine environment of either maternal diabetes or maternal obesity are at increased risk of developing metabolic syndrome. Given the increasing obesity prevalence, these findings have implications for perpetuating the cycle of obesity, insulin resistance and associated consequences in subsequent generations.[19]

Nutrition

Nutrition has a direct impact on growth. Inadequate nutrition including energy, protein and micronutrients - whether caused by illness or food insecurity - can slow growth potentially leading to growth faltering. Conversely, overfeeding associated with rapid weight gains may result in overweight or obesity.

Environment

Maternal age and general health, parity, socio-economic status and substance use such as smoking can affect birth weight and growth.[18] At high altitudes, infants are observed to be born smaller than average, which is believed to be due to lower oxygen levels.[17]

Acute and chronic diseases

The presence of medical conditions such as renal disease, congenital heart disease, recurrent infection, developmental delay, feeding difficulties and the need for long term medications can contribute to altered growth patterns in infants and children.

Growth assessment

Growth assessment, involving the measuring of weight, length or height and head circumference, followed by accurate plotting on a growth chart is a quick, non-invasive process which provides valuable information about the general health and well being of a child.

Monitoring growth rate is one of the tools available to help assess the nutritional status and health of individual children, but should always be used in conjunction with a more holistic assessment.

Possible causes of growth problems

There are many possible causes of deviations in child growth. Some of these include energy imbalance, acute and chronic illness, genetics and endocrine disorders. A more detailed list is provided in Table 5 below.

Table 5: Possible causes of abnormal child growth[20]

Changes in percentiles	Possible causes	Indicators
Increasing weight percentiles	**Energy imbalance**	Excessive food Inadequate physical activity
	Endocrine disorders	Hypothyroidism Excess cortisol (Cushings) Pituitary disease
	Genetic disorders	Prader-Willi Downs syndrome
Decreasing weight percentiles	**Acute illness**	Short term illness, vomiting, diarrhoea
	Chronic illness	Including, but not limited to cardiac, respiratory, gastrointestinal, renal disease
	Physical and/or developmental concerns	Neurological conditions, cerebral palsy
	Nutritional	Inadequate energy intake
Increasing height percentiles	Endocrine disorders	Excessive growth hormone Hyperthyroidism Rare genetic syndromes
Decreasing height percentiles	Endocrine	Growth hormone deficiency Hypothyroidism Ricketts
	Chronic illness	Chronic anaemia Chronic illness Systemic failure (e.g. renal, cardiac)
	Genetics	Chromosomal disorders
	Nutritional	Long-term primary or secondary malnutrition i.e. infection
Increasing head circumference percentile	Hydrocephalus, chromosomal abnormality, Developmental delay	
Decreasing head circumference percentile	Prenatal insult	Maternal substance abuse, maternal infection
	Birth complication	
	Chromosomal abnormality	

NB: Causes listed in **bold** are more common [20]

Following up on growth problems

Following routine growth assessment, the CCHN together with the parent should develop a plan outlining frequency of follow up and referral needs. This plan will be determined by the results of the assessment which contributes to identification of the needs of the child. The parent/carer and, where appropriate, other family members should be involved in the development of the plan, ensuring service provision is coordinated and comprehensive.

Children identified as requiring referral to specialist services should be directed to appropriate public or private services as available. CCHNs should maintain links with the referral services to ensure the needs of the client are being met. When specialist services are unavailable or inappropriate, the client may be offered continuing community health contact as appropriate and where resources are available.

Refer to 3.4.2 Growth faltering or 3.4.3 Overweight and obesity guidelines if deviations in growth are suspected.

Clinical pathways for growth are a useful guide to assist in determination of monitoring needs and direction of referral.

Growth charts

Growth charts are an essential screening tool in infancy, childhood and adolescence to assess general growth, wellbeing and nutritional status. The charts allow an individual's growth and size to be compared to other healthy children of the same age and gender.[21] Changes in growth trajectory can be tracked using growth charts. Charted information should always be used in conjunction with physical, developmental and history assessment before decisions can be made with regard to monitoring, referral and treatment requirements.[2]

Documentation of growth charts and other assessment tools

All relevant assessment findings are to be accurately recorded on the appropriate growth chart, and located within the Child Health Record. Summary information should also be entered into relevant electronic record systems according to local protocols. CCHNs should refer to the appropriate record keeping guidelines for documentation storage and use.

For those CCHNs using HCARe clinical services data collection, growth assessment is recorded as a component of each scheduled universal contact using the health issue code for that contact.

For non scheduled additional contacts, there are dedicated codes which should be used. These are outlined on the CACH website, under HCARe coding guidelines.

Should a referral be required, full physical and developmental assessment results, including relevant history, should be included to provide more relevant information.

Summary information of physical and developmental assessment, including recording of growth results on the appropriate growth chart, should be provided to the parent/s within the child's PHR.

Follow up

Following routine growth assessment, the CCHN together with the parent should develop a plan outlining frequency of follow up and referral needs. This plan will be determined by the results of the assessment which contributes to identification of the needs of the child. The parent/carer and, where appropriate, other family members should be involved in the development of the plan, ensuring service provision is coordinated and comprehensive.

For those children identified as having no significant concerns, the universal contact schedule will be continued. For children requiring additional monitoring, parameters should be determined in relation to the needs of the child, and for the duration required.

Background to growth charts in Australia

Prior to 2003, most Australian health professionals used growth charts developed by the US National Center for Health Statistics (NCHS) in 1977. In 2003 the National Health and Medical Research Council (NHMRC) recommended using the US Centers for Disease Control and Prevention (CDC) 2000 growth charts and these were gradually introduced in Australia over the following two to three years.[22]

In 2010, the Australian Health Ministers Advisory Council announced that there was unanimous support for the implementation of a single standardised national growth chart for infants. This standard was the World Health Organization (WHO) 2006 birth to 2 years growth charts. [23]

In Western Australia (WA) a decision was made to adopt the WHO charts for birth to 5 years to align with the Universal Child Health Contact Schedule (UCHCS) and the Enhanced Aboriginal Child Health Schedule (EACHS). From 2014, all infants born in WA will have their measurements plotted onto the WHO growth charts.

Differences between the CDC and WHO charts

US Centers for Disease Control and Prevention (CDC) charts are based on:

- United States data from 1963-1994 (children measured once)
- mixture of breastfed & formula fed infants (only 21% of the infants being breastfed exclusively for 4 months)
- the sample size was 400-500 children with <100 infants six months of age
- considered racially & ethnically diverse
- skew upwards leading to less overweight or obese children being identified
- ultimately a snapshot of how children were growing at a particular point in time in a particular country.

World Health Organization (WHO) growth charts (birth to 2 years) are based on:

- longitudinal monitoring from birth to 2 years collected from 1997-2003 (measured 21 times)
- from 6 different countries (India, Oman, Ghana, Brazil, Norway and USA) - total sample size of 428 boys and 454 girls
- exclusively/predominantly breastfed for at least 4 months with continued breastfeeding for 12 months
- complementary feeding by 6 months. Infants were weighed a total of 21 times with 2 weights collected in the first 2 months of life

The WHO growth charts 2-5 years were developed using a different cohort of children. A total of 6669 children were measured once and data was excluded from the construction of the charts if the individual was +2 stand deviations (SD) away from the mean for weight-for-height.[3]

The differences between the WHO and CDC weight for age curves are most marked in infancy. Children in the WHO standards:

- grow faster
- have higher mean weights in the first 3 months of infancy, and
- have higher weights in the first 6 months and lower between 6 and 24 months.[3]

Strengths and limitations

To ensure appropriate feeding advice is given to parents it is essential to understand the strengths and weaknesses of growth charts when assessing growth. Regardless of which growth chart is used, serial measurements of a child's length and weight plotted on a growth chart are essential for determining a child's pattern of growth.

Comparison of the WHO and CDC growth charts shows important differences that vary by age group. These differences have the potential to impact on the interpretation of growth and feeding advice at a clinical level and the estimation of prevalence of over and under weight at an epidemiological level.[12]

Criticisms of the WHO charts mostly relate to the fact that they were produced from a highly selected group of healthy breastfed children living in optimal conditions. This can be considered both a strength and a weakness. Concern has been expressed that comparing the growth of children who are not being raised in such ideal conditions or who are formula fed to the WHO standards might not be appropriate. Conversely growth of some children who do live in optimal circumstances may deviate from the standard but they are not unhealthy. Growth may not always follow the WHO curves.

From about 3 months of age the rate of weight gain starts to slow such that from about 6 months the WHO charts show babies to be a lower weight compared to the CDC charts. The interpretation of growth may therefore differ according to the growth chart used which in turn may have implications for the advice given to

mothers concerning breastfeeding, supplementation with formula and the introduction of solid foods.[4]

These differences have raised concerns that when using the WHO charts to assess the growth of formula fed infants, these infants might be identified as growing too slowly during the first few months of life but then identified as growing too quickly after approximately 3 months.[26] Health workers need to understand these differences in growth patterns and not misinterpret the infant as having faltering growth. To avoid inappropriate advice about feeding, the infant's general health and weight relative to length should be considered.[8]

It is worth noting that the protein content of infant formula is now lower than when the CDC charts were developed hence the current growth patterns of formula fed infants may not be the same as that represented on the CDC growth charts.[26] A multi-centre European study comparing the growth of breastfed infants with infants fed either a lower or high protein formula demonstrated that growth in the lower protein group was closer to breastfed infants.[27]

Fewer children aged 6 months to 2 years will be identified as having low weight-for-age using the WHO charts. However those identified as having low weight-for-age on the WHO charts will be more likely to have a substantial deficiency that requires further assessment. Differences in length-for-age are small. [26]

Interpreting and plotting growth charts

The following documents outline the specific procedures for growth assessment, and can be found in the *Community Health Policies, Procedures and Guidelines manual*:

- 6.1.5.1 Conducting weight assessment in infants and children 0-2 years
- 6.1.5.2 Conducting weight assessment in children 2 years and over
- 6.1.5.3 Conducting length assessment in infants and children 0-2 years
- 6.1.5.4 Conducting height assessment in children over 2 years of age
- 6.1.5.5 Conducting head circumference assessment in infants and children.

As a general rule, normally growing children follow individual growth trends that are parallel to the percentile lines on the growth charts.[28] Most children track along the chart on, or between, the percentile lines and roughly on, or parallel to, the 50th percentile.[28] Growth charts are not a sole diagnostic tool in determining healthy growth. Serial measures plotted onto growth charts should be used in conjunction with an overall assessment relating to the infant/child's wellbeing, attainment of developmental milestones and any parental concerns.[29]

Percentile lines show the reference range of weights and heights for a particular age and gender. For example the 50th percentile line indicates 50% of infants/children are of a lesser height/weight and 50% are the same height/weight or greater. An infant on the 5th percentile for height and weight means that 95% of infants are taller and heavier than he/she is. An infant on the 90th percentile for height and weight is taller and heavier than 90% of other infants. In both examples, although very different in size and at different ends of the percentile range, the infant is shown to be within the normal range.

As normal variations in height and weight are considerable, the percentile charts are drawn to depict the full range of normal growth. There is not a "right height and

weight" for children at different ages because a healthy weight for a child depends on height, body build and health, not just age, so it is individual for each child. Most infants' weight and length fall somewhere between the 3rd and the 97th percentile.[30] The rate of the growth is the most important factor when it comes to infant weight gain.[2]

Care needs to be taken when measuring, plotting and interpreting growth to ensure accuracy. Concern should be raised when the direction of growth falls downwards or tracks upwards within or across a percentile.[6] This is particularly important with the WHO charts as there are 5 percentiles on the charts compared to CDC charts which have 7. (See Figures 2 and 3). Significant weight loss can occur yet only 1 percentile may be crossed. Therefore the previous rule of thumb, whereby a cause for concern is flagged when growth trajectory crosses 2 or more percentiles, is no longer valid for the WHO charts.[31]

When viewing the length/height for age 0-5 years chart, there is a slight dip in the percentile line at age 2 years. This adjusts for the change in measurement technique whereby length is greater than height by approximately 1-2 cm. Therefore this dip is meant to be on the growth chart and it is not a printing error.[32] See Figure 2 below.

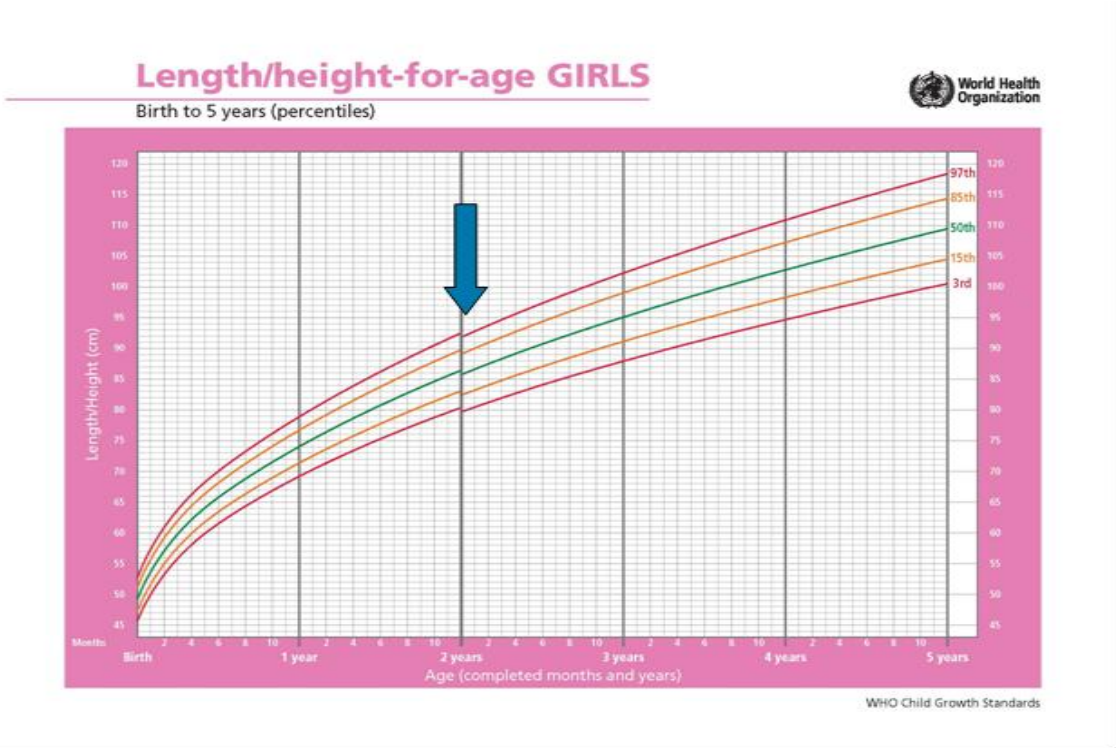

Figure 2: Example of WHO length/height for age chart demonstrating 5 percentile lines and an adjustment at 2 years

Figure 3: Example of CDC growth chart showing 7 percentile lines

Tracking downwards for weight is more common and easily rectified than for height or head circumference. If tracking downwards occurs in height or head circumference further investigation is warranted.[6] However, all measurements which begin to track downwards need to be monitored accordingly. For example, a child who has been ill or had a history of gastroenteritis may need to be monitored for a period of time before referring to a specialist. If this or any of the following situations has occurred when interpreting growth charts, then CHPs should refer to 3.4.2 Growth faltering or 3.4.3 Overweight and obesity within the Community Health Policies, Procedures and Guidelines manual, where these growth issues are discussed in more detail.

Monitoring children with special needs

Monitoring the growth of children with special health needs, such as; prematurity, medical conditions known to alter growth, genetic disorders, developmental delays and disabilities, requires additional considerations.

Premature infants

A child born before 37 completed weeks gestation is considered preterm.[8] Once a corrected age of 40 weeks is reached, the WHO standards can be used to monitor ongoing growth.[33] Corrected age should be used until 2 years of age. If the child catches up before this then chronological age can be used.

The appropriate rate of weight gain or catch up growth is unknown and concern has been raised that aggressive nutritional supplementation with rapid weight gain will promote increased adiposity and later increased risk of metabolic syndrome.[34]

- Infants born between 37 and 40 weeks should be plotted on the WHO birth to 2 year growth charts. The actual age for these infants commences at birth. Growth measurement plotting begins at birth at "0" and continues according to actual age.
- Infants born <37 weeks premature should be plotted onto the WHO infant growth charts with their actual age corrected for their prematurity until 2 years of age.[35]

How to calculate an infants' corrected age:

40 weeks - gestational age = weeks of prematurity

Actual age commences at birth.

Actual age at CCHN contact – weeks of prematurity = Corrected age.

Example: An infant is born at 34 weeks and at the 8 week CHN contact their corrected age is calculated as two weeks. The calculation is below.

40 weeks (term) - 34 weeks = 6 weeks prematurity

8 weeks – 6 weeks of prematurity = 2 weeks corrected age

- Fenton growth charts are available for very premature infants who may not be old enough to be plotted from week 0 on the WHO charts. To access the 2013 Fenton charts to monitor growth of preterm infants, click on the following link: http://www.ucalgary.ca/fenton/2013chart

Medical conditions and genetic disorders

Some conditions alter a child's growth potential e.g. chromosomal disorders such as Trisomy 21. Syndrome specific charts have been developed for a range of conditions. However, due to limitations in the development of some of these charts, including small cohort sizes, it is recommended that all children have their growth monitored using age appropriate charts for healthy children i.e. WHO standards for children under 5 years. Syndrome specific charts may be useful to provide a comparison for more frequently occurring syndromes, such as Trisomy 21, where recommended and accessed through specialist services. Children with medical conditions and genetic disorders are likely to be under specialist care so a collaborative approach to monitoring and care provision should occur where possible. Further details on monitoring growth in children with special needs can be obtained through the Royal Children's Hospital Melbourne child growth learning resource.

Small or large infants for gestational age

To avoid misdiagnosing growth issues it is important to be aware that if an infant is large or small at birth then their growth curve may move to a lower or higher percentile respectively, hence, these infants generally do not grow along the same

percentile from birth.[6] It is therefore paramount that a full assessment is taken considering the overall health and wellbeing of the infant/child.

Poor growth or growth faltering

Growth faltering is an observation of slower than expected rate of growth along an infant's previously defined growth curve.[38] Faltering growth is identified from measuring changes in normal weight gain. Other indicators for growth faltering can be gained from a full examination of the infant.

For more information, refer to 3.4.2 Growth faltering within the Community Health Policy, Procedures and Guidelines manual.

Overweight and obesity

CCHNs have an important role to play when it comes to the prevention and early intervention of childhood overweight and obesity due to their regular contact and monitoring of children with their parents.

Estimates of the prevalence of overweight and obesity vary according to the growth chart used. The proportion of all infants and toddlers plotting above the 85th percentile weight-for-length is greater using WHO (21%) compared with CDC (16.6%) charts according to a recent comparative study. The greatest disparity between the 2 charts occurs in weight-for-length percentiles in children between 6 months and 2 years of age.[38]

For children 0-2 years there is lack of evidence that BMI for age is more effective than weight-for-age or weight for-length at assessing adequacy of feeding, and under or overweight. Further research is needed to validate the use of BMI in this age group, with emphasis on identifying associations between BMI and subsequent health outcomes.[8]

For more information, refer to 3.4.3 Overweight and obesity within the Community Health Policy, Procedures and Guidelines manual.

Related policies, procedures, guidelines

3.4.2 Growth faltering
3.4.3 Overweight and obesity
3.4.4 Childhood anaemia
6.1.5 Growth monitoring procedures
3.8.5 Guide to completing a physical assessment of an infant and child
3.8.6 How children develop
3.3 Guidelines for universal meeting schedule

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Professional resources

Using WHO growth charts e-learning package
The Royal Children's Hospital Melbourne Child growth learning resource
National Health & Medical Research Council Infant Feeding Guidelines

Resources for families

- Ngala Parenting with Confidence
  http://www.ngala.com.au/
- Australian Breastfeeding Association
  https://www.breastfeeding.asn.au/
- Raising Children Network
  http://raisingchildren.net.au/