Weight and growth issues in children

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Failure to thrive (growth faltering)

Failure to thrive (FTT), or growth faltering, can be broadly defined as a failure to achieve growth, and this is usually identified in infancy. Malnutrition is strongly linked with FTT and in one study was found in two thirds of children with diagnosed FTT.

Historically, FTT cases have been categorised as organic or non-organic.
- Organic FTT occurs in less than 5% of FTT cases and is associated with a medical condition inhibiting food intake or absorption of nutrients.
- Non-organic FTT is defined as growth faltering as a result of environmental influences. These may include neglect, improper feeding and deprivation.

In more current research, there is a greater awareness of the idea that multiple factors contribute to the condition and therefore cannot be exclusively categorised as either.

Growth faltering occurs at some stage in approximately 5% of children under 5 years of age. It is essential to identify and support these individuals to ensure long term effects of stunting or delayed development do not occur. The incidence of FTT has been reported to be 1 to 10% of children under 2 years of age. These problems tend to manifest in the first 15 months of life and most diagnoses come from 3 to 12 months of age.

Standard growth charts are used as measures for FTT. In Australia, the 2000 US Centres for Disease Control and Prevention (CDC) growth charts are currently recommended to provide a growth reference for children. (The use of growth charts is undergoing review in 2011).

There is a lack of explicit definition or diagnostic tool that is available for FTT. Recommendations by the NHMRC Child Health Surveillance and Screening report (2002) outline the importance on the consensus of a definition for diagnosis. Management in this clinical pathway must also take into account factors of not only growth, but social/emotional factors, environmental factors and medical and family history. The judgement and intuition of the community health nurse (CHN) is an important factor as each FTT case is unique and not reliant upon one single measure.

Most suggestions in the literature state that identification of poor weight gain in the preschool years is mostly modifiable and does not have lasting affects on cognitive or later growth outcomes. However, long term outcomes of growth failure may correspond with poor developmental and learning scores later in life, as well as social and emotional difficulties.

A variety of behavioural and developmental characteristics can be associated with FTT in infants:
- excessive irritability
- incapacity to sustain gaze with an adult
- indifference to separation indicative of poor attachment
- resistance to cuddling
- impaired sleep/wake cycle
- feeding behaviours
- gross/fine motor skills
- language and cognitive skills
- other social skills – interaction with adults/other children
Growth monitoring
There is some conjecture about weight monitoring for children, because of the scarcity of evidence of its potential benefits or harms. Although this may be the case, the use of growth measurements as a screening tool is important in regards to FTT because it is estimated that as many as half of FTT cases go undiagnosed and therefore untreated.

No consensus on the ideal measures or predictors has been reached, but there is considerable evidence to suggest that weight alone is the simplest and most reasonable measure for growth faltering. In 1985 the World Health Organisation recommended anthropometrical measures/parameters as the sole form of diagnoses for FTT, but this has been widely acknowledged in the literature as being insufficient in the absence of a universal and accepted definition of FTT.

Children with FTT are commonly undernourished and show slow weight gain. However, recent studies have indicated that growth is not the only predictor for FTT; a more social-emotional connection to wellbeing also has an effect (although this can not be directly measured objectively, unlike growth). Symptoms for FTT are therefore not limited to lack of growth or weight gain, but may also be related to social environment or the infant’s reactions to its surroundings. Issues for the CHN include accurate diagnosis and the most appropriate treatment path.

Definitions
Downward growth (specifically across 2 or more percentiles) between two or more time points when plotted on a standard growth chart indicates significant evidence of a growth issue. Literature indicates that during growth faltering, change occurs firstly in weight, then length (approximately 3 months later) and lastly head circumference.

The following can be used as a guide for FTT states:

| Underweight: Low weight for height. Downward deviation in weight across 2 or more percentiles is a cause for concern. |
| Wasted: Significant discrepancy between height and weight centiles, where weight is significantly lower than height (particularly if parental stature differs from child). |
| Stunted: Decreasing percentiles in both height and weight. |

GOOD - Growing well.

CAUTION - Not gaining weight, find out why.

CAUTION - Gaining weight faster than expected. Find out why.

DANGER - Losing weight, could be ill. Find out why.
Growth measurements are not typically used as a diagnostic tool in health care, but rather an indicator that can be used to assess an overall picture of the child’s health and can justify further assessment.

CHNs do not typically use weight-for-length charts. For children with FTT, weight-for-age, weight-for-length and height-for-age measurements all define different outcomes for the FTT diagnosis so can be used in conjunction with one another.

**Weight-for-age**
Serial weight-for-age measures are useful as they indicate changes in weight over time. Measures tracking along a percentile are usually not a concern, even if they are low. However, if the child drops downward over 2 or more centiles, this may indicate a longer term nutritional problem as it suggests a decrease in total body mass.

**Weight-for-length/height**
This measures total body mass in relation to length or height of a child. This measure tends to indicate current nutritional status or recent weight loss (due to a decrease in soft tissue mass). Weight-for-length charts are not used as a growth monitoring tool in WA, but rather an observed critical difference between the weight-for-age and height-for-age that is judged to be a variant from the child's normal growth development.

**Height-for-age**
This measure can indicate a long term cumulative effect of FTT through malnutrition over a significant period of time which has resulted in stunting. This occurs when the child decreases across 2 or more percentile lines. It should be noted that a child who is very short in stature can be healthy, particularly if their parents are also short.

A reliable definition of FTT does not exist due to lack of consistency in standard cut off values for growth measures. This can lead to lack of diagnosis or misdiagnosis.

**Assessment**
FTT can be determined by a combination of measurements deviating downward across 2 centiles and CHN judgement.

It is important to note that FTT is not a final diagnosis but a description of a physical state, therefore the underlying cause/s for FTT should always be identified.

Regularly monitoring a child and recording their weight measurements increases the likelihood of identifying a case of FTT. Due to the varying causes of FTT, there are several different pathways for its management at the different levels of severity. Different management strategies will be implemented depending on the origins of the FTT.

**Growth assessment**
The recommended schedule for weighing babies is at the 6-8 week, 3-4 month, 8 month and 18 month universal contact visits. There is no need to weigh babies between these times unless there is an identified risk or concern.
Targeted growth monitoring can, however, be conducted when an at-risk child is identified. In these circumstances and when there are clinical indications to do so, weight and length are measured at the CHN’s discretion.

Because of the variance in definition of the condition, there needs to be clear care pathways in which CHN are able to confidently assess the individual diagnoses and manage or refer accordingly.

For more information on monitoring growth, refer to the *Growth Monitoring and Action* chapter in the *Child and Antenatal Nutrition Manual*.

**Normal variants of growth**
Normal variants of growth need to be taken into account to prevent misdiagnosis of infants that may:
- have small parents and are growing to their genetic potential
- have constitutional delay in growth
- have been born prematurely who are tracking below comparable infants, but are still growing
- have been larger than expected at birth, and growth has slowed.

**Determining cause of FTT**
To ensure an accurate diagnosis of FTT, the underlying cause and risk factors need to be considered.

Practitioners will first need to:
- address parental concerns
- rule out medical problems
- interview the parents to obtain family and genetic history as well as pregnancy and birth complications/experiences.

To adequately assess the cause of the growth faltering, the practitioner will need explore the infant’s growth pattern, food intake, physical condition, developmental progress, social and emotional factors and factors relating to its family such as medical history, to ensure a valid diagnosis. It will also be helpful to gain insight into feeding and activity behaviours and the emotional state of the mother.

**Physical barriers and feeding practices**
Physical barriers are a common cause of growth difficulties in infants. These can be physical difficulties with eating, drinking, sucking or breastfeeding. Many children with FTT have both physical and behavioural difficulties (rarely one or the other). Addressing challenging feeding practices can be worthwhile early on (e.g. poor breastfeeding attachment, distress with feeding, force feeding etc).

**Medical history**
The medical history of both the infant and the caregiver (especially mother) may be important in determining the underlying cause of the growth failure, with respect to
- previous growth data
- low birth weight or preterm birth
- maternal and antenatal health.
**Social and environmental factors**

Factors within the child’s environment including the stability of their family and surroundings can impact adversely on their growth potential, such as:

- marital stress
- maternal depression
- young/single parent
- domestic violence
- parental employment and economic wellbeing
- parental substance abuse
- care giving environment
- parent child relationship
- attitudes toward parenting and parental perception of the child’s needs
- parent-child interaction

Some research has shown a link between FTT and psychosocial factors, although recent research has indicated that neglect is not as directly responsible as first indicated in early studies. Children living in environments that are not ideal for optimal growth often also have behavioural feeding difficulties, compounding the difficulty for the parent to feed the child successfully.

Growth failure can be attributed to many different factors or a combination of factors. It is important to determine the underlying causes of FTT in order to adequately manage or refer the infant for further assessment or treatment.

**Management**

The course of action for management will vary according to the cause of the FTT. For each of the assessment areas, the CHN may need to refer to specialists or into an intervention program.

**Treatment of FTT**

Due to the scarcity of clinical trials of treatment options for FTT, there is little evidence to suggest one superior approach to manage FTT. Many studies focus on home based therapy, clinical interventions such as nutritional supplementation and the use of multidisciplinary teams to address the multiple contributors to FTT. Some studies indicated that there was no difference in outcome for home based versus clinical interventions. A majority of the studies have expressed validity of the use of multidisciplinary teams to address growth faltering both at the assessment and management level. Other common themes in the literature are a focus on feeding and interaction as main issues to overcome, as well as the use of education for caregivers on nutrition, environment and feeding practices to create a more successful holistic approach to weight gain.

Severe cases should be referred directly to hospital. CHNs may also need to address acute illnesses that may be a result of FTT. These include infection and dehydration and may require referral to a physician.

Diagnosis of a physical condition or disease being the underlying cause of the FTT will come primarily from examination and may also require clinical tests such as blood test,
stool sample, urine sample and other pathological tests. These tests are also valid if the underlying cause of the FTT is not deemed to be organic, but no other causes are apparent.

When medical causes have been ruled out, the CHN should prioritise the causes in order of impact when carrying out the management plan. Due to the malnutrition that is evident in most FTT cases, management is usually directed at providing nutritional support and education to increase nutritional intake.

If the problem is in relation to feeding practices the infant may have structural difficulties in feeding (such as cleft lip and palate).

Improvement in growth should be achieved within approximately 4 weeks to 3 months. Some improvement in growth should be seen in the first week of addressing the issue and should continue to ‘catch up’ dependent on the severity of the malnutrition. Targeted assessments involving frequent visits to monitor weight are required.

Other issues for the health professional to consider are those that result from the FTT diagnosis, such as parental anxiety or feeling a sense of failure.

**CHN intervention**
This form of care is recommended for improvement of mild FTT or to further support specialist interventions.

The success of interventions suggested by the CHN will depend on:
- the level of trust and the relationship that has been built between the CHN and parent
- the establishment of an environment in which the parent is comfortable (and blameless) in discussing their child’s growth and development
- the sharing of appropriate information.

Community based interventions include:
1) Development of care plans – moving to targeted weight assessment schedule.
2) Feeding diary - to collect information about milk feeds, solid food consumption and attachment.
3) Parental education – on nutrition, feeding techniques and relationships.

**Follow up**
Once growth improvement is established, the child may be returned to the Universal Contact Schedule for monitoring by their CHN. The CHN should:
- follow-up on specific concerns that were identified at baseline assessment
- ensure regular screening and follow-up of children in the same household
- continue to provide prevention information
- discuss options for additional care if required by parents.

Monitoring of growth should continue until the child enters school. If growth faltering occurs again, then the pathway will again be followed leading to an intervention by the CHN or referral to a specialist.
Management pathways will vary according to the cause of FTT. The use of clinical pathways allows a comprehensive and evidence based guidance for practitioners to help identify, manage and refer appropriately.
Iron deficiency and anaemia in children

In Australia it is estimated that approximately one third of children aged 1-3 years have low iron stores. Iron deficiency is the most common nutritional deficiency worldwide. Children and infants are at high risk of iron deficiency. It is possible that a child will develop iron deficiency anaemia without appropriate treatment. It is important for Community Health Nurses (CHN) to be able to detect and manage iron depletion at an early stage to ensure it does not develop further into iron deficiency, or furthermore into iron deficiency anaemia.

Definitions

| Iron depletion: | Low iron stores (ferritin) but no change in haematological parameters or mean cell volume |
| Iron deficiency: | Low iron stores (ferritin) and reduced mean cell volume but normal haemoglobin concentration |
| Iron-deficiency anaemia: | Low iron stores (ferritin), reduced mean cell volume and reduced haemoglobin. |

In infants, anaemia is defined as:
- At birth: < 130 g Hb/L
- < 6 months: Lower values maybe normal. Discuss with paediatrician.
- 6-24 months: < 105 g Hb/L
- 2-11 years: <115 g Hb/L

Iron is an important dietary mineral that is involved in various bodily functions, including the transport of oxygen in the blood, which is essential in providing energy for daily life. Iron is also vital for brain development.

In the third trimester of pregnancy, foetal iron stores are acquired. These iron stores are sufficient for 6-8 months after the baby is born, provided that the mother has had adequate iron intake. Recommendations for iron intake are outlined below.

Recommended daily intake of iron

| 0 – 6 months: | 0.2 mg/day (adequate intake) |
| 7 – 12 months: | 11 mg/day |
| 1 – 3 years: | 9 mg/day |

The clinical pathway for weight and growth issues aims to improve the quality of service delivery through enabling a quick reference assessment, diagnosis and consistent referral pathway. This allows nurses to ensure that adequate care and management of iron deficiency anaemia is implemented appropriately.

Iron deficiency and development

The rapid growth of the brain in the early stages of life makes infants more susceptible to iron deficiency. Iron deficiency has been suspected to have links with impaired performance in mental and motor development. Several studies highlight the importance of iron stores on development and behaviour test ratings. Infants with iron deficiency
anaemia have been shown to have poorer cognitive, motor and social/emotional functioning than healthy infants. This has also been linked to consistently poorer outcomes in the long term for children with iron deficiency anaemia.

Iron deficiency anaemia may result in poor growth, mild learning difficulties and recurrent viral infections.

Behaviour of iron deficient children is also affected, as they tend to be tired, have difficulty concentrating, are ‘clingy’ and have reduced interaction with other children. These behaviours can lead to developmental delay. The behavioural effects of iron-deficiency can be seen to improve after treatment; however, some evidence suggests no improvement in cognitive effects which can result in learning difficulties later in life.

Iron deficiency and growth
Growth may be affected in children who have iron deficiency. Iron deficiency may lead to failure to thrive or faltering growth and stunting.

Risk factors for iron deficiency
Risk factors for iron deficiency can include:
- Low birth weight babies and premature babies. This is due to reduced time in utero to build up their iron stores.
- Exclusive breastfeeding or formula feeding beyond six months and delayed introduction to solids. Iron deficiency may occur if the child does not transition onto 'solid' foods containing iron.
- High intake of cow’s milk. Cow’s milk is a poor source of iron and hence reliance can result in low iron levels, while it may be displacing other iron rich foods in the diet. Excessive intake of cow’s milk in infants (<12 months of age) can also lead to colitis and an increased risk of iron losses secondary to gastrointestinal bleeding.
- Insufficient intake of iron rich foods and poor diet.
- Gastrointestinal disease affecting absorption of iron.
- Lead poisoning.

Signs and symptoms
Infants who are iron-deficient are often listless, irritable and thin. Other signs and symptoms of iron deficiency anaemia in children can include:
- pallor
- dark circles under eyes
- behavioural problems
- repeat infections/illnesses
- loss of appetite
- lethargy
- breathlessness
- increased sweating
- strange cravings (known as pica) eg. eating non-food items such as dirt, paper, washing detergent
- failure to grow at the expected rate.

Medical history
If a baby is born preterm or at low birth weight, there is an increased risk of developing a nutritional deficiency. Infants with higher risk may therefore be tested at an earlier stage
than full term babies. There are special formulas available for preterm infants that are higher in iron and are prescribed by the doctor.

Maternal health
If a mother presents with anaemia during pregnancy, there is an increased risk of her infant also developing iron deficiency. Less than 10% of women of reproductive age in developed countries such as Australia will develop iron deficiency. If the increased iron needs of pregnant women are not met or anaemia was present before conception, there is an increased risk of the mother developing iron deficiency. The infant will draw upon the mother’s iron stores during pregnancy and hence the mother’s deficiency may affect the infant, which can result in an increased risk of the baby being preterm and underweight.

Breastfeeding history
Breastfeeding plays an important role in the prevention of iron deficiency. The most ideal situation is for babies to be breastfed exclusively for the first six months of life and then continue breastfeeding to 12 months or beyond, according to personal preferences of both mother and child. Introduction of solids at around six months is recommended because there is a need for additional iron sources from this age, as iron stores gained in pregnancy are now declining. Note: introducing solid foods to an infant’s diet does not mean ‘weaning’ or stopping breastfeeding.

Testing for iron deficiency
Some symptoms of iron deficiency may be quite obvious in routine child assessments (pallor and dark circles under eyes). Deficiency is often detected through routine laboratory assessments, which are usually targeted only at those at higher risk. For these infants, testing usually occurs at around 2 months, or between 6-9 months for higher risk babies such as preterm infants.

Blood examination and iron studies are used to determine the level of iron stores in the blood, and hence the level of deficiency. Blood exams are not generally carried out within the community health setting unless they are operating within a high risk group (for example at the Kimberley Aboriginal Medical Service). A referral to a GP will be required for most pathology testing.

Management
Iron supplementation
Therapeutic protocols for iron management can be implemented via oral iron replacement or Ferrum H injections. A referral is required to a GP so that appropriate supplements can be prescribed for anaemic children. A referral can also be made to a dietitian for education regarding food sources of iron and enhances and inhibitors of iron absorption.

Full supplementation is recommended at 6mg/kg per day for about 2 to 3 months. At this point, the infant/child will need to be reassessed by the GP before supplementation continues.

Iron supplementation may cause black bowel motions or constipation and this is not a cause for concern.
Iron fortified foods

All infant formulas in Australia are fortified with iron however iron in breastmilk is much more easily absorbed by the body than iron in formula (refer to the Infant Formula chapter of the Child and Antenatal Nutrition Manual for more information).

Introducing solid foods that are high in iron is important as the baby’s iron stores start to decline from 6 months of age. Introducing meat (of appropriate texture) around this time increases the likelihood of the child accepting the taste.

There are 2 different types of iron in food:
1) Haem iron is found in red meat and to a lesser extent in fish and poultry.
2) Non-haem is found in breads, breakfast cereals, vegetables (e.g. spinach, peas, and broccoli), legumes (e.g. baked beans) and eggs.

Haem iron is up to 10 times more easily absorbed by the human body than non-haem iron. It also has a special property called the ‘meat factor’ which helps the body absorb up to three times more of the non-haem iron in foods like vegetables.

Solid foods rich in haem iron become particularly important for infants from 6 – 12 months. This is when babies have extremely high iron needs which cannot be met by breastmilk, iron fortified formula or iron-fortified cereals alone.

There is no evidence to suggest the introduction of iron fortified foods in the first 4 months of life (or first 2 months for preterm/low birth weight) will provide any advantage.

Iron content of foods (per 100g)

<table>
<thead>
<tr>
<th>Food</th>
<th>Iron (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lean beef (grilled)</td>
<td>2.6</td>
</tr>
<tr>
<td>Lean lamb (grilled)</td>
<td>2.8</td>
</tr>
<tr>
<td>Lean pork (grilled)</td>
<td>0.7</td>
</tr>
<tr>
<td>Fresh flathead (steamed)</td>
<td>0.2</td>
</tr>
<tr>
<td>Red salmon (canned)</td>
<td>1.2</td>
</tr>
<tr>
<td>Skinless chicken breast (baked)</td>
<td>0.5</td>
</tr>
<tr>
<td>Liver - lamb (fried)</td>
<td>11.2</td>
</tr>
<tr>
<td>Egg – whole (boiled)</td>
<td>1.6</td>
</tr>
<tr>
<td>Soybeans – dry (boiled)</td>
<td>2.2</td>
</tr>
<tr>
<td>Baked beans (canned)</td>
<td>1.3</td>
</tr>
<tr>
<td>Almonds</td>
<td>3.9</td>
</tr>
</tbody>
</table>

(Source: NUTTAB, 2006)

Cow’s milk

The use of cow’s milk is to be limited in infants and should not be a sole source of nutrition for infants less than 12 months due to its low iron content and the risk of causing colitis. In children, cow’s milk should be limited to 500ml/day due to its low iron content and if the child is consuming large amounts of cow’s milk, it may be displacing other iron rich foods in the diet.
Enhancers of iron absorption
Vitamin C enhances the absorption of non-haem iron if consumed in the same meal. Encourage the consumption of vitamin C rich foods (such as citrus fruits, berries and capsicum) with high non-haem iron foods. Fruit and vegetables high in vitamin C should be encouraged as opposed to juice as a diet high in fruit juice in children may displace solids intake.

Inhibitors of iron absorption
Large amounts of some foods and additives decrease the bioavailability of iron. These include tea and tannins, unprocessed bran (more than 2 tablespoons per day) and coffee.

Follow up
Once normal haemoglobin levels are reached (where results are accessible), the child is returned to the Universal Contact Schedule for follow up by the CHN. The CHN should:
- follow-up on specific concerns that were identified at baseline assessment
- screen other children in the same household
- continue to provide prevention information (particularly during pregnancy)
- discuss options for additional care if required by parents.

Prevention and education
Education on appropriate introduction to solids and infant nutrition is the best prevention. Infants need to be introduced to foods containing iron at the appropriate age. Prevention of iron deficiency is particularly important for high risk groups, such as refugee and Aboriginal populations.
Childhood obesity

The World Health Organisation has described the growing global obesity problem as “an escalating global epidemic – ‘globesity’ that is taking over many parts of the world”. The prevalence of overweight children under 5 years is estimated at 18 million worldwide. In Australia, in the past 15 years there has been an increase in overweight and obese children, with a prevalence of 20-25%. In the US between 1980 and 2001, the number of infants younger than 6 months classified as overweight (weight-for-length measurements above the 85th percentile) rose from 11.4% to 17%. The obesity epidemic has become a cause for concern and urgent action for child health.

The increased prevalence and associated morbidity of overweight and obese cases in Australia warrants early intervention and preventative action beginning in infancy, to reduce the physical and psychological health problems that occur as a result of the condition later in life. These adverse health outcomes can be associated with chronic illnesses such as type 2 diabetes, hypertension, cancer and cardiovascular disease.

Refer to the Overweight and Obesity chapter of the Child and Adolescent Nutrition Manual for detailed information on the identification, risk factors and management of obesity in children. This information will help guide community health practices.

Measurement and identification of obesity

The Child and Antenatal Nutrition Manual and the Policies, Procedures and Guidelines manual can provide more information on the following summary.

Recommendations for practice

Step 1: Obtain accurate and reliable physical measures consistent with the universal and targeted schedule. If required, demonstrate the appropriate weighing technique for parents to help reduce measurement error and unnecessary parental concern.

Step 2: Select appropriate percentile growth chart and accurately plot these measures.

Step 3: Record other notable health assessments and measures. Growth assessment is only one of a range of screening tools available to assess infant health and wellbeing. Growth charts are not intended to be used as sole diagnostic or screening instruments.

Step 4: Correctly interpret percentile growth charts to parents.

Step 5: Follow any assessment/screening with appropriate actions:
- motivate, support and/or reinforce positive parental practices
- provide appropriate brief interventions
- refer problems to appropriate health practitioners
- treat and/or counsel the family on managing identified health issues.

Use of Body Mass Index (BMI)

Recommendations from the National Health and Medical Research Council (NHMRC) state that the standard measure of overweight and obesity for 2 to 18 year olds should be BMI. BMI-for-age should be used in clinical practice. Currently in Australia there are no local BMI growth charts; it is recommended that the US Centres for Disease Control (CDC)
and Prevention growth charts are used. Currently there are no standard definitions for overweight and obesity for infants (children under the age of 2 years).

A child is considered overweight if their BMI is above the 85th percentile and obese if their BMI is above the 95th percentile.

These are crude measures that should not be used in isolation, instead there needs to be a more holistic approach that includes family, medical and genetic assessment. Because of the conjecture about which measures are considered indicative of an issue, the CHN is encouraged to use judgement and experience, on a case by case basis.

The identification of overweight and obesity in children and adolescents involves the assessment of both risk factors of obesity and measurements plotted on the appropriate growth chart.

**Tools used to assess overweight and obesity in children and adolescents**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Weight Assessment Tools</th>
</tr>
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</table>
| Birth to < 2 years | •Assessment of risk factors of obesity  
|              | •Weight-for-length percentile growth chart |
| 2 to 20 years  | •Assessment of risk factors of obesity  
|              | •BMI-for-age percentile growth chart |

There are a number of considerations that may affect the accuracy of results when diagnosing overweight/obesity, which include:
- ‘catch up’ growth of premature or low birth weight infants
- height – some children can be uncharacteristically short or tall for their age
- unusual body fat distribution – accumulation of central abdominal fat is of particular concern
- ethnicity – racial differences can affect the true proportion of body fat and BMI, and therefore appropriate cut-off points. BMI reference charts relevant to the ethno-cultural mix of the current Australian demographic are yet to be developed
- highly developed muscles – some children may be more athletic than others
- early onset of puberty – weight and height increases are most significant during puberty.

**Weight-for-length percentile growth charts**

The US CDC recommend the use of weight-for-length percentile growth charts to assess overweight and underweight for children under 2 years of age. The Australian implementation of these charts is yet to be decided. In current practice, weight-for-length charts are not used in community health.

**Percentile range and corresponding weight status category**

<table>
<thead>
<tr>
<th>Percentile range</th>
<th>Weight-for-length and BMI-for-age weight status category</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5th percentile</td>
<td>Underweight</td>
</tr>
<tr>
<td>&gt; 85th percentile</td>
<td>Overweight</td>
</tr>
<tr>
<td>≥ 95th percentile</td>
<td>Very Overweight (Obese)</td>
</tr>
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</table>

Source: US Centre for Disease Control and Prevention
BMI-for-age percentile growth charts

The NHMRC recommends the use of BMI scores plotted on the BMI-for-age and gender CDC percentile growth charts, as an initial assessment tool to identify children and adolescents who are overweight or obese. BMI is not a diagnostic tool but, when used together with information on child and family lifestyle risk factors for obesity, it can help determine the need for a referral for further assessment and diagnosis.

BMI is a score calculated as the ratio of an individual’s weight (in kilograms) to the square of their height (in metres) - kg/m². In children, the BMI score is adjusted for age and gender (on BMI-for-age percentile growth charts), in order to account for growth and body fat changes that occur as part of normal development. The BMI percentile indicates the relative position of the child in relation to others at the same stage of development.

BMI-for-age scores above the 85th percentile indicate health risks that vary depending on body composition (bone, muscle and fat), family history and lifestyle factors (physical activity and nutritional intake).

It should be noted that 5% of healthy weight children would fall above the 95th percentile; therefore it is vital to investigate other risk factors of obesity.

Definition of weight status

**Underweight:** Below the 5th percentile. Refer for further medical assessment and treatment.

**Healthy weight:** Between the 5th and 85th percentile. Help maintain healthy weight.

**Overweight:** Equal to or above the 85th percentile, but below the 95th percentile. Refer for further medical assessment and treatment.

**Very Overweight:** Equal to or greater than the 95th percentile. Refer for further medical assessment and treatment.

Risk factors for obesity

The risk factors for obesity that should be considered (depending on the age of the child) are identified below:

Medical risk factors:
- weight gain history in infancy and early childhood
- parental weight status
- medical conditions and medications
- child’s psychosocial concerns (bullying, self-esteem etc.)

Lifestyle/behavioural risk factors:
- child and family diet/eating habits, including incorrect formula preparation
- child and family physical activity habits (sports, incidental exercise)
- child and family sedentary activity habits (television, computer use)

The risk of becoming obese can develop in utero and then continue through infancy and childhood.

Preconception and pregnancy:
Maternal obesity preconception increases the risk of the baby developing obesity. The mother’s health during pregnancy is also important as the fetus is directly affected by it.
Infant feeding:
Breastfeeding has a protective effect against overweight and obesity. Breastfeeding initiation and continuation for a minimum of 6 months reduces the risk of overweight and obesity. Mothers who eat a variety of nutritious food during pregnancy and breastfeeding found it easier to introduce these foods to the infant.

Sleep in infancy:
A shorter sleep duration for babies that is less than 10-12 hours is a risk factor for overweight/obesity.

Other conditions:
Other conditions that are risk factors for obesity include:
- gastroesophageal reflux
- gestational diabetes
- sleep apnoea

Management
After assessing risk factors and percentile growth charts, judgement is made to determine if a child is overweight or obese. Following the assessment, the CHN may refer to a GP or dietitian.

If no referral is deemed immediately necessary then the CHN may choose to monitor the growth of the child over a targeted assessment schedule. This may include developing a care plan, regular growth monitoring, dietary assessment and nutrition education.

Consider the development of obesity
An assessment of the possible development of the disease is necessary to determine the cause and appropriate management strategies. Different factors will affect the development of obesity and these include:
- psychological factors
- genetics
- metabolic factors
- biochemical and physiological factors
- environmental factors
- feeding and activity behaviours.

Due to the complexity of obesity development and severe health consequences, management of obesity usually incorporates a multidisciplinary approach.

Weight gain in infancy, which is early and rapid, can be seen to increase the risk of overweight in later childhood and adulthood. It is therefore important for health practitioners to identify overweight and obese infants as early as possible to ensure early treatment and prevention of it escalating with more severe consequences.

Monitor maternal health
CHNs can address risk factors in pregnant mothers and infants to prevent overweight and obesity. Referral to a maternal health nurse may be beneficial so that weight gain can be monitored and specific nutrition and lifestyle advice and can be given in a supportive environment.
Encourage breastfeeding & promote healthy eating habits in the early years

Exclusive breastfeeding for the first 6 months is recommended as it offers a variety of health benefits for the baby and mother.

Most infants will self regulate food intake through breastfeeding. There is evidence to suggest that babies that are bottle-fed will be naturally heavier than breastfed babies, but this is represented by the presence of lean muscle mass so is not necessarily an indicator of obesity. By two years of age, infants in both groups usually have similar growth curves.

If a child is overweight in their early years, there is a greater likelihood of that child being overweight later in life. Therefore, the first decade of life, primarily the first 5 years, is integral to early intervention by the primary care clinician.

Interventions for obesity are multifaceted as evidence suggests that no single intervention will improve health outcomes. CHNs provide high quality care during the early years and are able to establish and reinforce daily lifestyle habits that are important to the child’s health and wellbeing.

CHNs can emphasise the following feeding practices:
- encourage breastfeeding at prenatal visits and continue to support it in the post-natal period
- discourage complementary feeding prior to 6 months of age
- parents provide the food, babies will decide how much they eat
- discourage always feeding to soothe a crying baby.

Follow up

Once a healthy weight is established, the child may be returned to the Universal Contact Schedule for monitoring by their CHN. The CHN should:
- follow-up on specific concerns that were identified at baseline assessment
- ensure regular screening and follow-up of children in the same household
- continue to provide prevention information
- discuss options for additional care if required by parents.

Monitoring of growth should continue until the child enters school. If the child begins to gain excess weight again, then the pathway will again be followed leading to an intervention by the CHN or referral to a specialist.
Referral options

Referral pathways may engage more than one discipline to properly address growth as well as social/emotional issues that may underlie the condition. Depending on the cause(s) of the growth issue, the CHN may refer to the specialists outlined below.

GP/paediatrician
A referral to a GP or paediatrician is necessary for
- cases that are deemed too advanced or severe to be dealt with by community based therapy
- infants that may have an underlying disease causing their growth issue.
- children under 6 months requiring immediate action

Dietitian
Dietitians can be referred to if additional support or treatment is required. They are able to review all relevant medical history and conduct a dietary assessment to see if the diet is lacking in total energy and key nutrients. Dietitians can also conduct nutrition interventions, which can include vitamin supplementation, oral nutrition support and/or supervised diets.

Lactation consultant
For infants and mothers that are experiencing complex breastfeeding issues, a lactation consultant or breastfeeding service may help to support and educate the mother on best feeding practices and also explore and address other contributing factors to breastfeeding difficulties.

Feeding services at PMH
The feeding services team consists of a speech pathologist and dietitian who conduct a joint approach. A child can be referred to the team if there are complex medical feeding difficulties resulting in FTT, including dysphagia, oro-motor and/or structural issues. A referral from a GP or Paediatrician is required.

Speech pathologist or occupational therapist
These allied health professionals need to be referred to by GP or hospital in the case of structural and developmental difficulties that are hindering feeding.

Hospitalisation
In extreme or acute circumstances when hospital treatment is required the CHN can refer to child to a hospital service. This may take place if:
- there is severe neglect or evidence of abuse
- there is a high vulnerability or risk of abuse or neglect from a strained parent child relationship
- severe malnutrition, infection or dehydration is evident
- medical instability
- management of previous diagnosis has failed.

Department of Child Protection (DCP)
DCP workers, including social workers may be referred to in the case of social or emotional factors or environmental factors that contribute to the FTT. DCP can provide family assistance and support including financial counselling, parenting, education and
support. If there are concerns about the welfare of the child (such as neglect or abuse) DCP should also be notified.

**Best Beginnings**
Best Beginnings is a program offered by DCP and the Department of Health (WA) involving intensive home visiting for high risk families. It aims to ensure positive outcomes for infants and families that are at high risk of poor health. This is achieved through empowering the caregivers to provide a safe and nurturing home environment and provide access to supportive social links. Referral is accepted from staff of either department by CHNs, midwives, social workers, GPs and other agencies. Best beginnings staff are trained in service delivery for infants and their families.

**King Edward Memorial Hospital: Mother Baby Unit**
The Mother Baby Unit is a state-wide inpatient treatment centre for acute perinatal psychiatric conditions.

**Ngala Centre and Parent Helpline**
Ngala is a not-for-profit service provider, offering early parenting support and guidance.

**King Edward Memorial Hospital: Breastfeeding Centre of WA**
The Breastfeeding Centre is available for mothers and babies who attended King Edward Memorial Hospital for their pregnancy and birth. A midwife or lactation consultant assists mother and baby in overcoming breastfeeding difficulties. The centre also offers a telephone counselling service.


Lumeng J. What can we do to prevent childhood obesity. Zero to Three. 2009.


