NUTRITIONAL GUIDELINES

FOR CHILDREN WITH SPECIAL NEEDS

FROM BIRTH TO 18 YEARS OLD

CONTENTS

APPENDIX

INTRODUCTION

Nutrition is one of the important indicators to measure growth and development of children. Children are considered as a vulnerable group, especially children with special needs (CWSN). According to the Persons with Disabilities Act (2008), CWSN can be referred as those who have long term physical, mental, intellectual or sensory impairments which interact with various barriers that may hinder their full and effective participation in society. The most common conditions for CWSN are Autism, Down Syndrome, Cerebral Palsy and learning disabilities. The number of new cases for CWSN aged 0 to 18 years old as registered with the Social Welfare Department were 103,420 people in 2016 (Department of Social Welfare Malaysia, 2016).

Nutrition related problems are risk factors in all children. This is especially for children who are disabled, chronically ill or developmentally delayed. The inherent nature of a disability or illness places additional stresses on a child's growth and development. Hence, CWSN require greater care than healthy children because they are at risk of malnutrition (UNICEF, 2013). These children need to achieve their optimum caloric and nutrient intake to minimise the risk of nutrient deficiencies. They may be undernourished due to inadequate calorie or nutrient intakes. Nutritional problems in CWSN including over nutrition may be due to multiple causes, including ignorance and lack of appropriate care capacities, feeding problems, food and drug interactions, altered growth patterns and metabolic disorders (Peckenpaugh & Poleman, 1999; FAO, 1996). CWSN may also be overweight because of overeating and inadequate physical activity. Thus, the provisions of balanced and nutritious meals are important to keep them healthy.

Meeting the nutritional needs of CWSN is a challenging task and can be accomplished with appropriate training, education and resource materials available to health professionals, therapists, parents and caregivers in managing the diet and nutrition of CWSN. Coordination between the families and health care providers of these children is essential as the Health Professionals need to provide appropriate health services and advice to parents and caregivers. This guideline covers three main components as follows:

- Basic Nutrition
- Nutrition Screening & Assessment
- Feeding & Nutrition Intervention

It is hoped that by recognising the nutritional needs of the CWSN, this guideline will enable health professionals, therapists, parents and caregivers to more effectively manage dietary and related problems in this special group of children. Through this guideline, the skills in comprehensive feeding and nutrition screening, assessment, and intervention can be enhanced. A multi-disciplinary approach will facilitate positive health outcomes and a better quality of life for the CWSN.

OBJECTIVE

The objective of this guideline is mainly to provide knowledge and skills on nutrition management for CWSN from birth to 18 years. However, CWSN with highly specific medical and nutritional requirements will need to be managed by the tertiary care centres. This guideline can be used by the health professionals, health care providers, therapists, parents and caregivers in the management of nutrition CWSN.

DUTIES AND RESPONSIBILITIES

Medical Doctor

- Provide assessment, monitoring and necessary prescriptions of CWSN.
- Provide family support and counselling.
- Provide information on health related issues such as growth, development and nutrition of CWSN, immunization, including resources, supports and services.

Dental Officer

- To educate parents and care givers on the correct oral healthcare.
- Provide dental treatment when necessary and arrange for schedule follow up.
- Advise parents or caregivers on the condition of the children's teeth and any food modifications needed.

Nutritionist

- To carry out nutrition promotion and consultation for parents/ caregivers and CWSN.
- To provide nutrition assessment, intervention, monitoring and evaluation of related to CWSN without medical complications.

Dietitian

- Provide nutrition assessment, intervention, evaluation and monitoring.
- Provide individual consultation to parents and caregivers on feeding and nutrition intervention.
- Provide guidance to parents and caregivers on nutrition management of CWSN with health complications.

Nurses

- Work with the children and their families or caregivers to provide information, consultation, planning, implementation and monitoring of nursing support for children with special health care needs in their home, child care and school settings.
- Assist to carry out nursing diagnosis to identify by CWSN.
- Assist and monitor on nutrition intervention.
- Provide information and support related to nursing care.
- Prepare and record monthly and annual return.

Speech Therapists

- Work with children, youth and their family and caregivers to develop the child's verbal and non-verbal communication skills and their understanding of language.
- Work with CWSN and their families to improve with their swallowing and feeding skills.

Occupational Therapist/ Physiotherapist

- Work with children and their families and caregivers to develop the child's maximum level of independence by addressing physical aspects, including: movement, muscle strength, coordination, fitness and respiration.
- Work with CWSN, their families and caregivers to develop the child's maximum level of independence in all areas of daily living, including: dressing, bathing, feeding, play and school related activities.
- Help the CWSN to familiarise with the feeding patterns and food texture as advised by the nutritionists or dietitian.

Parents and care givers

- Committed in managing the children's nutrition as advised by healthcare providers.
- Apply basic nutrition guidelines when preparing the food and food modifications for CWSN.
- Monitor the eating patterns and habits of the CWSN at home.
- Consult health professionals on any complications identified in CWSN.

CHAPTER A

BASIC NUTRITION

Chapter A : Basic Nutrition

1. INTRODUCTION

Nutrition plays an important role in promoting and sustaining good health. An adequate intake of calories and nutrients from a variety of foods is important in order to meet the daily nutritional requirement and to minimise the risk of developing nutrient deficiencies.

It is very important to ensure CWSN are getting appropriate foods and incorporating the principle of good nutrition such as variety, moderation and a balanced intake of nutrients as follows:

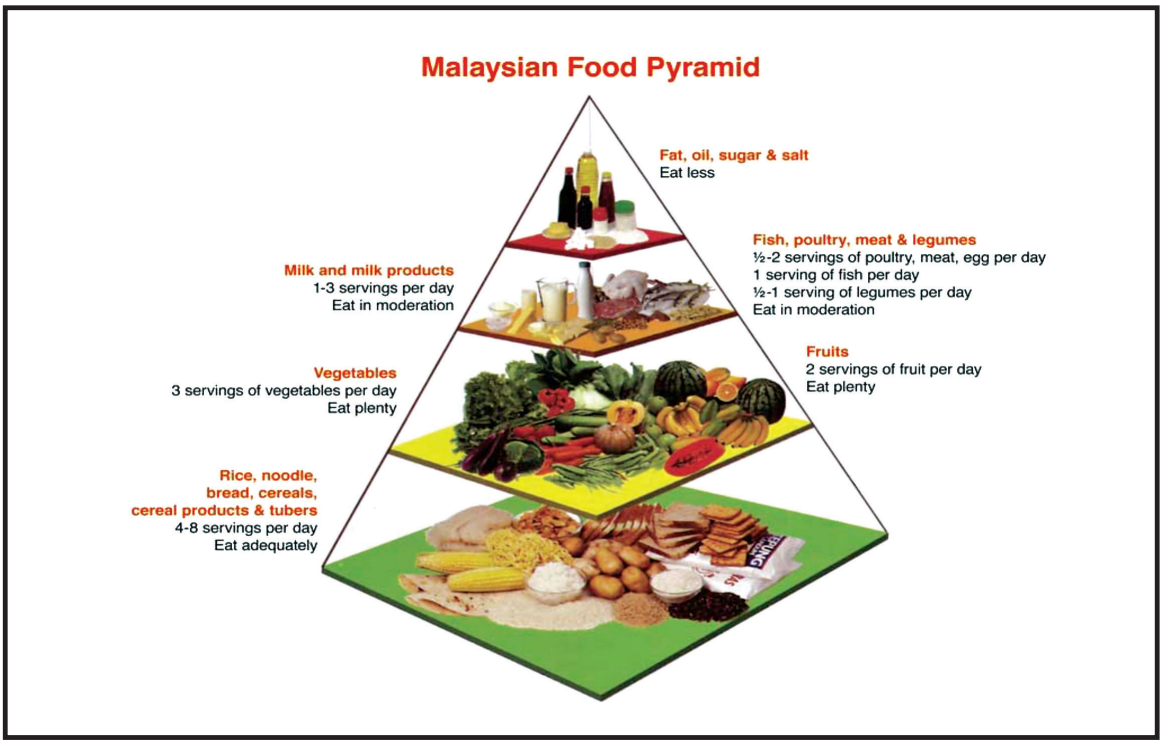


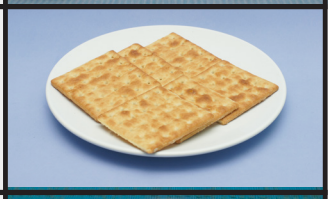
Figure 1.1: Malaysian Food Pyramid (Malaysia Dietary Guidelines, 2010)

CWSN may have different energy and nutrient requirement due to their level of disability or health condition. The best way to meet the daily requirements is to provide a variety of foods with different combinations of energy and nutrients that combines cereals, fruits and vegetables, meat, fish, poultry, legumes and milk products. Water or fluid is also important as it is essential for many body functions such as regulation of the body temperature and digestion.

1.1 Eat adequate amount of rice, other cereal products (preferably wholegrain) and tubers

- Cereals and cereal-based products provide the major source of energy and protein.
- Eating enough cereal foods helps to ensure an adequate nutritional intake.
- Other than being an excellent source of carbohydrate and protein, wholegrain cereals are an important source of fibre, vitamins, minerals, lignans and other phytochemicals (Slavin et al., 1999), notably iron, zinc, magnesium and phosphorus (FAO, 2002). (Adapted from MDG, 2010).
- Eat 4 to 8 servings of these foods daily according to their needs and requirements. However, there may be a need for CWSN to recalculate the number of serving due to their level of disability or health condition.
- One serving of cereals and cereal products and tubers is shown in Table 1.1.

Table 1.1: One serving of cereals and cereal products and tubers (30 g carbohydrate per serving)

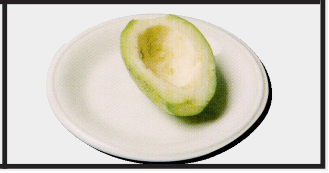
Rice noodle (*bihun*), soaked	1 ½ cups	
Biscuits, cream crackers	6 pieces	
Bread, white/ wholemeal	2 slices	
Mi or *kue teow*, wet	1 cup	
Potatoes	2 whole (medium size)	
Rice, white, cooked	1 cup / 2 scoops (*senduk nasi*)	
Rice porridge, plain	2 cups	

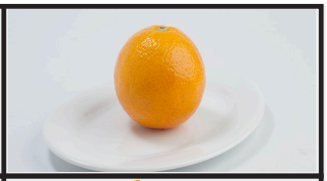
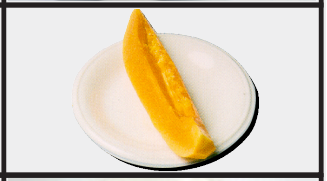
**Note: 1 cup = 200 ml*

1.2 Eat plenty of fruits and vegetables everyday

- Fruits and vegetables are good sources of vitamins, minerals and fibre needed to maintain health and prevent diseases.
- Fibre helps in digestion and prevents constipation.
- Eat 2 servings of fruits and 3 servings of vegetables daily. However, for CWSN, it may be necessary to recalculate the number of servings due to their level of disability or health condition.
- One serving of fruits or vegetable is equivalent to the foods listed in the Table 1.2a and 1.2b below.

Table 1.2a: One serving of fruits (15 g carbohydrate per serving)

Apple, Chinese pear, mango, *ciku*	1 whole	
Banana (*Pisang berangan*)	1 whole (medium size)	
Banana (*Pisang mas*)	2 whole	
Grapes	8 small	
Guava/ pear	½ whole	

Mandarin orange	1 whole (medium size)	
Papaya, pineapple, watermelon	1 slice	
Prunes	4 small	
Raisins	1 dessert spoon	

***Note:** 1 cup = 200 ml*

Table 1.2b: One serving of vegetables

Dark green leafy-vegetables with edible stem, cooked	½ cup	
Fruit vegetables, cooked	½ cup	
Local salad (*Ulam*), raw	1 cup	

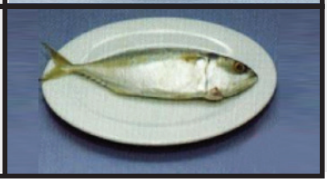
1.3 Consume moderate amount of fish, meat, poultry, egg, legumes and nuts

- Fish, meat, poultry, egg, legumes, nuts and seeds are important sources of protein.
- Protein in meat, fish, poultry and eggs contain all the essential amino acids.
- Legumes, nuts and seeds are also valuable sources of protein.
- These protein food groups also provide vitamins and minerals such as iron, zinc, magnesium and B vitamins (thiamin, riboflavin, niacin, vitamin B6 and B12).
- Legumes also count as a starchy food that can serve as excellent sources of dietary fibre (FNRI/DOST, 2000; Venter & van Eyssen, 2001; Scholtz et al., 2001; NHMRC, 2003; Health Canada, 2007).
- Fish, meat/ poultry/ egg, and legumes must be eaten daily. One serving of fish, meat, poultry, egg, legume and nuts are shown in Table 1.3a, 1.3b and 1.3c. Suggested intakes are as follows:

    - o Fish : 1 serving
    - o Meat, poultry and egg : ½ - 2 servings
    - o Legumes : ½ - 1 serving

- However, for CWSN, it may be necessary to recalculate the number of servings due to their level of disability or health condition.

Table 1.3a: One serving of fish (14 g protein per serving)

Anchovies (head removed)	⅔ cup	
Indian mackerel fish (*Ikan kembong*) [20 cm x 4.5 cm x 3 cm]	1 whole (medium size)	

Yellow-banded trevally fish (*Ikan selar*) [22 cm x 6.2 cm x 3.2 cm]	1 whole (medium size)	
Spanish mackerel fish (*Ikan tenggiri*) [14 cm x 8 cm x 1 cm]	1 piece	

Table 1.3b: One serving of poultry, meat and eggs (14 g protein per serving)

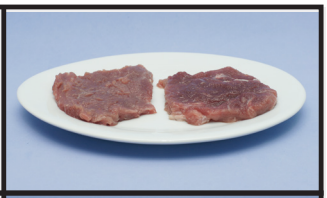
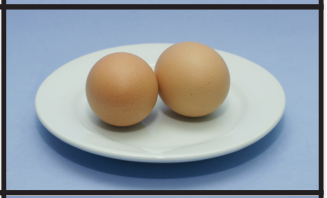
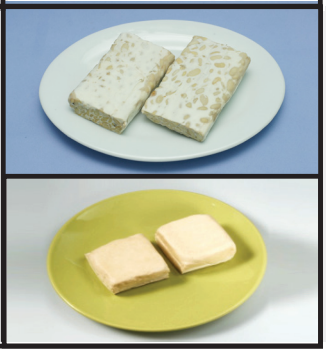
Beef, lean (7.5 cm x 9 cm x 0.5 cm)	2 pieces	
Chicken, drumstick	1 piece	
Chicken, egg	2 whole	
Chicken, liver	2 pieces	
Squid (12.5 cm x 6 cm)	2 whole (medium size)	

Table 1.3c: One serving of legumes

Green/ Mung bean or baked beans	1 ½ cups	
Chickpea, cooked	1 cup	
Soy bean milk, unsweetened	1 ½ glasses	
Fermented soya bean cake (*tempeh*) or soya beancurd (*taukua/ tauhu*)	2 pieces	

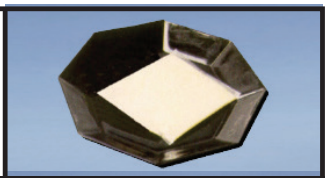
1.4 Consume adequate amounts of milk and milk products

- Milk is one of the most complete foods, containing nearly all the constituents of nutritional importance to humans.

- Milk and milk products are the richest source of calcium in the diet that is readily absorbed.

- Milk and milk products are also important contributors of protein, Vitamin A, Riboflavin, Vitamin B12 and Zinc to the diet.
- However, sweetened condensed milk and sweetened condensed filled milk (*susu krimer manis*) are not considered as milk products.
- Consume 1 - 3 servings of milk and milk product daily. However, for CWSN, it may be necessary to recalculate the number of servings due to their level of disability or health condition.
- If the child is having lactose intolerance, please refer to the suggested intervention for food allergies in Chapter C.
- One serving of milk and milk products is equivalent to the food listed in the Table 1.4.

Table 1.4: One serving of milk and milk products

Cheese	1 slice	
Milk, liquid	1 glass	
Milk, powdered	4 dessert spoons (heaped)	
Yoghurt	1 cup	

Note:
1 cup = 200 ml
1 glass = 250ml
1 dessert spoon = 10 ml

1.5 Limit intake of foods high in fats, oils, salt and sugar and minimise usage of these food groups in food preparation

- Fats and oils are part of a healthful diet as they are an important source of energy and essential fatty acids (EFAs). Fats and oil are also important to facilitate the absorption of fat-soluble vitamins.

- Fats and oil impart taste and flavour to food, thereby enhancing their palatability besides fulfilling their calorie needs.

- The daily diet should contain appropriate amount of fat to minimise the risk of inadequate intake of essential fatty acids (EFA).

- Reduce the amount of salt in cooking and the addition of other flavour enhancers such as monosodium glutamate (MSG), sauces (such as soy sauce, oyster sauce, tomato sauce) and flavouring cubes.

- Parents should inculcate for low salt intake to their children from childhood.

- Diet high in sugar may affect the intake of micronutrients (MDG, 2010)

- Sugar is the main cause of dental caries. Sugar could contribute to obesity, excess energy and accentuating appetite leading to over consumption.

2. INSUFFICIENT NUTRIENT INTAKE IN CHILDREN WITH SPECIAL NEEDS

In general, CWSN require the same amount of nutrient as normal healthy children. However, due to their conditions, they may have difficulties in meeting their daily requirements, especially for calories, protein, fibre and fluids. Good dietary combination and intake will overcome this problem. Therefore, special attention to food preparation should be given in order to achieve their requirements.

2.1 Energy

- The energy need (calculated in calorie) - for a CWSN varies from one to another, depending on his/ her conditions and the level of disabilities. CWSN with disorders that are at risk for excessive weight gain e.g. Down Syndrome, Prader-Willi Syndrome, Spina Bifida and other disorders with limited activity may have lower energy needs.

- Conditions that require increased energy consumption for example: CWSN with hyperactivity, dyskinetic, Cerebral Palsy or other chronic diseases usually require more calories.

- Other CWSN such as hearing impairment, blindness and non-physical disabilities usually require the same calories as normal children.

- Caloric recommendation for children with Down Syndrome and Cerebral Palsy should be calculated based on their growth chart. It is more accurate than the calorie calculated based on age or weight alone.

- If the child needs further calorie adjustment, refer to Dietitian.

- Tips to consume adequate amount of calories and nutrients:

    o Eat according to caloric recommendations based on age, sex and physical activity level.

    o Eat a variety of foods from all food groups in appropriate amounts to obtain adequate nutrients.

    o For children who are overweight or obese, adopting a healthy diet and increasing physical activity to optimise their rate of weight gain:

        - Replace calorie-dense foods with healthier options.
        - Eat smaller serving sizes of high calorie foods.
        - Eat 3 main meals per day, plus 1 or 2 nutritious snacks between meals. Avoid skipping meals as this will lead to eating bigger meals or snacks later.
        - Motivate children to be physically active every day.

- For children who are underweight or having growth failure, increase calorie intake as recommended:-

  - Provide smaller but frequent meals throughout the day.
  - Choose foods with higher calorie and protein content.
  - Provide complete balanced nutritional supplements and drinks to ensure additional calorie and nutrient intake.
  - Thickened fluids may be helpful in ensuring adequate calorie intake. Example: add blended/ fines cereal into milk, add mashed sweet potatoes into vegetable puree or add in milk powder into soup or fruit juice. (Refer Table 2.1 for Calorie Modification Based on Food Group).

Table 2.1: Calorie Modification Based on Food Group

Foods	Low calories diet/ Normal diet	High calories diet
Cereal, cereal products and tuber		
Rice	Serve as normal portion or less	Add 1 tsp or more margarine
Noodles (*bihun, mi, kue teow*)	Serve as normal portion or less	Add 1 tsp or more margarine
Bread, sliced	Serve sandwich without spread	Add 1 tsp or more margarine/ jelly/ jam/ peanut butter
Bun	Plain bun	Filling bun or plain bun: Add ½ tsp or more margarine/ jelly/ jam or peanut butter
Biscuits	Serve plain crackers or marie biscuits in normal portion	Add ½ tsp margarine/ jelly/ jam/ peanut butter/ cheese or assorted biscuits.

Foods	Low calories diet/ Normal diet	High calories diet
Cereal, cereal products and tuber		
Potatoes	Baked, boiled or mashed	Add 1 tsp margarine to mashed/baked potatoes or serve French fries
Corn flakes	Cereal with no added sugar	Add in syrup/ honey with raisins, dates or sliced banana
Fruits and Vegetables		
Fruits	No change	Fruity milk shake, smoothies, banana split with ice cream. Mousse, cocktail, pudding
Vegetables	Serve as normal portion	Add in olive oil/ mayonnaise/ salad dressing

Source: Malaysia Dietary Guidelines for Children and Adolescents (2013)

2.2 Protein

- An adequate amount of protein is essential for the child's growth and development. It helps in maintenance and repair of body tissues. Therefore, it is important to make sure that the child gets enough protein as recommended.

- Proteins in human diet are derived from two main sources, namely animal proteins (e.g. eggs, milk, meat and fish) and plant proteins (e.g. pulses, cereals, nuts, beans and soy products).

- Animal proteins are more "biologically complete" than vegetable proteins because it contains all the essential amino acids and iron needed by the body. Essential amino acid and iron are crucial for the child's growth and development especially for CWSN.

- CWSN who have diet restricted in protein derived from animal source, alternatives from vegetable sources should include a wide variety e.g. legumes, nuts, seeds and cereals.

- Tips to consume adequate amount of protein:

    - Consume one serving of fish daily and choose a variety of fish.

    - Choose or prepare either meat, poultry or egg dishes daily to the recommended amount.

    - Choose meat that are low in fat and cholesterol such as skinless chicken and lean mutton

    - Minimise consumption of processed meat sources such as burgers patties, sausages or nuggets to not more than once a week.

    - Consume legumes daily.

    - Add nuts and seeds as ingredients in dishes.

Source: Malaysia Dietary Guidelines for Children and Adolescents (2013)

2.3 Fibre

- Fibre is an indigestible carbohydrate that plays an important role in moving food through the digestive system.

- Lack of fibre in the diet, coupled with low fluid intake and immobility, frequently result in constipation.

- This can be prevented by providing foods that are high in fibre such as whole grain cereal and cereal products, legumes, fruits and vegetables.

- According to the Recommended Nutrient Intake (RNI), adequate intake of total fibre for young children is ranging from 19 to 25 g/day, whereas for adolescents, it ranges from 26 to 38 g/day. (Refer to Table 2.3 for the Fibre Content In Some Selected Foods).

- CWSN may not be able to consume the same amount of fibre as a normal child due to some limitations. However, they should be encouraged to eat food rich in fibre as much as possible.

- Tips to increase the fibre intake:

  - Include at least one serving of whole grain in every meal.

  - Sprinkle oat over salad, breakfast cereals and yoghurt.

  - Use whole-wheat/*atta* flour when possible in your cooking and baking.

  - Choose whole grain bread or high fibre cereal products.

  - Consume brown rice instead of white rice. If the switch is hard to make, start by mixing them together.

  - Add beans such as kidney beans or red beans to your salads. Or sprinkle some fermented soya bean cake (*tempeh*) on local salad (*kerabu*).

  - Substitute legumes for meat, two to three times per week in dishes or soups.

  - Eat at least two servings of fruits and three servings of vegetables daily. Eat whole fruits instead of drinking juices. Juice has a very minimal insoluble fibre.

  - Serve fresh fruit for snack.

  - Add chopped dried fruits to your cookies, muffins, pancakes or breads before baking.

  - Add fruits, vegetables, nuts or seeds into *cucur, cekodok* and porridge.

  - Add sliced banana or raisin to your cereals.

Reference: UCSF (2013)

Table 2.3: Fibre Content in Some Selected Foods

Food	Amount	Weight (g)	Fibre Content (g)
Rice, noodles, bread, other cereals and cereal products and tubers			
Sweet potatoes	1 cup	138	0.3
Oat	1 cup	96	0.7
Potatoes	2 whole (medium size)	180	0.7
Corn	1 comb	222	4.4
White bread	1 slice	28	0.1
Wholemeal bread	1 slice	30	0.1
Raisin bread	1 slice	28	1.2
Breakfast cereal	1 cup	23	1.0
Barley	2 table spoons	26	0.8
Brown rice	2 rice scoops	102	2.0
White rice	1 cup	128	0.0

Food	Amount	Weight (g)	Fibre Content (g)
Fruits & Vegetables			
Guava (without skin)	1 slice	59	4.0
Pear (yellow)	1 whole (medium size)	169	2.5
Apple	1 whole (medium size)	128	0.3
Orange	1 whole (medium size)	134	0.6
Green pea	½ cup	92	2.5
Banana, *Berangan*/ *Rastali*	1 whole (medium size)	93	0.6
Tomato	1 whole (medium size)	100	2.2
Prune	4 pieces	28	2.0
Carrot	½ cup	62	2.0
Spinach (cooked)	½ cup	72	1.7
Cabbage (cooked)	½ cup	60	1.4
Kailan (cooked)	½ cup	52	1.1
Cucumber	6 pieces	50	0.4
Legumes & nuts (cooked)			
High fiber baked beans	½ cup	95	6.7
Lentils	½ cup	80	6.3

Food	Amount	Weight (g)	Fibre Content (g)
Peanut	½ cup	58	4.8
Chickpea	1 cup	186	4.8
Baked bean	1 ½ cups	95	3.8
Tempeh	2 pieces	71	2.1
Mung bean/ Red bean	1 ½ cups	12	0.5
Dhal	1 cup	160	0.3

Reference:
MDG (2010) & Nutrient Composition of Malaysian Foods (1997)

2.4 Water and Fluids

- Water is the principle chemical constituent of the human body. It absorbs metabolic heat within the body, maintains vascular volume and serves as a medium for transport within the body by supplying nutrients and removing waste.
- Daily water intake must be balanced with losses in order to maintain total body water.
- Children with delayed development may not be able to respond to their thirst or express their needs to drink.
- Some children may not be able to adequately close his/her lips to hold and swallow liquids easily.
- Such children are at risk of dehydration and constipation.

Table 2.4: Water requirement based on age category

Age category	Water Requirement
1- 3 years old	4 glasses (1000 ml)
4-6 years old	6 glasses (1500 ml)
7-9 years old	7 glasses (1750 ml)
10-12 years old	8 glasses (2000 ml)
13-18 years old	8-11 glasses (2000 ml – 2750 ml)

Adapted from: Malaysian Dietary Guidelines (2010)

Tips to increase water and fluid intake:

- Give children aged 2 to 3 years old small amounts of plain water for up to 1 to 2 glasses and for children ages 4 to 18 years old, 6 to 8 glasses of water.
- Provide water, juices and milk with meals.
- Serve foods with high fluid content (e.g., fruits, yoghurt and pudding).
- Ensure that the child drinks plain water frequently even when he/ she is not thirsty.
- Ensure plain water is always available.
- Encourage drinking of fluids between meals.
- Drinks may be provided via an attractive or special container.

Source: Malaysia Dietary Guidelines for Children and Adolescents (2013)

3. EAT ACCORDING TO NEEDS

3.1 Babies from Birth to 6 Months

- Give breast milk only (exclusive breastfeeding) from birth to 6 months and continue breastfeeding up to 2 years.

- Infants with special needs require a lot of extra help and attention especially during the first year of their life. Breastfeeding is one of the ways to help the infants directly. Breast milk is more than just food for the infants. Breast milk has life cells, immune factors and hormones to protect the infant's health. It is like an immunization to protect the infant from getting serious infections or illness (CHOP, 2013).

- Breastfeeding for infants with special needs may face the problems such as low muscle tone, non-rhythmic suck, arching of the body, over-sensitive to stimulation, weak reflexes for sucking, swallowing, gagging and may tire more easily (CHCM, 2011).

3.1.1 Baby with Cleft Palate/ Lip

- Babies with cleft lip should be able to breastfeed as the tissue of the breast can help the baby create a seal more effectively. Babies with a cleft palate are less likely to breastfeed directly from their mother's breast.

- Expressed breast milk (EBM) can be given via special cleft palate bottles, spoons or cups. However, mother needs to be encouraged to put the baby on the breast.

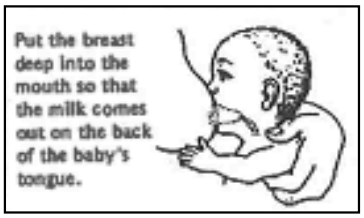


Figure 3.1(a): Breastfeeding a cleft palate baby

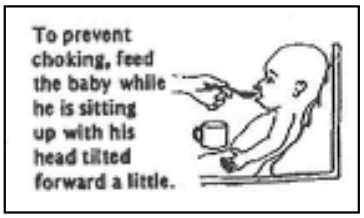


Figure 3.1(b): EBM via cup in cleft palate baby

Source: MOH (2009) Breastfeeding Promotion and Support: A Training Course for Health Professionals; Chapter 10 Infants with special needs.

3.1.2 Baby with Down Syndrome

- Babies with Down Syndrome may encounter problems such as hypotonia and poor sucking reflex.
- Therefore, proper positioning, manual expression and supporting of the breast so that the infant does not lose the nipple are very important steps.
- Breastfeeding baby with Down Syndrome could improve mouth and tongue coordination which help in the speech and language development.
- The presence of fatty acid (DHA) in the breastmilk increases brain growth and development.
- Complementary foods must be given at six months of age (180 days).

Reference: Breastfeeding Promotion and Support: A Training Course for Health Professionals (2009)

3.2 Infant and Young Children (from 6 months to 3 years old)

- An infant's development does not always match his or her chronological age. Infants may be developmentally delayed in their feeding skills due to medical conditions such as Down Syndrome and Cerebral Palsy.
- Infants with such conditions may not be developmentally ready for complementary foods at similar chronological ages as full-term, healthy infants. A caregiver of a developmentally delayed infant will need instructions on feeding techniques from the infant's health care provider or a trained professional in feeding developmentally disabled children. Please refer to the Pediatrician for further advice (USDA, 2009).
- Table 3.2 illustrates the recommended daily amount of food for infants and young children (6 months – 3 years old). Gradually change the food texture and methods of preparation as the infant gets older, adapting according to his/her development and abilities.

Table 3.2: Recommended Daily Amount of Food for Infants and Young Children (6 months - 3 years old)

Food Group	*Recommended Daily Amounts		
	6 – 8 months	9 – 11 months	1 – 3 years old
Rice, noodles, bread, cereals, cereal products & tubers 	1½ cups (porridge)	2 cups (thick porridge)	2 cups (cooked rice)
Fruits & Vegetables 	¼ cup / 2 dessert spoons (cooked vegetables) ¼ slice of papaya or ½ small size banana (17 g)	½ cup / 4 dessert spoons (cooked vegetables) 1 slice of papaya or 2 small size banana (66 g)	1 cup / 8 dessert spoons (cooked vegetables) 1 slice of papaya or 2 small size banana (66 g)
Fish, poultry, meat, egg & legume 	2 teaspoons of any type of meat or edible portion of fish (¼ piece of medium size fish)	2 teaspoons of any type of meat or edible portion of fish (¼ piece of medium size fish or ½ egg	½ piece of medium size *Kembong* fish or 1 whole egg

Food Group	*Recommended Daily Amounts		
	6 – 8 months	9 – 11 months	1 – 3 years old
Milk & milk products 	Breastfeeding on demand	Breastfeeding on demand	Breastfeeding on demand or 3 glasses of milk
	1 teaspoon of added oil/ margarine *** No added sugar & salt**	1½ teaspoons of added oil/ margarine *** No added sugar & salt**	1 teaspoon of added oil/ margarine

**These foods can be exchanged to other foods within the same group (with equivalent serving size).*

Reference: Malaysian Dietary Guidelines for Children and Adolescents (2013)

3.3 Children and Adolescent (from 4 - 18 years old)

- Energy needs for CWSN vary widely and should be adjusted to support growth and developmented. Energy calculations for certain diagnoses based on current practice and research are as shown in Table 3.3a. Calorie estimates should be realistic based on the children diet history, medical status, and intake levels. Careful monitoring will determine if additional modification needs to be made (Willis, 2005).

Table 3.3a: Energy Adjustment for Selected Special Conditions Among Children

Special Condition	Energy Adjustment
Cerebral Palsy	Formula to calculate daily energy requirement: **For non-ambulatory child: 11.1 kcal x length (cm)** **For ambulatory child: 13.9 kcal x length (cm)** e.g. Fatimah is a 5 years old girl. She is bed-ridden and her length is 96 cm, thus her energy requirement is: 11.1 kcal X 96 cm = **1066 kcal** *Source: Hogan (2010)*

Special Condition	Energy Adjustment
Down Syndrome	For inactive/ sedentary child, requirement should be the energy **less than 10% - 15% of RNI** e.g. According to RNI, energy requirement for a 12 years old normal boy is 2180 kcal. Therefore, for a down syndrome boy who is at the same age, his/ her energy requirement is: 2180 kcal – 10% = **1962 kcal** *Source: Medlen (2002)*
Failure To Thrive	Peterson Formula : RNI for age X $\frac{\text{Ideal weight-for-age}}{\text{Actual weight}}$ or, 150% @ 1.5 X RNI (RDA, FAO 1995)

***RNI: Recommended Nutrient Intakes for Malaysia (2017)**

- The recommendation on the number of servings based on an average calorie requirement for boys and girls between 4 – 18 years old (Table 3.3b).
- The calorie needs based on age group and sex are presented in Table 3.3c.
- A sample of one day menu for children aged 3 years, 4 – 6 years, 7 – 9 years, 10 – 12 years (boys), 13 – 18 years (boys) and 10 – 18 years (girls) are shown in Table 3.3d, Table 3.3e, Table 3.3f, Table 3.3g, Table 3.3h and Table 3.3i respectively.

Table 3.3b: Recommendation on the number of servings for boys and girls between 4 - 18 years old

Food Group	* Average Recommended Daily Amounts			
	4 - 6 years old	7 - 9 years old	10 -12 years old	13- 18 years old
Rice, noodles, bread, cereals, cereal products & tubers 	3 cups cooked rice	5 cups cooked rice	6 cups cooked rice	8 cups cooked rice
Fruits & Vegetables 	1 cup cooked green leafy vegetables	1 ½ cup cooked green leafy vegetables	1 ½ cup cooked green leafy vegetables	1 ½ cup cooked green leafy vegetables
	2 medium sized banana	2 medium sized banana	2 medium sized banana	2 medium sized banana
Fish, poultry, meat, egg & legume 	1 piece medium size *Kembong* fish	1 piece medium size *Kembong* fish	1 piece medium size *Kembong* fish	1 piece medium size *Kembong* fish
	½ piece of lean meat or ½ egg or ¼ piece of poultry	1 piece of drumstick or 2 match box size lean meat or 1 whole egg	1 piece of drumstick or 2 match box size lean meat or 1 whole egg	2 piece of drumstick or 4 match box size lean meat or 2 whole eggs
	½ piece of tofu	½ piece of tofu	1 piece of tofu	1 piece of tofu

Table 3.3b: Recommendation on the number of servings for boys and girls between 4 - 18 years old

Food Group	* Average Recommended Daily Amounts			
	4 - 6 years old	7 - 9 years old	10 -12 years old	13- 18 years old
Milk & milk products 	2 glasses of milk	2 glasses of milk	2 glasses of milk	3 glasses of milk
Total Daily Energy Intake Estimation	**1300 kcal**	**1600 kcal**	**2000 kcal**	**2500 kcal**

Notes:

1. Estimation of fat used in cooking (30-35 g/ daily) and added sugar (10 g/ daily) have been taken into consideration in calculating the number of servings.
2. These foods can be exchanged with other foods within the same group (with equivalent serving size).

Adjusted from: RNI (2017)

Table 3.3c: Recommended Caloric Intake for Children and Adolescents by Age and Sex

Age Catagory	Boys (kcal)	Girls (kcal)
3 years	1000	1000
4 to 6 years	1300	1300
7 to 9 years	1800	1600
10 to 12 years	2200	2000
13 to 15 years	2700	2200
16 to 18 years	2800	2000

Source: NCCFN (2005); values are rounded up to the nearest tens.

Table 3.3d: Sample One Day Menu for Children Aged 3 Years Old (1000 kcal)

Menu	Serving Size	Weight / Volume	Calorie (kcal)
Breakfast			
Breakfast cereal Raisins Fresh Milk	½ small bowl 1 teaspoon ½ glass	20 g 10 g 130 ml	60 30 80
			170
Morning Tea			
Biscuits, cream cracker Chocolate flavoured milk Bananas, *mas*	3 piece ½ glass 1 whole	10 g 125 ml 35 g	45 65 35
			145
Lunch			
Rice, white Vegetables, stir fried Chicken, soup Apple Plain water	½ cup ½ cup ½ piece 1 whole 1 glass	50 g 30 g 40 g 115 g 250 ml	70 25 30 65 0
			190
Afternoon Tea			
Nuts, cashew Yoghurt, fruits flavoured Watermelon Plain water	1 teaspoon 1 small cup ½ slice 1 glass	10 g 110 g 130 g 250 ml	65 70 35 0
			170

Table 3.3d: Sample One Day Menu for Children Aged 3 Years Old (1000 kcal)

Menu	Serving Size	Weight / Volume	Calorie (kcal)
Dinner			
Rice, white Vegetables, stir fried Threadfin bream, cooked in soy sauce Plain water	½ cup ½ cup ½ piece 1 glass	50 g 30 g 40 g 250 ml	70 25 75 0
			170
Supper			
Fresh milk	1 glass	250 ml	160
			160
		Total Calories/ Day	**1005**

Source: NCCFN (2005); values are rounded up to the nearest tens.

Table 3.3e: Sample One Day Menu for Children Aged 4 – 6 Years Old (1300 kcal)

Menu	Serving Size	Weight / Volume	Calorie (kcal)
Breakfast			
Bread, white Jam Full cream milk	2 slices 1 teaspoon 1 glass	60 g 10 g 250 ml	150 20 160
			330
Morning Tea			
Biscuits, *marie* Apple, juiced (without sugar)	3 pieces 1 glass	20 g 250 ml	90 60
			150
Lunch			
Rice, white Indian mackerel, cooked in soy bean paste Mixed vegetables, fried Watermelon Plain water	¾ cup 1 piece 1 cup 1 slice 1 glass	75 g 80 g 60 g 250 g 250 ml	100 130 50 70 0
			350
Afternoon Tea			
Kuih kasturi Plain water	1 piece 1 glass	40 g 250 ml	100 0
			100

Table 3.3e: Sample One Day Menu for Children Aged 4 – 6 Years Old (1300 kcal)

Menu	Serving Size	Weight / Volume	Calorie (kcal)
Dinner			
Rice, white Chicken, *masak kunyit* Mixed vegetables, soup Plain water	¾ cup ½ cup 1 small bowl 1 glass	75 g 50 g 50 g 250 ml	100 90 50 0
			240
Supper			
Fresh milk	1 glass	250 ml	160
			160
		Total Calories/ Day	**1330**

Table 3.3f: Sample One Day Menu for Children Aged 7 – 9 Years Old (1800 kcal)

Menu	Serving Size	Weight / Volume	Calorie (kcal)
Breakfast			
Sandwich, sardine Salad Apple, juiced (without sugar)	1 slice 1 cup 1 glass	65 g 50 g 250 ml	70 10 60
			230
Morning Tea			
Kuih cara berlauk Tea	2 pieces 1 cup	30 g 200 ml	70 20
			90
Lunch			
Rice, white Chicken, *kurma* *Kailan*, cooked in oyster sauce Guava Plain water	1 cup 1 piece ½ cup ½ whole 1 glass	100 g 120 g 60 g 150 g 250 ml	130 250 90 70 0
			540
Afternoon Tea			
Bun, coconut Full cream milk	1 whole 1 glass	60 g 250 ml	165 160
			325

Table 3.3f: Sample One Day Menu for Children Aged 7 – 9 Years Old (1800 kcal)

Menu	Serving Size	Weight / Volume	Calorie (kcal)
Dinner			
Rice, white Fish, cooked in soy sauce Brinjal, stir fried Soy Cake (*Tempeh*), fried Plain water	1 cup 1 whole ½ cup 1 piece 1 glass	100 g 75 g 60 g 40 g 250 ml	130 150 50 70 0
			170
Supper			
Biscuits, cream cracker Fresh milk	3 pieces 1 glass	10 g 250 ml	45 160
			205
		Total Calories/ Day	**1790**

Note: The energy requirement for bed-ridden CWSN is 1800 kcal. While for mobility CWSN, please follow normal energy requirement according to their age.

Table 3.3g: Sample One Day Menu for Children Aged 10 – 12 Years Old (boys) (2200 kcal)

Menu	Serving Size	Weight / Volume	Calorie (kcal)
Breakfast			
Fried noodles Boiled egg Tea	1 cup ½ egg 1 cup	60 g 20 g 250 ml	150 40 160
			350
Morning Tea			
Curry puff *Apam gula hangus* Plain water	1 piece 1 piece 1 glass	50 g 30 g 250 ml	150 195 0
			245
Lunch			
Rice, white Black pomferet, fried in chilli Mustard, stir fried Mixed vegetables, soup Guava Plain water	1 ½ cups 1 piece ½ cup 1 small bowl ½ whole 1 glass	150 g 95 g 60 g 150 g 150 g 250 ml	10 160 50 50 70 0
			520
Afternoon Tea			
Fruit flavoured yoghurt Green pea, coated	2 small cups 1 small pack	230 ml 40 g	140 190
			330

Table 3.3g: Sample One Day Menu for Children Aged 10 – 12 Years Old (boys) (2200 kcal)

Menu	Serving Size	Weight / Volume	Calorie (kcal)
Dinner			
Rice, white Chicken, *masak sambal* Mixed vegetables, stir fried Orange Plain water	1 ½ cup 1 piece ½ cup 1 whole 1 glass	150 g 100 g 60 g 160 g 250 ml	190 210 50 70 0
			520
Supper			
Biscuits, cream cracker Chocolate flavoured milk	6 pieces 1 glass	20 g 250 ml	90 110
			200
		Total Calories/ Day	**2165**

Note: The energy requirement for bed-ridden CWSN is 1800 kcal. While for mobility CWSN, please follow normal energy requirement according to their age.

Table 3.3h: Sample One Day Menu for Children Aged 13 – 18 Years Old (boys) (2700 kcal)

Menu	Serving Size	Weight / Volume	Calorie (kcal)
Breakfast			
Breakfast cereal	½ bowl	40 g	130
Low fat milk	½ cup	200 ml	100
Bread, white	1 slice	30 g	70
Jam, marmalade	1 teaspoon	10 g	20
Orange, juiced (without sugar)	1 glass	250 ml	70
			390
Morning Tea			
Dumpling, chicken	1 whole	30 g	150
Full cream milk	1 glass	250 ml	160
			310
Lunch			
Rice, white	1 ½ cup	150 g	300
Chicken, *kurma*	1 piece	100 g	200
Kailan, cooked in oyster sauce	½ cup	60 g	60
Guava	½ whole	150 g	70
Plain water	1 glass	250 ml	0
			630
Afternoon Tea			
Fried *bihun*	1 ½ scoops	200 g	330
Egg, fried (sunny side up)	1 whole	50 g	100
Tea (without sugar)	1 cup	200 ml	0
			430

Table 3.3h: Sample One Day Menu for Children Aged 13 – 18 Years Old (boys) (2700 kcal)

Menu	Serving Size	Weight / Volume	Calorie (kcal)
Dinner			
Rice, white Beef, curry Anchovies, fried in chilli Spinach, stir fried Guava Plain water	2 cups 2 pieces ½ cup ½ cup ½ whole 1 glass	200 g 100 g 30 g 60 g 150 g 250 ml	260 150 95 60 70 0
			635
Supper			
Biscuits, *marie* Chocolate flavoured milk	6 pieces 1 glass	40 g 250 ml	185 110
			295
		Total Calories/ Day	**2690**

Note: The energy requirement for bed-ridden CWSN is 1800 kcal. While for mobility CWSN, please follow normal energy requirement according to their age.

Table 3.3i: Sample One Day Menu for Children Aged 10 – 18 Years Old (girls) (2000 kcal)

Menu	Serving Size	Weight / Volume	Calorie (kcal)
Breakfast			
Sandwich, sardine Fresh milk	2 slices 1 glass	120 g 250 ml	280 160
			440
Morning Tea			
Kuih kasui Tea	2 pieces 1 cup	80 g 200 ml	140 20
			160
Lunch			
Rice, chicken Papaya Plain water	1 plate 1 slice 1 glass	325 g 210 g 250 ml	330 70 0
			400
Afternoon Tea			
Mung bean with coconut milk Bread, white Plain water	1 ½ bowls 1 slice 1 glass	230 g 30 g 250 ml	240 70 0
			310

Table 3.3i: Sample One Day Menu for Children Aged 10 – 18 Years Old (girls) (2000 kcal)

Menu	Serving Size	Weight / Volume	Calorie (kcal)
Dinner			
Rice, white Red snapper, cooked in tamarind *Kailan*, fried Watermelon Plain water	1 cup 1 piece ½ cup 1 slice 1 glass	100 g 70 g 60 g 250 g 250 ml	130 150 60 70 0
			410
Supper			
Bun, coconut Chocolate flavoured milk	1 whole 1 glass	60 g 250 ml	165 110
			275
		Total Calories/ Day	**1995**

Note: The energy requirement for bed-ridden CWSN is 1800 kcal. While for mobility CWSN, please follow normal energy requirement according to their age.

4. THE IMPORTANCE OF NUTRIENT DENSE FOOD

- Foods that are high in nutrients, supply a significant amount of essential nutrients for the calories.

- Nutrient dense foods are high in nutrients such as vitamins, minerals, protein and fibre. Examples are milk and milk products, eggs, whole grain breads, cereals, beans, pasta, vegetables and fruits.

- Limit foods or drinks with high sugar content that have minimal amount of nutrients such as sweets, candies, soft drinks, cordials and syrups.

- Nutrient dense food is important to CWSN especially those who are unable to obtain sufficient energy and nutrients from oral intake. Therefore, avoid serving insufficient nutrient food such as coffee, tea, plain noodle or plain biscuit to these children.

- Nutrient dense foods can be served by adding other foods to them, for example:

  - Anchovies and peanuts in porridge
  - Peanut butter or cheese to plain biscuits
  - Cereal to milk beverages
  - Fruits, nuts or cereal in cakes
  - Shredded chicken and combination of vegetables in noodle soup.

5. PREPARATION OF THE RIGHT FOOD TEXTURE

5.1 Introduction to Food Texture

- Oral motor development among CWSN varies depending on their disability.

- The development may be delayed as compared to typically developing children (normal children). However, they may be able to perform as normal children after undergoing a rehabilitation program. The period of the rehabilitation may vary depending on the condition of the CWSN.

- Table 5.1 shows the oral motor skills development according to age and the recommended food textures. It also illustrates gross and fine motor skills according to age which can be used as a guide in planning food preparation for the children.

Table 5.1: Normal Motor Skills Development Related to Feeding

Age (month)	Oral-motor skills		Gross-motor skills	Fine-motor skills
	Skills	Food Texture		
0 - 3	Rooting reflex & sucking reflex	Breastfeeding/ Liquids only		Grasp reflex
3 - 6	Gradual disappearances of rooting and sucking reflex to voluntary swallowing	Continue breastfeeding/ Liquids only	Achieving head control	Hand regards
6 - 8	Lips do not assist in foods removal. Some food is pushed out of mouth.	Gradually able to tolerate pureed foods and cereals.	Good head control. Sit with support	Infant brings hand to mouth while holding an object -(mouthing).
	Periodic choking, gagging may occur. Minimal tongue thrust. Food is pushed out of tongue, resulting in some loss of food.	Tolerates liquids and mashed food.		

Age (month)	Oral-motor skills		Gross-motor skills	Fine-motor skills
	Skills	Food Texture		
9 - 11	Hold soft cookies/ finger food in between gums without biting. Begin to develop chewing and lip closure.	Tolerates liquids, mashed and coarsely chopped food	Sit independently (good trunk control)	Able to finger feed independently (pincher grip)
12 - 15	Swallow with easy lip closure. No loss of food and saliva. Able to chew food. Begin to develop biting.	Eating mainly solid foods including raw vegetables	Walking holding on to furniture (cruising)	Hold cup using both hands
15 - 18	Playful bite on spoon may occur. Drinks entirely from cup with no spillage.	Eating mainly solid foods including raw vegetables	Able to walk independently. Able to sit at the table to eat	Hold cup with one hand. Can hold spoon. Attempt to bring food to mouth using spoon.
18 - 30	Develop self-eating patterns and habits	Eating mainly solid foods including raw vegetables		Hold a spoon correctly. Able to bring food to mouth in a coordinate manner.

Source: Care of children with Special Needs: Manual on Activity of Daily Living (Self-Help Skills), (2006)

5.2 Modification of Food Texture

- Texture modification is needed for children with developmental delay, having oral injury or craniofacial abnormality which affected their chewing and swallowing abilities.

- Food texture should be modified according to the child's chewing and swallowing ability. It begins with pureed, then progress to soft foods, then lumpy or solid food (normal diet).

- Texture modification helps ensure safe feeding and helps in stimulating feeding development.

- It is important to be consistent in preparing daily foods for the CWSN especially with ground or blended foods because these children are very sensitive to certain food textures and some of them will refuse to certain food textures that may cause gagging.

- Appropriate food texture is important for children who are unable to chew and swallow to prevent choking or aspiration (Refer Appendix I).

- Several equipment are needed to prepare various textures of foods, such as food processors, blenders, choppers, spoons or fork and shredders.

- Each type of food should be prepared and fed separately. This will help the child in learning to recognise specific taste of each food and to make food more appetizing.

- Table 5.2 shows food texture descriptions which are designed to assist health care providers to educate parents on how to prepare nutritious and appetizing foods for the children.

- Children who need texture modification are advised to take their meals frequently to meet their energy and nutrient requirements.

- If the child needs further chewing and swallowing rehabilitation, please refer the child to the Dentist or Speech Therapist.

Adapted from Guidelines for the Feeding of Infants and Young Children (2009)

Table 5.2: Food Texture Descriptions

Food Texture	User indicator	Description
Soft 	Special needs children who: • Have chewing problems. • Have teeth problems or no teeth but **able to swallow.** • Falls sick, has diarrhoea or vomiting. • Have undergone surgery (post-operation). • Is bed-ridden.	• Normal foods, excluding hard texture, sticky or crispy foods. • Soft texture such as porridge *(bubur)* or soft rice *(nasi lembut/ lembik)*, mung beans porridge or wheat porridge. • Thick liquids such as pudding/ jelly added with milk. • Soft protein sources such as eggs, *tauhu, tempeh,* cheese, baked beans, yoghurt and fish. • If animal protein such as poultry is used, it must be cut into small pieces. However, it is advisable for red meat to be minced before cooking. • If vegetable is used, it must be blanched first before cutting into small pieces, to prevent nutrient loss. • Steam, blanch and stew are recommended, to maintain the nutrients and making the food softer. • Avoid - Spicy food - Hard texture such as nuts (cashew nut, hazelnut) - Raw vegetables (carrot, celery) - Diced or cubed red meat

Table 5.2: Food Texture Descriptions

Food Texture	User indicator	Description
Chopped 	Special needs children who: • **Able to swallow** • **Weak in chewing**	• Cut food into small piece (½ - 1 cm) or children mouth bite size with a food chopper, knife or food processor. • If animal protein such as poultry are used, it must be chopped finely (minced). • If vegetables are used, it must be blanched first before cutting into small pieces, to prevent nutrient loss. • Avoid: - Spicy foods
Mashed 	Special needs children who: • Have **chewing problem.** • Have **minimum swallowing ability.** • Have molars not well developed.	• Food should be easily mashed between teeth and gum. • The texture should be between pureed and chopped. • The food should be mashed with spoon and fork without adding water or liquid (e.g. potato, banana, blanched vegetables, fish and eggs). • If animal protein such as poultry is used, it must be blended. • Avoid: - Spicy food

Food Texture	User indicator	Description
Pureed 	Special need children who have: • **Swallowing problems** caused by mouth injury or oesophagus/ larynx disorder. • **Chewing problems** or do not have teeth.	• Food should be soft or small enough to be swallowed, with little or no chewing. • Food should be semi solid, in children mouth bite-size. • In order to make pureed foods, a small amount of liquid has to be added to avoid dryness and to make it smoother. • Food with smooth texture similar to baby cereal and plain yoghurt, with creamy and no coarse lumps. The food should not be runny. • Fine blended foods that stick on the spoon. • Blender or food processor is needed. • Blending foods with soup, milk or juice is recommended, rather than plain water, to maintain nutrients and enhance the food flavour (e.g. cereal blended with milk). • Avoid : - Spicy foods - Foods with hard texture such as nuts (cashew nut, hazelnut). - Raw vegetables (carrot, celery).

CHAPTER B

NUTRITION SCREENING AND ASSESSMENT

Chapter B : Nutrition Screening and Assessment

1. INTRODUCTION

The degree to which a CWSN is at risk of impaired nutritional status depends on the nature and duration of risk factors. Nutrition screening is the process of identifying infants and children who have nutrition-related risk factors or concerns before action can be taken to help the child (UCEDD, 2005).

Nutrition screening has various functions, requirements and benefits. Nutrition screening and assessment consist of the collection of preliminary data in one or more of the following categories.

- Anthropometric parameters
- Clinical (medical history and diagnosis)
- Bio-chemical laboratory data
- Diet history
- Developmental feeding skills
- Behaviour (related to feeding)
- Socio economic characteristics

Nutritional assessment is the process whereby the state of nutritional status of an individual, or group, is determined. It needs to be done frequently so that the growth of an individual or a target group is monitored and any growth falter is detected. The utilization of calorie and nutrients is the major influence on nutritional status.

Once a nutrition risk indicator is identified, the nutrition assessment serves to rule out or confirm suspected problem. Nutrition assessments should be completed by health care providers for CWSN and developmental disabilities.

Nutritional assessment consists of an in-depth and detailed collection and evaluation of data in the following areas: anthropometrics, clinical/ medical history, diet, developmental feeding skills, behaviour related to feeding, and bio-chemical laboratory data. The assessment may reveal areas of concern such as oral-motor development or behavioural issues that require further evaluation by the appropriate therapists or specialist. The nutrition assessment is one of the essential elements of a comprehensive interdisciplinary team evaluation and intervention plan.

(Reference: WSDH, 2010)

2. ANTHROPOMETRIC ASSESSMENT

Weight and length/ height of the children should be measured at every visit. Linear growth observed reflects the nutritional history of the child and helps to distinguish between short and long term nutritional problems. However, it may be difficult to evaluate and obtain accurate measurements of CWSN due to their spasticity or the uncooperativeness. Based on the current practice and scientific evidence, the Working Committee has recommended standardized techniques for anthropometric assessment as showed in Figure 2.1.

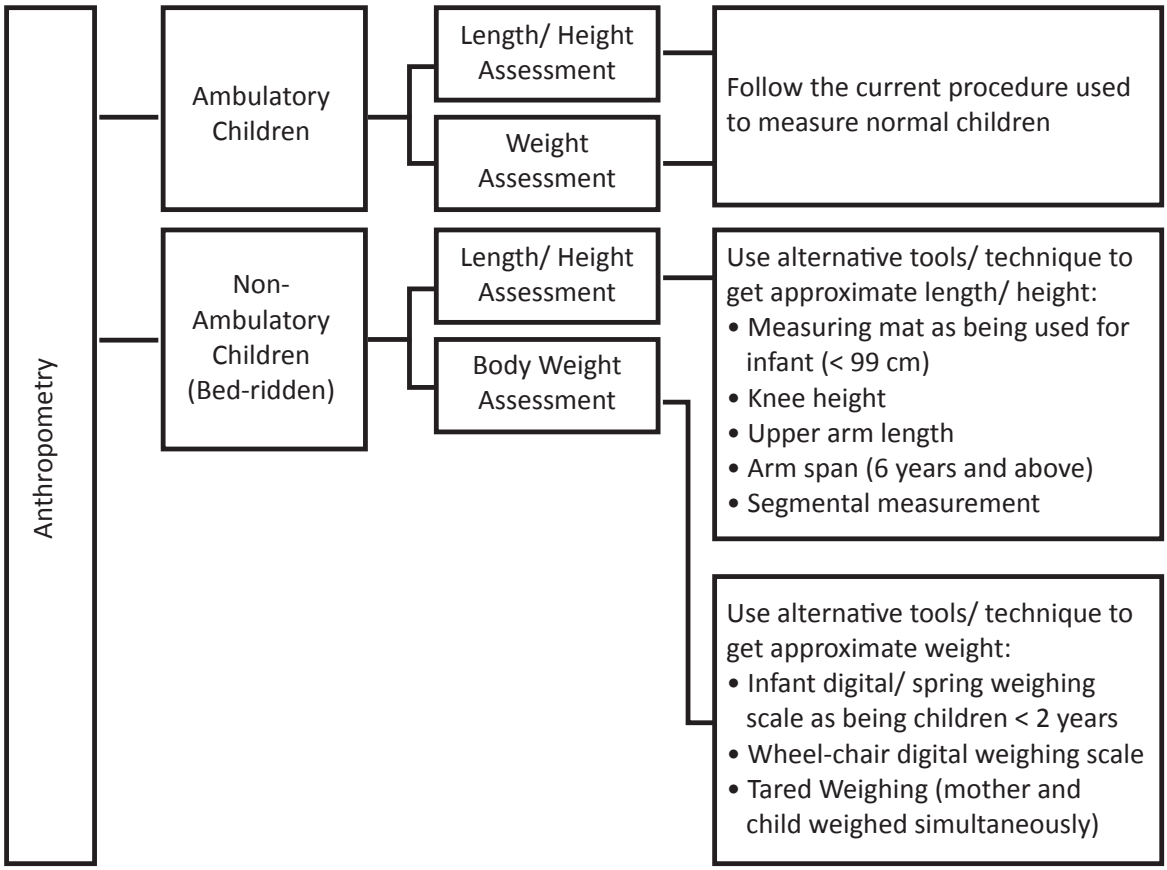


Figure 2.1: Algorithm chart of anthropometric assessment

2.1 Anthropometric assessment for ambulatory children

Ambulatory children are children who are able to stand straight without support (AHD, 2000). The current procedure used to measure a normal child can be used to measure length/ height and weight of these children.

2.2 Anthropometric assessment for non-ambulatory children

Non-ambulatory children are defined as those are not able to walk, bedridden or lower limb amputees (ODWC, 2013). Weighing and measuring length/ height for children with bone deformities and severe contractures may be more difficult than normally developed person, such as cerebral palsy. Alternative techniques are required to get the length/ height estimation.

2.2.1 Alternative techniques for length/ height estimation

Non-ambulatory children are defined as those that are not able to walk and bedridden with lower limb amputees (ODWC, 2013). Weighing and measuring length/ height for children with bone deformities and severe contractures may be more difficult than normally developed person, such as in cerebral palsy. Alternative techniques would be then be required to get the length/ height estimation.

a. Knee height (KH) measurement

Knee height is a distance between the heels to the superior surface of the knee over the femoral condyle.

Method:

- Measure with an anthropometer or flexible fibre measuring tape with the child sitting down and the ankle bent to 90°.

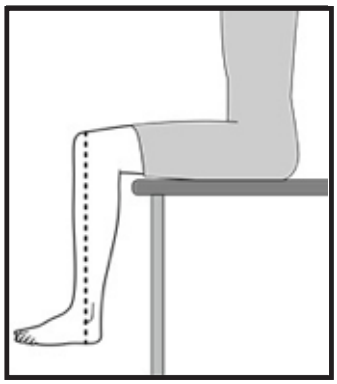


Figure 2.2.1a (i):
Sitting Position

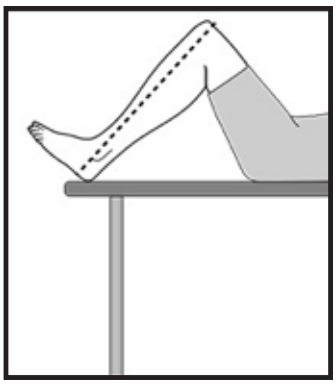


Figure 2.2.1a (ii):
Lying Position

- Measure on the lateral side of the least affected lower limb.
- Take two (2) measurements to ensure accuracy. However, if the difference between two (2) measurements is more than 0.1 cm, a third measurement should be recorded.
- Then convert the measurement into a height measurement using this formula:

Formula Knee Height for Adults

Male	= [1.924 x knee height (cm)] + 69.38 (The technical error is ± 1.1cm)
Female	= [2.225 x knee height (cm)] + 50.25 (The technical error is ± 1.1cm)

Reference: Suzana and Ng (2003), Asia Pacific Journal of Clinical Nutrition

- Knee height is the technique used to estimate length/ height. Plot the child's length/ height on a length-for-age/ height-for-age growth chart as used for normal children (refer to Appendix B, C and D). For Down Syndrome and Cerebral Palsy (quadriplegia) children, refer to growth chart in Appendix E and Appendix F.

Table 2.2.1: Examples of length/ height calculations based on knee height (KH) measurements:

Sample Client	1st Measurement	2nd Measurement	3rd Measurement	Length/ height
A	25.4 cm	25.4 cm	-	(2.69 x KH) + 24.4 = (2.69 x 25.4) + 24.4 = 92.7 cm
B	25.4 cm	25.5 cm	-	Average KH = (25.4 + 25.5) / 2 = 50.9/ 2 = 25.45 = 25.5 (2.69 x KH) + 24.4 = (2.69 x 25.5) + 24.4 = 93.0 cm
C	27.3 cm	27.7 cm	27.4 cm	(2.69 x KH) + 24.4 = (2.69 x 27.4) + 24.4 = 98.1 cm

b. Upper Arm Length

Upper arm length (UAL) is measured from the acromion to the head of the radius.

Method:

- Measure with anthropometer or flexible fibre measuring tape with the child sitting down and the arm bent to 90º.
- Measure on the lateral side of the least affected upper limb.
- Take two (2) measurements and average them to ensure accuracy. However, if the difference between the two (2) measurements is more than 0.1 cm, the third measurement should be recorded.

- Then convert the measurements into a height measurement using the following formula:

Stature = (4.35 X UAL) + 21.8 (The technical error is + 1.7 cm)

Reference: WSDH (2010)

- Upper arm length is the technique used to estimate length/ height. Plot the child's length/ height on a length-for-age / height-for-age growth chart as used for normal children (refer to Appendix B, C and D. For Down Syndrome and Cerebral Palsy (quadriplegia) children, refer to growth chart in Appendix E and Appendix F.

c. Arm span measurement

Two (2) persons are needed to measure arm span with anthropometer (wooden ruler) approximately two (2) meter long with etched gradations to 0.1 cm.

For the typically developing children over the age of six (6), the ratio of arm span to height has been found to be 1:1. However, this may not be the case for the child with special needs. This technique is not suitable for children who cannot fully extend their arms and fingers and children less than six (6) years old.

i) Full arm span

Arm span is defined as the greatest distance between the tips of the extended middle fingers of the right and left hands when the arms are fully extended, and the back is straight. Measurement of the arm span is useful for estimating the stature of children with lower extremity contractures or lower body paralysis.

Method:

Person A

- Have the child sit in straight position with arms outstretched.
- Hold the fixed end of the anthropometer at the tip of the middle finger of one of the child's hands.

Person B

- Position the anthropometer at the tip of the middle finger of the child's other hand across the child's back.
- Have the child stretch his/her arms to the maximum arm span.
- Take two (2) measurements to ensure accuracy. If the difference between the two (2) measurements is more than 0.1 cm, a third measurement should be recorded.

Arm span is a technique used to estimate length/ height. Plot the child's length/ height on a Length-for-Age/ Height-for-Age growth chart as used for normal children (refer to Appendix B, C and D. For Down Syndrome and Cerebral Palsy (quadriplegia) children, refer to growth chart in Appendix E and Appendix F.

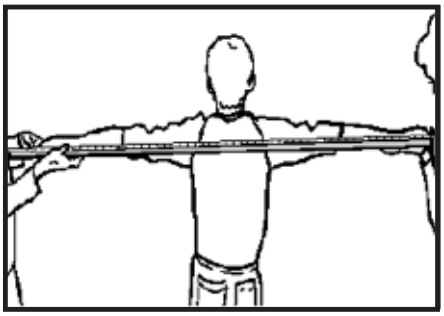


Figure 2.2.1c (i): Right technique

Figure 2.2.1c (ii): Wrong technique

Reference: WSDH (2010)

ii) Semi arm span

The measurement is taken from the end of middle finger up to the sternal notch when the child raised his hand horizontally (to stretch his hand)

Method:

- Have the child sit in straight position with left arm outstretched.
- Hold the fixed end of the anthropometer at the tip of the middle finger of the child's hand and take the reading on the measuring tape at the sternal notch of the child.
- Record the reading to 0.1cm
- Calculate the estimation using the formula
- Plot the reading in the chart

Formula for Semi Arm Span

Male	= [0.681 x semi arm span (cm)] + 47.56
Female	= [0.851 x semi arm span (cm)] + 18.78

Source: Suzana & Ng (2003), Asia Pacific Journal Clinical Nutrition

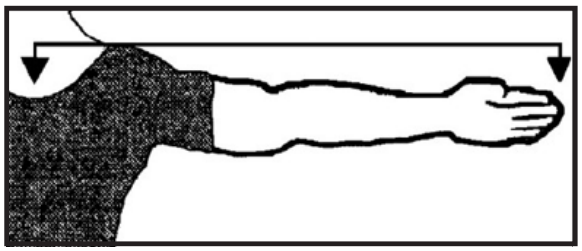


Figure 2.2.1c (iii): Semi arm span measurement

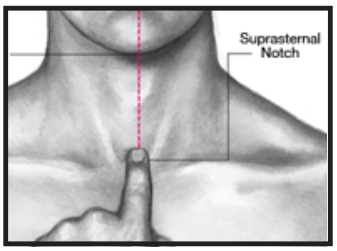


Figure 2.2.1c (iv): Sternal Notch

d. Segmental measurements

A segmental measurement is the least accurate measurement. Therefore, it may be the last option to be used if other alternative tools/ techniques are not applicable.

The measurement is taken from joint to joint or from head to heel with flexible fibre measuring tape for child in lying position. Place the measuring tape at the side of the child with less serious condition. As picture 1.2.1d shown measurement start from top of the skull (parietal bone) to the collar bone (clavicle), hip bone (ilium), knee cap (patella) and heel (calcaneus). Then the measurements are totalled, giving an approximate length. Then, plot the child's length/ height on a Length-for-age/ Height-for-age growth chart (refer to Appendix B, C and D as used for normal children. For Down Syndrome and Cerebral Palsy (quadriplegia) children, refer to growth chart in Appendix E and Appendix F.

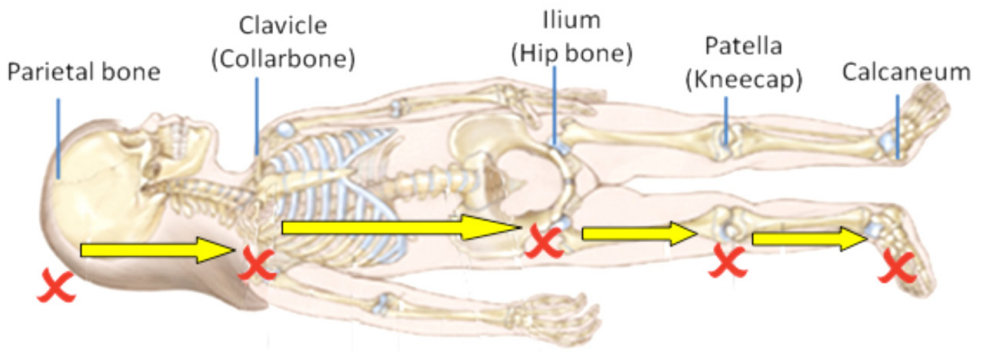


Figure 2.2.1d: Measurement from head to heel
Reference: Peckenpaugh & Poleman (1999)

2.2.2 Alternative tools/ techniques for weight measurement

- Ambulatory child can be weighed on digital type or spring type weighing scale as other normal child. Then plot the child's weight on a Weight-for-age and BMI-for-age growth chart (refer to Appendix B, C and D as used for normal children. To identify Down Syndrome and Cerebral Palsy (quadriplegia) children, refer to growth chart in Appendix E and Appendix F.

Figure 2.2.2a:
Beam Type
Weighing Scale

Figure 2.2.2b:
Digital Type
Weighing Scale

Figure 2.2.2c:
Spring Type
Infant Weighing Scale

Figure 2.2.2d:
Spring Type
Weighing Scale

Figure 2.2.2e:
Digital Wheel-Chair Weighing
Scale

- Non-ambulatory child can be weighed in digital wheel-chair weighing scale. Then plot the child's weight on a Weight-for-age and BMI-for-age growth chart (refer to Appendix B, C and D as used for normal children. To identify Down Syndrome and Cerebral Palsy (quadriplegia) children, refer to growth chart in Appendix E and Appendix F.

- The alternative technique to weigh the child requires the mother and the child to be weighed simultaneously (Tared Weighing).

Method:

- Minimize clothing on the child.
- Ask the mother to stand on the scale.
- Record the weight and include the reading with one decimal point (e.g. 65.5 kg).

- Pass the child to a person nearby. Record the second reading with just the mother (e.g. 58.3 kg).
- The difference (e.g. 7.2 kgs) is the weight of the child.
- Then plot the child's weight on a Weight-for-Age and BMI-for-Age growth chart (refer to Appendix B, C and D as used for normal children. To identify Down Syndrome and Cerebral Palsy (quadriplegia) children, refer to growth chart in Appendix E and Appendix F.

Figure 2.2.2f: Tared Weighing

Reference: Cogill (2003)

2.3 Interpretation of anthropometric measurement

The child's growth development can be determined by interpreting the growth trend on the growth chart. However, single interpretation from a single chart is not suitable for CWSN because different cases consist of varying levels of retardation, contracture and body stature development.

There is insufficient information on normal growth pattern for CWSN. However, it is very important for health care providers to ensure that malnutrition is not a contributing factor to the growth deficit.

Therefore, three (3) different indicators (BMI-for-age, Weight-for-age and Height-for-Age) are recommended to be used especially for children below five (5) years old to determine whether the child's nutritional status falls into the abnormal range (wasted, underweight, overweight, stunted).

For children aged 5-19 years old, it is recommended to use two (2) different indicators (BMI-for-age and Height-for-age) to determine whether the child's nutritional status falls into the abnormal range (wasted, overweight, stunted).

However, for individual management by Nutritionist and Dietitian, specific growth chart for specific condition such as Down Syndrome and Celebral Palsy (quadriplegia) is recommended, refer to growth chart in Appendix E and Appendix F.

2.4 Head circumference

Routine measurement of head circumference should be done as for normal children less than three (3) years old. This measurement is used to monitor the child's brain development. If the child found to have an abnormal brain development (more than +2SD or less than -2SD), refer to the Medical Doctor as soon as possible.

Method:

- The measurement tape is placed across the frontal bones just above the eyebrows, around the head above the ears on each side, and over the occipital prominence at the back of the head.

- The examiner holds the tape snugly (tidily and tightly) around the head. Hair ornaments and braids should be removed.

- The tape is moved up and down over the back of the head to locate the maximal circumference of the head. The tape should be perpendicular to the long axis of the face and should be pulled firmly to compress the hair and underlying soft tissues.

- Record the measurement to the nearest 0.1 cm.

3. DIET ASSESSMENT

The objective of diet assessment is to get more information on the child's food intake including current intake of medicine, appetite, feeding problem, type of food texture and other matters related to feeding practices.

There are two (2) types of forms recommended to be used for diet assessment of the CWSN.

a) Diet Assessment which has been integrated into the Children with Special Needs Assessment Format (*Format Penilaian Kanak-Kanak Dengan Keperluan Khas*), KKK 2/03A. (Refer Appendix G).

- This is a master form filled in by the nurses when the child attends the clinic on the first visit.
- It is used to gather information on the child's background/history.
- It provides general information on the child's current diet practices.
- This form will be kept in the child's health record in the health clinic and will be given and used by the Medical Doctor/ Nutritionist/ Dietitian.

b) Eating and Feeding Practices Evaluation Form for Children with Special Needs (refer Appendix H).

- This format consists of several parts:
  - A) Personal Particular
  - B) Health Information
  - C) Anthropometric
  - D) Nutrition
  - E) Diet History
- The Nutritionist/ Dietitian need to gather information on the child's nutrition.
- This form will only be completed during the first visit, except Part E - Diet History.
- During follow-up visit, the Nutritionist/ Dietitian need to fill in Diet History for Part E.
- Further diet plan and advice should be based on the Diet History findings.

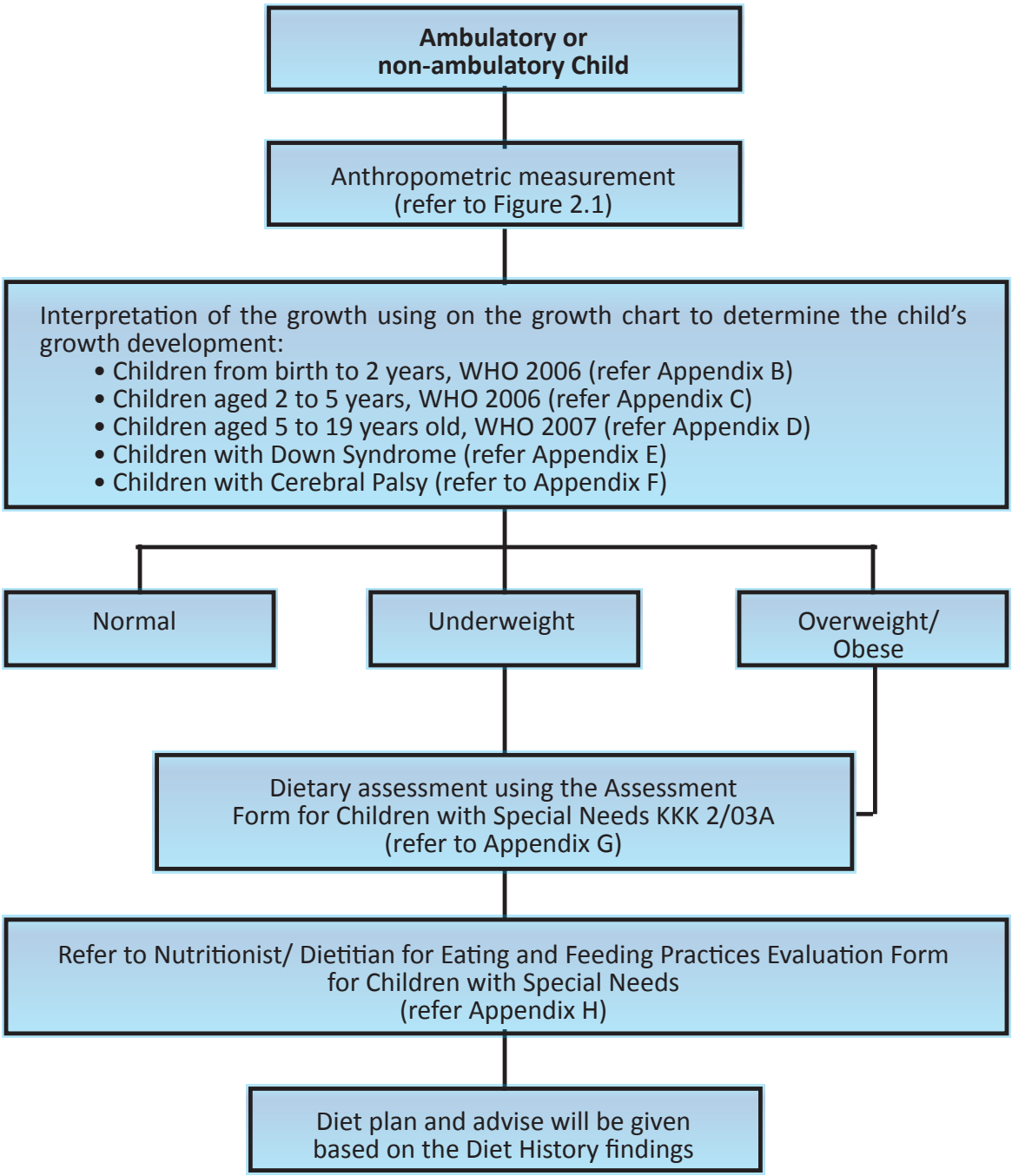


Figure 2.11: Flow Chart for Nutritional Screening and Assessment of CWSN

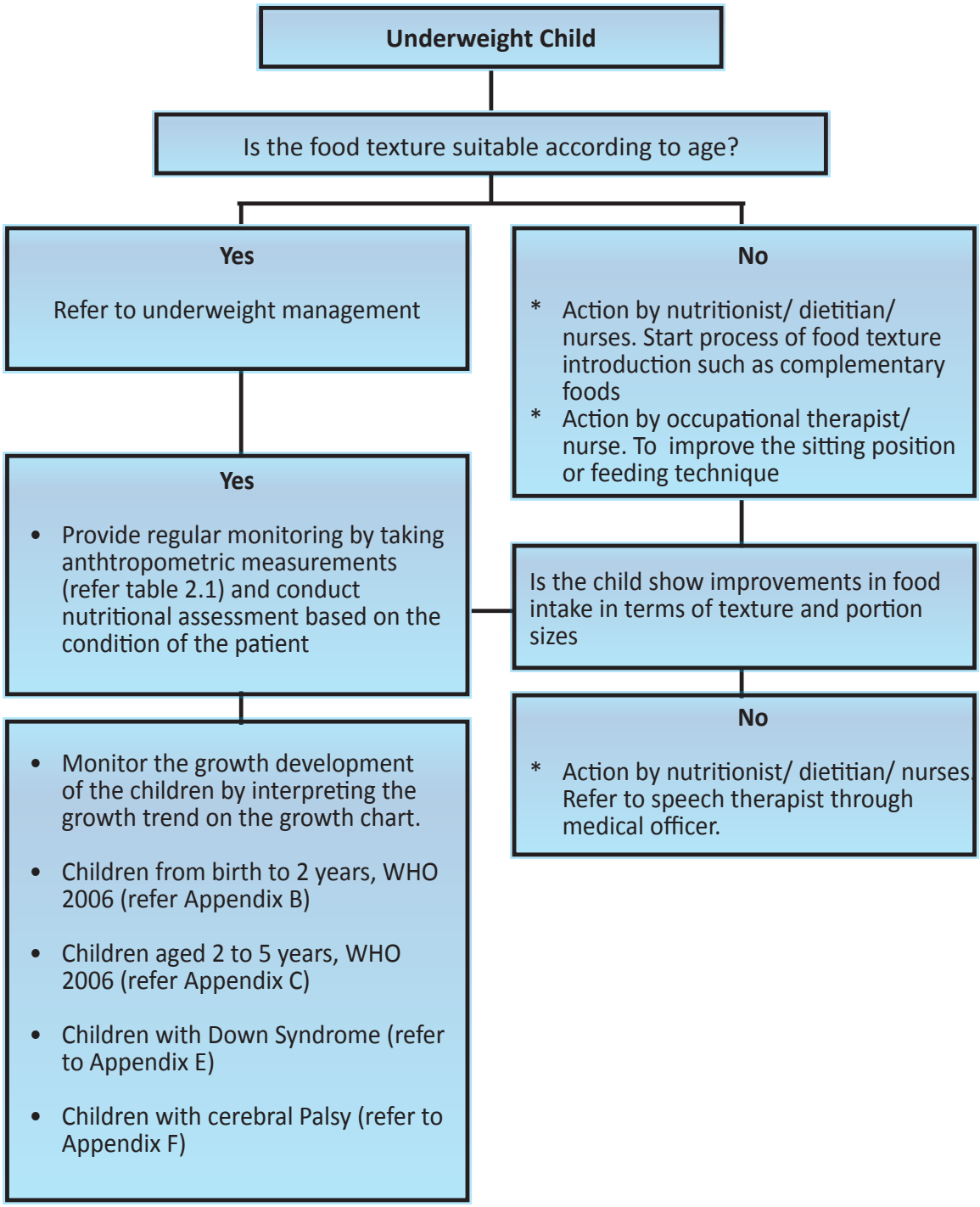


Figure 2.12: Flow Chart for Management of Underweight CWSN

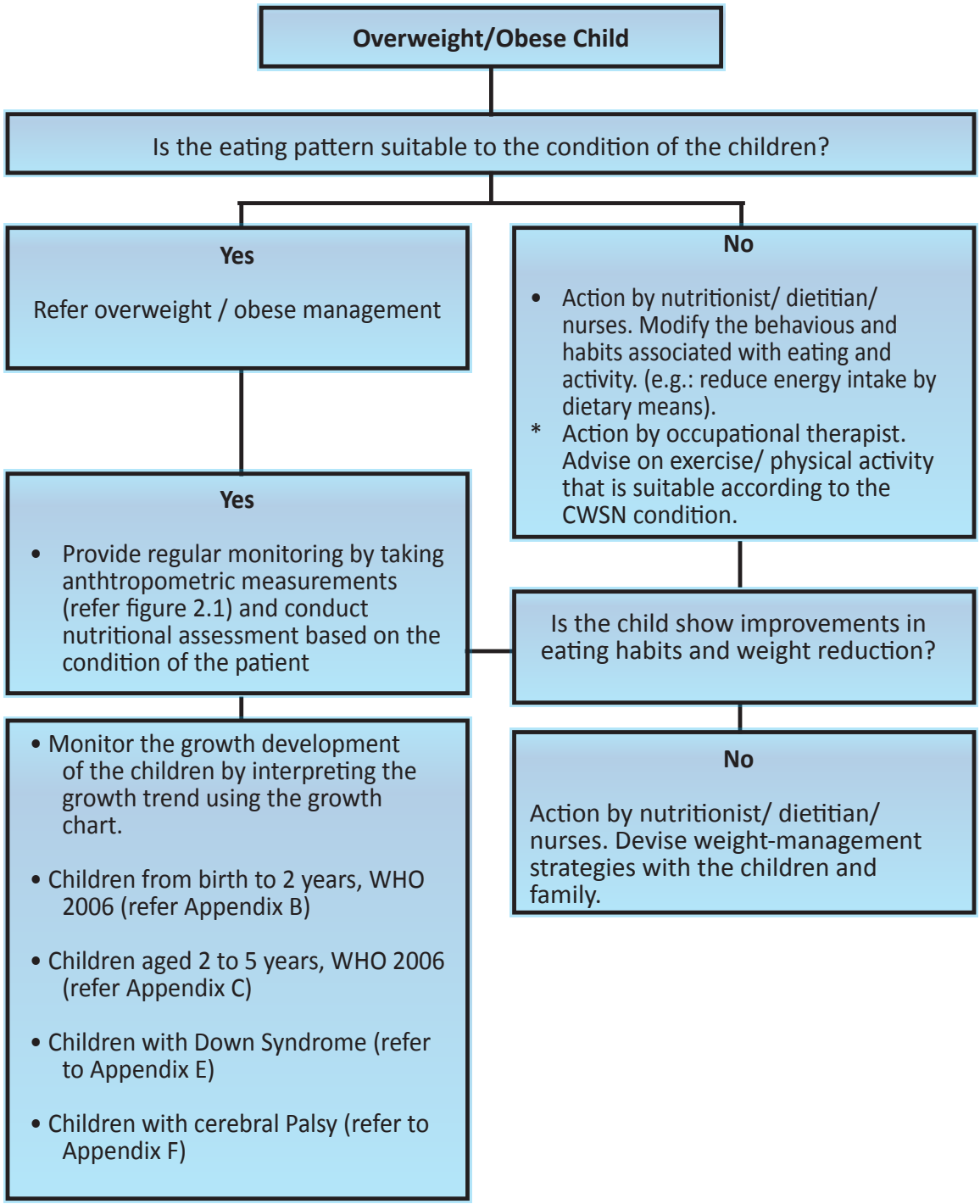


Figure 2.13: Flow Chart for Management of Overweight or Obese CWSN





CHAPTER C

NUTRITION/DIETARY INTERVENTION

Chapter C: Nutrition/Dietary Intervention

1. INTRODUCTION

Feeding patterns of CWSN are closely related with age, oral motor skill, gross motor control and fine motor control. Feeding and swallowing disorders in these children have been noted to have significant implications on the developmental and nutritional needs, gastrointestinal function, parent-child interaction and overall quality of life. Oral motor function influences the normal growth and development of oral structures - occlusion and salivary control. Oral motor function therapy incorporates the management of abnormal oral muscle tone, which may impact upon lip closure, tongue movement and effective swallowing.

2. FEEDING PROBLEM

According to National Food Service Management Institute, NFSMI (2006), feeding problems is defined as a condition whereby a child is unable or refuses to eat in order to consume adequate food or liquid. It is caused by inability to self-feed due to neuromuscular disturbances or behavioural problem or both, which alter the child's intake. The condition is associated with cavity and oropharynx; defects of the larynx, trachea and oesophagus; neurologic defects and neuromuscular disease. Feeding problems can affect weight gain and growth of a child very quickly, thus affecting the child's development and causes stress to the parents. The problems are usually related to oral-motor effects, positioning, self-feeding or behaviour. Signs indicating oral-motor problems include:

- Difficulty in sucking, swallowing and chewing
- Drooling, pushing food out of the mouth with tongue, gagging and vomiting
- Not tolerating a cup or spoon near the mouth, refusing to drink from a cup, refusing lumpy food, and inappropriate meal time behaviour
- Inappropriate feeding position

3. FEEDING INTERVENTION

Feeding intervention should be in accordance to the children's health status and their condition. The intervention can be one or more of the following:

- Use of modified / special utensils and equipment
- Modifying the food texture
- Proper positioning
- Right feeding skills

Food textures may need to be modified to reduce the child's feeding problems (sucking, swallowing or chewing). Types of feeding problems may differ across age group because of varied feeding methods and expected skills. All concerns regarding feeding by the parents and caregiver should be taken into consideration during feeding intervention.

4. FEEDING INTERVENTION ACCORDING THE CHILD'S CONDITIONS

No.	Conditions	Explanation	Intervention.
1.	**Weak sucking** Ineffective latch-on during breastfeeding.	• He/ she gets tired easily while feeding, and takes longer time to finish the food.	• A good sucking pattern is an important step towards good speech patterns when they are older. • All mothers are encouraged to breastfeed their babies from birth to 6 months exclusively.

No.	Conditions	Explanation	Intervention.
	Suckling An early oral intake pattern seen in infants whose lower jaw and tongue elevate as a unit and thereby place pressure on the nipple to obtain liquid nourishment. Source: Medical Dictionary for Health Profession and Nursing (2012)	• Nipple can be removed easily from his/her mouth. • He/ she has irregular sucking patterns.	• Advise mother on proper feeding skill. • Make sure that the child is dry, warm and has rest before feeding. • If necessary, support the jaw, to ensure that the lips stay closed around the nipple. • Cuddle the child and talk to him/ her during feedings. • Bottle feeding is not encouraged for baby who able to suck properly. However, if the child needs bottle feeding: - Try different sizes and shapes of the nipple, and use softer nipple. - **DO NOT** try to make a larger hole in a nipple. This will fasten the milk flow and can cause choking. - Cup feeding should be introduced as early as possible (when the child has developed good sealed lips).

No.	Conditions	Explanation	Intervention
2.	**Choking** Inability to breathe because the trachea is blocked, constricted or swollen shut.	• When a piece of food or other object gets stuck in the upper airway.	• Cut food into small pieces or modify food texture according to the child's feeding ability. • Have the child chew his or her food thoroughly, keeping the head in the forward position and making sure they swallow the first bite before taking the next. • Do not let the child eat or suck on anything like candy while lying down or playing. Have the child sitting on a high chair or a table while they eat. • Always have a drink available while eating – but avoid swallowing food and liquid at the same time. • Example of foods that should be avoided or supervised closely as they are known to cause choking are: - Popcorn - Chunks of cheese and meat - Chips – potato, corn, tortilla - Bread - Candy (any size and consistency) - Nuts - Grapes

No.	Conditions	Explanation	Intervention.
3.	**Difficulty in swallowing** Dysphagia means the patient has difficulties swallowing; it is usually caused by nerve or muscle problems. Dysphagia may occur after a stroke, throat and mouth cancer, gastroesophageal reflux disease (GERD), or as a symptom of several different neurological disorders.	• The child has swallowing difficulty when he/ she is given multi-textured foods. • If the child persists with this problem, refer him/ her to Speech Therapist to identify the phases of swallowing difficulty.	• Cut food into small pieces. • Serve soft diet. • Make sure the consistency of the food texture. • Use proper feeding positioning.
4.	**Difficulty in chewing** Pain in the mouth, stiffness or discomfort in the jaw muscles, or problems with your teeth can make it tough to chew solid foods	• The child has a problem with his/ her teeth/ oral motor coordination.	• Use the right food texture such as soft diet, chopped, mashed or pureed. • Examples of suitable foods: - Chicken chopped with noodles. - Green pea – cooked, chopped without skin - Scrambled eggs - Mashed steamed fish - Mashed papaya/ banana - Mashed potatoes - Spinach – cooked

No.	Conditions	Explanation	Intervention
5.	**Regurgitation** The backward flow of food through oesophagus from stomach. *Source: Meriam-Webster Online Dictionary (2017)*	• Common problem among children with physical or mental delay. • Due to inappropriate opening of the lower oesophageal sphincter which release gastric content into the oesophagus. • Serious regurgitation can cause electrolyte disturbances or malnutrition, and require medical attention. • The child may be getting too much food or may need a little more attention.	• Serve food in small amount. • Serve pureed food. • Avoid hard textured food. • Serve moist food. • Use blended/ fine cereal, mashed sweet potatoes or milk powder to thickened feedings. • If excessive regurgitation occurs, refer the child to a medical doctor for further management. • Ensure the child is in sitting position at 30° for 20 – 30 minutes after meals.
6.	**Drooling** Salivary incontinence or the involuntary spillage of saliva over the lower lip	• The child is unable to close the mouth and swallow saliva.	• Serve normal diet, soft diet, mashed food or pureed food according to the child's condition. • The child needs to be taught consistently on how to seal the lip (oral motor stimulation-lip exercise to strengthen the lip).

No.	Conditions	Explanation	Intervention.
7.	**Gagging** Reflex contraction of the muscles of the throat caused especially by stimulation (as by touch) of the pharynx *Source: Meriam-Webster Online Dictionary (2016)*	• The gag reflex is stimulated by touching the back side of the tongue. • This condition will inhibit proper food intake and will cause food refusal. • Gagging will lead to choking problem when chewing begins. • Offering the wrong texture may also cause gagging.	• Begin feeding the child with pureed diet, then progress to soft foods, then lumpy or solid food, according to the child's tolerance and ability. • Cook foods until it is soft enough to be pierced with fork. • Cut foods into small pieces or thin slices. • Cut round foods like cooked carrots into short, thin strips rather than round pieces. • Remove all bones from poultry, fish and meat. • Remove skins, pits and seeds from fruits. • Ensure proper feeding technique and positioning. • Place the spoon at the tip of the tongue and encourage the child to take the food with lips.
		• Hypersensitive in mouth area, especially to new food textures, tastes or temperatures.	• Avoid solid foods and start desensitization programme (refer Appendix M).
		• A form of tantrum, attention seeking behaviour or to show a dislike of any of the food that's being served.	• Be patient and ensure proper feeding technique and positioning.

No.	Conditions	Explanation	Intervention.
8.	**Grasping** An involuntary flexion of the fingers to tactile or tendon stimulation on the palm of the hand, producing an uncontrollable grasp; usually associated with frontal lobe lesions. *Source: Meriam-Webster Online Dictionary (2016)*	• Delayed psychomotor development. • The child is not able to hold food or utensils properly.	• Serve dry finger food such biscuits or carrot stick. • With encouragement and training the child by Occupational Therapist, it will help to improve the eye-hand coordination and sensory input.
9.	**Vomiting** The forceful expulsion of the contents of the stomach via the mouth or sometimes the nose, also known of as emesis *Source: Meriam-Webster Online Dictionary (2016)*	• The expulsion of food from the stomach. • May be caused by overfeeding, improper feeding, flu or viral infection.	• Avoid solid food for 8 hours. • Give sips of sweet drink (glucose drink/ fruit juices) for the first hour in small amount. • If tolerated, double the amount of sweet drinks or other fluid in every subsequent hour. • Avoid food/ drink that may cause vomiting. • If vomiting continues for more than 24 hours, refer the child to a medical doctor for further management.

No.	Conditions	Explanation	Intervention
10.	**Choosy/ Picky eater** Classified as part of a spectrum of feeding difficulties. It is characterized by an unwillingness to eat familiar foods or to try new foods, as well as strong food preferences. *Source: http://www.ncbi.nlm.nih.gov*	• The child may want to show personal identity. • May be caused by improper introduction of complementary feeding and improper role model from parents or caregivers.	• Introduce new food gradually, be consistent and persistent. Keep on trying at least 10 times per food. • Try different style of food preparation. Use food with different colours. E.g. stir fried spinach and carrot. • Serve dish with a mix of food that the child likes and dislikes.
11.	**Blind feeding**	• Children who are blind, visually impaired and deaf-blind may have issues related to texture, willingness to try a variety of foods and willingness to eat. • If not resolved, these problems can impact nutritional habits into adulthood, requiring feeding clinics or other interventions.	• Parents/ care givers should hold the child's hands to help them in recognising the food items according to the clockwise position which are 12, 3, 6 and 9 o'clock. • For example, at 12 o'clock position are protein sources like fish or chicken, 3 o'clock position are vegetables and 6 o'clock positions are carbohydrates like rice or bread. • For most young children with visual impairment, having a consistent mealtime routine helps in building their confidence and independence.

Table 4.1: Sample menu for picky eaters aged 7 to 9 years (1800 kcal)

Menu	Serving Size	Weight (g)	Calorie (kcal)
Breakfast			
French toast (served with maple syrup, honey or cream cheese)	1 slice	50 g	150 kcal
Full cream milk	1 glass	250 ml	160 kcal
			310 kcal
Morning Tea			
Chicken dumpling	1 piece	60 g	150 kcal
Mix fruit juice	1 glass	250 ml	80 kcal
			230 kcal
Lunch			
Cheesy baked potato	1 whole (medium-sized)	90 g	230 kcal
Fried chicken	1 piece	90 g	160 kcal
Mixed vegetable soup	1 bowl	50 g	50 kcal
Plain water	1 glass	250 ml	0 kcal
			440 kcal
Afternoon Tea			
Fruit skewers	2 skewers	100 g	190 kcal
Plain water	1 glass	250 ml	0 kcal
			190 kcal
Dinner			
Spaghetti bolognese	1 plate	400 g	400 kcal
Guava	½ whole	150 g	70 kcal
Plain water	1 glass	250 ml	0 kcal
			470 kcal
Supper			
Fruit flavored yoghurt	1 small cup	110 g	70 kcal
Chocolate flavored milk	1 glass	250 ml	130 kcal
			200 kcal
		Total Calories/ Day	**1840**

5. COMMON NUTRITIONAL PROBLEMS AND INTERVENTIONS FOR CHILDREN WITH SPECIAL NEEDS

No	Problem	Definition	Further information	Suggested Intervention
1	**Overweight and obesity** *It is common among children with:* • *Down Syndrome* • *Prader – Willi Syndrome* • *Spina bifida*	Obesity is defined as an excessive deposition of fat in the body. The indicators used to assess overweight and obesity are based on The WHO Child Growth Standards (2006 and 2007): **Overweight** **< 5years old:** •BMI- for-age > + 2SD - ≤ + 3SD *Reference: WHO (2006)* **5-19 years old:** •BMI- for-age > + 1SD - ≤ + 2SD *Reference: WHO (2007)*	• Overweight and obesity are usually caused by lack of physical activity and the decreased rate of growth in height amongst CWSN. • A CWSN may be able to eat like a normal child but has limited ability to do physical activity; therefore, he/ she is prone to be overweight. • The parents and caregivers may be overfeeding the child as a sign of love. They may feel sorry for the child or may want to make the child happy. • The child with Down Syndrome and mental retardation may be lacking of satiety sensation that leads to overeating.	a. Weight management for CWSN who are overweight includes dietary modifications, behavioural management and increased physical activities. b. Generally diet restriction is not advised for overweight children for fear depriving them from other essential nutrients. The mainstay of the treatment is to increase physical activity. c. For obese children, calorie reduction must be considered together with increased physical activity. Refer to nutritionist/ dietitian. d. Give advice to parents or caregivers on healthy eating and tell them to serve the amount of food in accordance to the children's needs. e. Encourage them to increase physical activity depending on their capability.

No	Problem	Definition	Further information	Suggested Intervention
		Obesity **< 5years old:** •BMI-for-age >+ 3SD *Reference: WHO (2006)* **5-19 years old:** •BMI-for-age >+ 2SD *Reference: WHO (2007)*		f. Modify the food preparation: - Use low calorie cooking methods such as steaming, braising, roasting or grilling. - Remove all visible fat from meats and skin from poultry. - Use low calorie liquids such as plain water or fruit juices without additional sugar as part of their main meals or snacks. - Limit usage of oil, sugar, mayonnaise, salad dressing, lard, syrup, butter & spreads and toppings. - Use fresh fruits and vegetables to add volume and make it crunchier. - Offer nutritious snacks such as fresh fruits, low fat/ sugar yoghurt, high fibre biscuits and bun. g. CWSN who are obese require special attention and need to be referred to a Medical Doctor for further management.

No	Problem	Definition	Further information	Suggested Intervention
				h. Growth monitoring of the child should be done at every scheduled visit. i. Arrange consistent physical activity for the child according to his/ her ability and health condition. j. Avoid using food as a reward for behaviour modification.
2	**Underweight and failure to thrive (FTT)** *It is common among children with:* • *Cerebral Palsy* • *Feeding problems*	In children below five (5) years old, BMI-for-age, less than -2SD and below is considered wasting based on growth chart from WHO, 2006. In children above 5 to 19 years old, BMI-for-age less than -2SD and below is considered thinness based on the growth chart from WHO, 2007.	• Less than normal in body weight. • Some CWSN may be underweight even with an apparently adequate food intake. Vomiting, diarrhoea and mal-absorption can contribute to weight loss. • FTT is a medical term frequently used to describe children, generally up to age of three (3) years, who demonstrate a downward deviation in growth when compared to the growth standard.	a. Nutrient dense food should be given to the child rather than less nutrient dense food, especially if the child has appetite problem. b. Recommendations listed below can be used to boost calories without increasing the amount of food served to the child: • Encourage small & frequent meals to increase food consumption. • Use a combination of foods rather than a single food such as: - Scramble eggs with cheese.

No	Problem	Definition	Further information	Suggested Intervention
		Underweight **< 5 years old**: • Underweight: Weight-for-age > -3 SD - ≤ -2SD • Wasting: BMI-for-age >-3SD - ≤ -2SD *Reference: WHO (2006)* **5-19 years old**: • Wasting: BMI-for-age ≥-3 SD - <-2 SD *Reference: WHO (2007)*	• FTT is a term generally used to describe a baby or child whose current weight or rate of weight gain is significantly below than expected of similar children of the same gender, age and ethnicity: a) Weight-for-age below -3 SD b) The growth curve will eventually cross the two (2) major lines over a period of 3-6 months. *Adapt: Bergman and Graham (2005)*	- Bread or cracker with margarine or peanut butter spread. - Add eggs, spreads or salads to sandwich. - Add soft or mashed fruit to shakes, yoghurt or pudding. • Choose nutritious beverages such as milk shake, hot chocolate, soy bean milk or fruit juices rather than flavoured cordial or carbonated drinks or coffee/ tea. • Substitute sugar with fruit juice or milk when making jelly. Mix plain or flavoured yogurt with fruits, or use in beverages such as blended shake. • Include high fat foods such as margarine, mayonnaise and cream cheese to provide concentrated amounts of calories. All of these may be used as spreads on breads or mix in rice to increase calories. E.g. Rice mix with margarine, fried rice and porridge with added oil.

No	Problem	Definition	Further information	Suggested Intervention
		<u>Severe underweight</u> **< 5 years old**: •Severe underweight: Weight-for-age ≤-3 SD •Severe wasting: BMI-for-age ≤-3 SD (Reference: WHO, 2006) **5-19 years old**: •Severe wasting: BMI-for-age <-3 SD *Reference: WHO (2007)*		• Add powdered milk to milk, milk shake, puddings, custards, cream soups, mashed potatoes, scrambled eggs or cooked cereal. • Provide nutritious and calorie dense snacks; however snacks should be spaced appropriately to prevent decreased food intake during main meals; such as ice cream and yoghurt, custard and milk, fruity milk shake, *cucur* oat with margarine, *cekodok ikan bilis*, *pengat pisang*, sardine roll, serve cheese with crackers toast salads and cheese c. Use high calorie and high protein foods to provide nutritious sources for weight gain. d. Growth monitoring for the child should be done at every scheduled visit. e. Once the child achieved the expected weight, healthy eating practice should be implemented gradually.

No	Problem	Definition	Further information	Suggested Intervention
3	**Constipation** *It is common among children with:* • *Cerebral Palsy* • *Down Syndrome* • *Spina Bifida*	Constipation is defined as the incomplete or infrequent emptying of the lower part of the bowel which leads to stool accumulation. The presence of hard, dry faecal material, even if passed frequently, may also be considered constipation. Stool frequency of less than three times per week would be a diagnostic of constipation in any age group.	• There are many factors which may cause constipation and these include: - Lack of dietary fibre intake - Lack of fluid intake - Limited or non-existent physical activity - Side effects of medications - Irregular bowel patterns or toileting habits - Stress • The child who has constipation is often uncomfortable and refuses to eat.	a. Constipation in CWSN can be prevented by increasing the intake of fibre and fluid gradually. b. Increase the fibre content of meals: - Serve whole grain breads - Serve bran cereals for breakfast - Serve fresh fruits and vegetables; dried fruits, nuts and seeds (sesame, sunflower, and pumpkin). - Sprinkle oat or cereals on variety of dishes. - Prunes or prune juice may help to urge to defecate. c. Increase the fluid sources: - Provide water, juices and milk during meals. - Serve foods with high fluid content (e.g. soup, fruits, yoghurt, jelly and pudding) - Encourage the child to drink fluids between meals. - Provide beverage with fibre such as adding cereal to milk

No	Problem	Definition	Further information	Suggested Intervention
				d. Encourage healthy daily habit: - Feed the child at regular mealtimes. - Establish a regular sleeping schedule. - Allow ample time for a bowel movement. - Encourage participation in daily physical activity to increase intestinal motility. - Provide support and conducive environment to reduce stress.
4	**Diarrhoea**	An increased frequency of bowel movements and the stool are less formed and more watery than normal.	• May be caused by intolerance, allergy, overfeeding certain medicine or laxatives, improper feeding, flu or viral infection.	a. Encourage breastfeeding b. Continue feeding with small volumes but more frequently. c. Use Oral Rehydration Salts (ORS) based on the advice by Medical Doctor. d. High carbohydrate drinks such as cendol, cordials, syrup and carbonated drink are discourage. e. Avoid food/ drink that may cause diarrhoea f. If diarrhoea continues for more than 24 hours, refer the child to a medical doctor for further management.

<table>
<tr><th>No</th><th>Problem</th><th>Definition</th><th>Further information</th><th>Suggested Intervention</th></tr>
<tr><td>5</td><td>Food allergies

It is possible to happen among children with digestive immaturity.</td><td>Food allergy is an adverse reaction to a food that involves immune system. The immune system produces antibodies in response to the consumption of specific components of food, which are called allergens and a physiologic reaction that ensures can be fatal.</td><td>• Symptoms of food allergy include runny nose, bronchitis, vomiting, diarrhoea, rashes, itching, dark circles around the eyes and headaches. The allergic reaction depends on how much and how frequent the food is being eaten.

• Food allergies are also common among CWSN and they are usually much individualised.

• The most common food that can cause allergic among children are milk, wheat, corn, chocolate, eggs, fish and other seafood, nuts (almond, pecans and walnuts) and citrus fruits.

• Health care providers should consider history of food allergies and other nutritional problems among the children when performing health assessment.

• If the allergy is severe and requires exclusion of many foods or a total food group from the diet, a nutritionist or dietitian should be consulted to assure an adequate diet.</td><td>a. Identify food that the child is allergic to, based on the diagnosis of the Medical Doctor.

b. Avoid serving this food and replace it with other food. Use the table below as a guide:

<u>Substitutes for allergenic Foods</u>

<table><tr><th>Eliminated Food</th><th>Replacement Food</th></tr><tr><td>Cow's Milk</td><td>• Hypo-allergenic or synthetic amino acid formula for babies aged 6 months and above
• Soy milk and soy products</td></tr><tr><td>Eggs</td><td>Tofu , fish, chicken, meat</td></tr><tr><td>Seafood (other than fish)</td><td>Fish, chicken, meat, soy products</td></tr><tr><td>Wheat</td><td>Rice and rice products</td></tr></table></td></tr>
</table>

5. COMMON NUTRITIONAL PROBLEMS AND INTERVENTIONS FOR CHILDREN WITH SPECIAL NEEDS

No	Problem	Definition	Further information	Suggested Intervention
1	**Overweight and obesity** *It is common among children with:* • *Down Syndrome* • *Prader – Willi Syndrome* • *Spina bifida*	Obesity is defined as an excessive deposition of fat in the body. The indicators used to assess overweight and obesity are based on The WHO Child Growth Standards (2006 and 2007): **Overweight** **< 5years old:** •BMI- for-age > + 2SD - ≤ + 3SD *Reference: WHO (2006)* **5-19 years old:** •BMI- for-age > + 1SD - ≤ + 2SD *Reference: WHO (2007)*	• Overweight and obesity are usually caused by lack of physical activity and the decreased rate of growth in height amongst CWSN. • A CWSN may be able to eat like a normal child but has limited ability to do physical activity; therefore, he/ she is prone to be overweight. • The parents and caregivers may be overfeeding the child as a sign of love. They may feel sorry for the child or may want to make the child happy. • The child with Down Syndrome and mental retardation may be lacking of satiety sensation that leads to overeating.	a. Weight management for CWSN who are overweight includes dietary modifications, behavioural management and increased physical activities. b. Generally diet restriction is not advised for overweight children for fear depriving them from other essential nutrients. The mainstay of the treatment is to increase physical activity. c. For obese children, calorie reduction must be considered together with increased physical activity. Refer to nutritionist/ dietitian. d. Give advice to parents or caregivers on healthy eating and tell them to serve the amount of food in accordance to the children's needs. e. Encourage them to increase physical activity depending on their capability.

Note:

This chapter contents adapted from:

- Beyer, P. L. 2001. Chapter 17 Complications of Enteral Nutrition. In: Part IV Principles of Nutrition Support. The Science and Practice of Nutrition Support: A Case-Based Core Curriculum. American Society for Parental and Enteral Nutrition.
- Horsley J.W., Allen E. R. & Daniel P.W. 1996. Nutrition Management of Handicapped and Chronically III School Age Children. Virginia Department of Health and the Virginia Department of Education.
- Lynn A. and Yeong B. Y. 2002. Feed Your Child Right. Singapore: Times Editions.
- Medlen. J.E.G. 2002. The Down Syndrome Nutrition Handbook. USA: Woodbine House.
- MOH. 2006. Care of children with Special Needs: Manual on Activity of Daily Living (Self-Help Skills). Family Health Development Division, Ministry of Health Malaysia.
- Schmitt, B. D. 2012. My Child Is Sick. American Academy of Pediatrics Books.
- Slater, D. 2011. Finding Balance: Obesity and Children with Special Needs. Ability Path Organization.
- Wellman, N. S. & Rarback, S. 2001. Nutrition for Children with Special Needs: A Handbook for Parents, Teachers, Caregivers & Food Service Provider. Florida Department of Education





APPENDIX A

DEFINING SPECIAL NEEDS

APPENDIX A

The term 'children with special needs' (CWSN) is a very broad term for children who have extra or special requirements that make it much harder for them to grow, develop or learn than most children of the same age. CWSN may require long-term specialized services, supports and monitoring.
According to the Malaysian 'Persons with Disabilities' (PWD) Act 2008, PWDs including children, are defined as those who have long-term physical mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society.

For the purpose of registration of PWDs, the Department of Social Welfare Malaysia further categorises disabilities or handicaps into 7 categories :

1. Hearing disabled
2. Visually disabled
3. Speech disability
4. Physical disability
5. Learning disability
6. Mental disability
7. Multiple disabilities

http://www.jkm.simple.my/content.php?pagename=pendaftaran_orang_kurang_upaya&lang=en (Last accessed 10th July 2016)

Some examples of disorders and disabilities in CWSN include:

i. Neurological impairments e.g. cerebral palsy, muscular dystrophies, spinal cord disorders

ii. Chronic organ dysfunction e.g. severe congenital heart defects, chronic lung disease

iii. Congenital sensory impairments – deafness, blindness

iv. Neurodevelopmental disorders

- Genetic disorders e.g. Down Syndrome, Prader- Willi Syndrome
- Autism Spectrum Disorder
- Intellectual impairment
- Global Developmental Delay (in children less than 5 years of age)

Depending on each child's specific problems and their severity, there can be many factors that impact on the nutritional status of CWSN. Risk factors for nutritional problems may be related to:

a) Inadequate dietary intake of food or certain nutrients

- Oral motor dysfunction i.e. difficulty to suck, chew or swallow efficiently.

- Physical deformity which may make proper positioning for feeding difficult, or even painful.

- Gastroesophageal reflux which predisposes to choking, aspiration into the lungs and recurrent lung infections.

- Constipation which may cause vomiting, food refusal and abdominal pain.

- Cognitive or behavioral factors:

  - Children with these issues may not be able to request for food and drink, or may not be able to communicate symptoms.

  - Some children with sensory issues may insist on taking only very few types of food/fluids (e.g. only specific texture, smell, color or taste) for prolonged periods

b) Inability of the body to absorb or utilize food

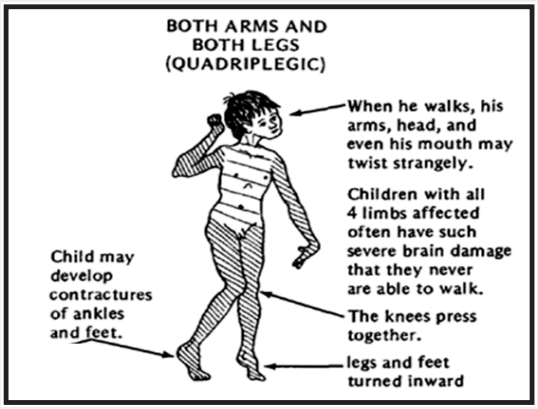
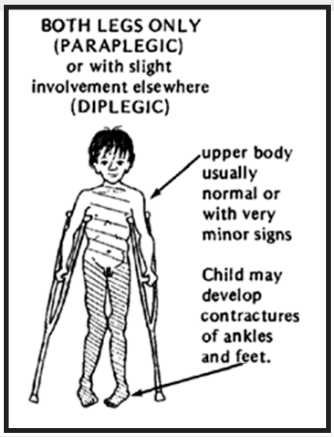
- Certain medical conditions require specific and carefully controlled diets, such as children with diabetes, children on chemotherapy and children with inborn errors of metabolism (IEMs).

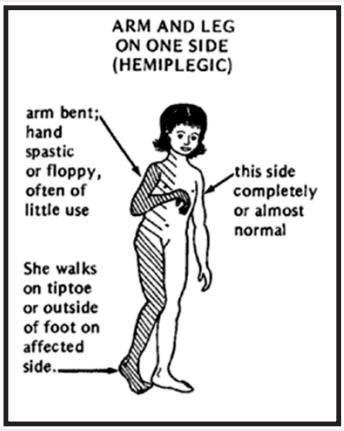
c) Altered energy requirements – For example, high energy demands may exceed the child's ability to take in nutrition.

In some instances, CWSN may also have co-existing conditions ('comorbidities') or they may be on multiple medications. These can make it challenging to meet their nutritional needs. Hence, each child will have very individual needs according to the type and severity of their particular problems. A multidisciplinary team approach to assessment and intervention may be necessary in complex cases.

Example of condition	Description
Down syndrome *A common genetic disorder usually due to an extra copy of chromosome 21.*	Problems frequently encountered include : • Global developmental delay (including delayed gross motor, fine motor, language or self-independent skills) • Varying degrees of intellectual impairment • Problems with sucking, swallowing or chewing which may need specialized feeding support especially in infancy. • Slow weight gain early in life but with risk to obesity later in adolescence and adulthood. • Constipation • May be associated with problems such as vision impairment, cardiac defects or thyroid problems.

Example of condition	Description
Cerebral palsy *An example of a complex neurological impairment that causes significant physical disability*	A group of disorders caused by permanent damage to the brain early in life, resulting in problems with movement, postural control and motor coordination. Although the primary brain insult is not progressive, the symptoms and manifestations of CP often changes as the child grows due to other associated problems. These include : • Intellectual impairment • Gastroesophageal reflux • Limb contractures (muscle shortening) • Bony complications – hip dislocation, scoliosis • Chronic pain • Constipation • Epilepsy • Recurrent lung infections A child with severe form of CP may also have difficulties with sucking, chewing, and swallowing since early life. Some children may need to be provided alternative feeding routes such as with a gastrostomy. All the above factors make children with CP very prone to undernutrition. **Types of Cerebral Palsy** **1. SPASTIC** Spastic Cerebral Palsy is the commonest type (70% to 80% of all CP). It results in muscular stiffness and as such the affected parts of the body are difficult to control.

Example of condition	Description
	i. Spastic Quadriplegia This type affects all four limbs (both arms and both leg) with equal severity.  **ii. Spastic Diplegia** This type affects all four limbs (both arms and both legs) but the legs are more seriously affected compared to the arms. 

Example of condition	Description.
	iii. Spastic Hemiplegia This type affects only one side of the body (one leg and one arm).  **2. DYSKINETIC CP (Dystonic and Choreo-athethoid CP types)** In this form of CP, the affected person's muscle tone may be vary at any one time. In Dystonic CP, muscle tone is most often increased, making limbs stiff and limiting movements. Whereas in Choreoathetoid CP, muscle tone is often reduced and there is prominent involuntary movements of the limbs. **3. ATAXIC CP** Ataxic CP is a rare form of CP. Those with the ataxic type often have problems starting and carrying out purposeful movements such as standing or walking. Such children

Example of condition	Description
	often appear 'clumsy' because they walk with a wide-based, staggering gait.  To keep her balance the child with ataxia walks bent forward with feet wide apart. She takes irregular steps, like a sailor on a rough sea or someone who is drunk. **4. COMBINATION** A child with combined type CP has more than one type of muscle tone abnormality e.g. Spastic/ Dystonic type.
Autism Spectrum Disorders *An example of a neurodevelopmental disorder with significant behavioural and sensory issues*	Autism spectrum disorder (ASD) is a life-long neurodevelopmental problem with onset before 3 years. Children with ASD may possess the following characteristics in various combinations and in varying degrees of severity. • Problems with social interaction and social communication - Lack of eye contact - May prefer to be alone, may not want cuddling

Example of condition	Description
	- May avoid other same-age children or become anxious around other children - Lack the ability or desire to communicate with others, this includes the lack of non-verbal means such as pointing. - Speech and language impairments are often present and can be profound • Repetitive or stereotyped behaviours, speech or play interests - May echo words or phrases repetitively - Unusual play interests that are sustained and repetitive; eg. spinning objects or self, lining up toys in long rows - Lack of imaginative play • Insistence on sameness - May get extremely upset with changes, may engage in odd 'rituals', intense attachment to certain or unusual objects • Sensory issues - Hypersensitive or under-sensitive to sensory stimuli such as sound, touch, lights, taste, smells etc. These sensory issues may result in the child with autism having a very narrow and unbalanced diet. Children with ASD can also experience other medical issues that may further affect their dietary intake such as : • Chronic constipation and abdominal discomfort • Some may be on medication to help manage their behaviour (e.g. self-injurious behaviour). • Sleep disorders

APPENDIX B

GROWTH CHART FOR CHILDREN BIRTH TO 2 YEARS OLD (WHO 2006)

Chart B1(i) : Weight-for-age (Boys)
Chart B1(ii) : Weight-for-age (Girls)
Chart B2(i) : BMI-for-age (Boys)
Chart B2(ii) : BMI-for-age (Girls)
Chart B3(i) : Length-for-age (Boys)
Chart B3(ii) : Length-for-age (Girls)

Chart B1(i): Weight-for-age (Boys)

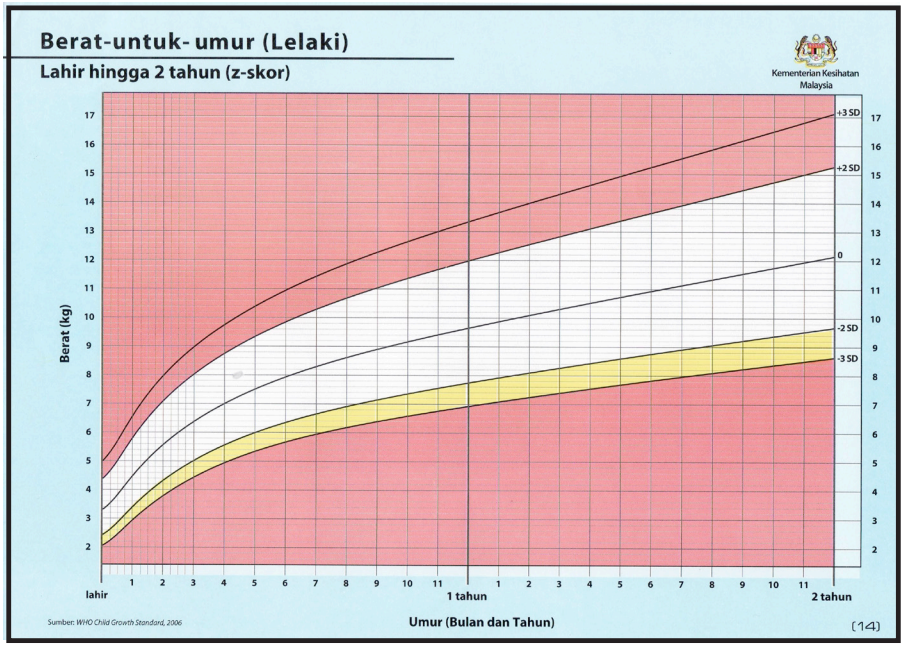


Chart B1(ii): Weight-for-age (Girls)

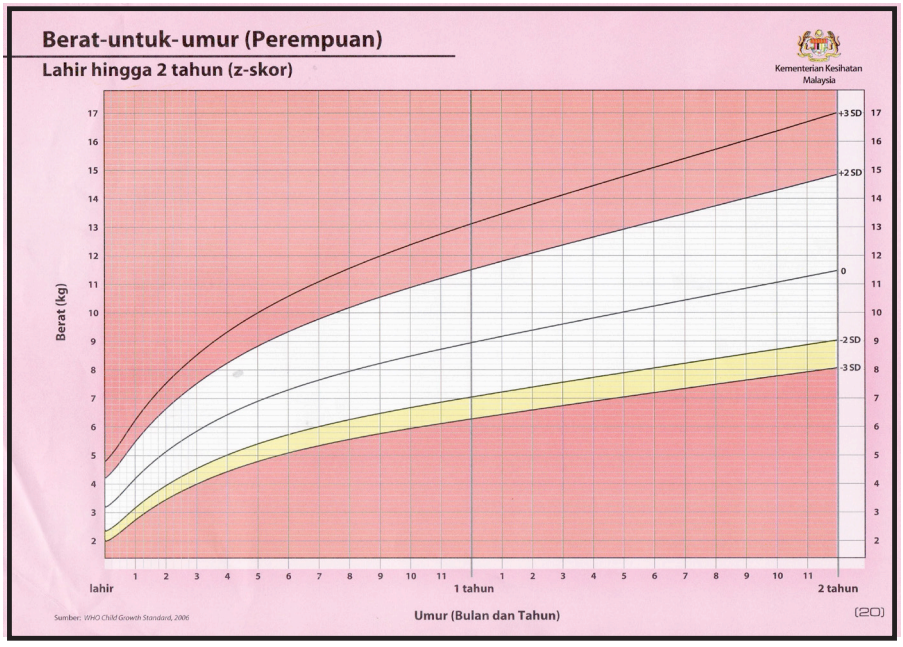


Chart B2(i): BMI-for-age (Boys)

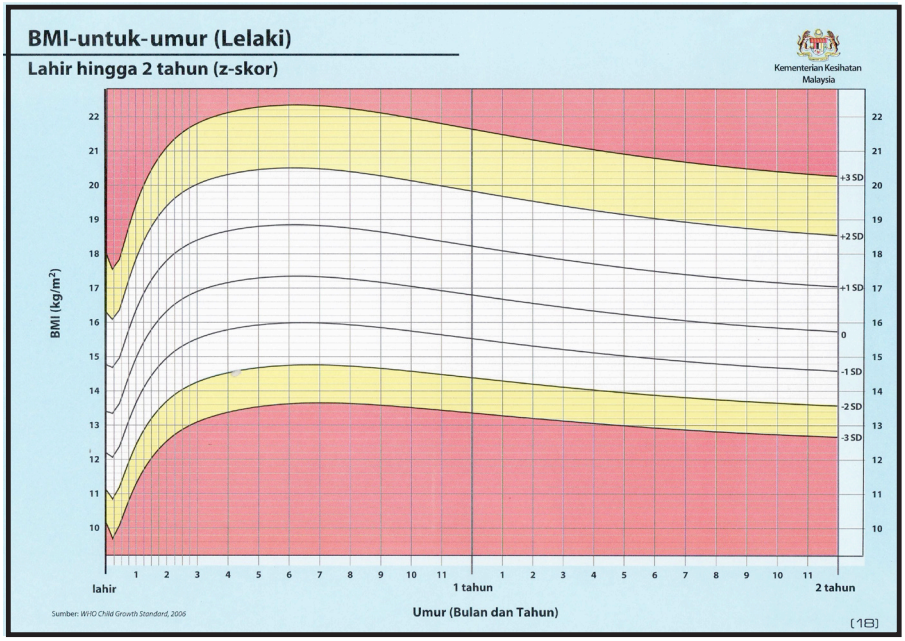


Chart B2(ii): BMI-for-age (Girls)

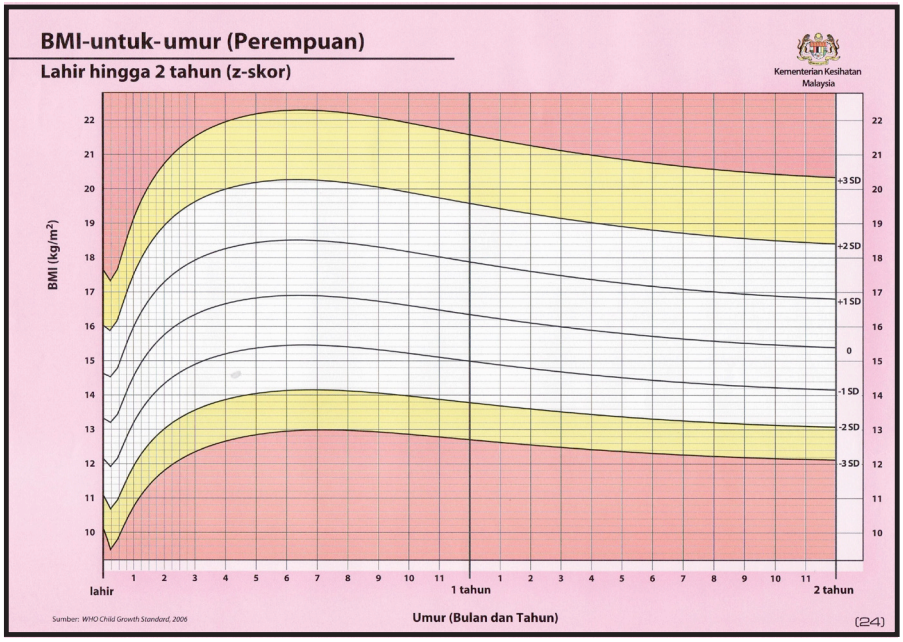


Chart B3(i): Length-for-age (Boys)

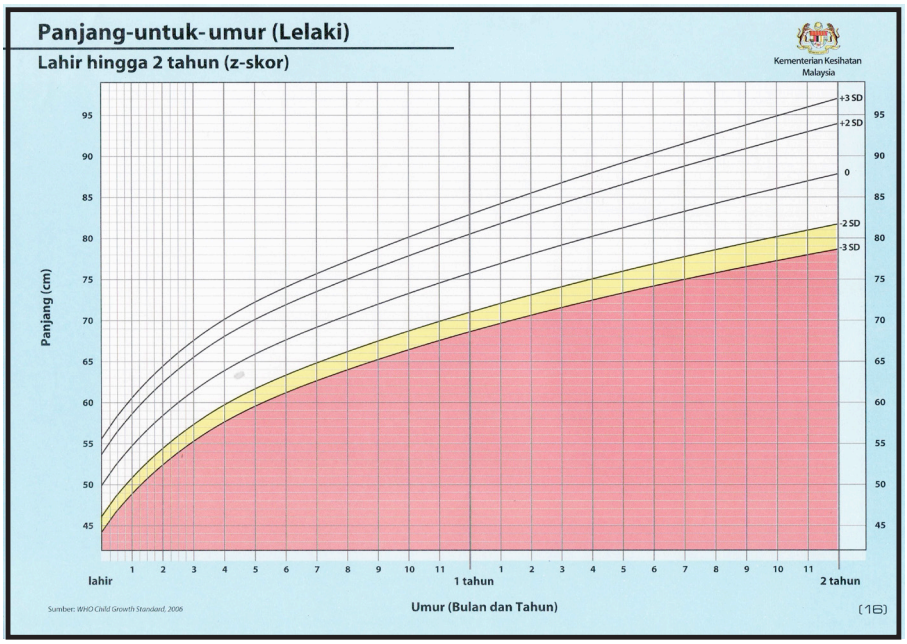
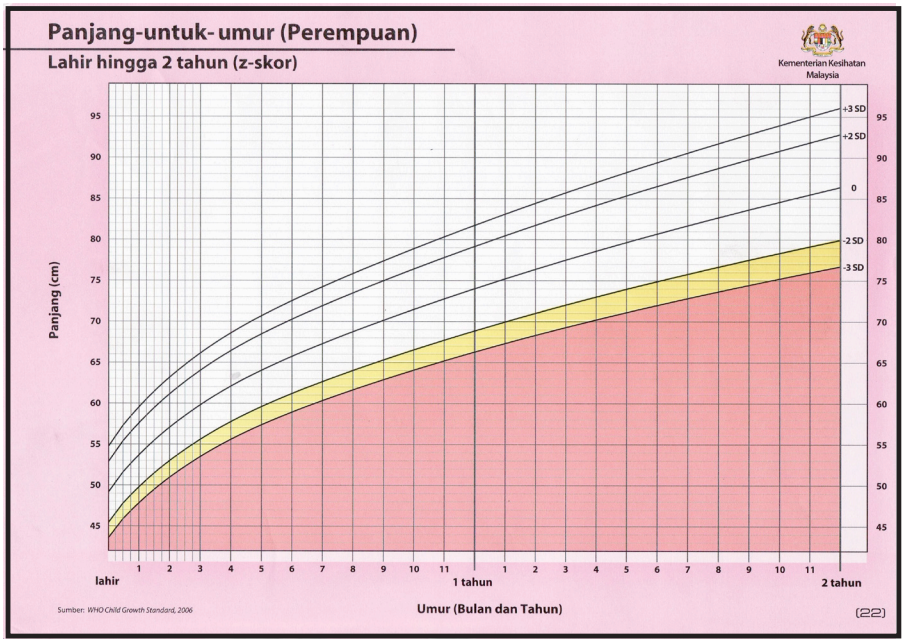


Chart B3(ii): Length-for-age (Girls)



HEAD CIRCUMFERENCE CHART BIRTH TO 36 MONTHS OLD (PERCENTILES) (CDC 2000)

Chart B4(i) : Head Circumference-for-age (Boys)
Chart B4(ii) : Head Circumference-for-age (Girls)

Chart B4 (i): Head Circumference-for-age (Boys)

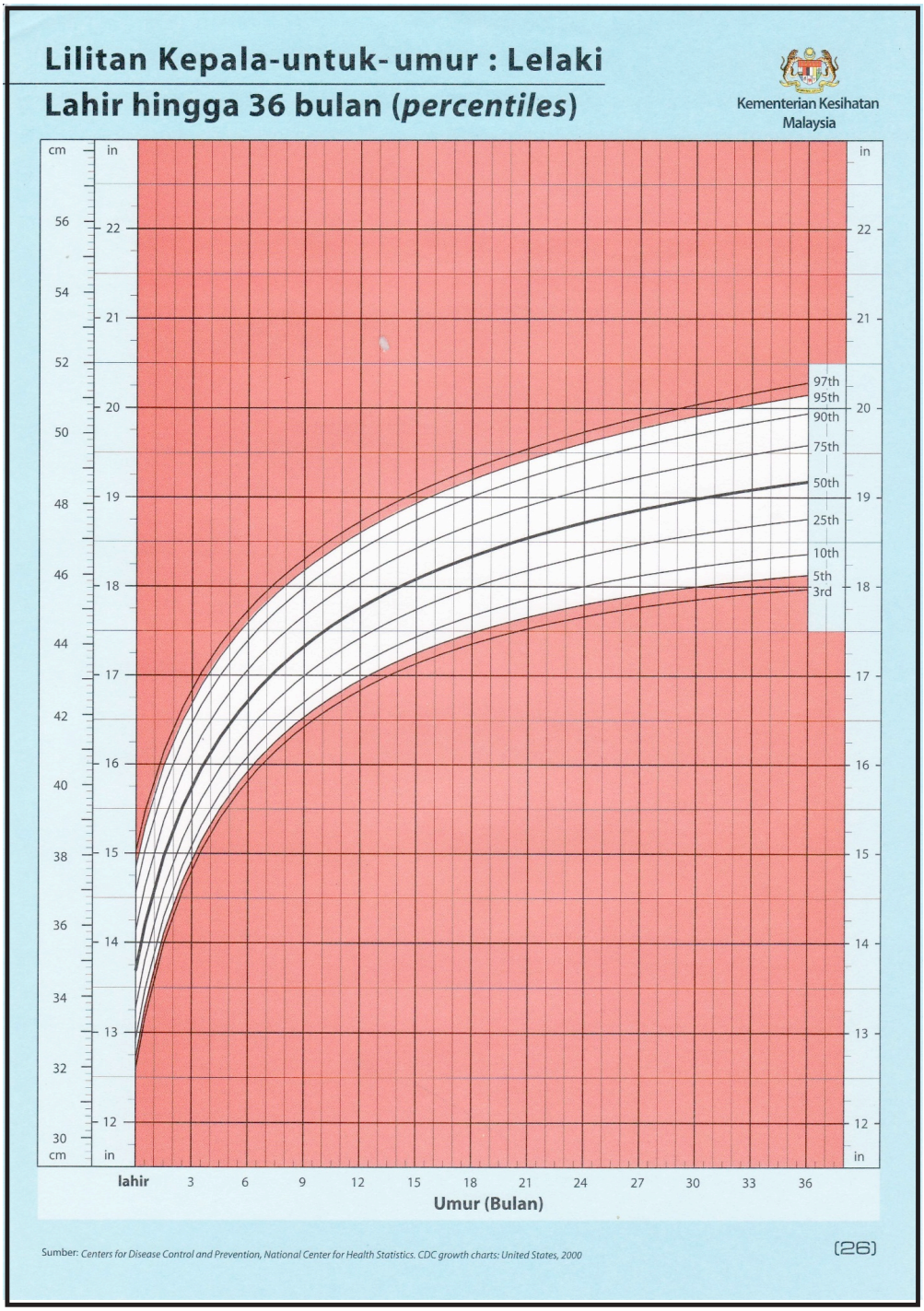
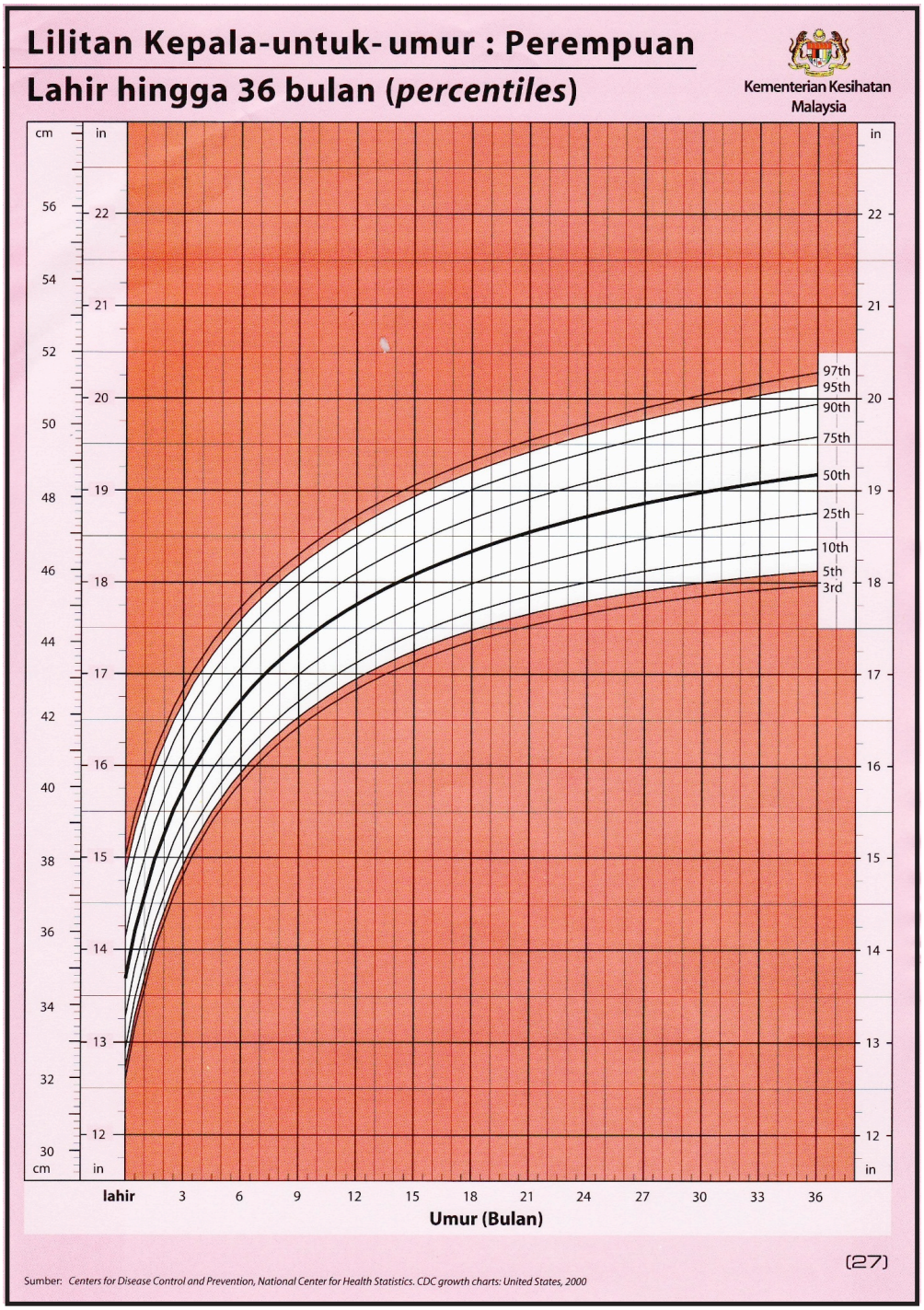


Chart B4 (ii): Head Circumference-for-age (Girls) (Boys)



APPENDIX C

GROWTH CHART FOR CHILDREN 2 TO 5 YEARS OLD (WHO 2006)

Chart C1(i) : Weight-for-age (Boys)
Chart C1(ii) : Weight-for-age (Girls)
Chart C2(i) : BMI-for-age (Boys)
Chart C2(ii) : BMI-for-age (Girls)
Chart C3(i) : Height-for-age (Boys)
Chart C3(ii) : Height-for-age (Girls)

Chart C1(i): Weight-for-age (Boys)

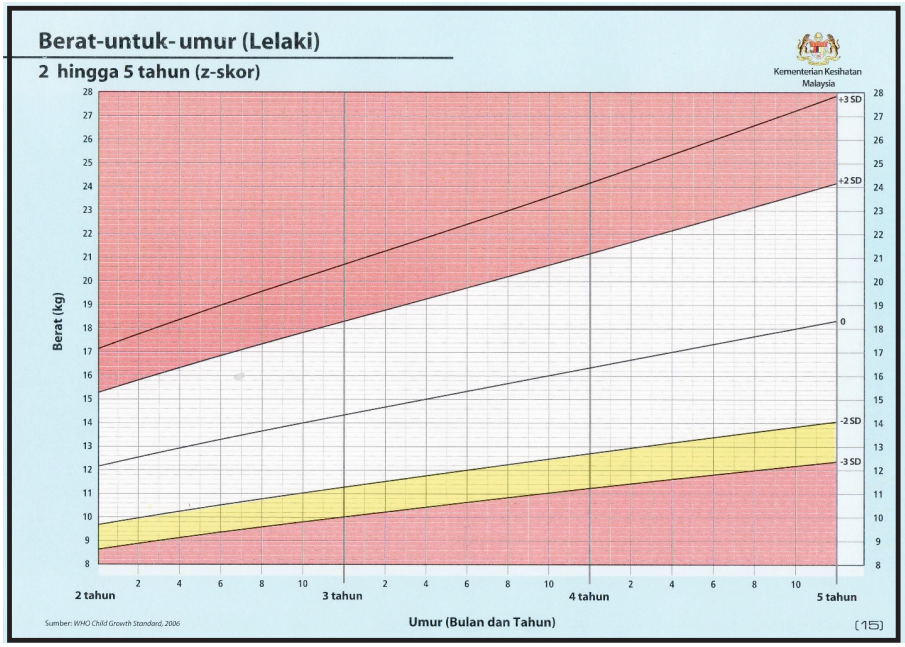


Chart C1(ii): Weight-for-age (Girls)

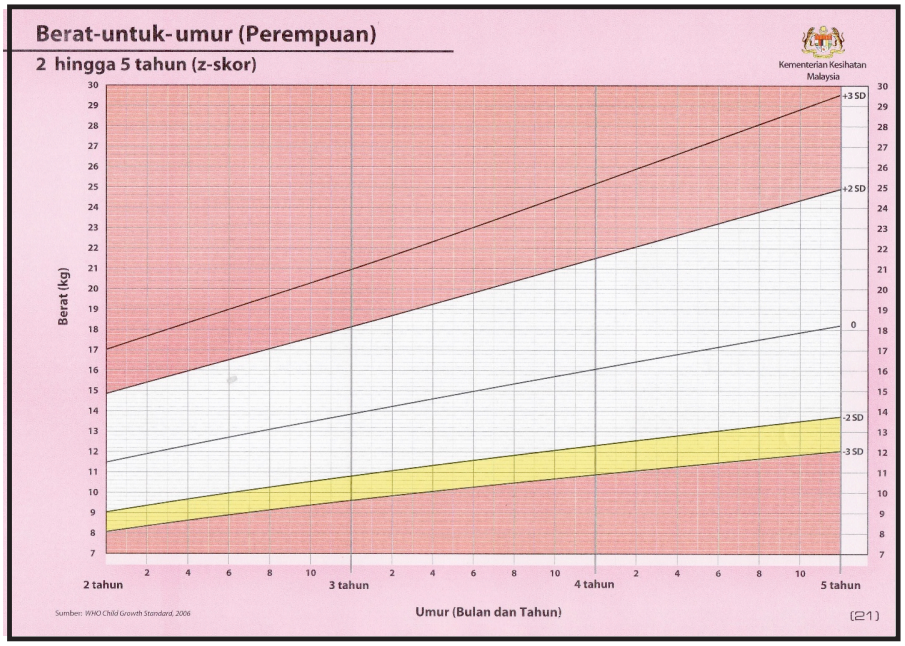


Chart C2(i): BMI-for-age (Boys)

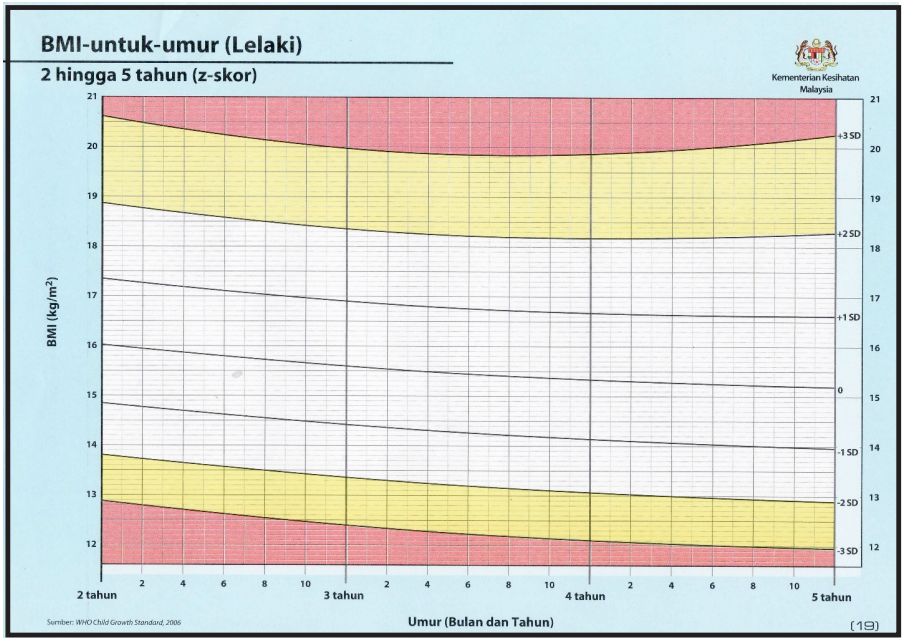


Chart C2(ii): BMI-for-age (Girls)

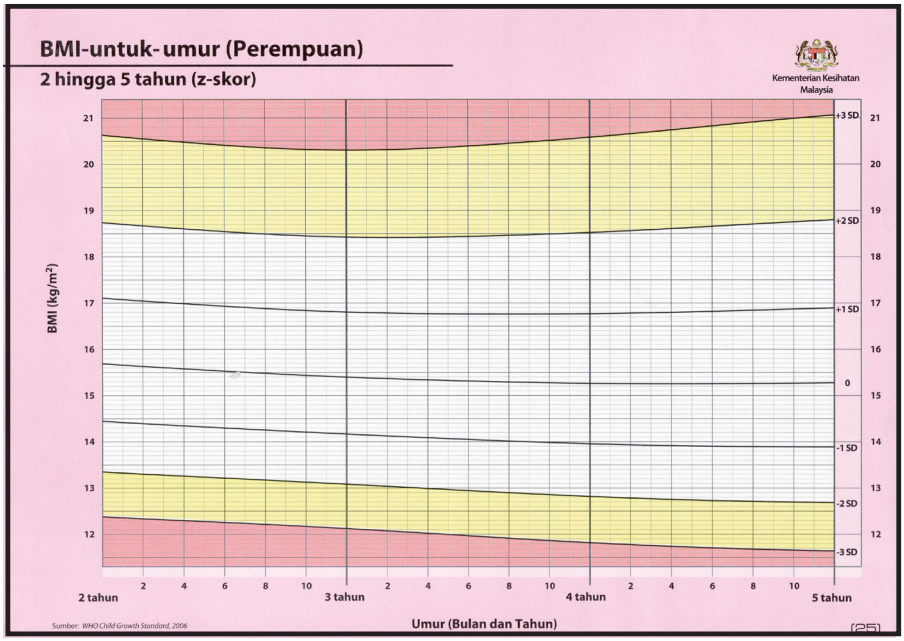


Chart C3(i): Height-for-age (Boys)

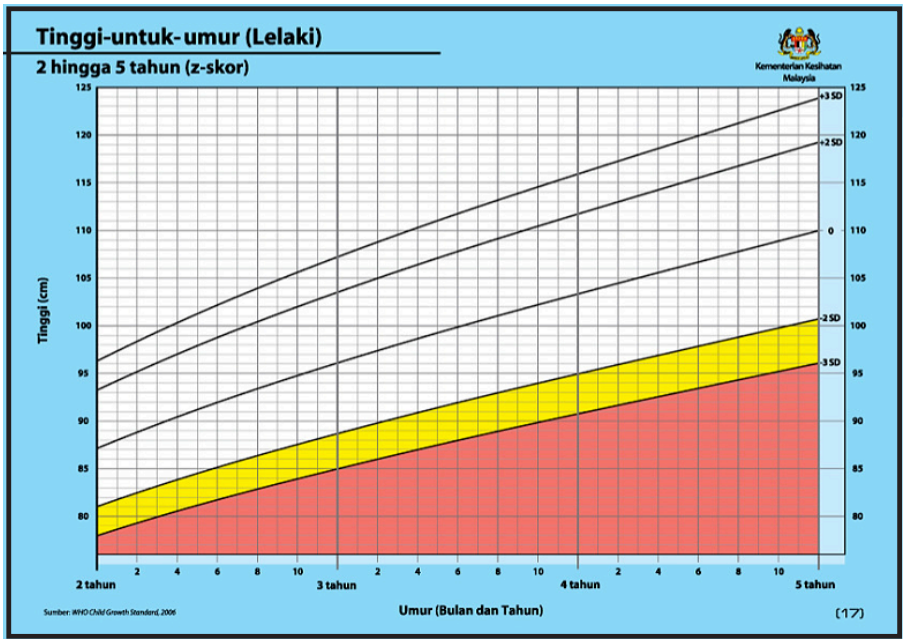
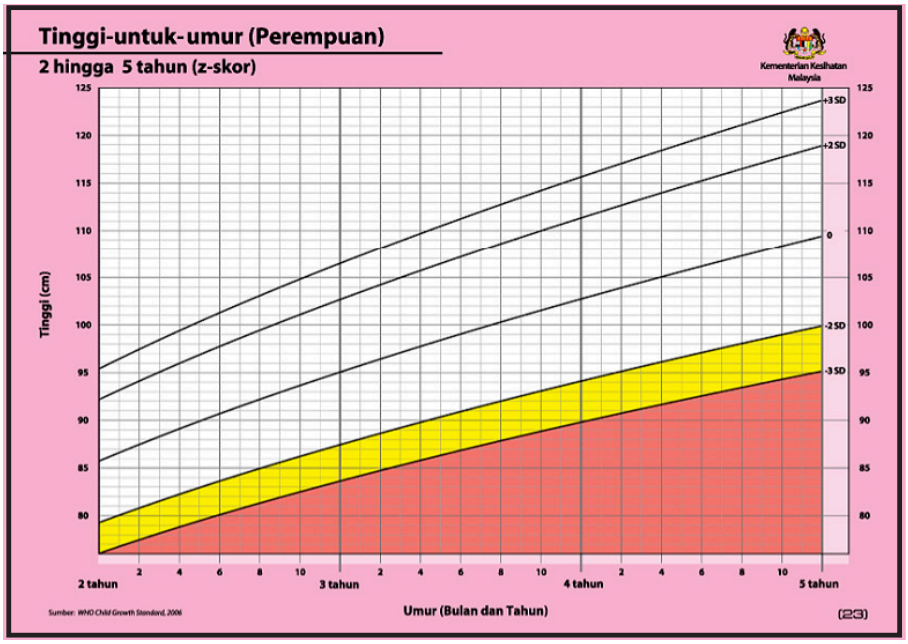


Chart C3(ii): Height-for-age (Girls)







APPENDIX D

GROWTH CHART FOR CHILDREN & ADOLESCENT 5 TO 19 YEARS OLD (WHO 2007)

Chart D1 (i) : Height-for-age (Boys)
Chart D1 (ii) : Height-for-age (Girls)
Chart D2 (i) : BMI-for-age (Boys)
Chart D2 (ii) : BMI-for-age (Girls)

Chart D1 (i): Height-for-age (Boys)

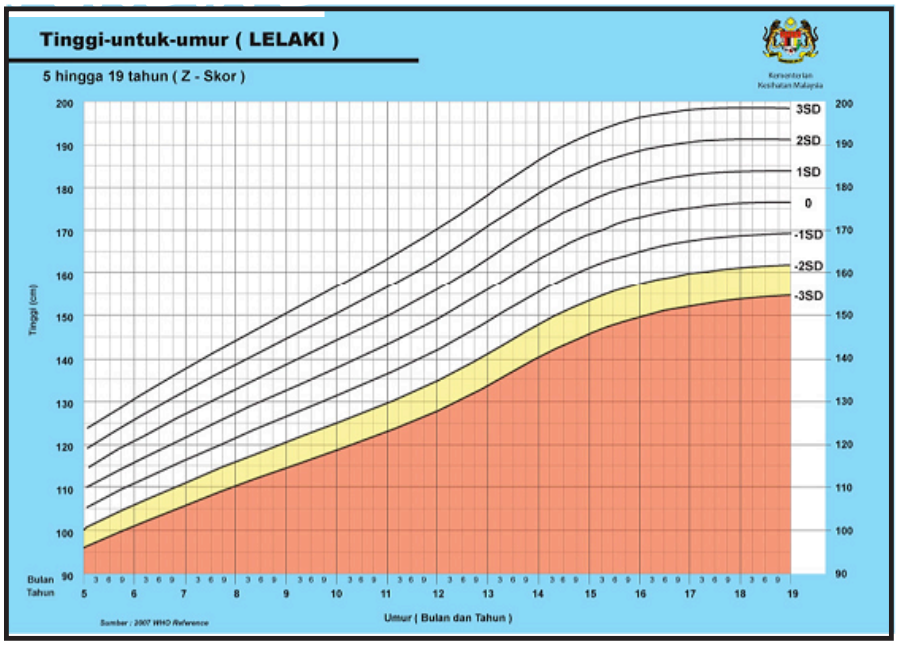


Chart D1 (ii): Height-for-age (Girls)

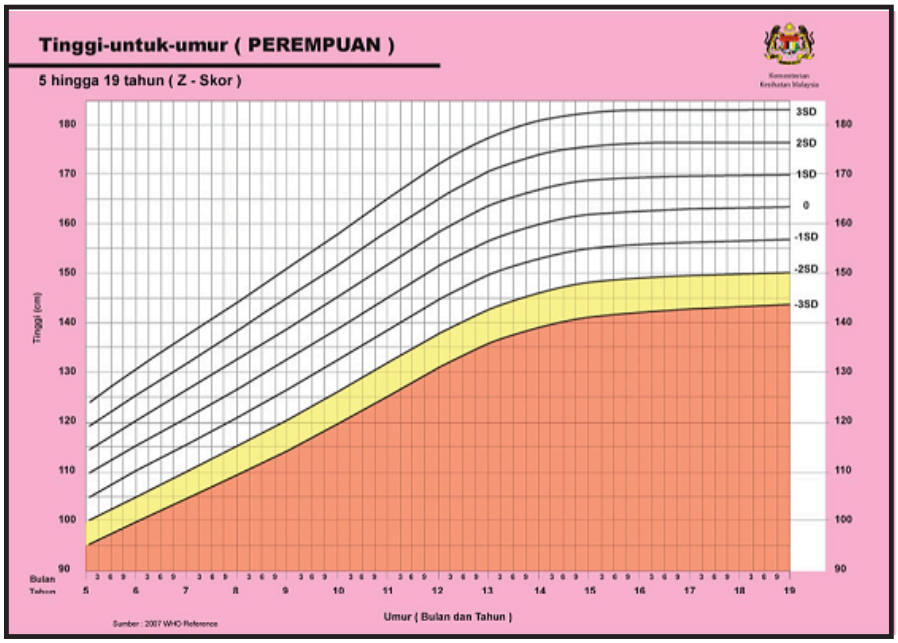


Chart D2 (i): BMI-for-age (Boys)

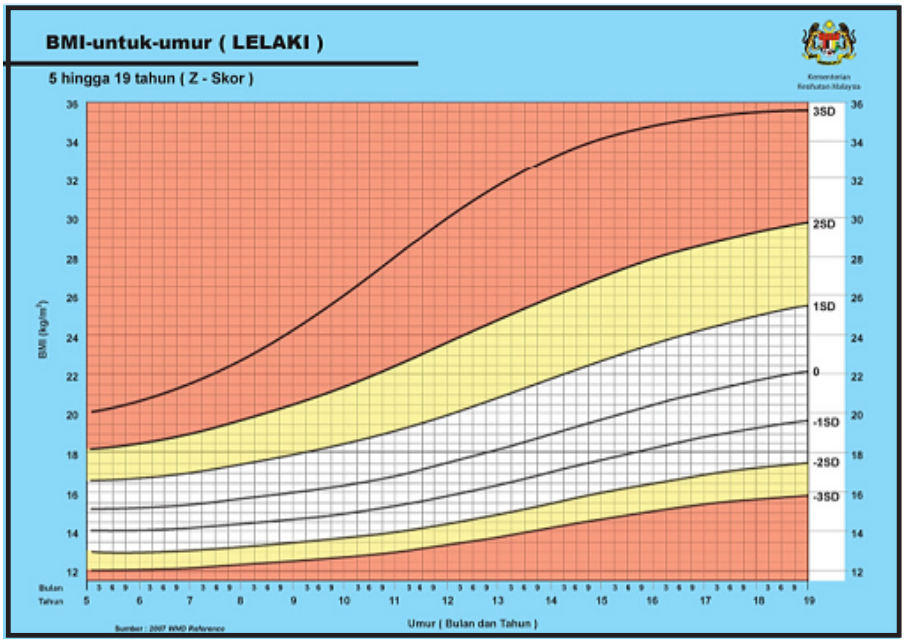
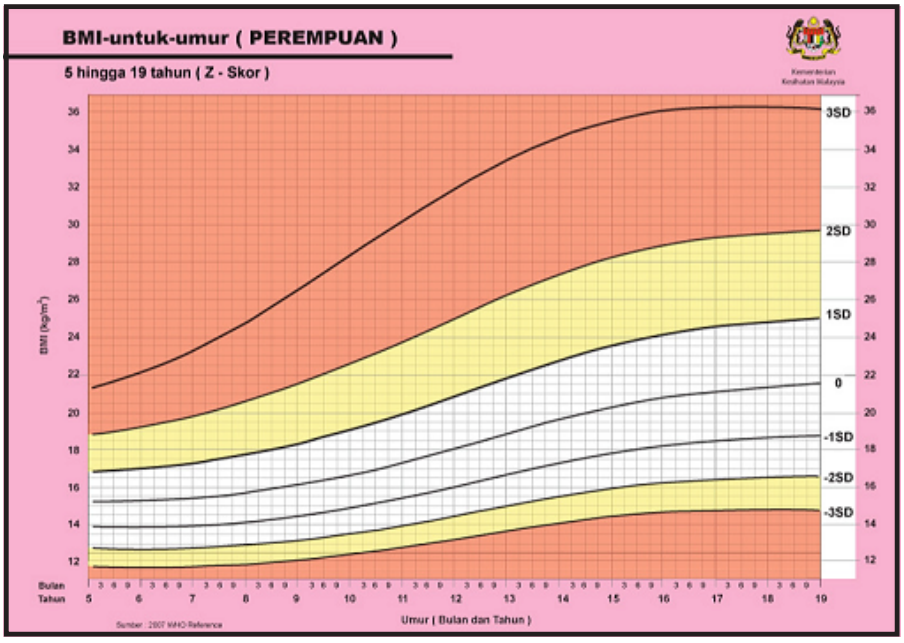


Chart D2 (ii): BMI-for-age (Girls)







APPENDIX E

GROWTH CHART FOR CHILDREN WITH SPECIAL NEEDS (DOWN SYNDROME) ACCORDING TO CDC 2015

BIRTH TO 20 YEARS OLD

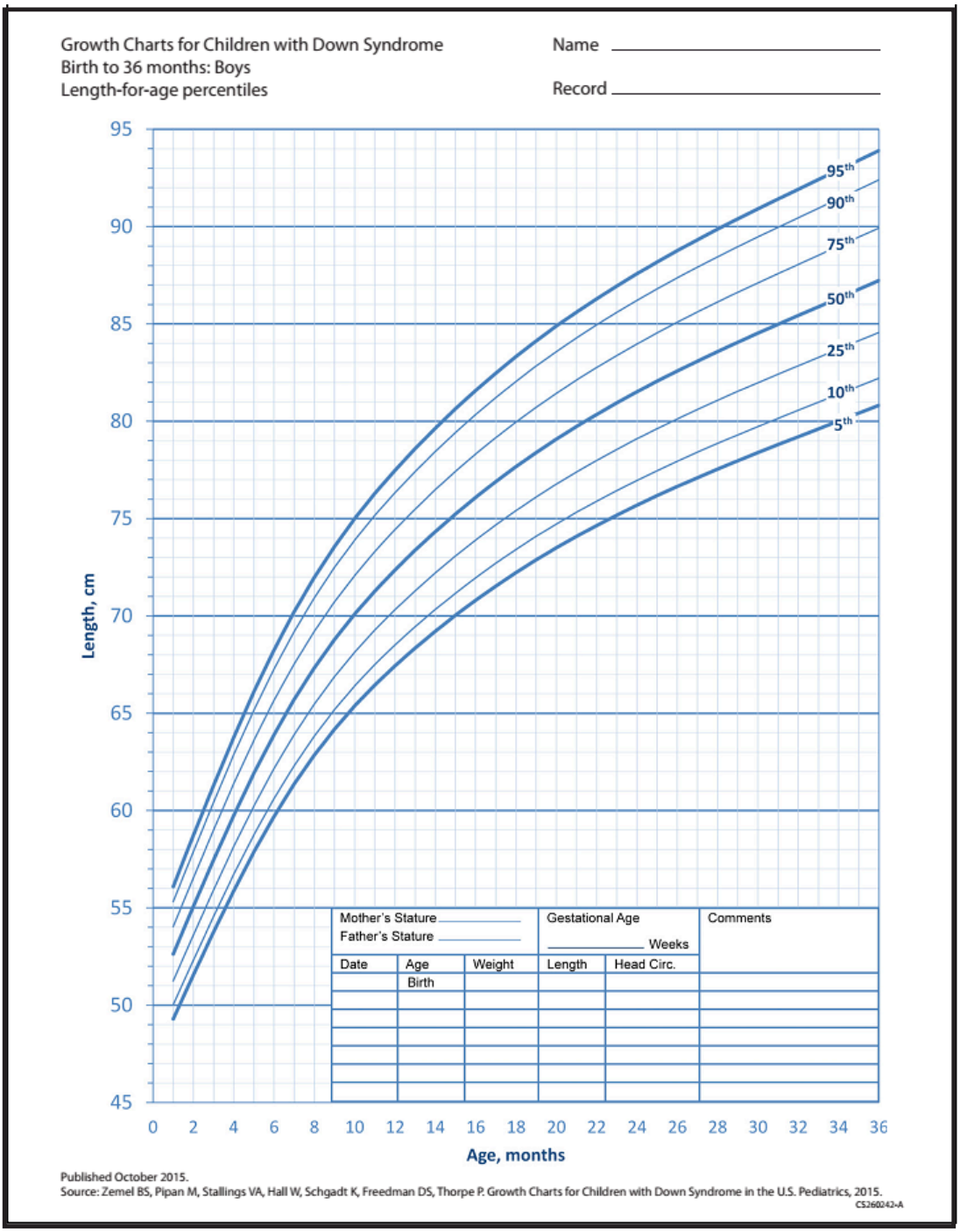
Birth to 36 months old

- Graph E1 (i) : Length/ height-for-age percentiles (Boys)
- Graph E1 (ii) : Length/ height-for-age percentiles (Girls)
- Graph E2 (i) : Weight-for-age percentiles (Boys)
- Graph E2 (ii) : Weight-for-age percentiles (Girls)

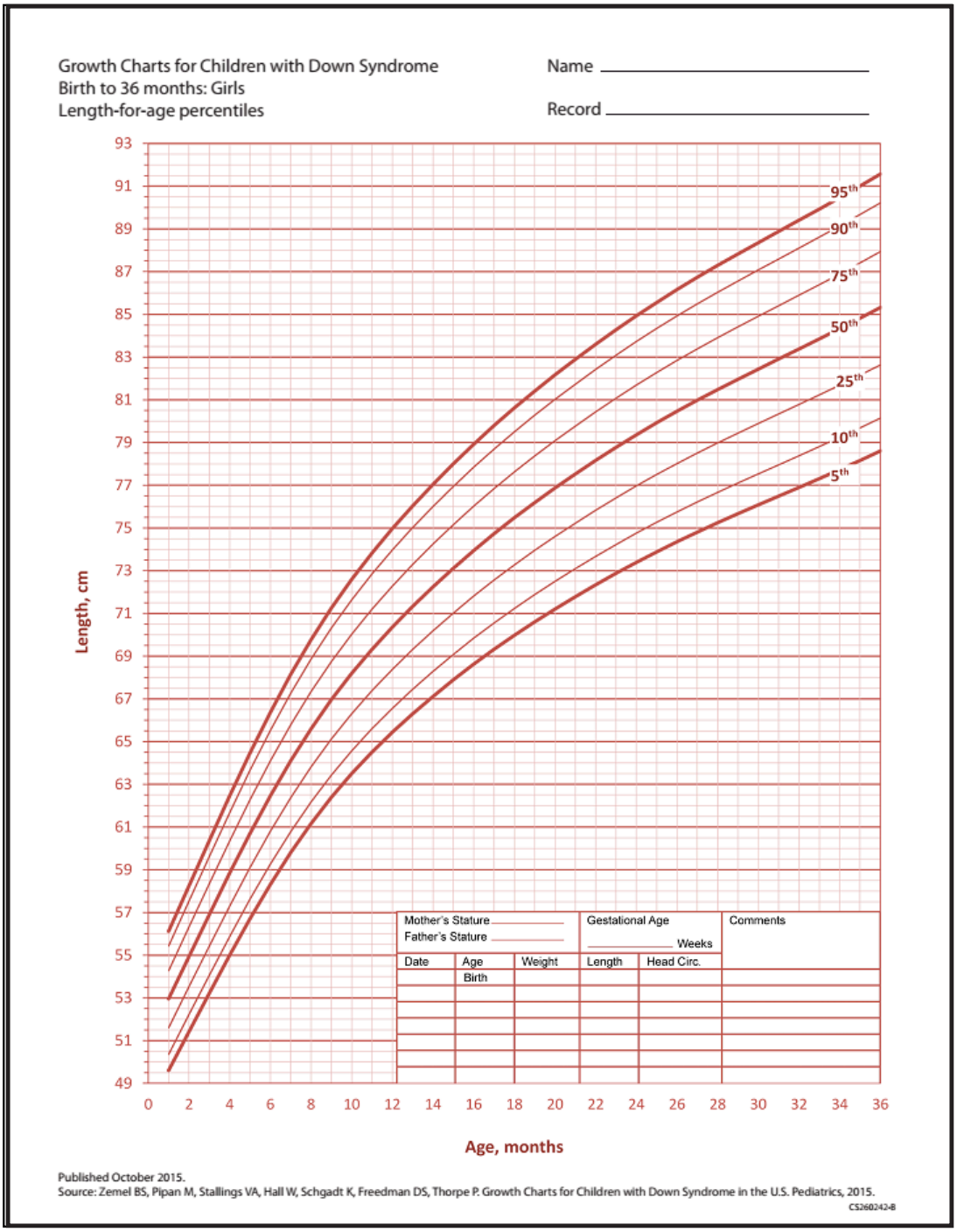
2 to 20 Years Old

- Graph E3 (i) : Height-for-age percentiles (Boys)
- Graph E3 (ii) : Height-for-age percentiles (Girls)
- Graph E4 (i) : Weight-for-age percentiles (Boys)
- Graph E4 (ii) : Weight-for-age percentiles (Girls)

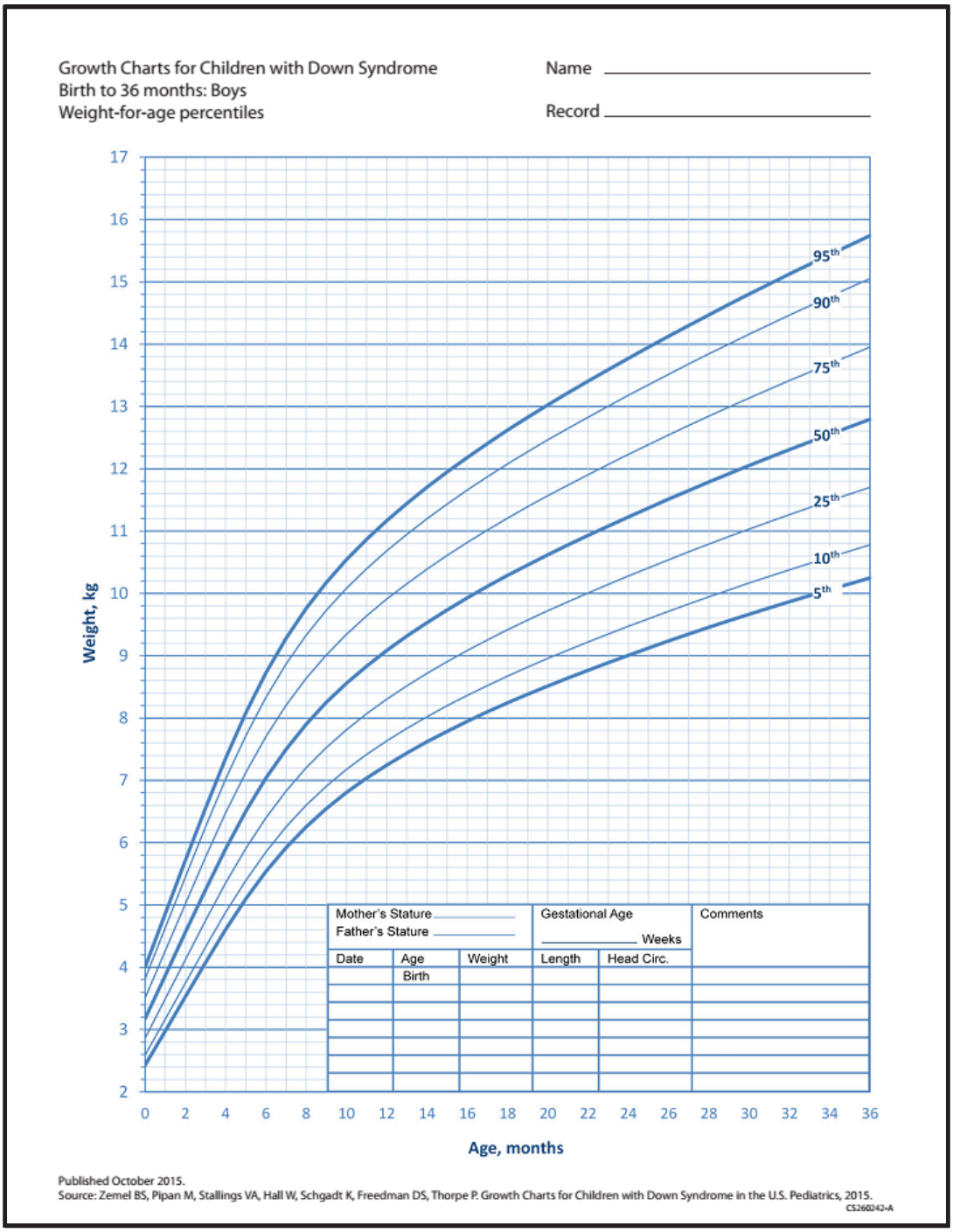
Graph E1 (i) : Length/ Height-for-age percentiles (Boys)



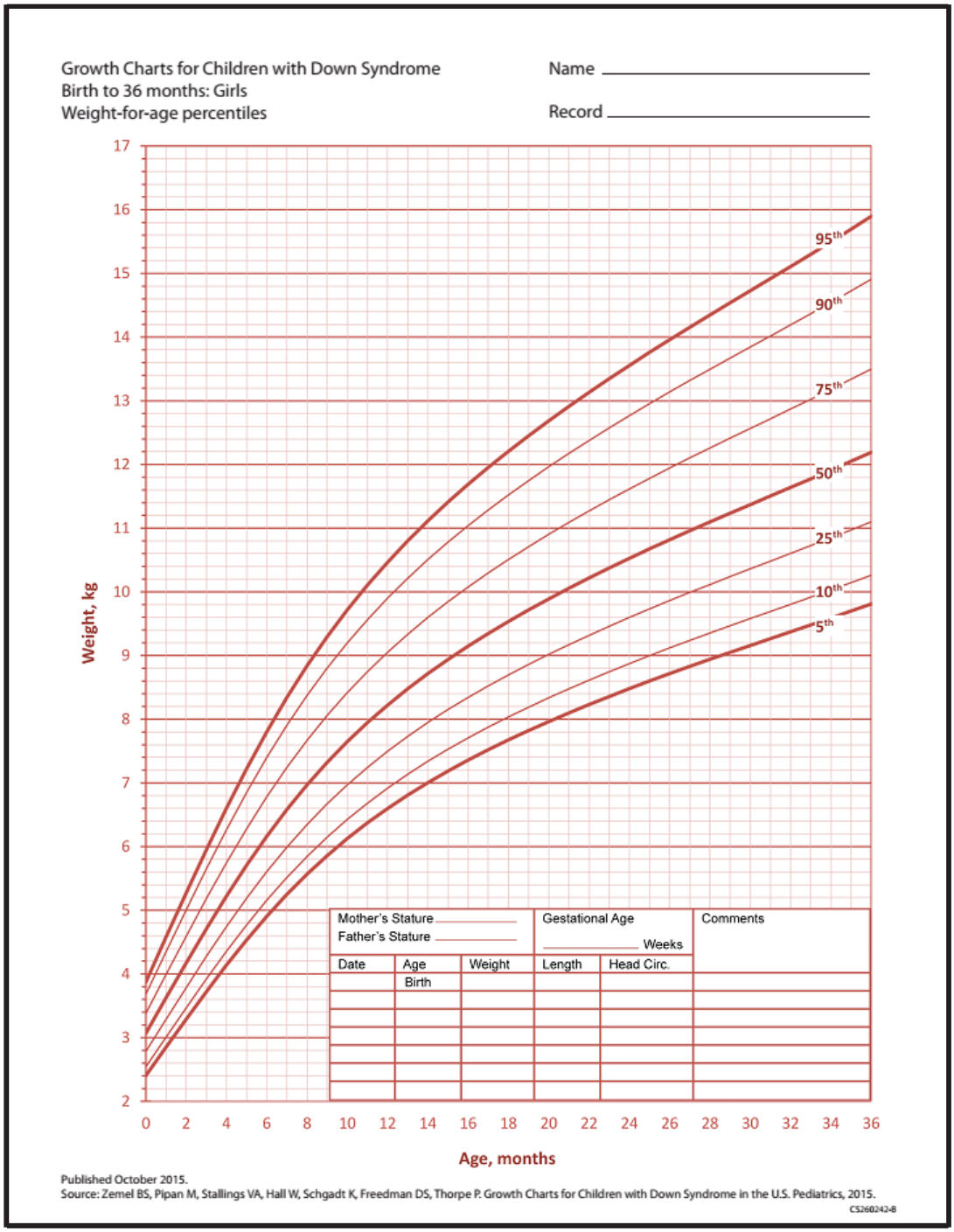
Graph E1 (ii) : Length/ Height-for-age percentiles (Girls)



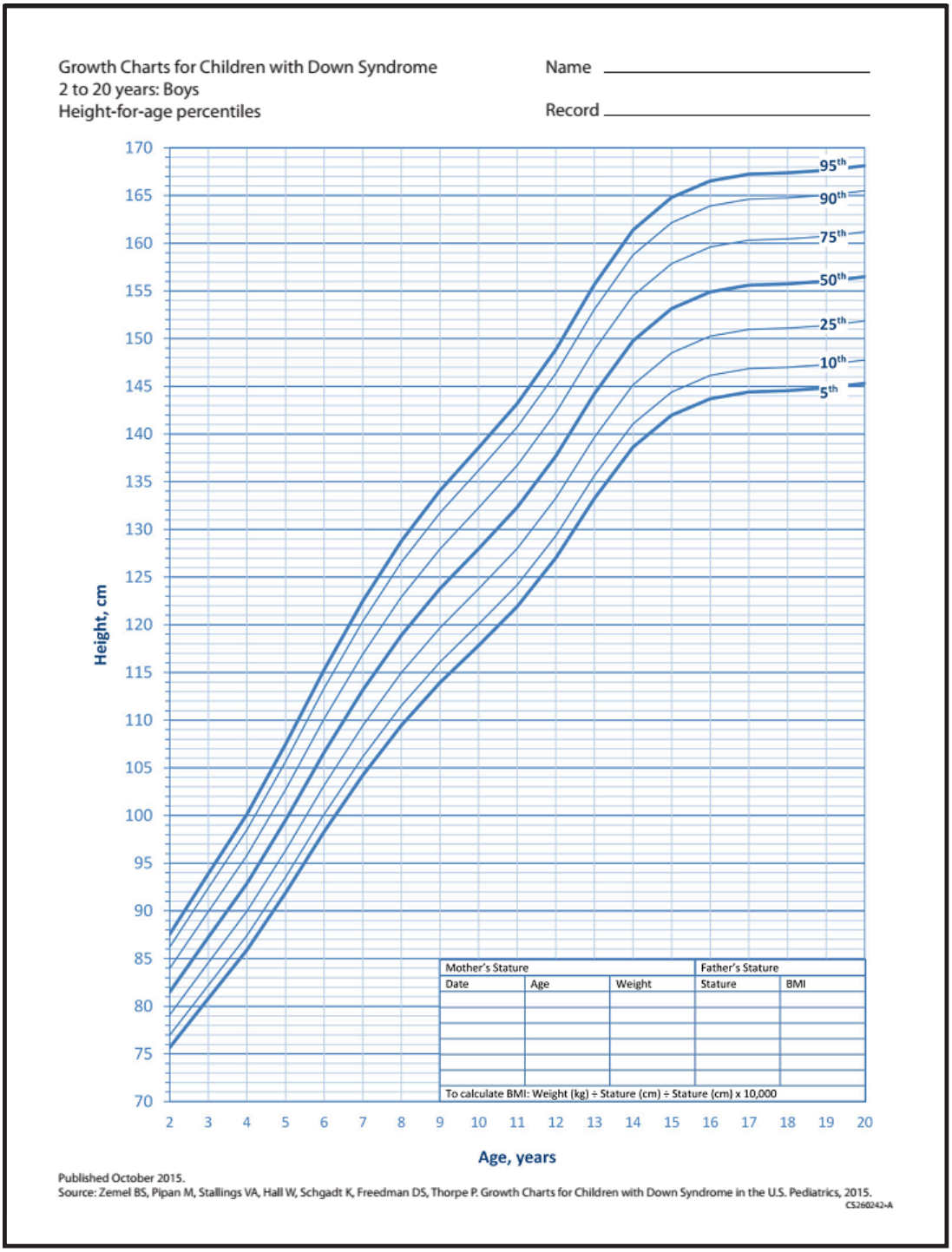
Graph E2 (i) : Weight-for-age percentiles (Boys)



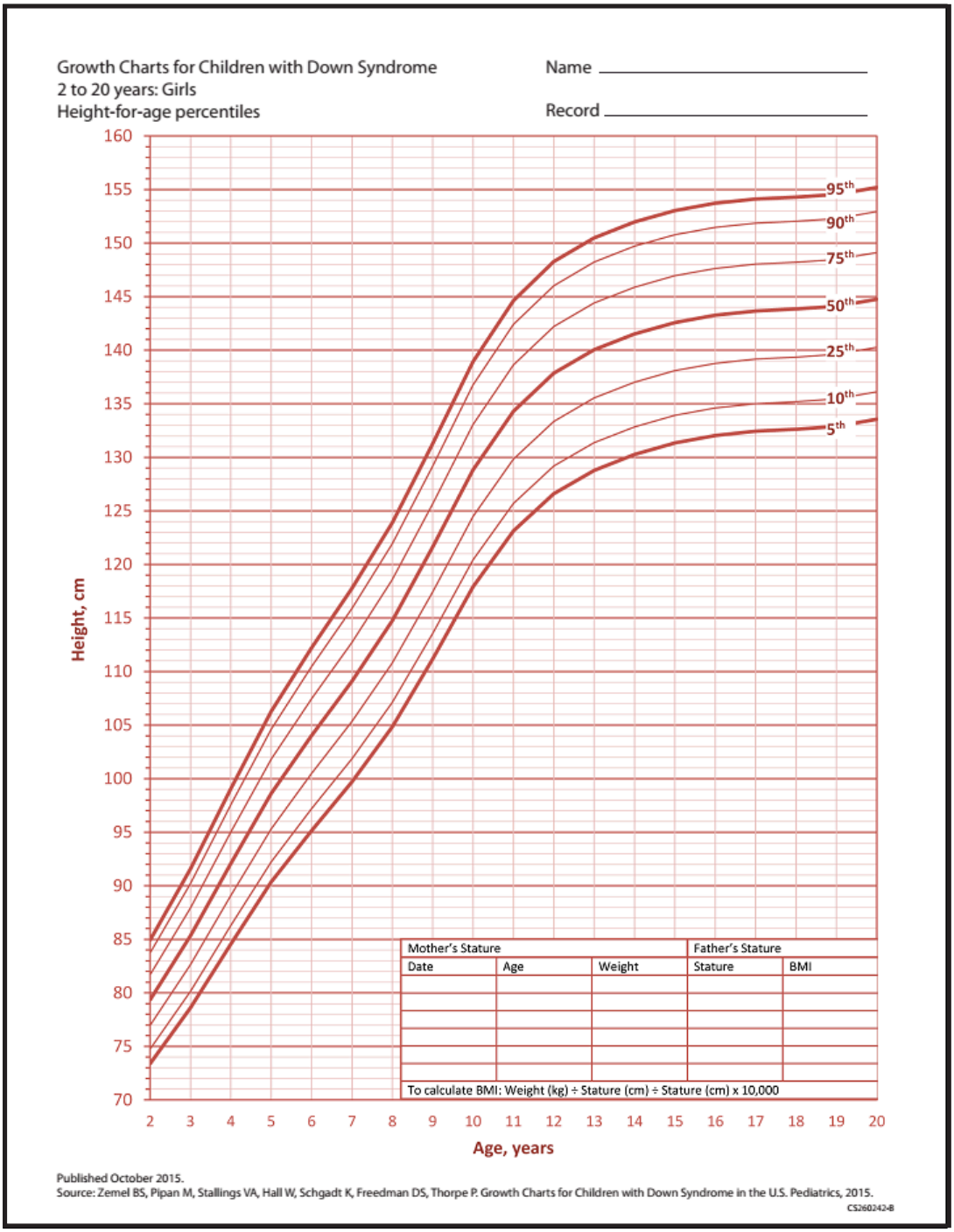
Graph E2 (iI) : Weight-for-age percentiles (Girls)



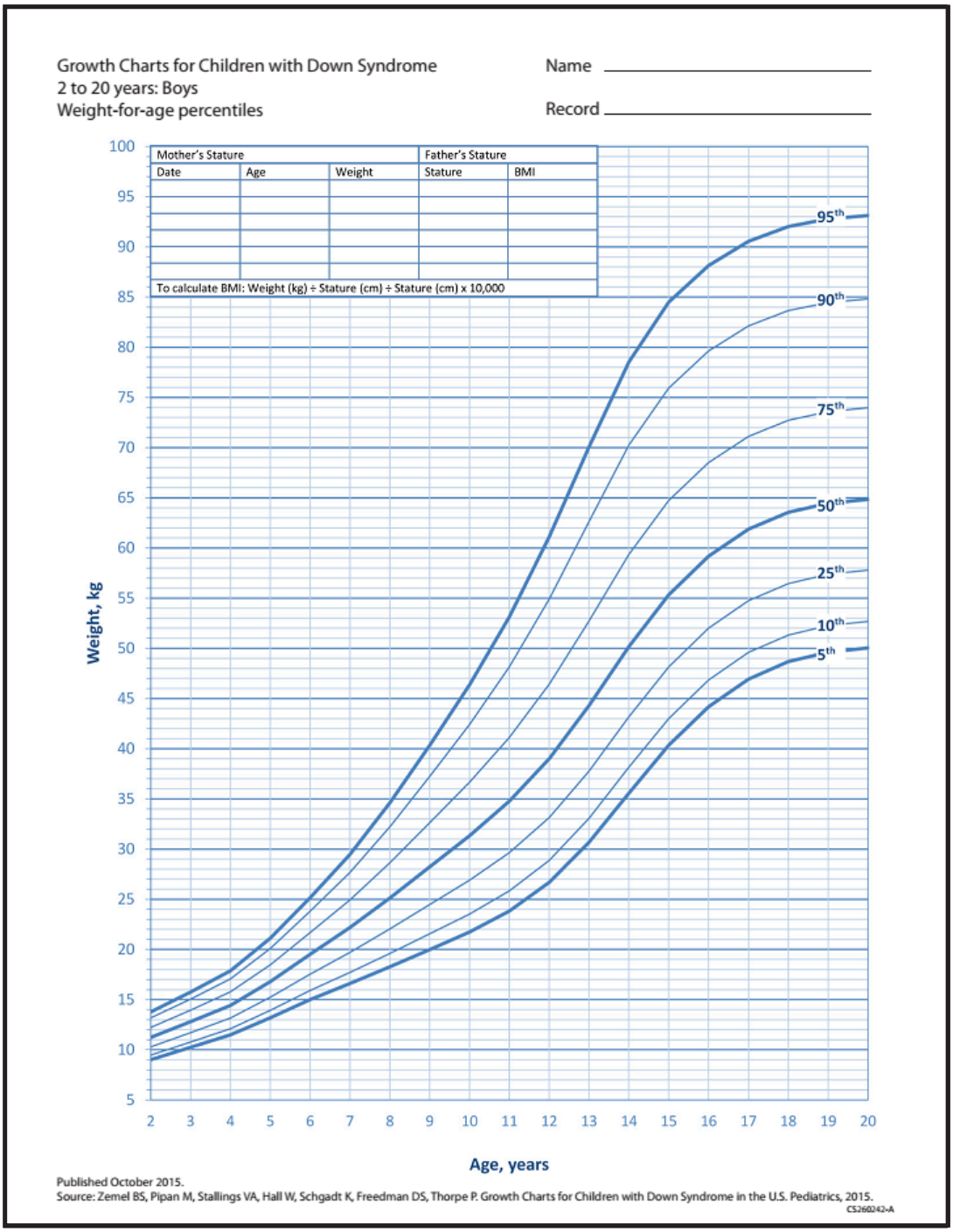
Graph E3 (i) : Height-for-age percentiles (Boys)



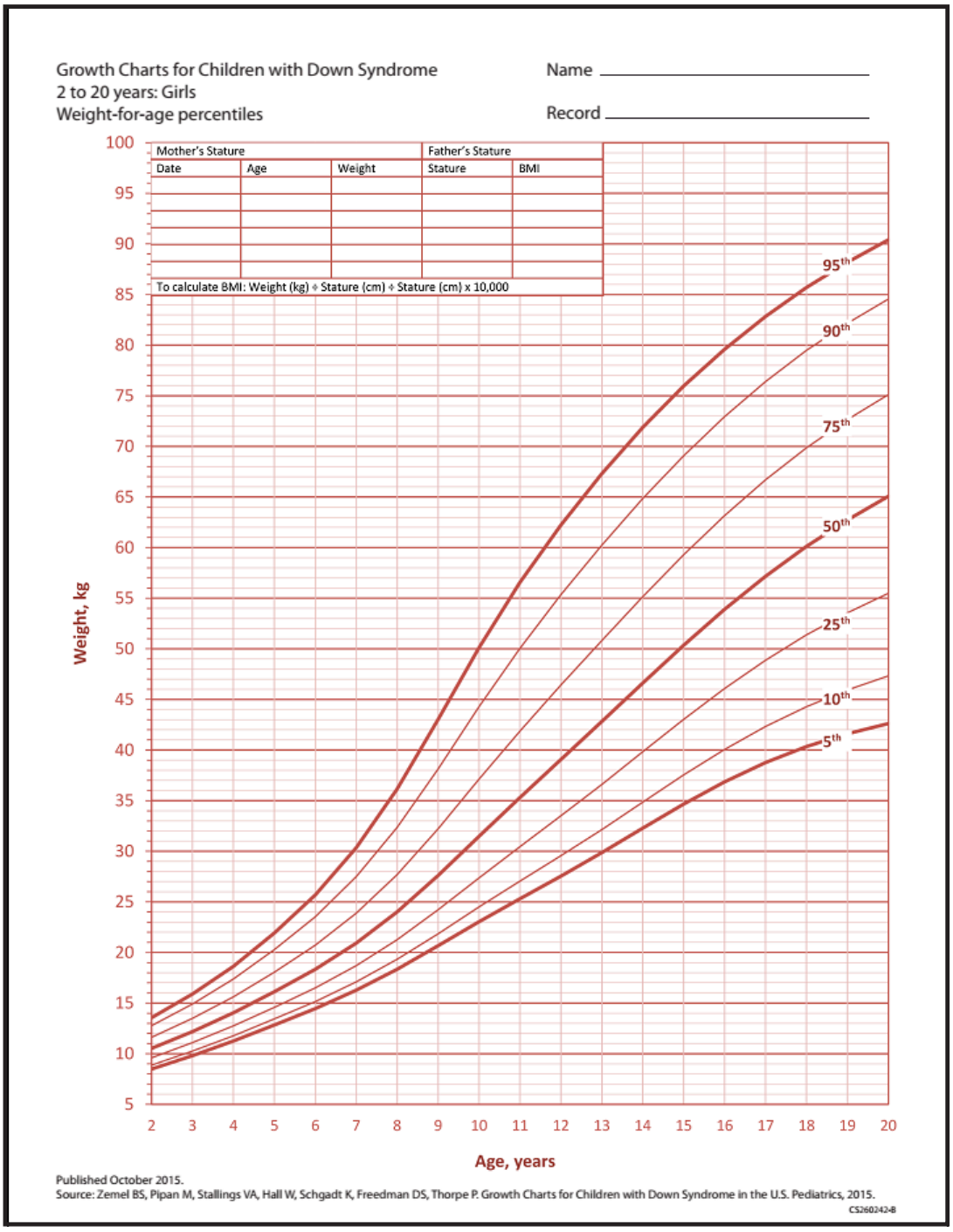
Graph E3 (iI) : Height-for-age percentiles (Girls)



Graph E4 (i) : Weight-for-age percentiles (Boys)



Graph E4 (ii) : Weight-for-age percentiles (Girls)







APPENDIX F

GROWTH CHART FOR CHILDREN WITH CEREBRAL PALSY ACCORDING TO GROWTH MOTOR FUNCTION CLASSIFICATION SYSTEM (GMFCS)

2 TO 20 YEARS OLD

GMFCS I (Walks Without Limitations)

F1 (i) : Weight-for-age percentiles (Boys)
F1 (ii) : Weight-for-age percentiles (Girls)
F2 (i) : Stature-for-age percentiles (Boys)
F2 (ii) : Stature-for-age percentiles (Girls)
F3 (i) : BMI-for-age percentiles (Boys)
F3 (ii) : BMI-for-age percentiles (Girls)

GMFCS II (Walks with Limitations)

F4 (i) : Weight-for-age percentiles (Boys)
F4 (ii) : Weight-for-age percentiles (Girls)
F5 (i) : Stature-for-age percentiles (Boys)
F5 (ii) : Stature-for-age percentiles (Girls)
F6 (i) : BMI-for-age percentiles (Boys)
F6 (ii) : BMI-for-age percentiles (Girls)

GMFCS III (Walks Using a Hand – Held Mobility Devices)

F7 (i) : Weight-for-age percentiles (Boys)
F7 (ii) : Weight-for-age percentiles (Girls)
F8 (i) : Stature-for-age percentiles (Boys)
F8 (ii) : Stature-for-age percentiles (Girls)
F9 (i) : BMI-for-age percentiles (Boys)
F9 (ii) : BMI-for-age percentiles (Girls)

GMFCS IV (Self Mobility with Limitations; May Used Powered Mobility)

F10 (i) : Weight-for-age percentiles (Boys)
F10(ii) : Weight-for-age percentiles (Girls)
F11 (i) : Stature-for-age percentiles (Boys)
F11(ii) : Stature-for-age percentiles (Girls)
F12 (i) : BMI-for-age percentiles (Boys)
F12(ii) : BMI-for-age percentiles (Girls)

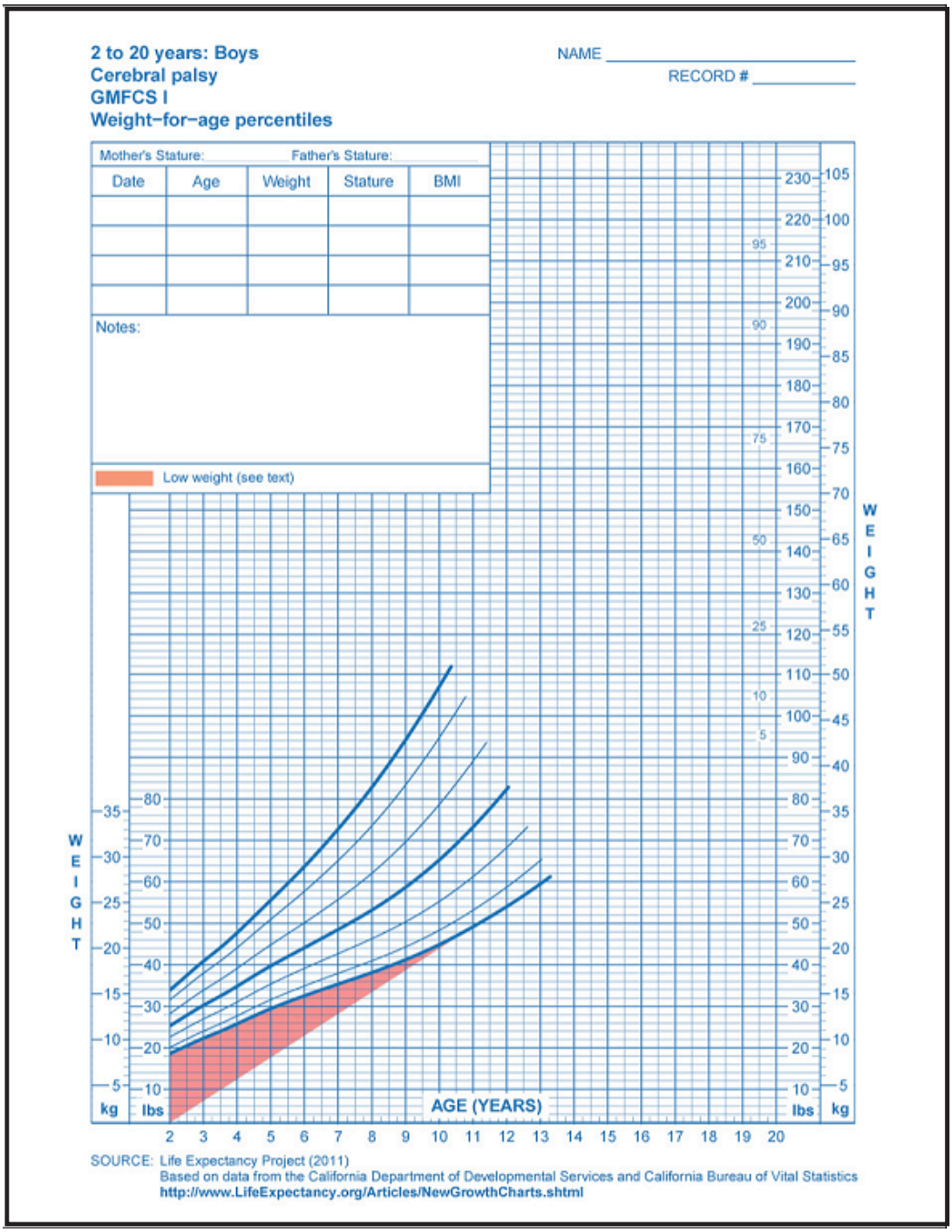
GMFCS V, Feeds Orally (Transported in a Manual Wheelchair)

F13 (i) : Weight-for-age percentiles (Boys)
F13(ii) : Weight-for-age percentiles (Girls)
F14 (i) : Stature-for-age percentiles (Boys)
F14(ii) : Stature-for-age percentiles (Girls)
F15 (i) : BMI-for-age percentiles (Boys)
F15(ii) : BMI-for-age percentiles (Girls)

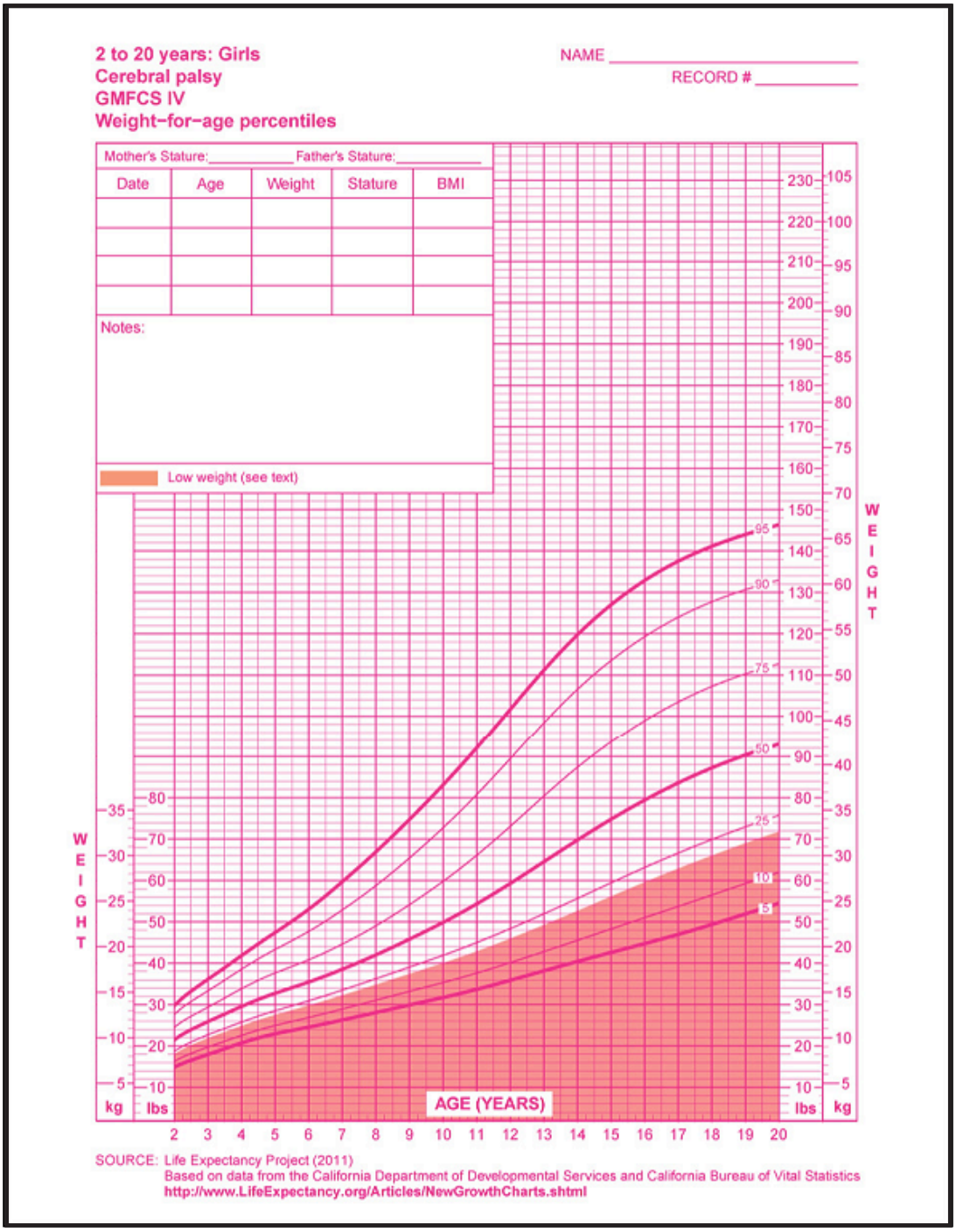
GMFCS V, Tube Fed

F16 (i) : Weight-for-age percentiles (Boys)
F16 (ii) : Weight-for-age percentiles (Girls)
F17 (i) : Stature-for-age percentiles (Boys)
F17 (ii) : Stature-for-age percentiles (Girls)
F18 (i) : BMI-for-age percentiles (Boys)
F18 (ii) : BMI-for-age percentiles (Girls)

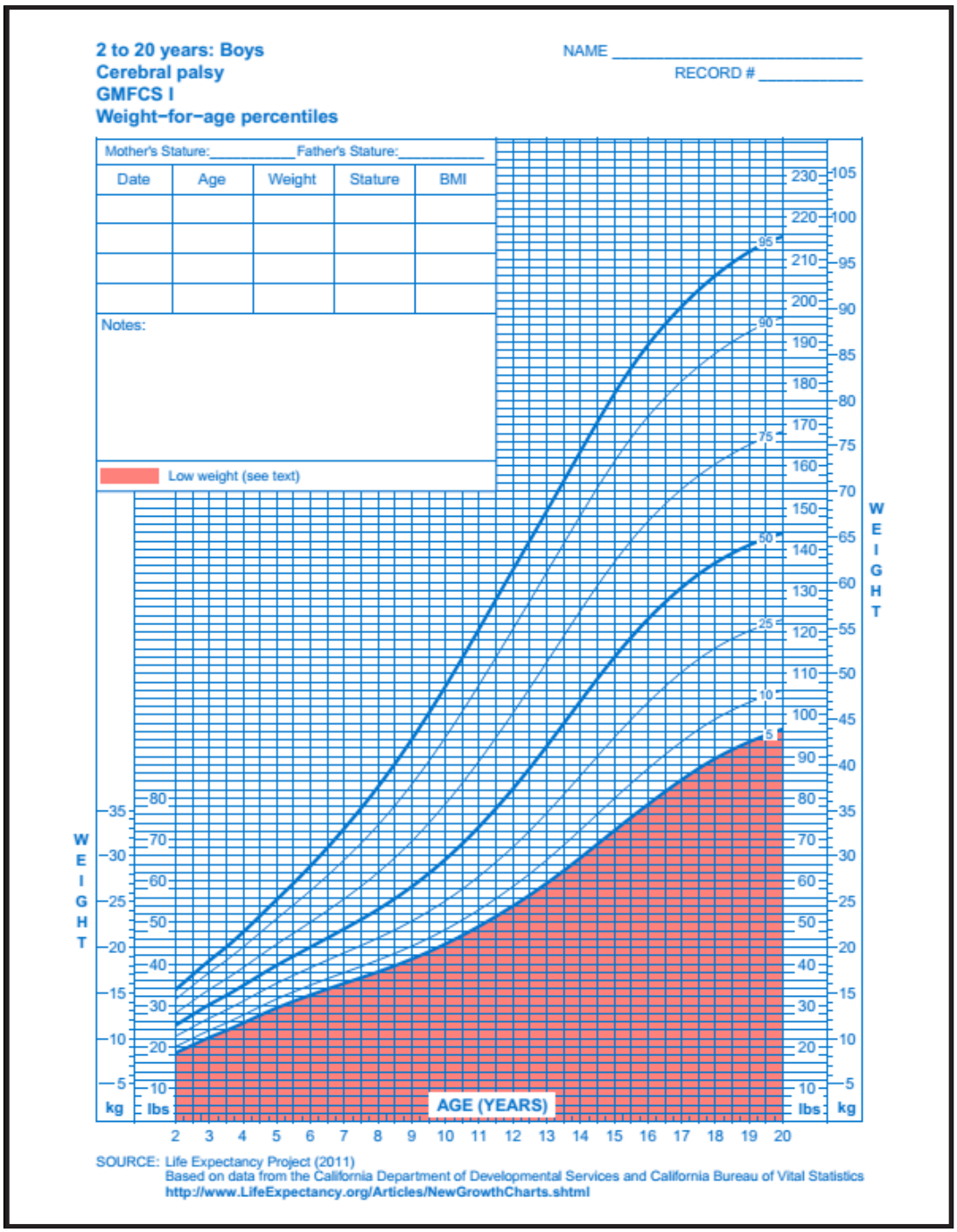
F1 (i) : Weight-for-age percentiles (Boys)



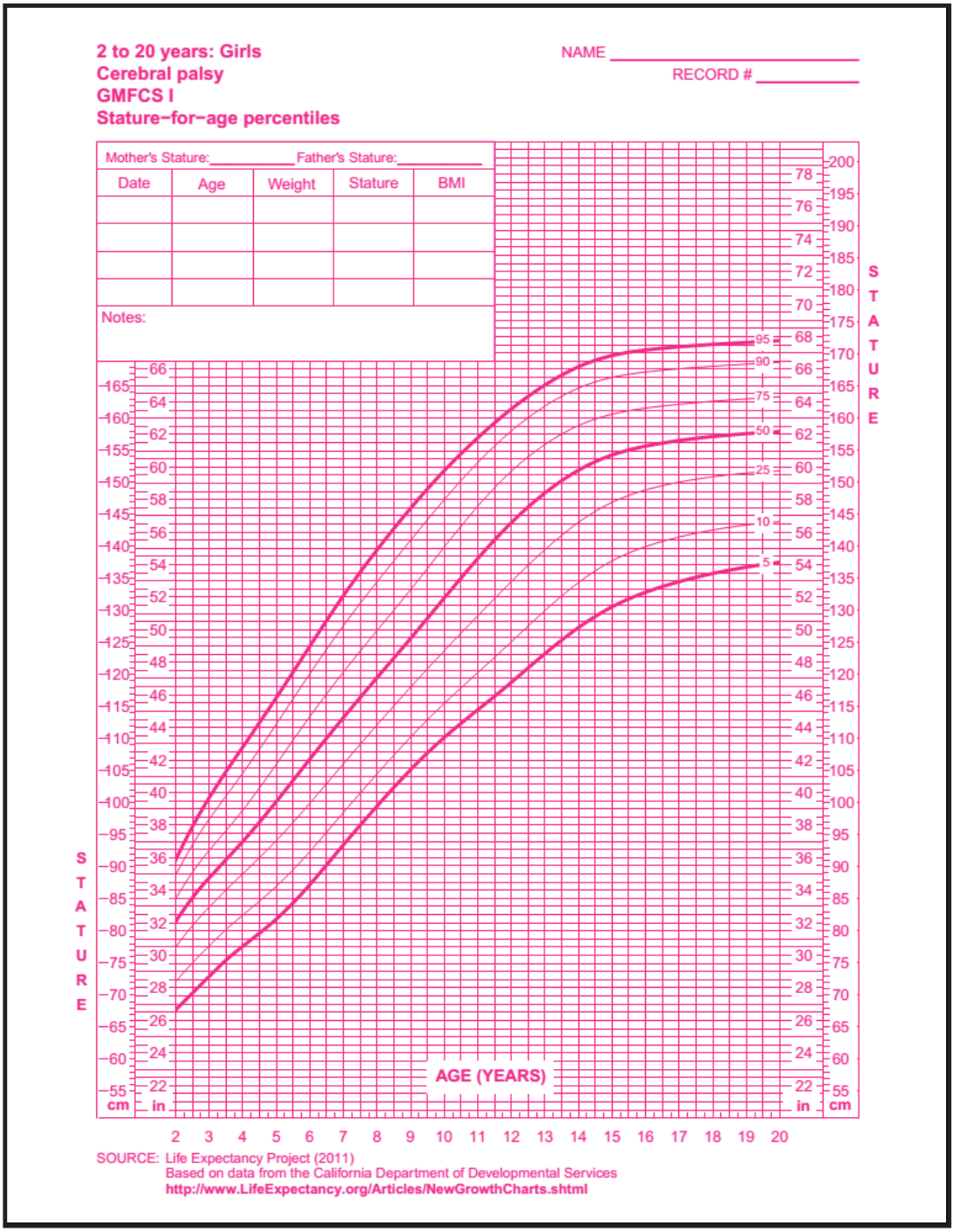
F1 (ii) : Weight-for-age percentiles (Girls)



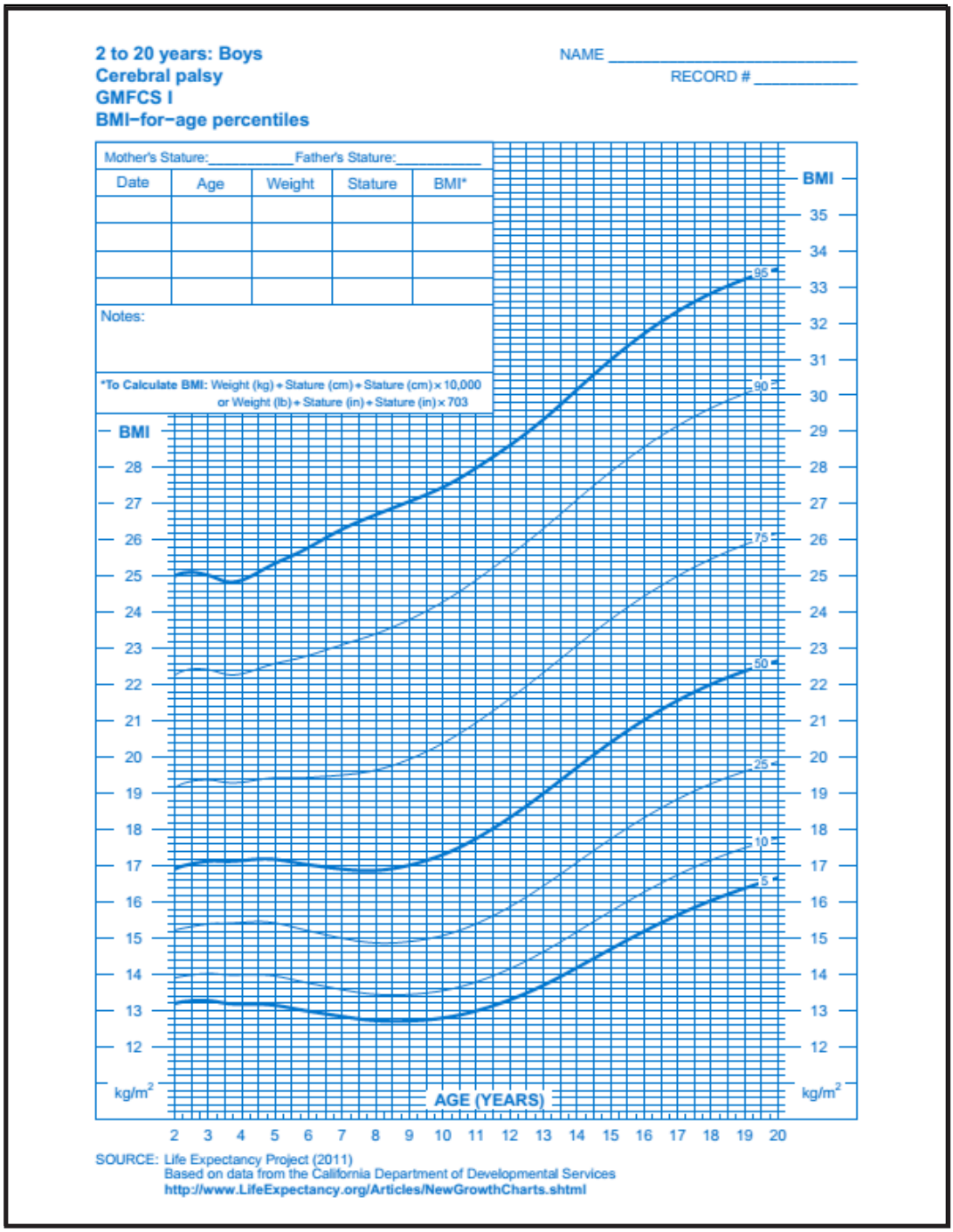
F2 (i) : Stature-for-age percentiles (Boys)



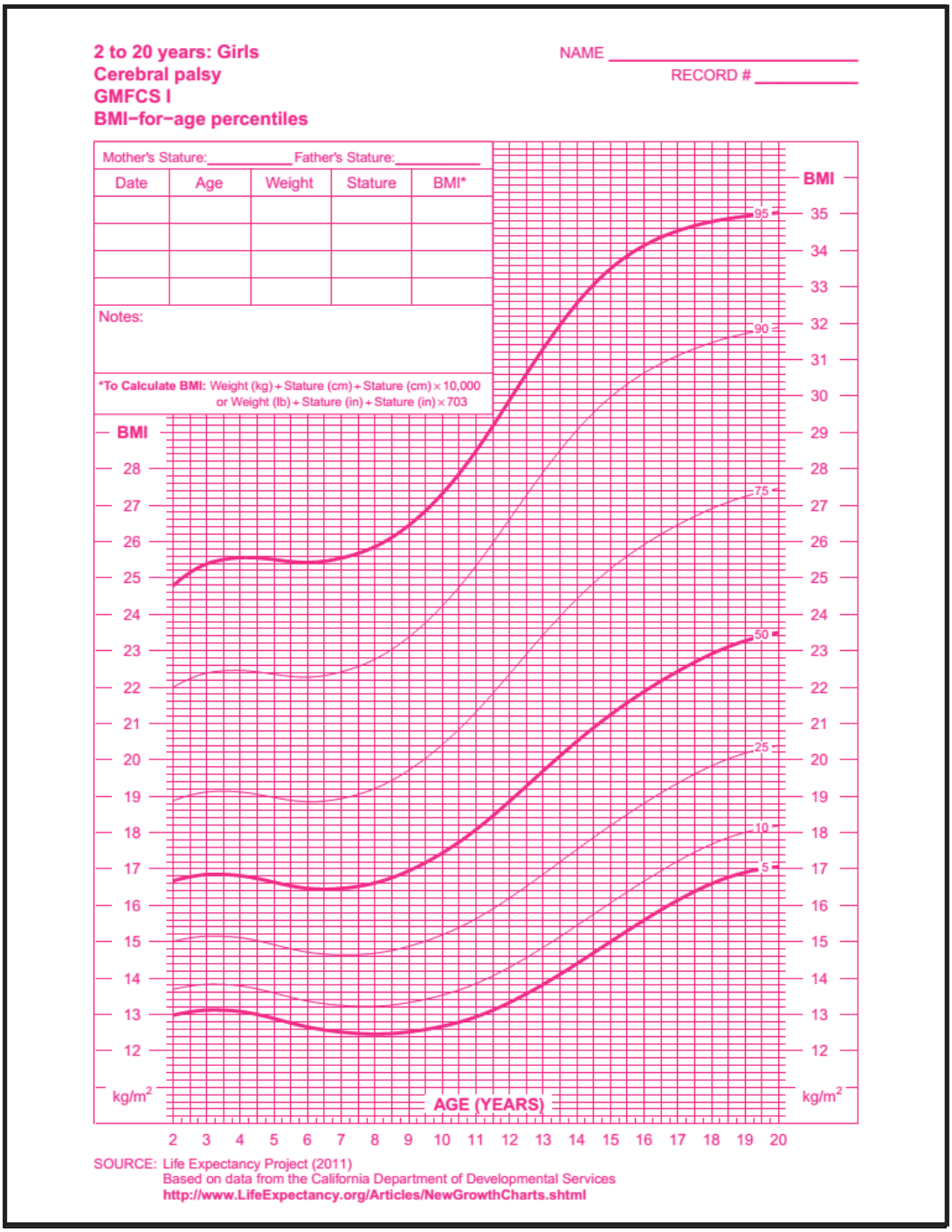
F2 (ii) : Stature-for-age percentiles (Girls)



F3 (i) : BMI-for-age percentiles (Boys)



F3 (ii) : BMI-for-age percentiles (Girls)



F4 (i) : Weight-for-age percentiles (Boys)

2 to 20 years: Boys
Cerebral palsy
GMFCS II
Weight–for–age percentiles

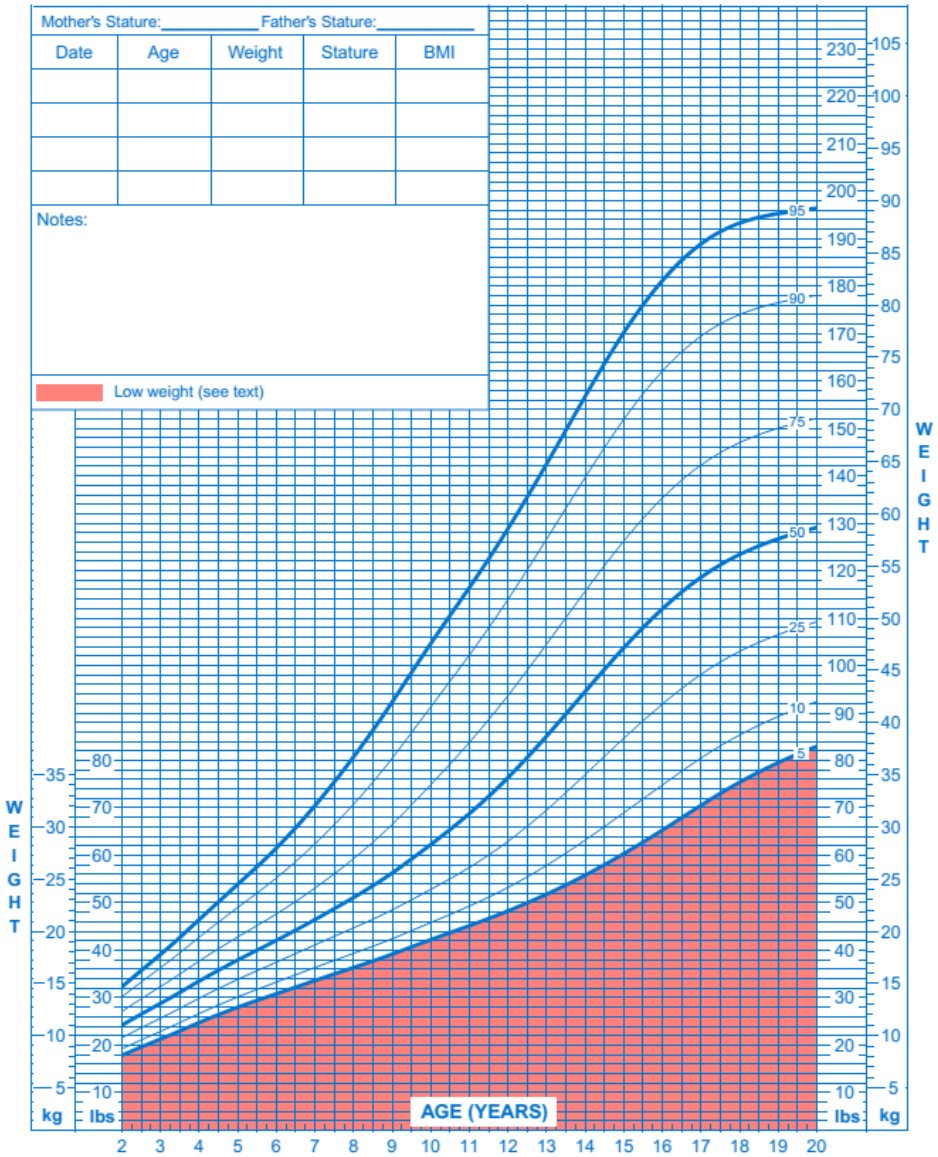
NAME _____
RECORD # _____

Mother's Stature:_____ Father's Stature:_____

Date	Age	Weight	Stature	BMI

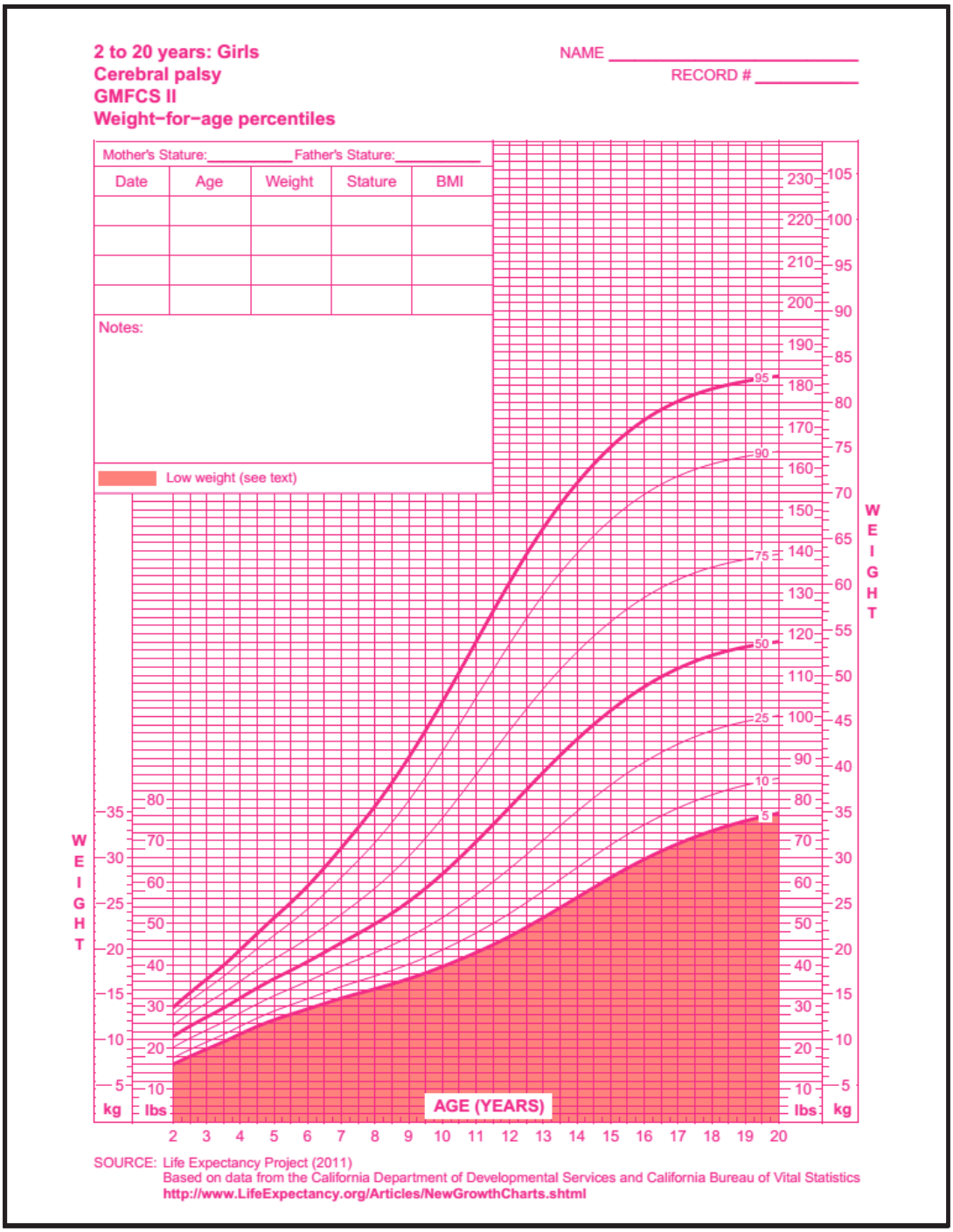
Notes:

Low weight (see text)

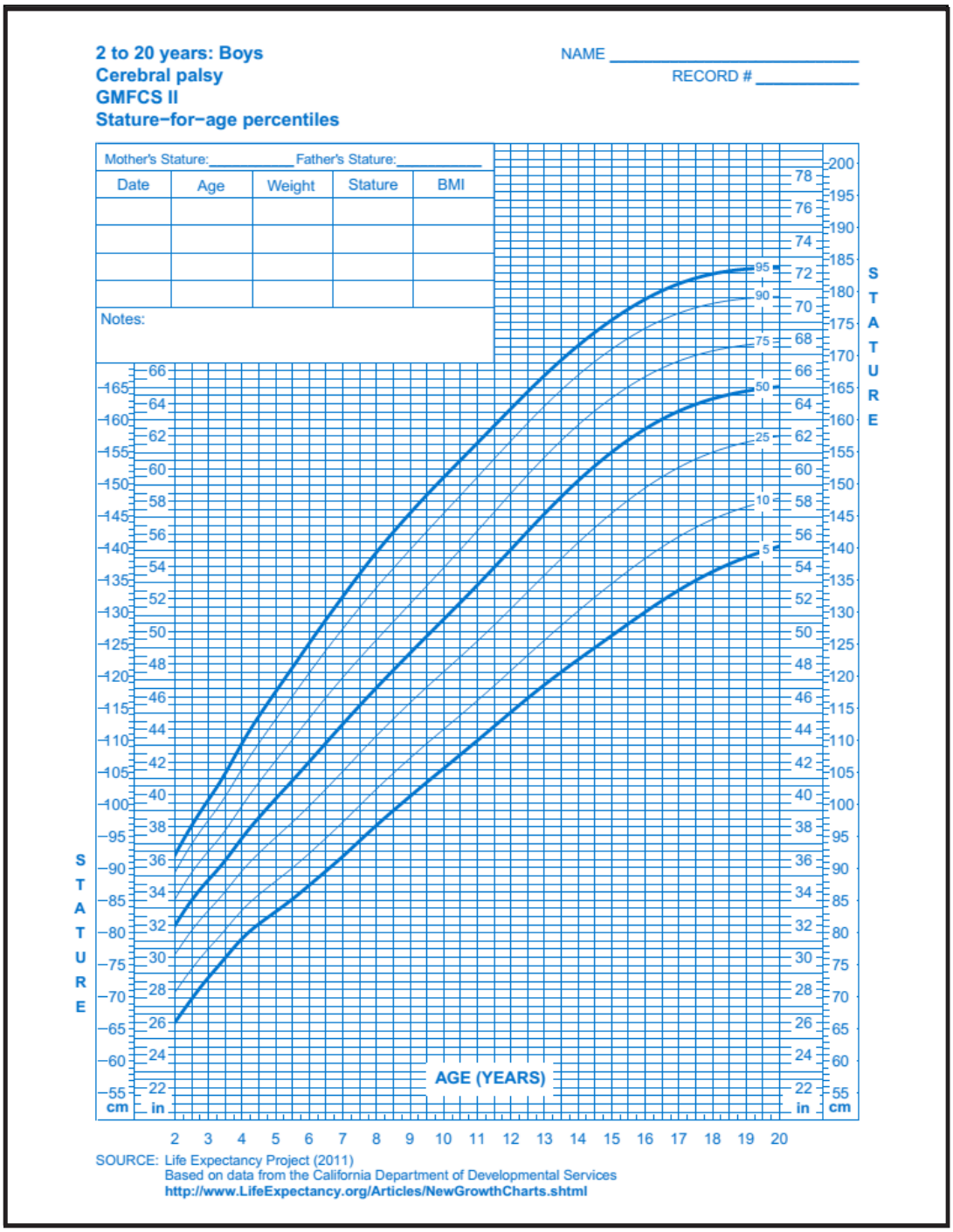


SOURCE: Life Expectancy Project (2011)
Based on data from the California Department of Developmental Services and California Bureau of Vital Statistics
http://www.LifeExpectancy.org/Articles/NewGrowthCharts.shtml

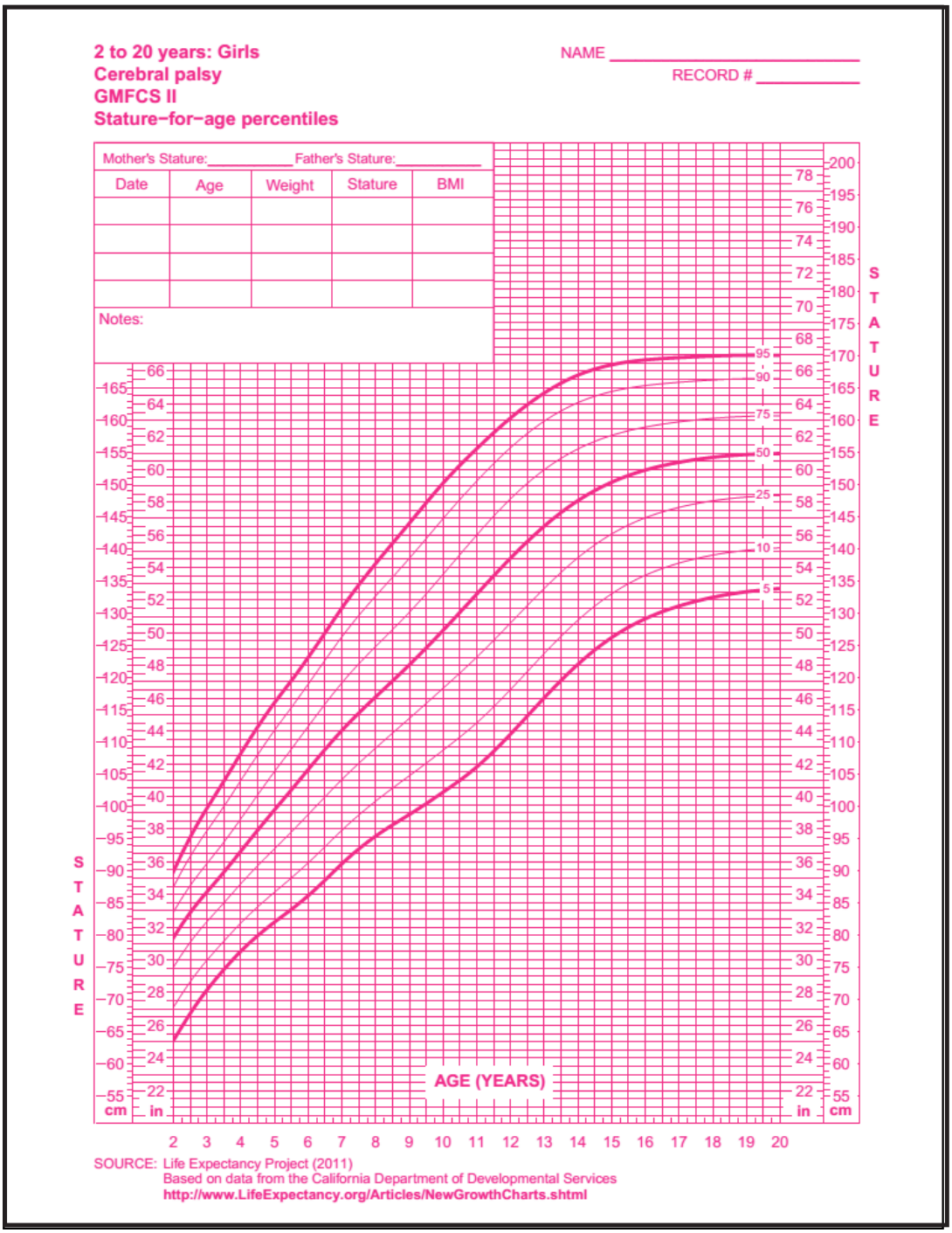
F4 (ii) : Weight-for-age percentiles (Girls)



F5 (i) : Stature-for-age percentiles (Boys)



F5 (ii) : Stature-for-age percentiles (Girls)



F6 (i) : BMI-for-age percentiles (Boys)

2 to 20 years: Boys
Cerebral palsy
GMFCS II
BMI–for–age percentiles

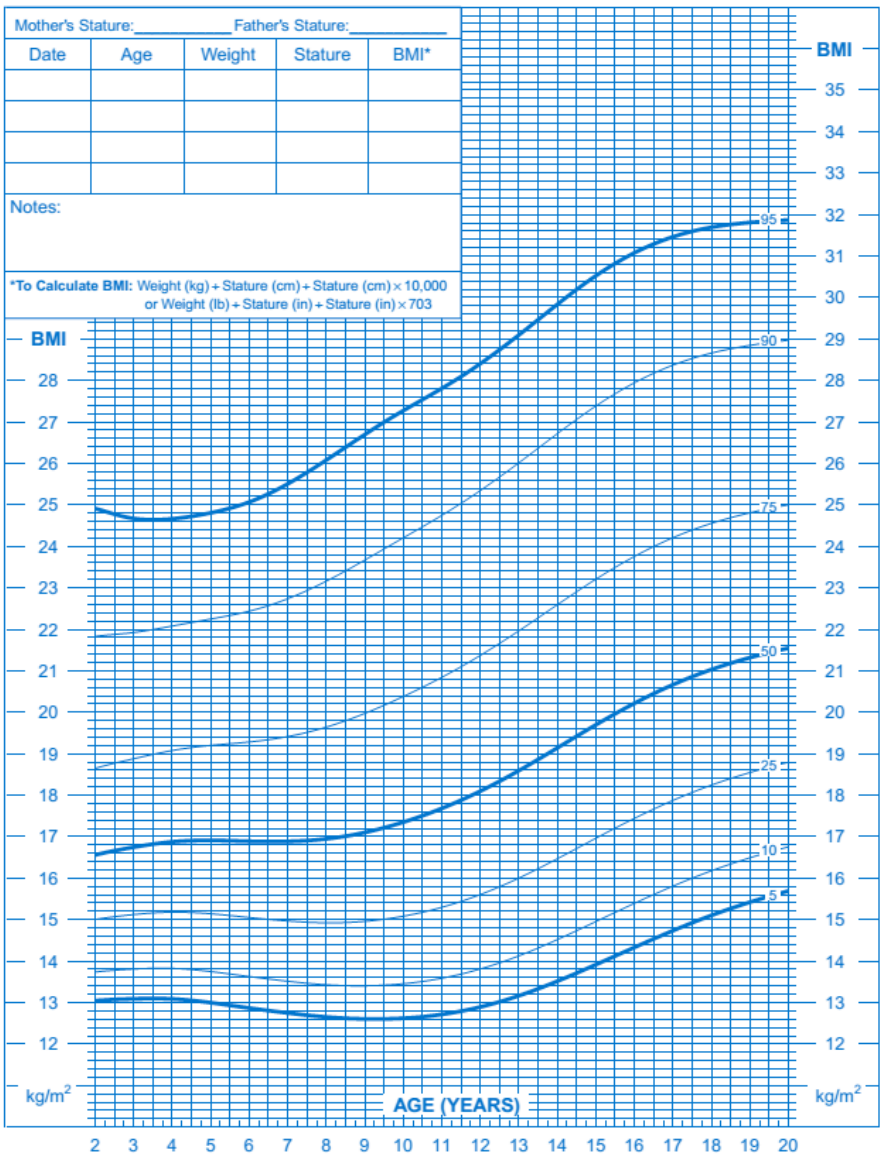
NAME _____
RECORD # _____

Mother's Stature: _____ Father's Stature: _____

Date	Age	Weight	Stature	BMI*

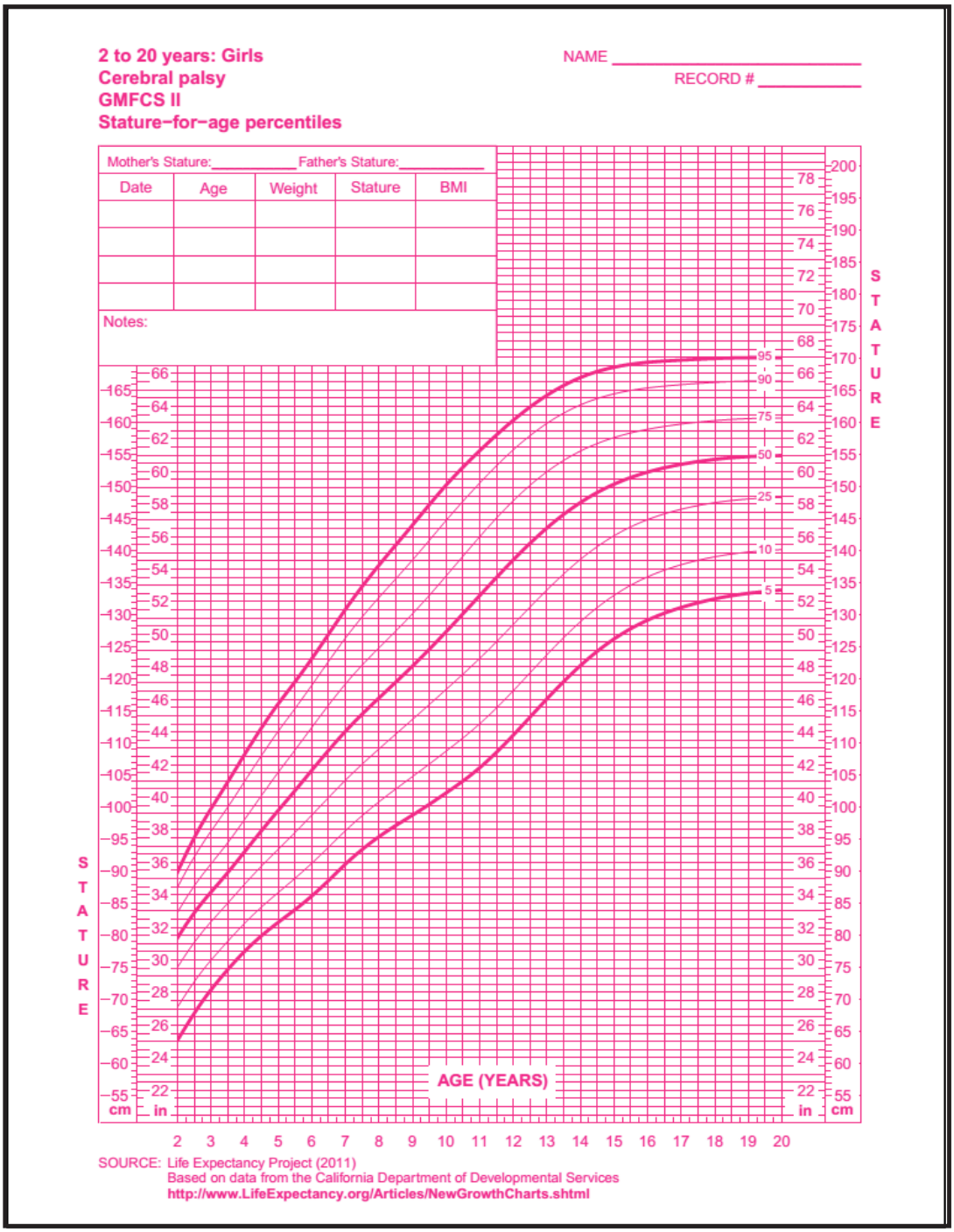
Notes:

***To Calculate BMI:** Weight (kg) ÷ Stature (cm) ÷ Stature (cm) × 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) × 703

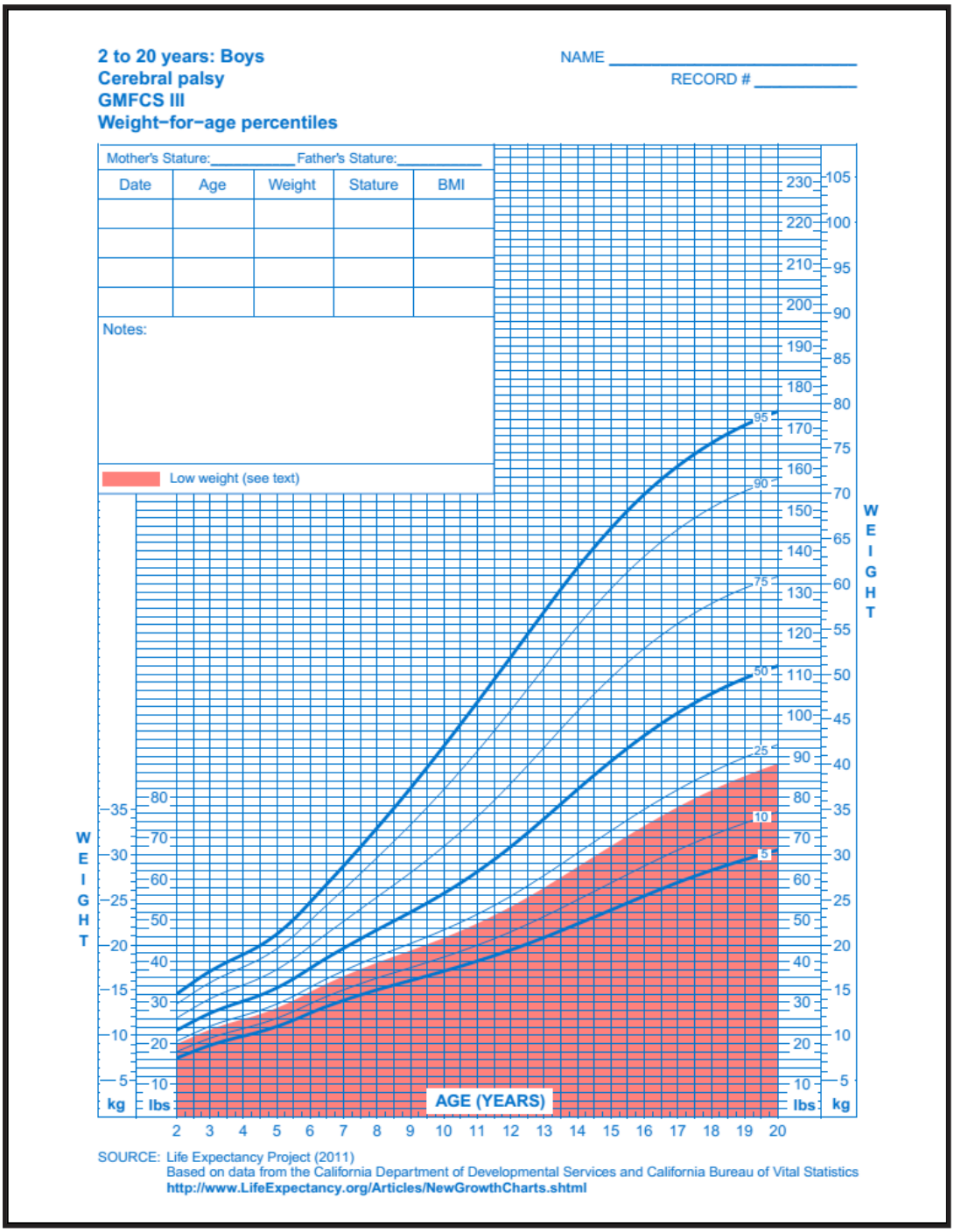


SOURCE: Life Expectancy Project (2011)
Based on data from the California Department of Developmental Services
http://www.LifeExpectancy.org/Articles/NewGrowthCharts.shtml

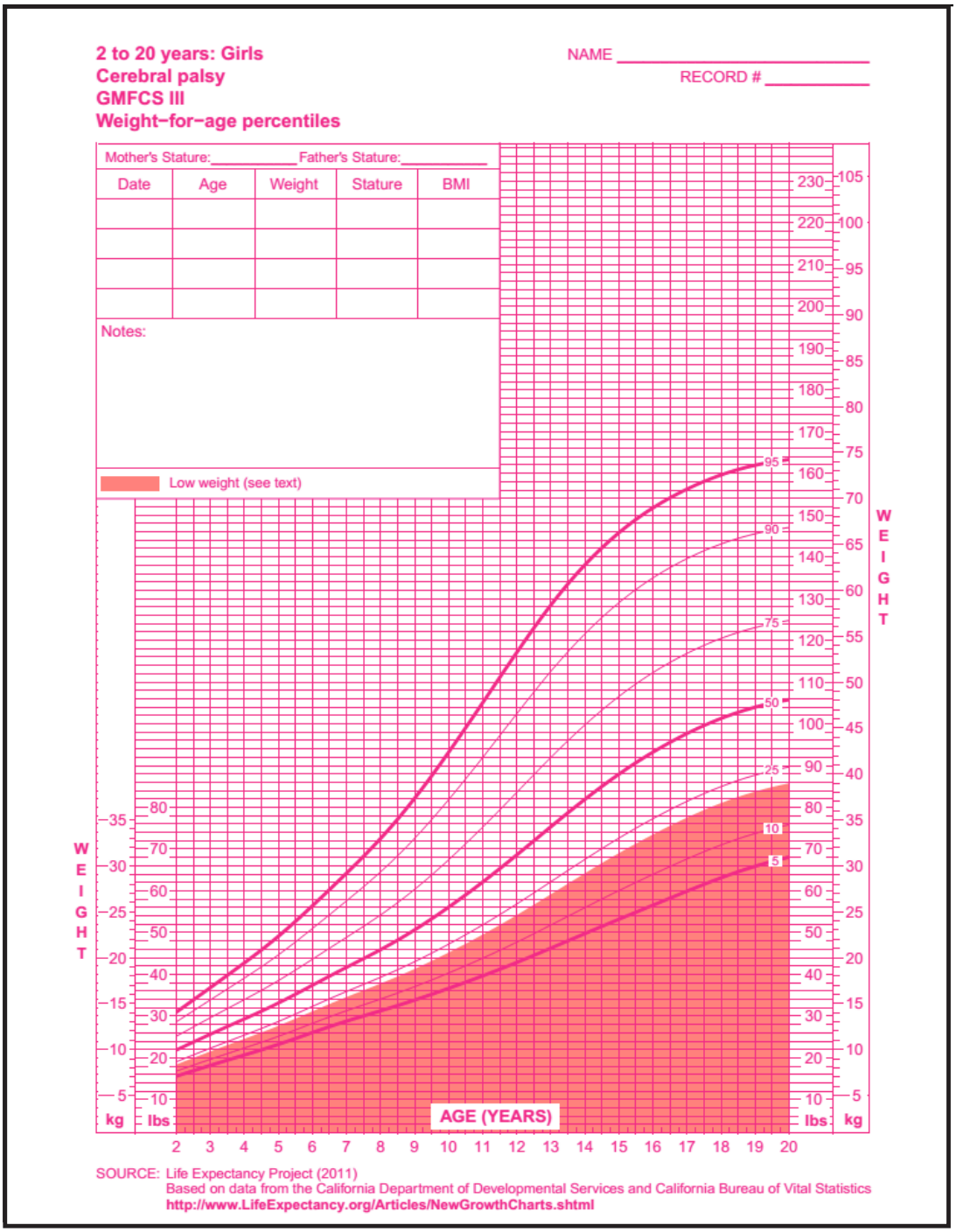
F5 (ii) : Stature-for-age percentiles (Girls)



F7 (i) : Weight-for-age percentiles (Boys)



F7 (ii) : Weight-for-age percentiles (Girls)



F8 (i) : Stature-for-age percentiles (Boys)

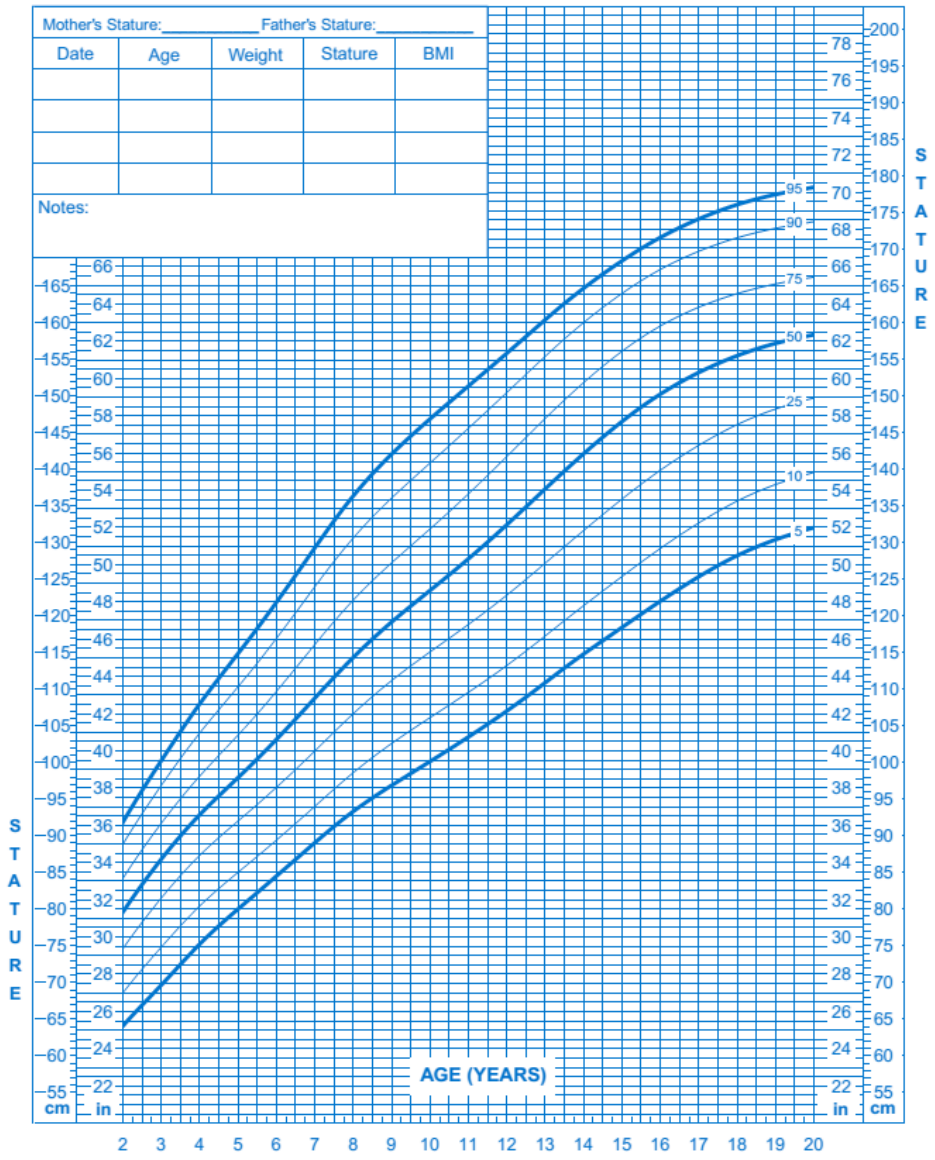
2 to 20 years: Boys
Cerebral palsy
GMFCS III
Stature–for–age percentiles

NAME _____
RECORD # _____

Mother's Stature:_____ Father's Stature:_____

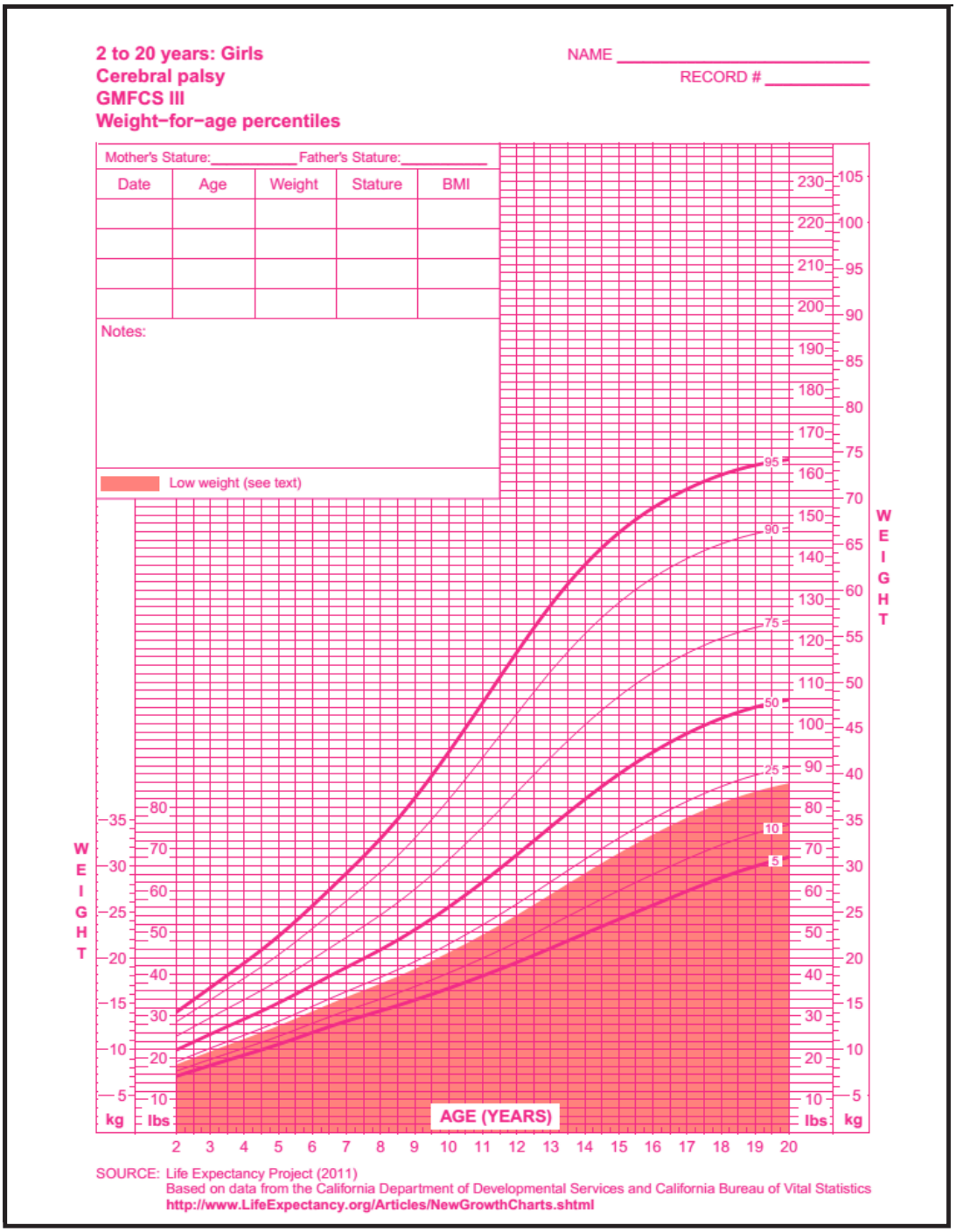
Date	Age	Weight	Stature	BMI

Notes:



SOURCE: Life Expectancy Project (2011)
Based on data from the California Department of Developmental Services
http://www.LifeExpectancy.org/Articles/NewGrowthCharts.shtml

F8 (ii) : Stature-for-age percentiles (Girls)



F9 (i) : BMI-for-age percentiles (Boys)

2 to 20 years: Boys
Cerebral palsy
GMFCS III
BMI–for–age percentiles

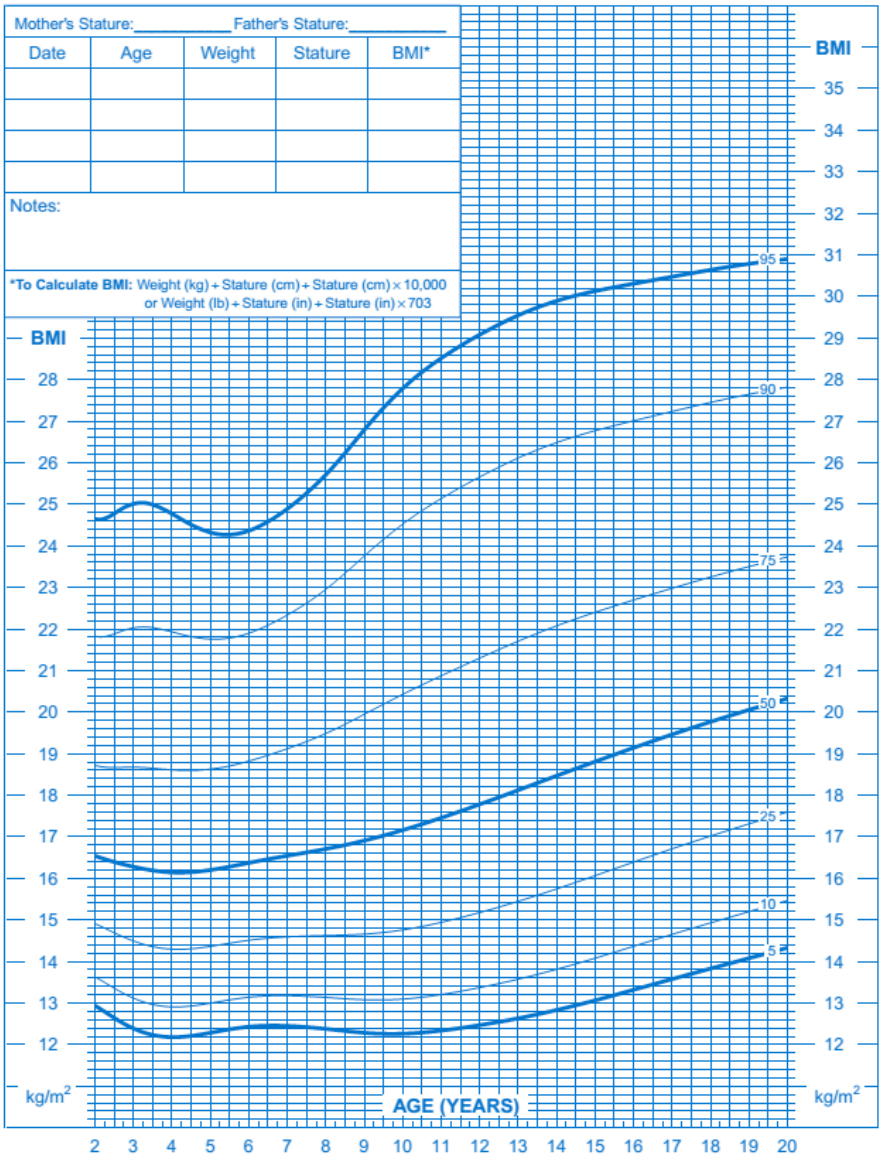
NAME _____
RECORD # _____

Mother's Stature:_____ Father's Stature:_____

Date	Age	Weight	Stature	BMI*

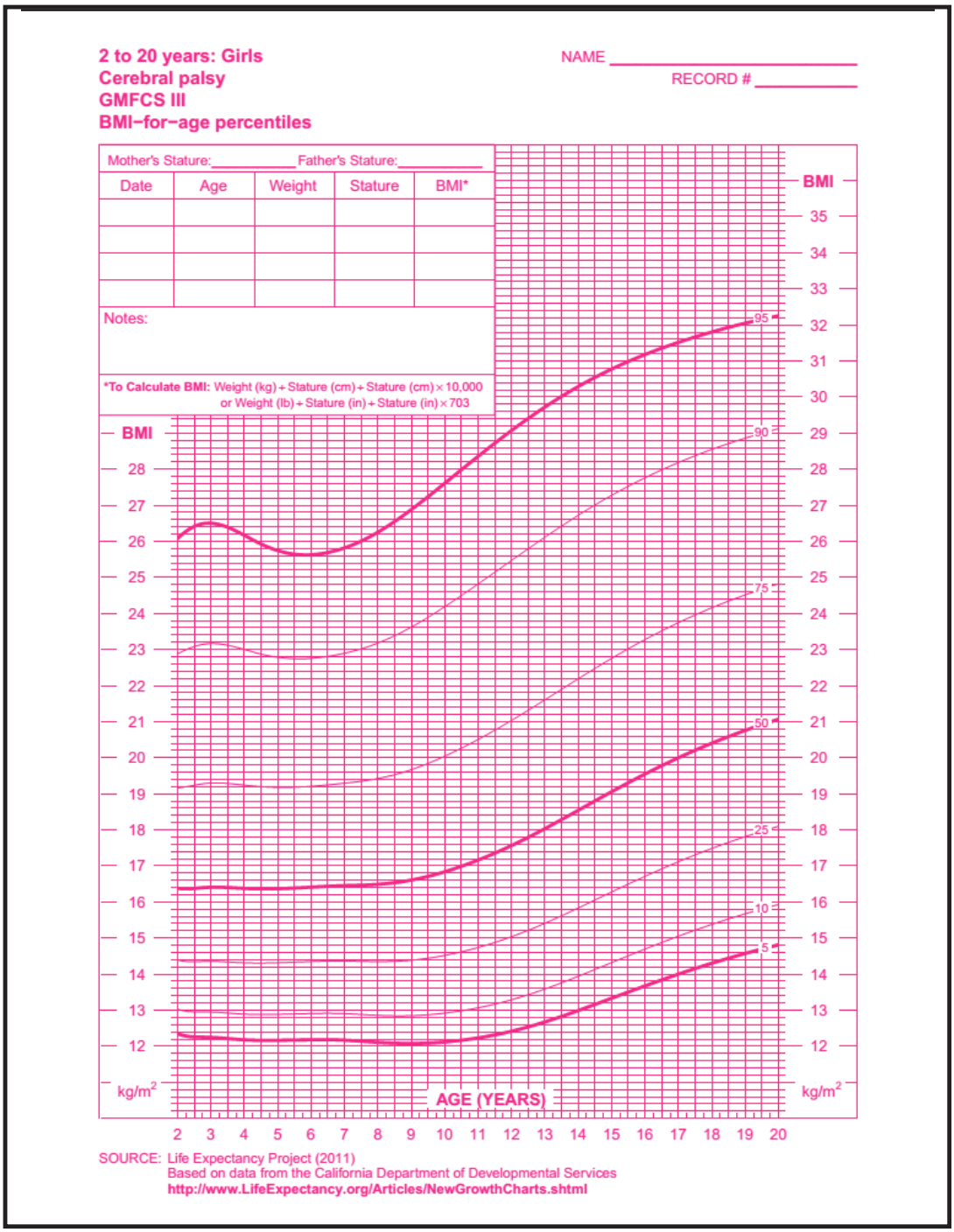
Notes:

*To Calculate BMI: Weight (kg) ÷ Stature (cm) ÷ Stature (cm) × 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) × 703

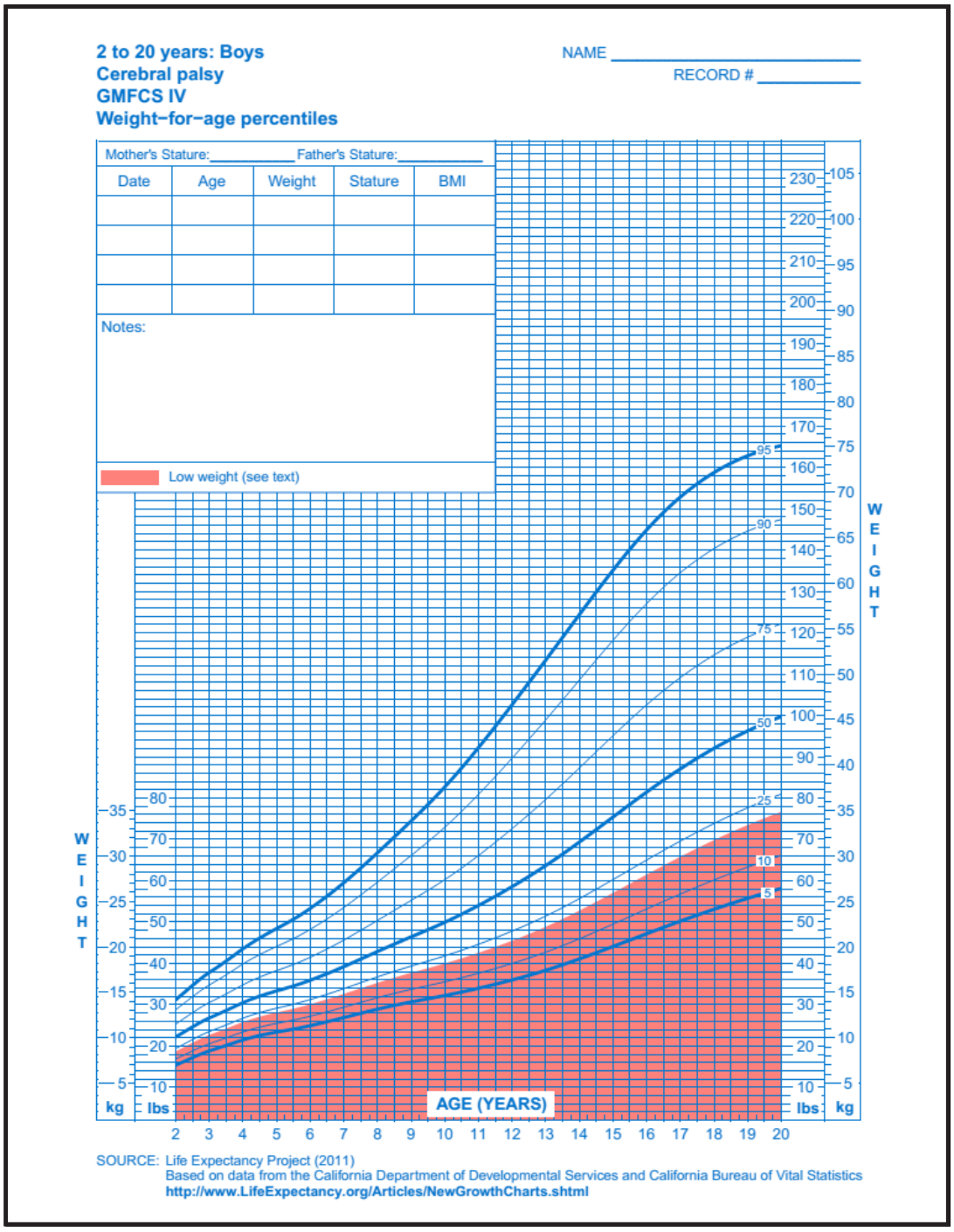


SOURCE: Life Expectancy Project (2011)
Based on data from the California Department of Developmental Services
http://www.LifeExpectancy.org/Articles/NewGrowthCharts.shtml

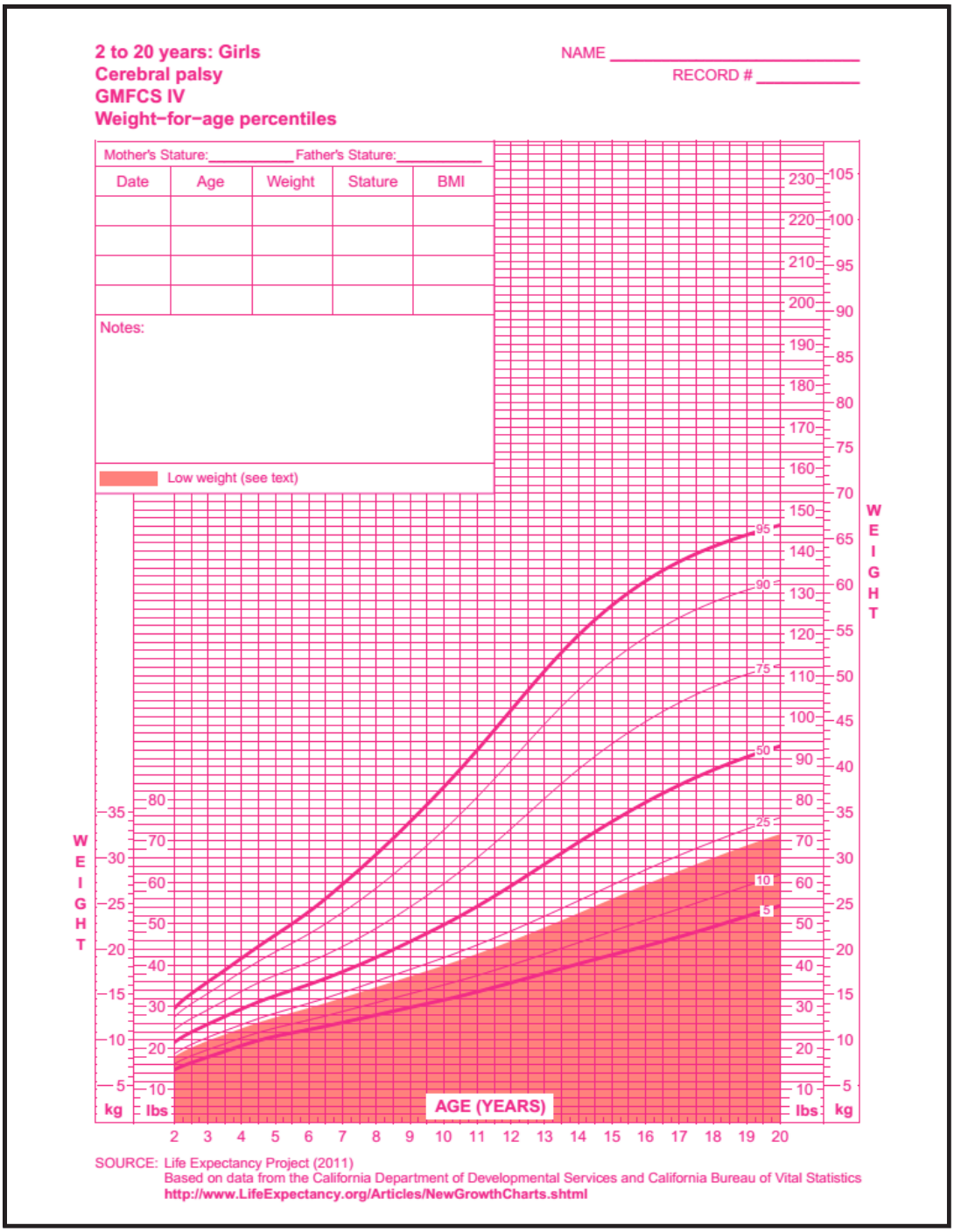
F9 (ii) : BMI-for-age percentiles (Girls)



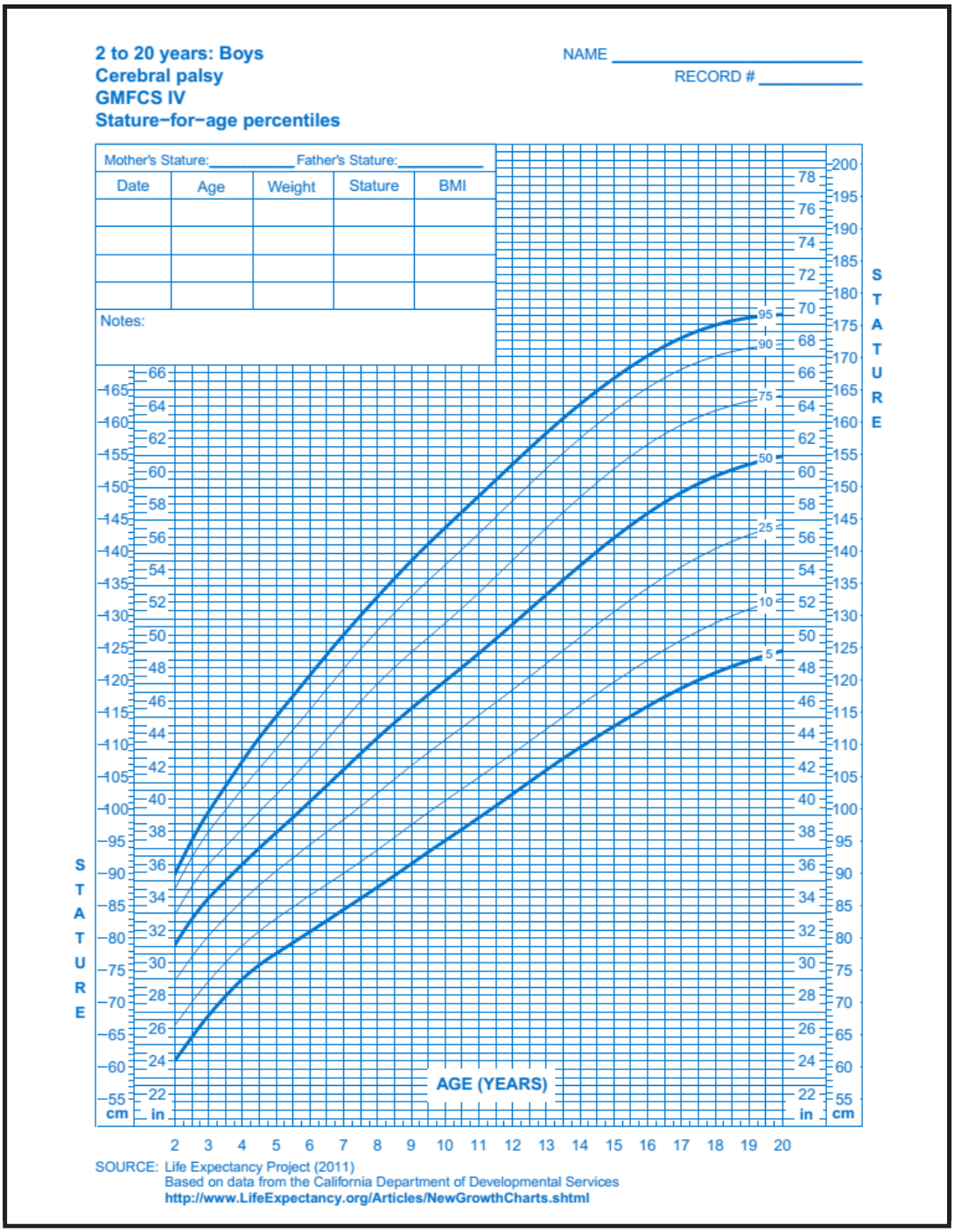
F10 (i) : Weight-for-age percentiles (Boys)



F10 (ii) : Weight-for-age percentiles (Girls)



F11 (i) : Stature-for-age percentiles (Boys)



F11 (ii) : Stature-for-age percentiles (Girls)

2 to 20 years: Girls
Cerebral palsy
GMFCS IV
Stature–for–age percentiles

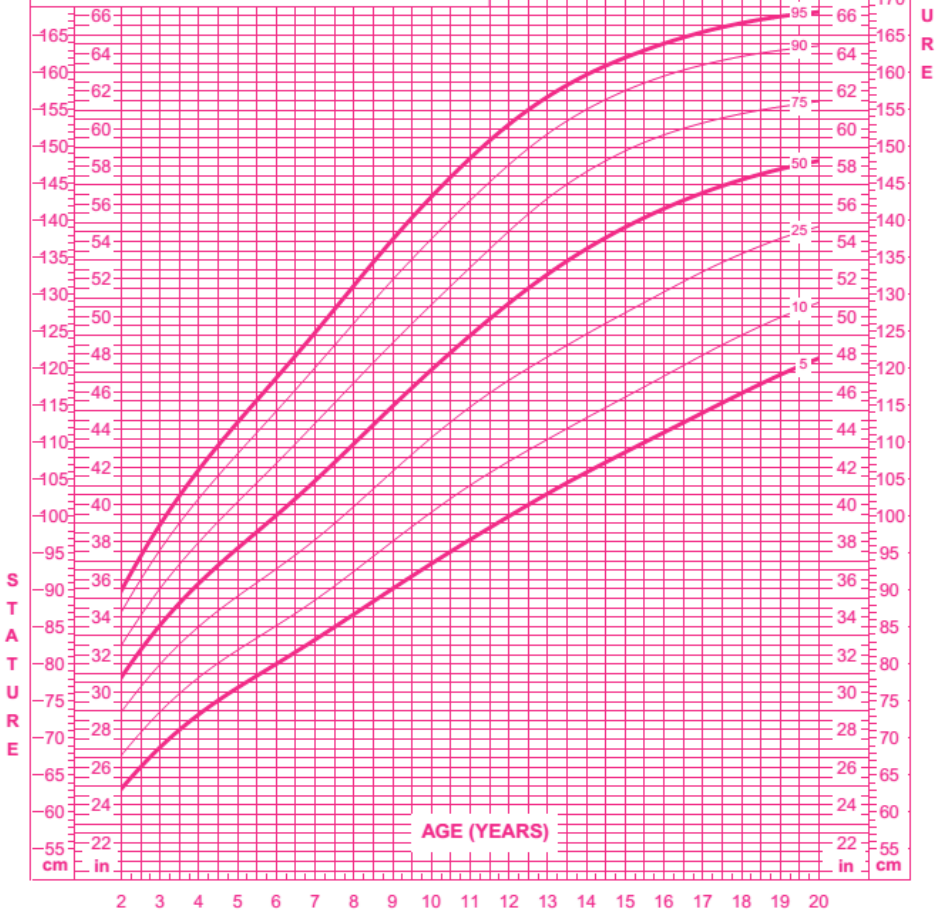
NAME _____

RECORD # _____

Mother's Stature:_____ Father's Stature:_____

Date	Age	Weight	Stature	BMI

Notes:



SOURCE: Life Expectancy Project (2011)
Based on data from the California Department of Developmental Services
http://www.LifeExpectancy.org/Articles/NewGrowthCharts.shtml

F12 (i) : BMI-for-age percentiles (Boys)

2 to 20 years: Boys
Cerebral palsy
GMFCS IV
BMI–for–age percentiles

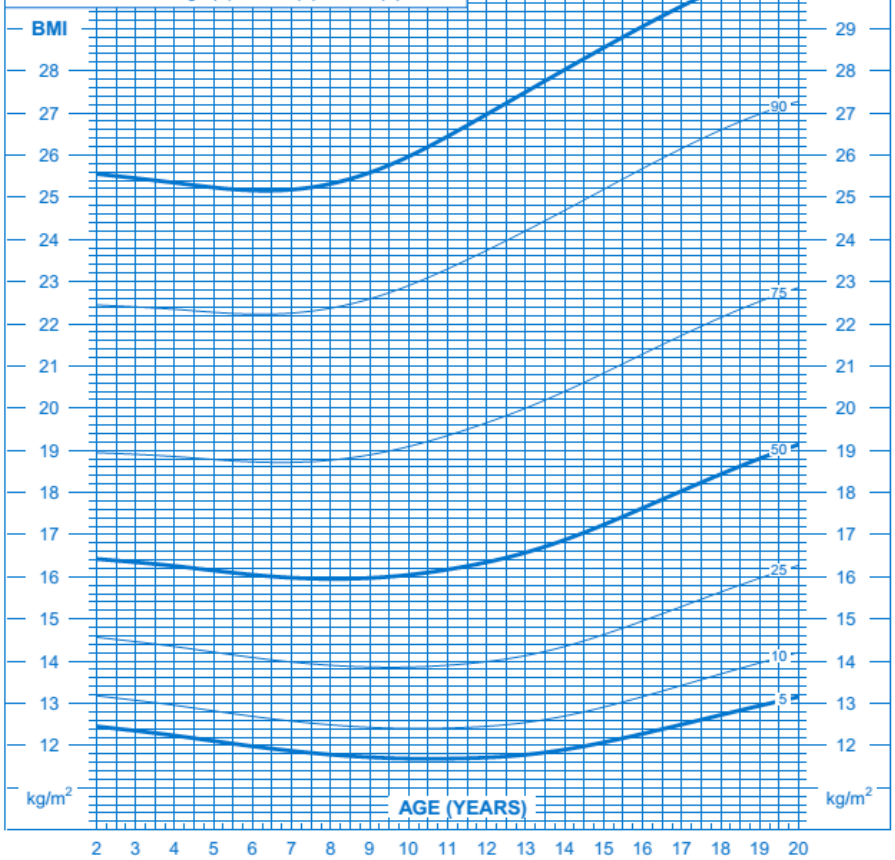
NAME _____
RECORD # _____

Mother's Stature:_____ Father's Stature:_____

Date	Age	Weight	Stature	BMI*

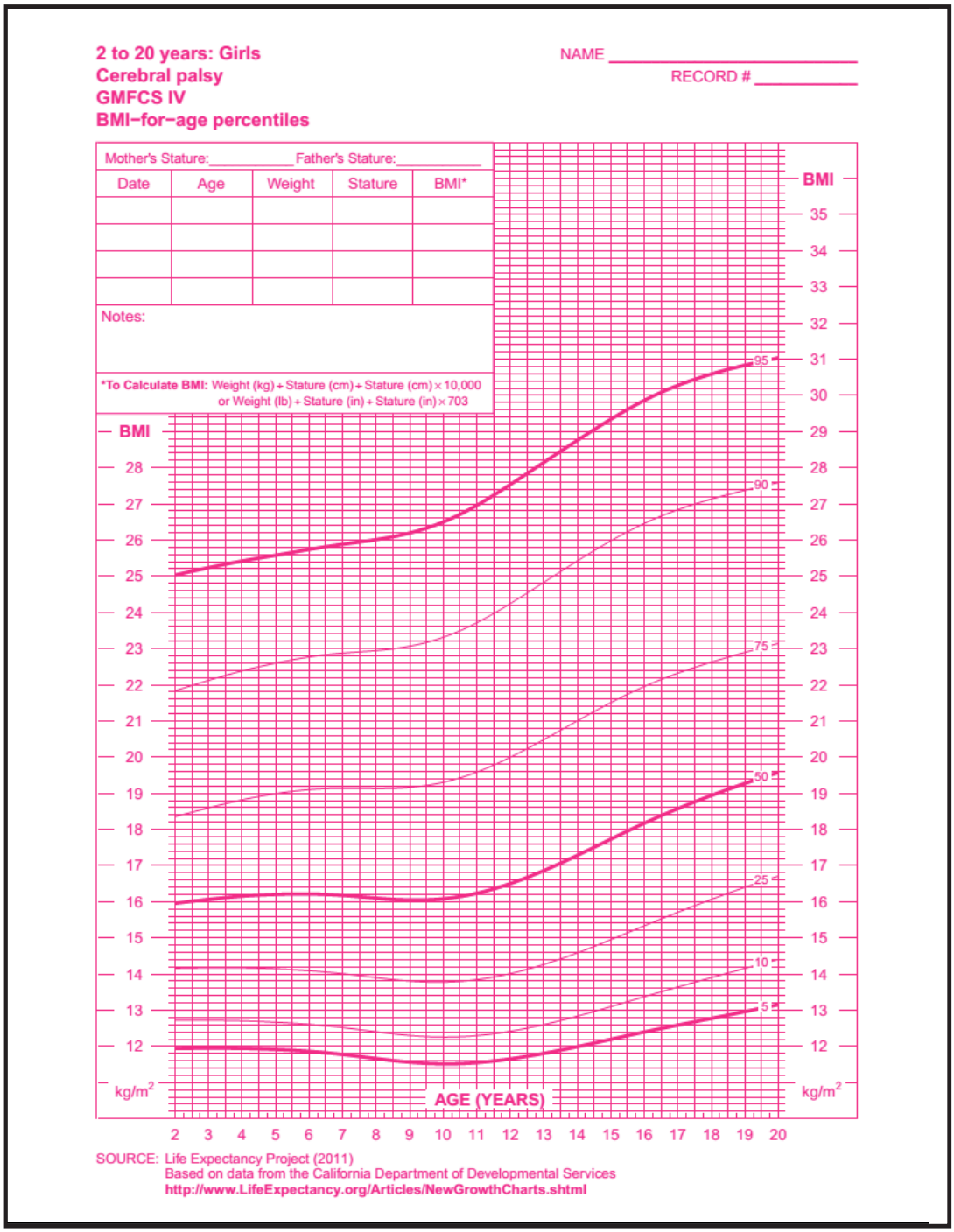
Notes:

*To Calculate BMI: Weight (kg) + Stature (cm) + Stature (cm) × 10,000
or Weight (lb) + Stature (in) + Stature (in) × 703

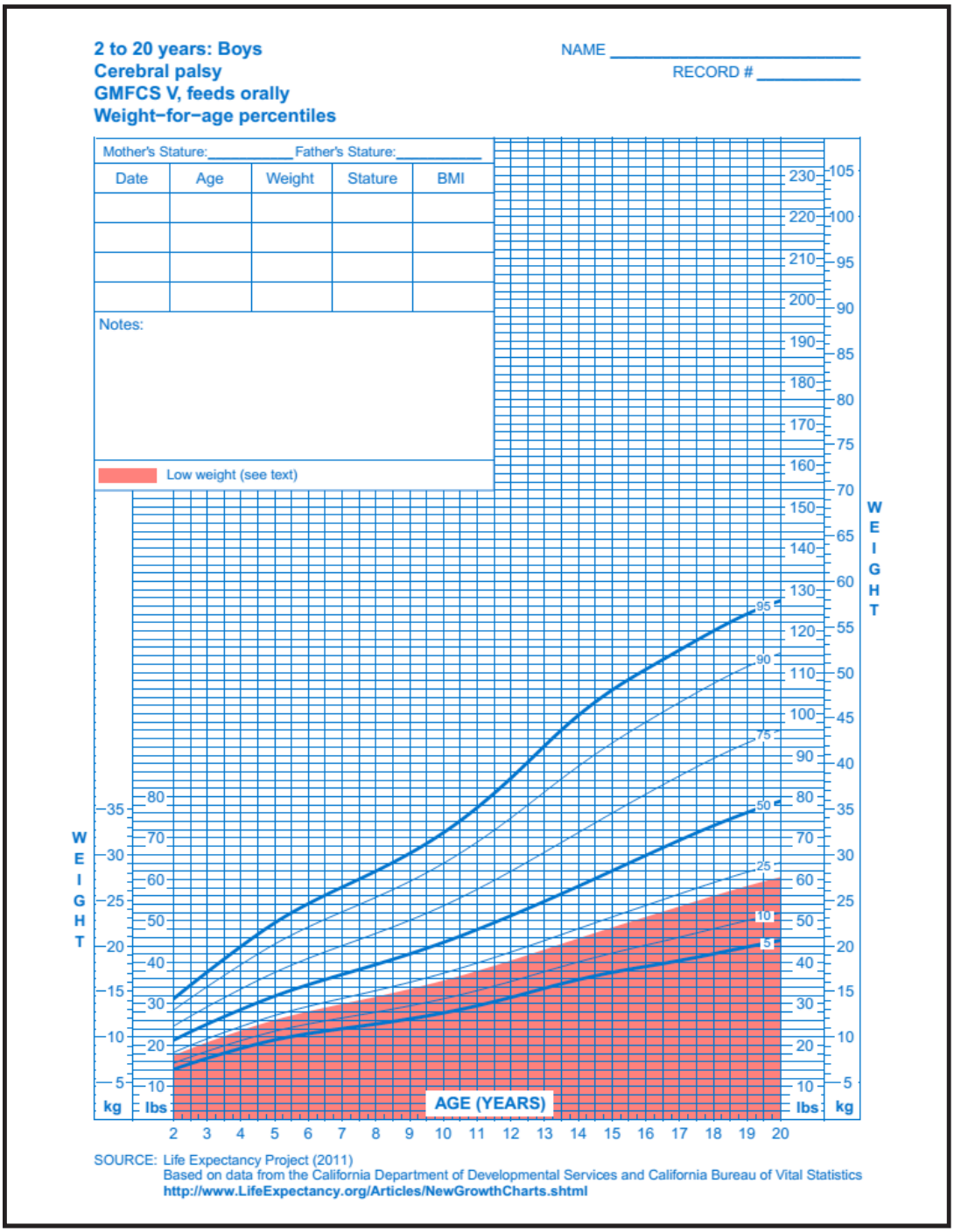


SOURCE: Life Expectancy Project (2011)
Based on data from the California Department of Developmental Services
http://www.LifeExpectancy.org/Articles/NewGrowthCharts.shtml

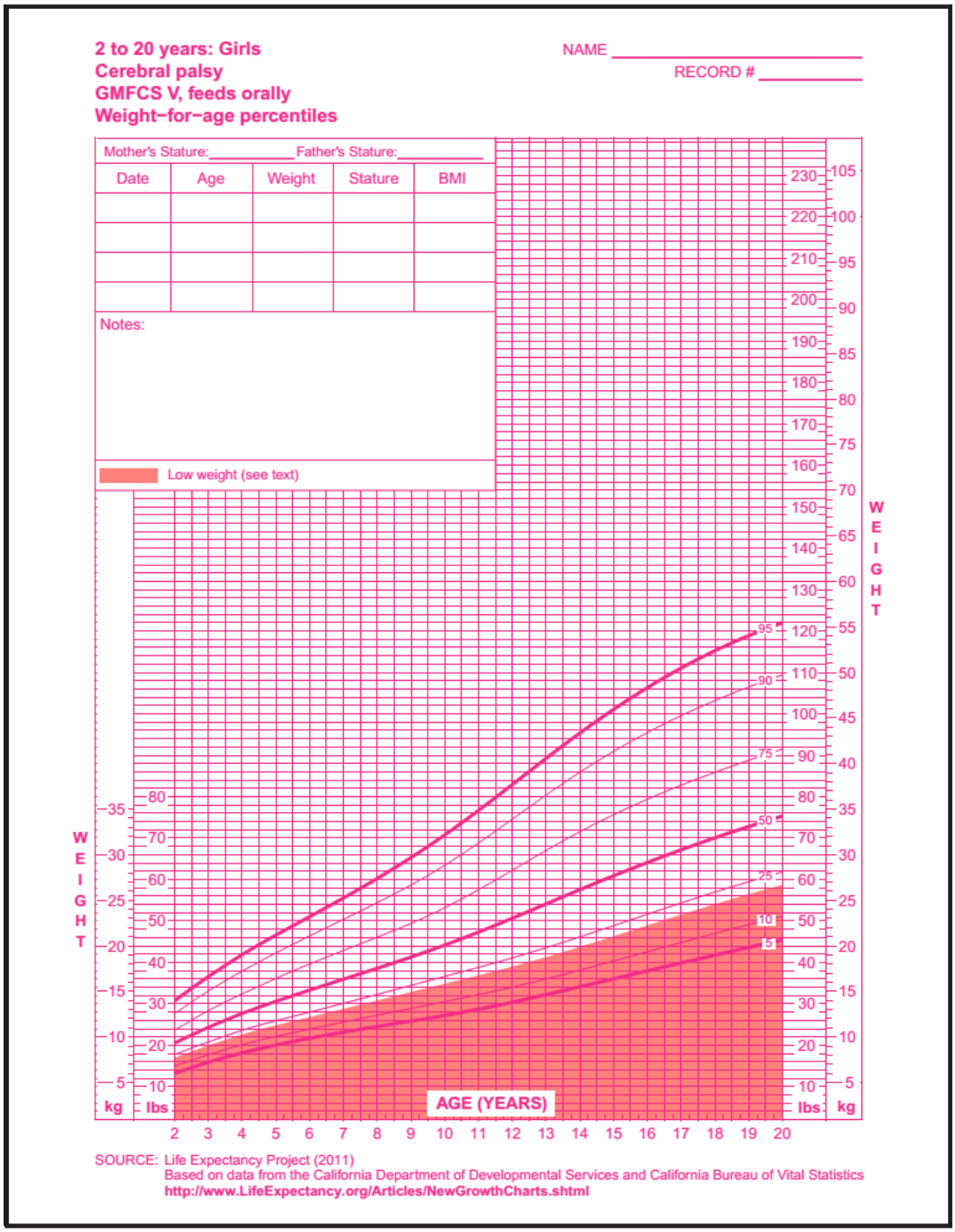
F12 (ii) : BMI-for-age percentiles (Girls)



F13 (i) : Weight-for-age percentiles (Boys)



F13 (ii) : Weight-for-age percentiles (Girls)



F14 (i) : Stature-for-age percentiles (Boys)

2 to 20 years: Boys
Cerebral palsy
GMFCS V, feeds orally
Stature–for–age percentiles

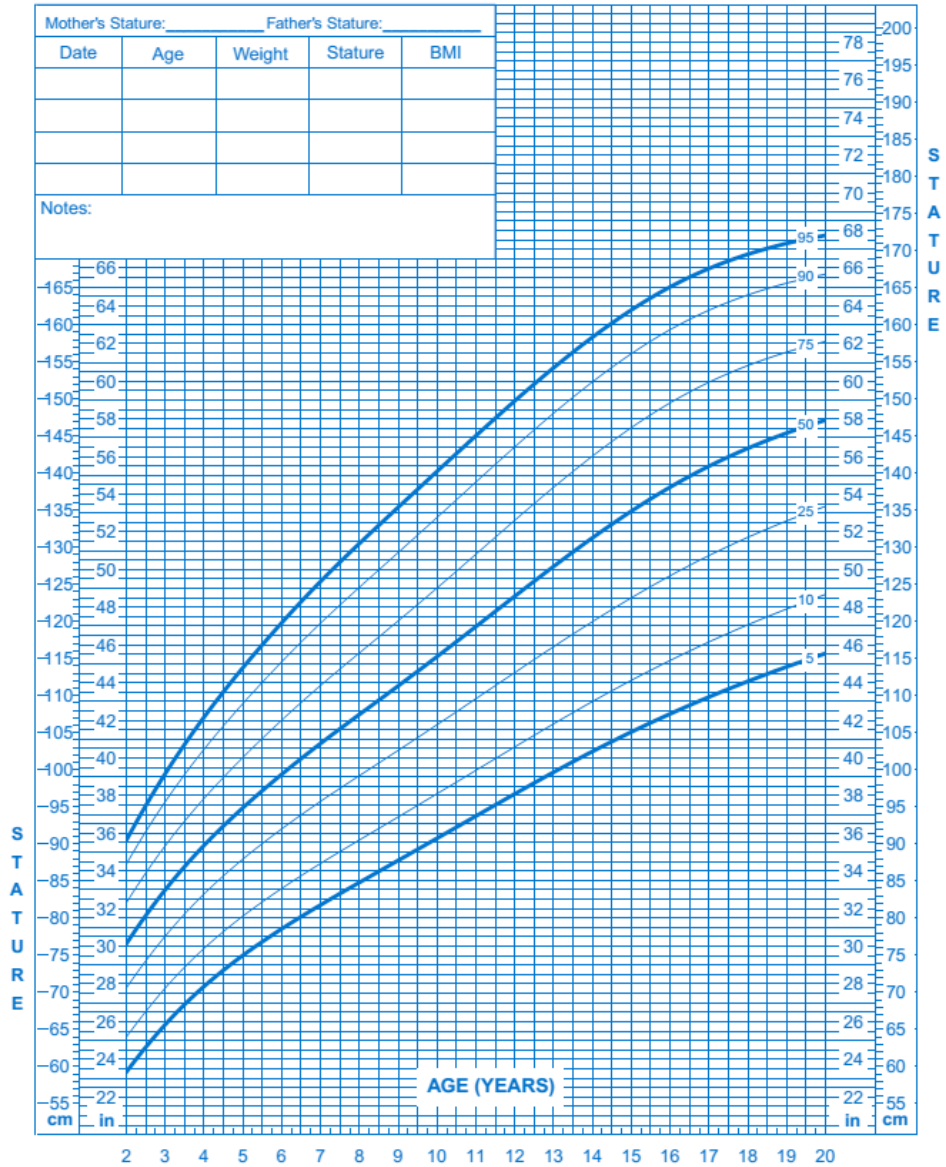
NAME _____

RECORD # _____

Mother's Stature:_____ Father's Stature:_____

Date	Age	Weight	Stature	BMI

Notes:



SOURCE: Life Expectancy Project (2011)
Based on data from the California Department of Developmental Services
http://www.LifeExpectancy.org/Articles/NewGrowthCharts.shtml

F14 (ii) : Stature-for-age percentiles (Girls)

2 to 20 years: Girls
Cerebral palsy
GMFCS V, feeds orally
Stature–for–age percentiles

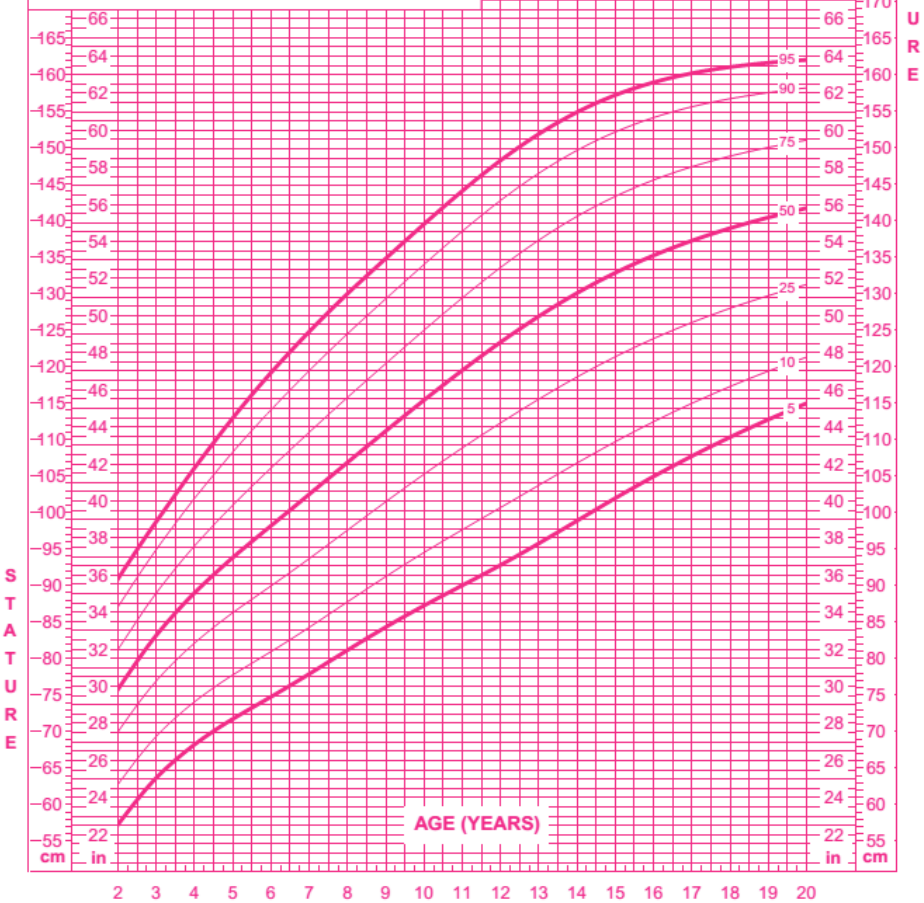
NAME _____

RECORD # _____

Mother's Stature:_____ Father's Stature:_____

Date	Age	Weight	Stature	BMI

Notes:



SOURCE: Life Expectancy Project (2011)
Based on data from the California Department of Developmental Services
http://www.LifeExpectancy.org/Articles/NewGrowthCharts.shtml

F15 (i) : BMI-for-age percentiles (Boys)

2 to 20 years: Boys
Cerebral palsy
GMFCS V, feeds orally
BMI–for–age percentiles

NAME _____

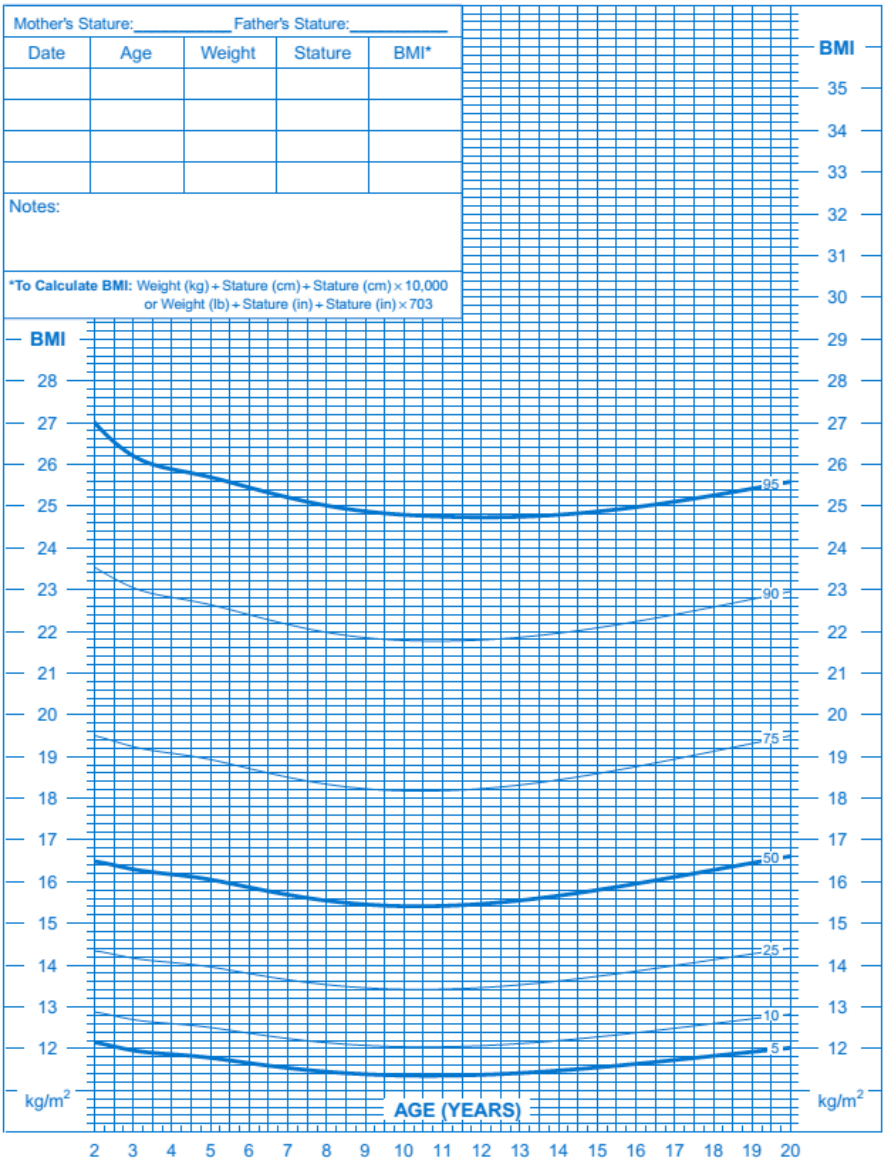
RECORD # _____

Mother's Stature:_____ Father's Stature:_____

Date	Age	Weight	Stature	BMI*

Notes:

***To Calculate BMI:** Weight (kg) ÷ Stature (cm) ÷ Stature (cm) × 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) × 703



SOURCE: Life Expectancy Project (2011)
Based on data from the California Department of Developmental Services
http://www.LifeExpectancy.org/Articles/NewGrowthCharts.shtml

F15 (ii) : BMI-for-age percentiles (Girls)

2 to 20 years: Girls
Cerebral palsy
GMFCS V, feeds orally
BMI–for–age percentiles

NAME _____

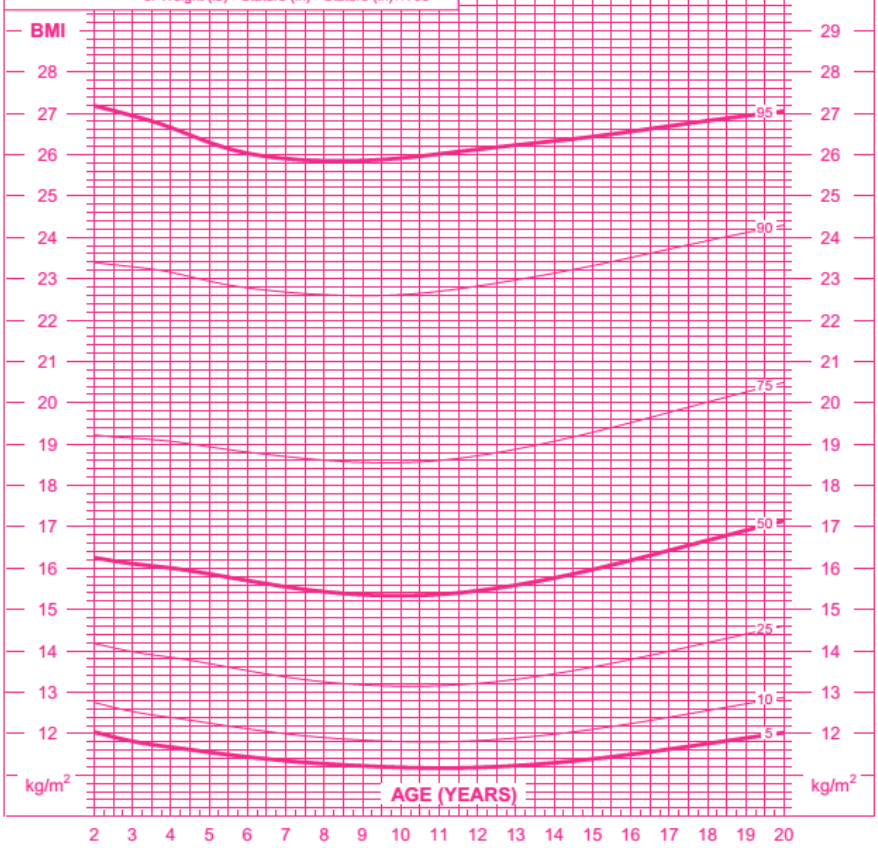
RECORD # _____

Mother's Stature:_____ Father's Stature:_____

Date	Age	Weight	Stature	BMI*

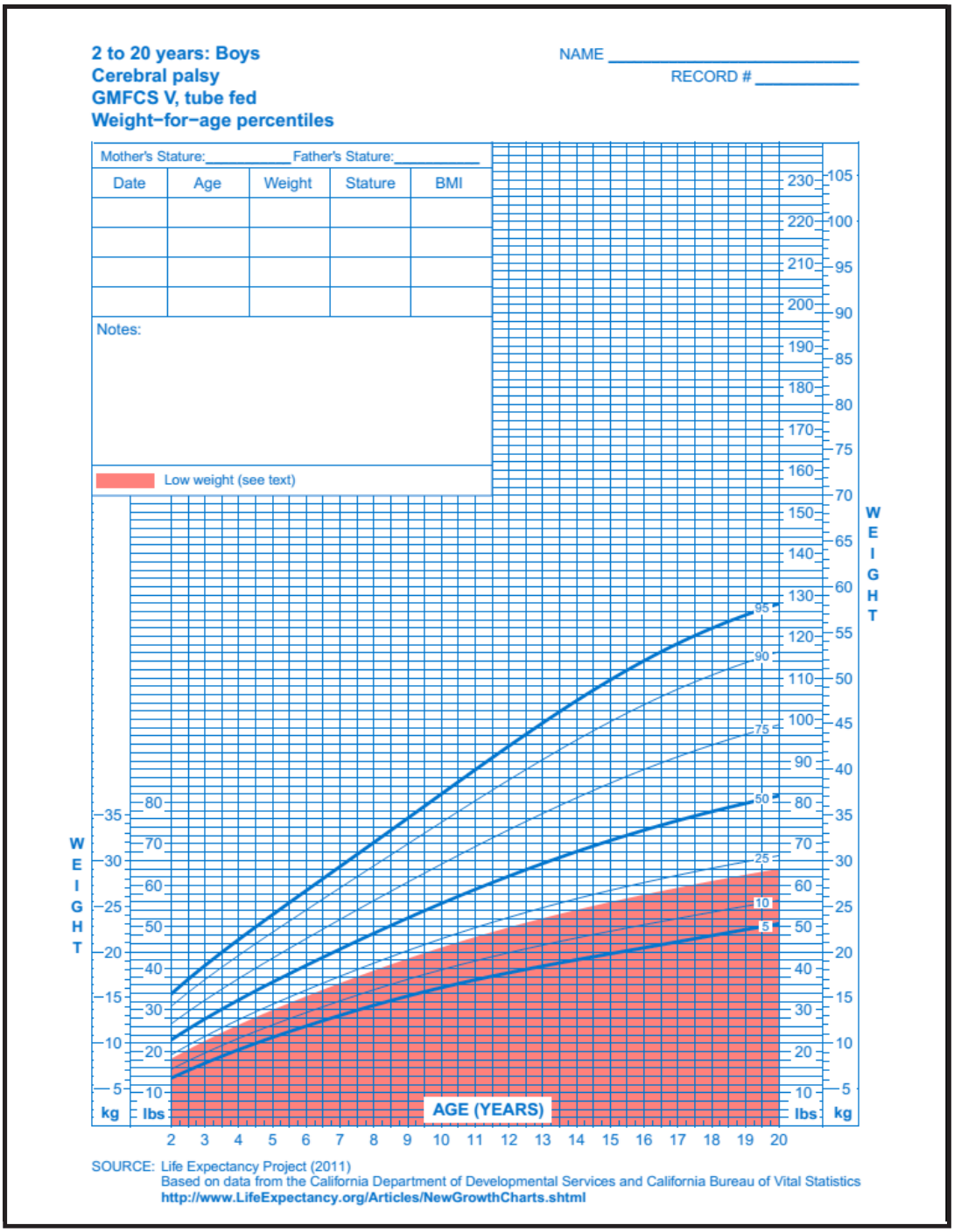
Notes:

***To Calculate BMI:** Weight (kg) ÷ Stature (cm) ÷ Stature (cm) × 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) × 703

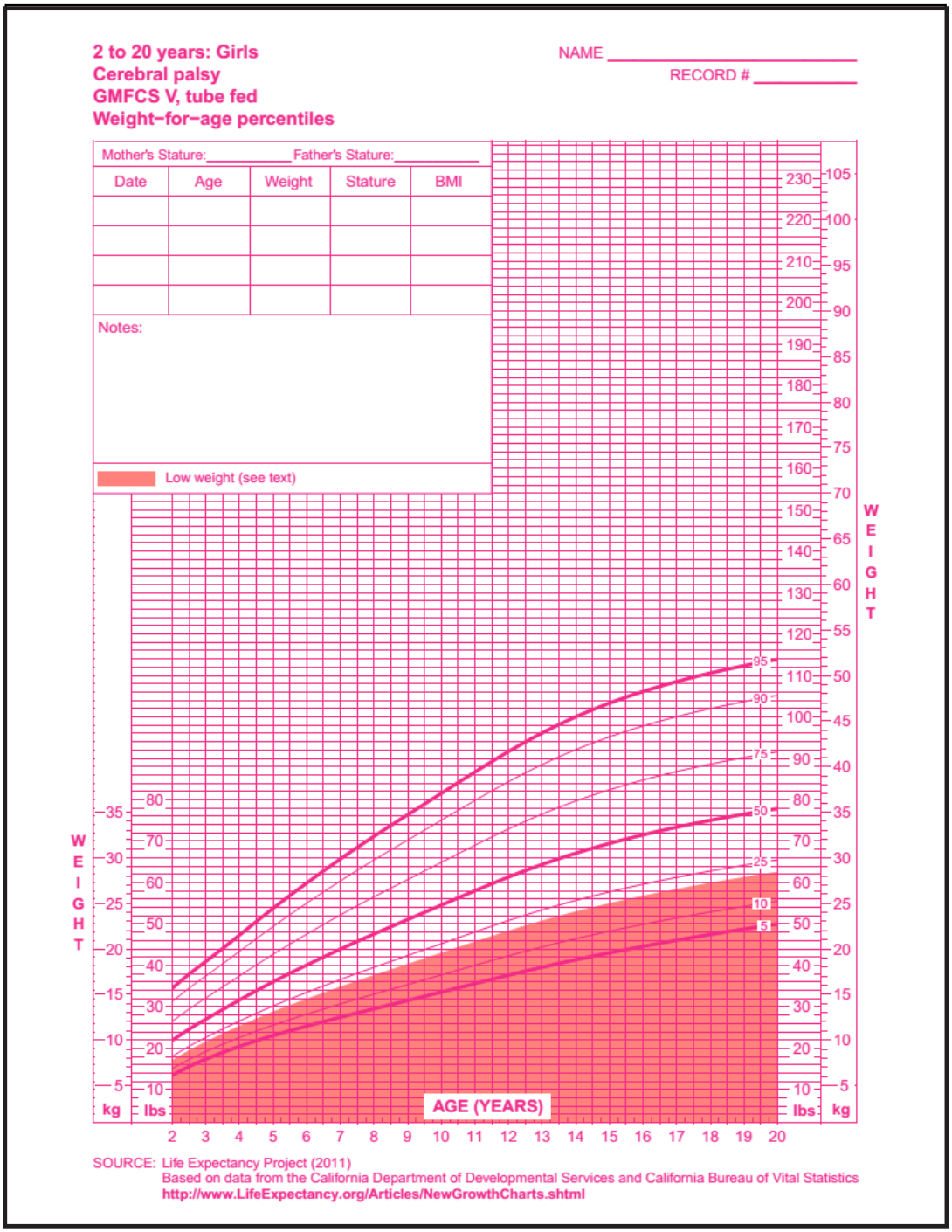


SOURCE: Life Expectancy Project (2011)
Based on data from the California Department of Developmental Services
http://www.LifeExpectancy.org/Articles/NewGrowthCharts.shtml

F16 (i) : Weight-for-age percentiles (Boys)



F16 (ii) : Weight-for-age percentiles (Girls)



F17 (i) : Stature-for-age percentiles (Boys)

2 to 20 years: Boys
Cerebral palsy
GMFCS V, tube fed
Stature–for–age percentiles

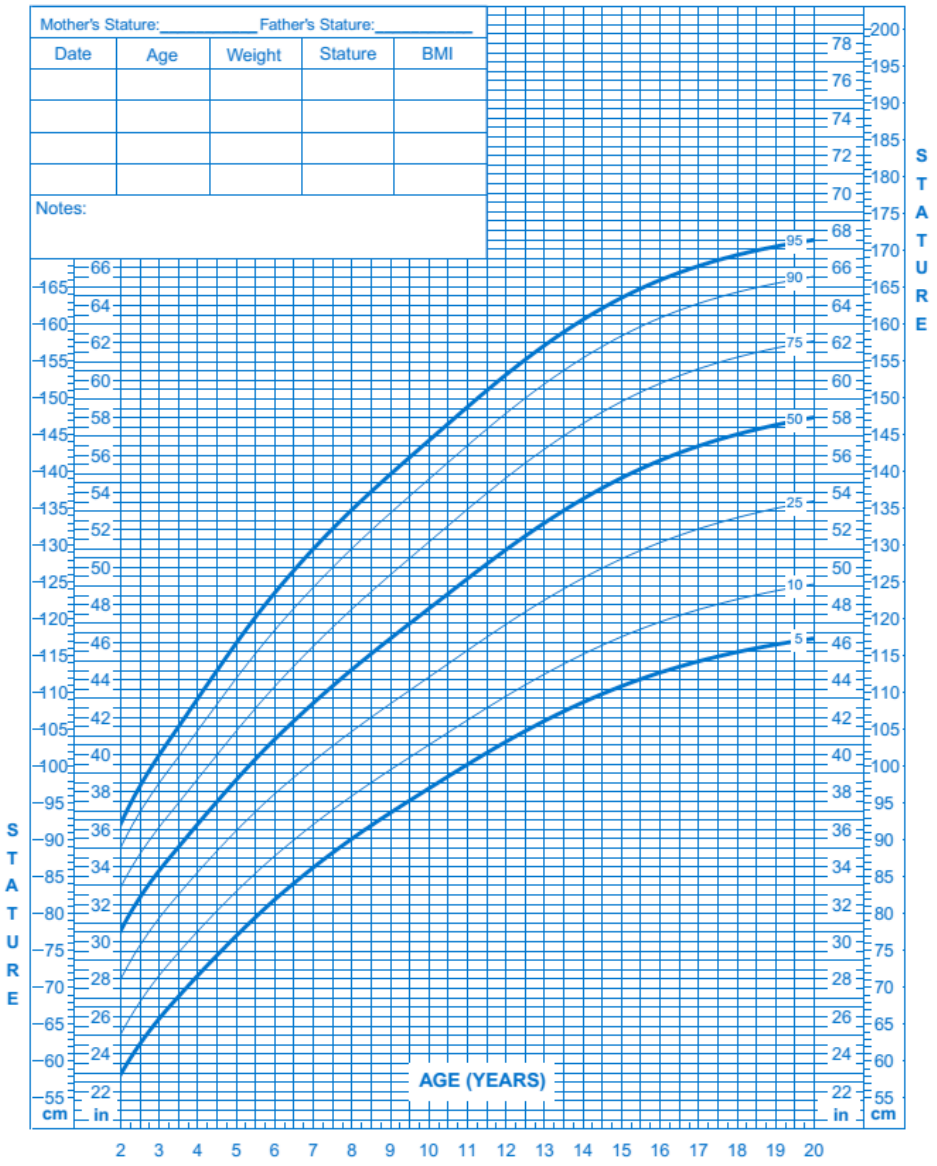
NAME _____

RECORD # _____

Mother's Stature:_____ Father's Stature:_____

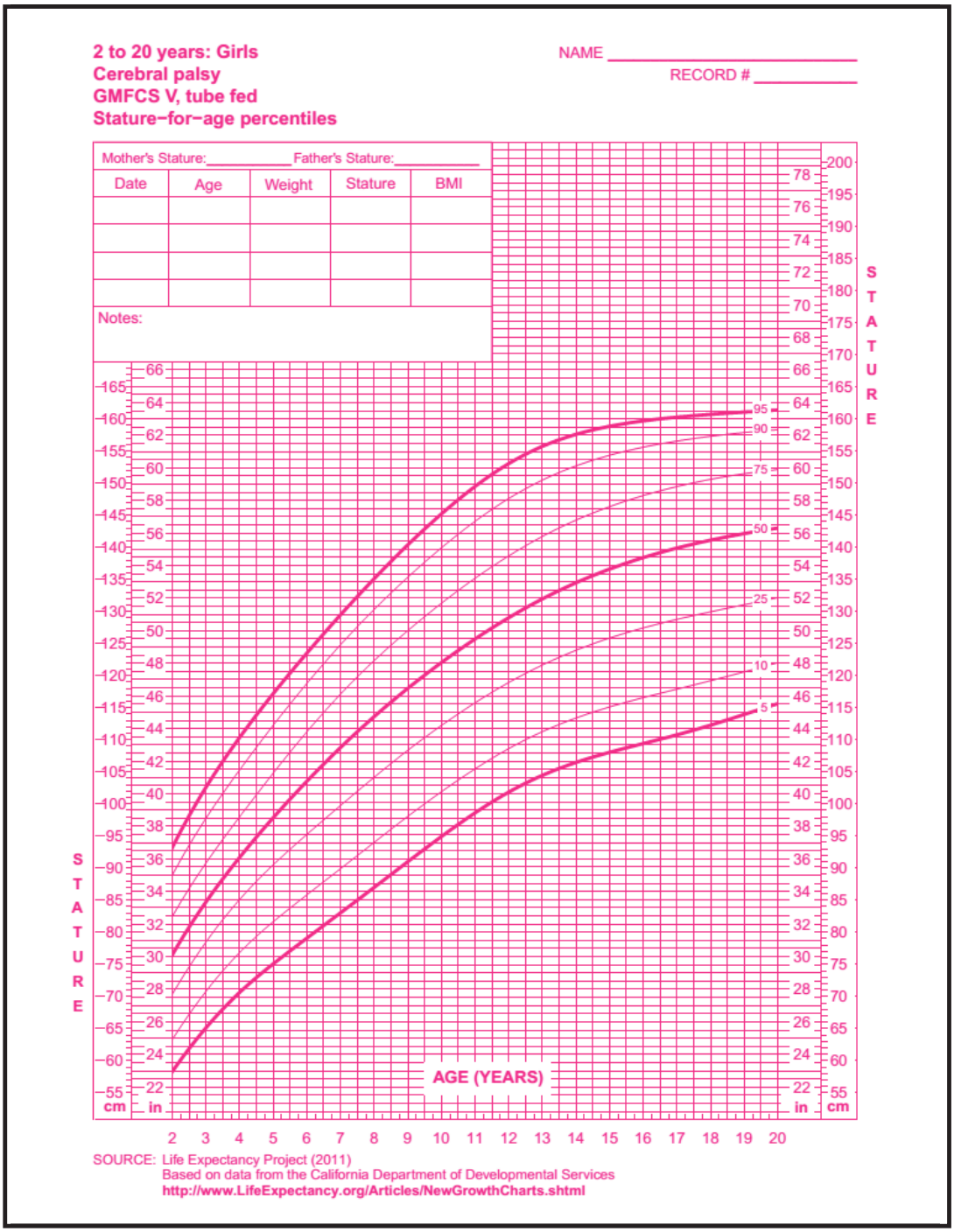
Date	Age	Weight	Stature	BMI

Notes:



SOURCE: Life Expectancy Project (2011)
Based on data from the California Department of Developmental Services
http://www.LifeExpectancy.org/Articles/NewGrowthCharts.shtml

F17 (ii) : Stature-for-age percentiles (Girls)



F18 (i) : BMI-for-age percentiles (Boys)

2 to 20 years: Boys
Cerebral palsy
GMFCS V, tube fed
BMI–for–age percentiles

NAME _____

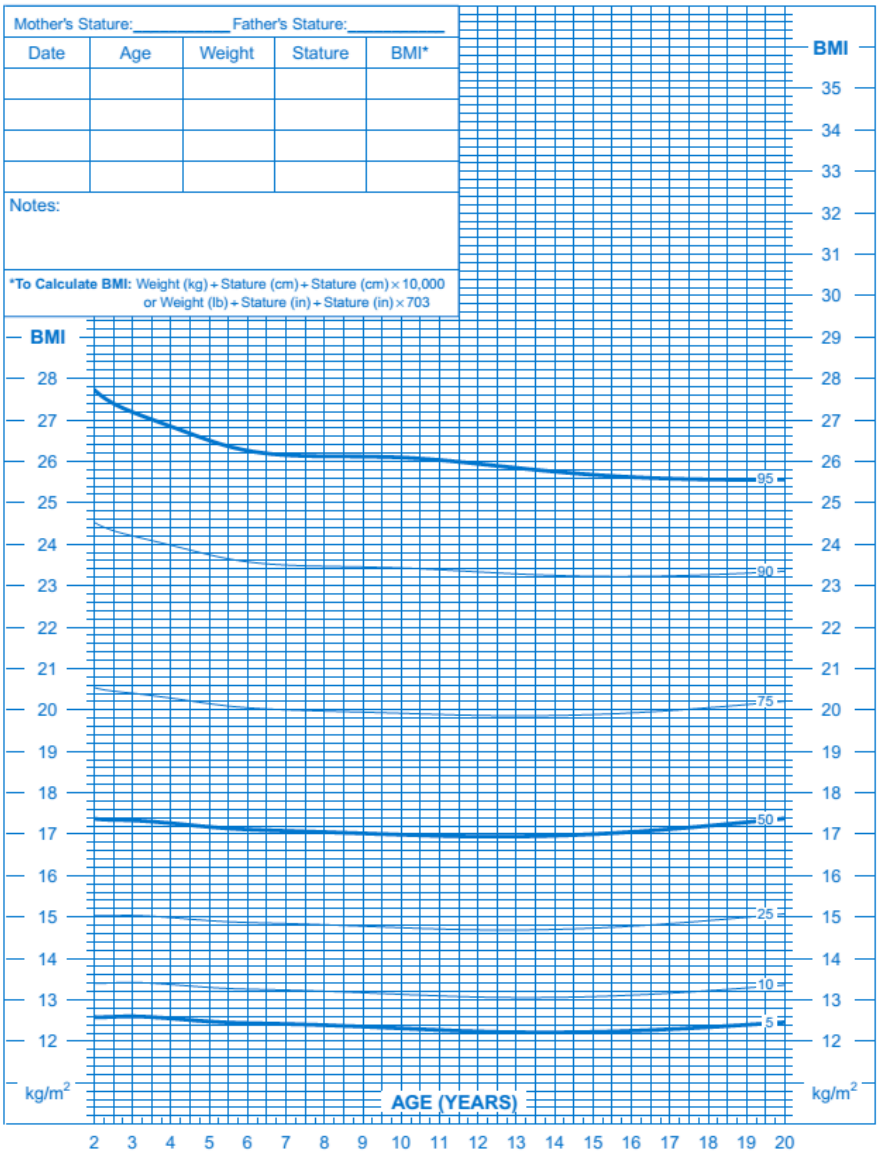
RECORD # _____

Mother's Stature:_____ Father's Stature:_____

Date	Age	Weight	Stature	BMI*

Notes:

*To Calculate BMI: Weight (kg) ÷ Stature (cm) ÷ Stature (cm) × 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) × 703



SOURCE: Life Expectancy Project (2011)
Based on data from the California Department of Developmental Services
http://www.LifeExpectancy.org/Articles/NewGrowthCharts.shtml

F18 (ii) : BMI-for-age percentiles (Girls)

2 to 20 years: Girls
Cerebral palsy
GMFCS V, tube fed
BMI–for–age percentiles

NAME _____

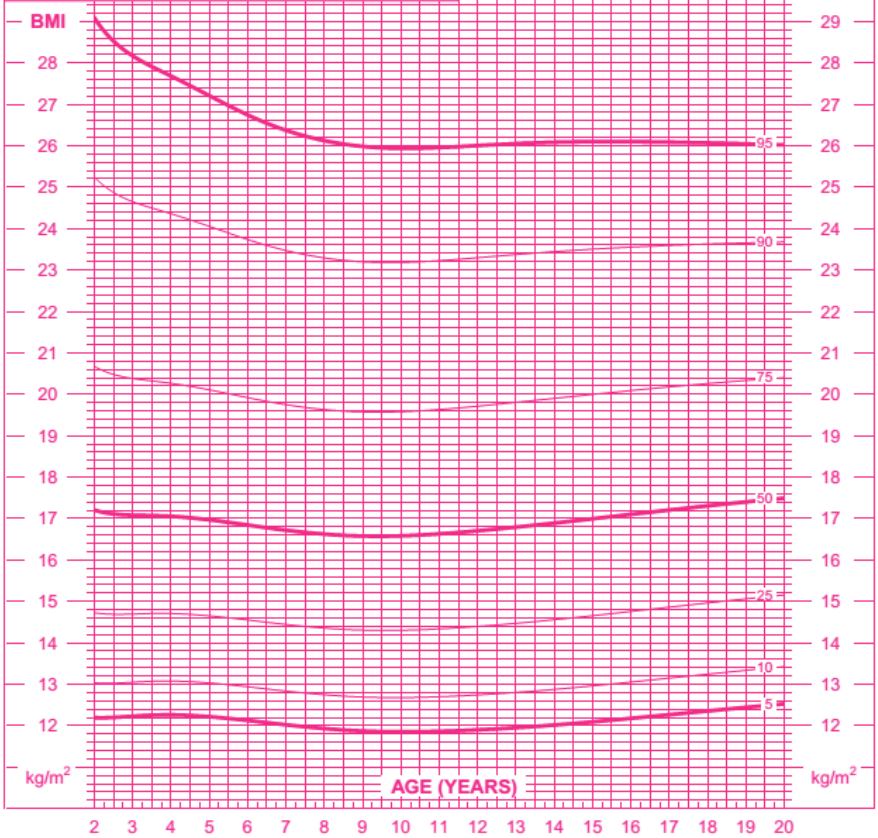
RECORD # _____

Mother's Stature:_____ Father's Stature:_____

Date	Age	Weight	Stature	BMI*

Notes:

***To Calculate BMI:** Weight (kg) ÷ Stature (cm) ÷ Stature (cm) × 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) × 703



SOURCE: Life Expectancy Project (2011)
Based on data from the California Department of Developmental Services
http://www.LifeExpectancy.org/Articles/NewGrowthCharts.shtml

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GMFCS – E & R
Gross Motor Function Classification System
Expanded and Revised

(Reference: Dev Med Child Neurol 1997;39:214-223)

INTRODUCTION & USER INSTRUCTIONS

The Gross Motor Function Classification System (GMFCS) for cerebral palsy is based on self-initiated movement, with emphasis on sitting, transfers, and mobility. When defining a five-level classification system, our primary criterion has been that the distinctions between levels must be meaningful in daily life. Distinctions are based on functional limitations, the need for hand-held mobility devices (such as walkers, crutches, or canes) or wheeled mobility, and to a much lesser extent, quality of movement. The distinctions between Levels I and II are not as pronounced as the distinctions between the other levels, particularly for infants less than 2 years of age.

The expanded GMFCS (2007) includes an age band for youth 12 to 18 years of age and emphasizes the concepts inherent in the World Health Organization's International Classification of Functioning, Disability and Health (ICF). We encourage users to be aware of the impact that **environmental** and **personal** factors may have on what children and youth are observed or reported to do. The focus of the GMFCS is on determining which level best represents the **child's or youth's present abilities and limitations in gross motor function**. Emphasis is on usual **performance** in home, school, and community settings (i.e., what they do), rather than what they are known to be able to do at their best (capability). It is therefore important to classify current performance in gross motor function and not to include judgments about the quality of movement or prognosis for improvement.

The title for each level is the method of mobility that is most characteristic of performance after 6 years of age. The descriptions of functional abilities and limitations for each age band are broad and are not intended to describe all aspects of the function of individual children/youth. For example, an infant with hemiplegia who is unable to crawl on his or her hands and knees, but otherwise fits the description of Level I (i.e., can pull to stand and walk), would be classified in Level I. The scale is ordinal, with no intent that the distances between levels be considered equal or that children and youth with cerebral palsy are equally distributed across the five levels. A summary of the distinctions between each pair of levels is provided to assist in determining the level that most closely resembles a child's/youth's current gross motor function.

We recognize that the manifestations of gross motor function are dependent on age, especially during infancy and early childhood. For each level, separate descriptions are provided in several age bands. Children below age 2 should be considered at their corrected age if they were premature. The descriptions for the 6 to 12 year and 12 to18 year age bands reflect the potential impact of environment factors (e.g., distances in school and community) and personal factors (e.g., energy demands and social preferences) on methods of mobility.

An effort has been made to emphasize abilities rather than limitations. Thus, as a general principle, the gross motor function of children and youth who are able to perform the functions described in any particular level will probably be classified at or above that level of function; in contrast, the gross motor function of children and youth who cannot perform the functions of a particular level should be classified below that level of function.

OPERATIONAL DEFINITIONS

Body support walker – A mobility device that supports the pelvis and trunk. The child/youth is physically positioned in the walker by another person.

Hand-held mobility device – Canes, crutches, and anterior and posterior walkers that do not support the trunk during walking.

Physical assistance – Another person manually assists the child/youth to move.

Powered mobility – The child/youth actively controls the joystick or electrical switch that enables independent mobility. The mobility base may be a wheelchair, scooter or other type of powered mobility device.

Self-propels manual wheelchair – The child/youth actively uses arms and hands or feet to propel the wheels and move.

Transported – A person manually pushes a mobility device (e.g., wheelchair, stroller, or pram) to move the child/youth from one place to another.

Walks – Unless otherwise specified indicates no physical assistance from another person or any use of a hand-held mobility device. An orthosis (i.e., brace or splint) may be worn.

Wheeled mobility – Refers to any type of device with wheels that enables movement (e.g., stroller, manual wheelchair, or powered wheelchair).

GENERAL HEADINGS FOR EACH LEVEL

LEVEL I	-	Walks without Limitations
LEVEL II	-	Walks with Limitations
LEVEL III	-	Walks Using a Hand-Held Mobility Device
LEVEL IV	-	Self-Mobility with Limitations; May Use Powered Mobility
LEVEL V	-	Transported in a Manual Wheelchair

DISTINCTIONS BETWEEN LEVELS

Distinctions Between Levels I and II - Compared with children and youth in Level I, children and youth in Level II have limitations walking long distances and balancing; may need a hand-held mobility device when first learning to walk; may use wheeled mobility when traveling long distances outdoors and in the community; require the use of a railing to walk up and down stairs; and are not as capable of running and jumping.

Distinctions Between Levels II and III - Children and youth in Level II are capable of walking without a hand-held mobility device after age 4 (although they may choose to use one at times). Children and youth in Level III need a hand-held mobility device to walk indoors and use wheeled mobility outdoors and in the community.

Distinctions Between Levels III and IV - Children and youth in Level III sit on their own or require at most limited external support to sit, are more independent in standing transfers, and walk with a hand-held mobility device. Children and youth in Level IV function in sitting (usually supported) but self-mobility is limited. Children and youth in Level IV are more likely to be transported in a manual wheelchair or use powered mobility.

Distinctions Between Levels IV and V - Children and youth in Level V have severe limitations in head and trunk control and require extensive assisted technology and physical assistance. Self-mobility is achieved only if the child/youth can learn how to operate a powered wheelchair.

Gross Motor Function Classification System – Expanded and Revised (GMFCS – E & R)

BEFORE 2ND BIRTHDAY

LEVEL I: Infants move in and out of sitting and floor sit with both hands free to manipulate objects. Infants crawl on hands and knees, pull to stand and take steps holding on to furniture. Infants walk between 18 months and 2 years of age without the need for any assistive mobility device.

LEVEL II: Infants maintain floor sitting but may need to use their hands for support to maintain balance. Infants creep on their stomach or crawl on hands and knees. Infants may pull to stand and take steps holding on to furniture.

LEVEL III: Infants maintain floor sitting when the low back is supported. Infants roll and creep forward on their stomachs.

LEVEL IV: Infants have head control but trunk support is required for floor sitting. Infants can roll to supine and may roll to prone.

LEVEL V: Physical impairments limit voluntary control of movement. Infants are unable to maintain antigravity head and trunk postures in prone and sitting. Infants require adult assistance to roll.

BETWEEN 2ND AND 4TH BIRTHDAY

LEVEL I: Children floor sit with both hands free to manipulate objects. Movements in and out of floor sitting and standing are performed without adult assistance. Children walk as the preferred method of mobility without the need for any assistive mobility device.

LEVEL II: Children floor sit but may have difficulty with balance when both hands are free to manipulate objects. Movements in and out of sitting are performed without adult assistance. Children pull to stand on a stable surface. Children crawl on hands and knees with a reciprocal pattern, cruise holding onto furniture and walk using an assistive mobility device as preferred methods of mobility.

LEVEL III: Children maintain floor sitting often by "W-sitting" (sitting between flexed and internally rotated hips and knees) and may require adult assistance to assume sitting. Children creep on their stomach or crawl on hands and knees (often without reciprocal leg movements) as their primary methods of self-mobility. Children may pull to stand on a stable surface and cruise short distances. Children may walk short distances indoors using a hand-held mobility device (walker) and adult assistance for steering and turning.

LEVEL IV: Children floor sit when placed, but are unable to maintain alignment and balance without use of their hands for support. Children frequently require adaptive equipment for sitting and standing. Self-mobility for short distances (within a room) is achieved through rolling, creeping on stomach, or crawling on hands and knees without reciprocal leg movement.

LEVEL V: Physical impairments restrict voluntary control of movement and the ability to maintain antigravity head and trunk postures. All areas of motor function are limited. Functional limitations in sitting and standing are not fully compensated for through the use of adaptive equipment and assistive technology. At Level V, children have no means of independent movement and are transported. Some children achieve self-mobility using a powered wheelchair with extensive adaptations.

BETWEEN 4TH AND 6TH BIRTHDAY

LEVEL I: Children get into and out of, and sit in, a chair without the need for hand support. Children move from the floor and from chair sitting to standing without the need for objects for support. Children walk indoors and outdoors, and climb stairs. Emerging ability to run and jump.

LEVEL II: Children sit in a chair with both hands free to manipulate objects. Children move from the floor to standing and from chair sitting to standing but often require a stable surface to push or pull up on with their arms. Children walk without the need for a hand-held mobility device indoors and for short distances on level surfaces outdoors. Children climb stairs holding onto a railing but are unable to run or jump.

LEVEL III: Children sit on a regular chair but may require pelvic or trunk support to maximize hand function. Children move in and out of chair sitting using a stable surface to push on or pull up with their arms. Children walk with a hand-held mobility device on level surfaces and climb stairs with assistance from an adult. Children frequently are transported when traveling for long distances or outdoors on uneven terrain.

LEVEL IV: Children sit on a chair but need adaptive seating for trunk control and to maximize hand function. Children move in and out of chair sitting with assistance from an adult or a stable surface to push or pull up on with their arms. Children may at best walk short distances with a walker and adult supervision but have difficulty turning and maintaining balance on uneven surfaces. Children are transported in the community. Children may achieve self-mobility using a powered wheelchair.

LEVEL V: Physical impairments restrict voluntary control of movement and the ability to maintain antigravity head and trunk postures. All areas of motor function are limited. Functional limitations in sitting and standing are not fully compensated for through the use of adaptive equipment and assistive technology. At Level V, children have no means of independent movement and are transported. Some children achieve self-mobility using a powered wheelchair with extensive adaptations.

BETWEEN 6TH AND 12TH BIRTHDAY

Level I: Children walk at home, school, outdoors, and in the community. Children are able to walk up and down curbs without physical assistance and stairs without the use of a railing. Children perform gross motor skills such as running and jumping but speed, balance, and coordination are limited. Children may participate in physical activities and sports depending on personal choices and environmental factors.

Level II: Children walk in most settings. Children may experience difficulty walking long distances and balancing on uneven terrain, inclines, in crowded areas, confined spaces or when carrying objects. Children walk up and down stairs holding onto a railing or with physical assistance if there is no railing. Outdoors and in the community, children may walk with physical assistance, a hand-held mobility device, or use wheeled mobility when traveling long distances. Children have at best only minimal ability to perform gross motor skills such as running and jumping. Limitations in performance of gross motor skills may necessitate adaptations to enable participation in physical activities and sports.

Level III: Children walk using a hand-held mobility device in most indoor settings. When seated, children may require a seat belt for pelvic alignment and balance. Sit-to-stand and floor-to-stand transfers require physical assistance of a person or support surface. When traveling long distances, children use some form of wheeled mobility. Children may walk up and down stairs holding onto a railing with supervision or physical assistance. Limitations in walking may necessitate adaptations to enable participation in physical activities and sports including self-propelling a manual wheelchair or powered mobility.

Level IV: Children use methods of mobility that require physical assistance or powered mobility in most settings. Children require adaptive seating for trunk and pelvic control and physical assistance for most transfers. At home, children use floor mobility (roll, creep, or crawl), walk short distances with physical assistance, or use powered mobility. When positioned, children may use a body support walker at home or school. At school, outdoors, and in the community, children are transported in a manual wheelchair or use powered mobility. Limitations in mobility necessitate adaptations to enable participation in physical activities and sports, including physical assistance and/or powered mobility.

Level V: Children are transported in a manual wheelchair in all settings. Children are limited in their ability to maintain antigravity head and trunk postures and control arm and leg movements. Assistive technology is used to improve head alignment, seating, standing, and and/or mobility but limitations are not fully compensated by equipment. Transfers require complete physical assistance of an adult. At home, children may move short distances on the floor or may be carried by an adult. Children may achieve self-mobility using powered mobility with extensive adaptations for seating and control access. Limitations in mobility necessitate adaptations to enable participation in physical activities and sports including physical assistance and using powered mobility.

BETWEEN 12TH AND 18TH BIRTHDAY

Level I: Youth walk at home, school, outdoors, and in the community. Youth are able to walk up and down curbs without physical assistance and stairs without the use of a railing. Youth perform gross motor skills such as running and jumping but speed, balance, and coordination are limited. Youth may participate in physical activities and sports depending on personal choices and environmental factors.

Level II: Youth walk in most settings. Environmental factors (such as uneven terrain, inclines, long distances, time demands, weather, and peer acceptability) and personal preference influence mobility choices. At school or work, youth may walk using a hand-held mobility device for safety. Outdoors and in the community, youth may use wheeled mobility when traveling long distances. Youth walk up and down stairs holding a railing or with physical assistance if there is no railing. Limitations in performance of gross motor skills may necessitate adaptations to enable participation in physical activities and sports.

Level III: Youth are capable of walking using a hand-held mobility device. Compared to individuals in other levels, youth in Level III demonstrate more variability in methods of mobility depending on physical ability and environmental and personal factors. When seated, youth may require a seat belt for pelvic alignment and balance. Sit-to-stand and floor-to-stand transfers require physical assistance from a person or support surface. At school, youth may self-propel a manual wheelchair or use powered mobility. Outdoors and in the community, youth are transported in a wheelchair or use powered mobility. Youth may walk up and down stairs holding onto a railing with supervision or physical assistance. Limitations in walking may necessitate adaptations to enable participation in physical activities and sports including self-propelling a manual wheelchair or powered mobility.

Level IV: Youth use wheeled mobility in most settings. Youth require adaptive seating for pelvic and trunk control. Physical assistance from 1 or 2 persons is required for transfers. Youth may support weight with their legs to assist with standing transfers. Indoors, youth may walk short distances with physical assistance, use wheeled mobility, or, when positioned, use a body support walker. Youth are physically capable of operating a powered wheelchair. When a powered wheelchair is not feasible or available, youth are transported in a manual wheelchair. Limitations in mobility necessitate adaptations to enable participation in physical activities and sports, including physical assistance and/or powered mobility.

Level V: Youth are transported in a manual wheelchair in all settings. Youth are limited in their ability to maintain antigravity head and trunk postures and control arm and leg movements. Assistive technology is used to improve head alignment, seating, standing, and mobility but limitations are not fully compensated by equipment. Physical assistance from 1 or 2 persons or a mechanical lift is required for transfers. Youth may achieve self-mobility using powered mobility with extensive adaptations for seating and control access. Limitations in mobility necessitate adaptations to enable participation in physical activities and sports including physical assistance and using powered mobility.

Adopted from: Palisano, Rosenbaum, Bartlett & Livingston (2007)

APPENDIX G

ASSESSMENT FORM FOR CHILDREN WITH SPECIAL NEEDS

(Format Penilaian Kanak-Kanak Dengan Keperluan Khas)

Code: KKK 2/03A

APPENDIX G

ASSESSMENT FORM FOR CHILDREN WITH SPECIAL NEEDS

CHILDREN BIODATA

NAME : .....

.....

GENDER : Male ☐ Female ☐

DATE OF BIRTH: ☐☐☐☐☐☐☐☐ (Day Month Year)

BIRTH CERTIFICATE/ NRIC NO.: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Child No. ☐☐

Residence Information

Postcode ☐☐☐☐☐

Address : .....

.....

Distance to health facilities from residence ☐☐☐ km

Transports : ☐ Own ☐ Public

CURRENT DIAGNOSIS

DIAGNOSIS	Date of diagnosis

HEALTH INFORMATION

PRENATAL

Risk Factor

- None ☐
- Diabetes ☐
- High Blood Pressure ☐
- Bleeding ☐
- Water breaks ≥ 24 hours ☐
- Infection during pregnancy ☐
- Others ☐

Specify .....

INTRANATAL

Full term : Yes ☐

No ☐ ..... weeks

Mode of Delivery : Normal ☐ Forcept ☐ Vacum ☐ LSCS ☐

Apgar Score : / 1 min | / 5 min

Weight of Birth ☐☐☐☐ gm

MEDICAL PROBLEM

No medical problem : ☐

Congenital Defect : ☐

Specify .....

Neonate Jaundice : ☐

Treatment (if any)
- Phototherapy ☐
- Blood Exchange ☐

Infection
- Meningitis/Encephalitis ☐
- Other ☐

Specify .....

SURGERY HISTORY

None ☐ Yes ☐

Specify .....

IMMUNISATION HISTORY

MOTHER

Rubella : No ☐ Yes ☐

Tetanus : No ☐ Yes ☐

CHILD

Complete by age : Yes ☐ No ☐

Epilepsy ☐

Other medical problem ☐

Specify .....

FAMILY HISTORY

Disability No ☐ Yes ☐

Specify .....

Blood relation with mother and father

No ☐ Yes ☐

Specify .....

DEVELOPMENTAL HISTORY

Developmental delays as reported by the mother/ father/ guardian

1.

2.

3.

4.

NUTRITION ASSESSMENT

Nutritional History

Food Allergy : .....

Appetite

Very Good ☐ Good ☐

Uncertain ☐ Moderate ☐

No appetite ☐

Digestive

Constipation ☐ Diarrhoea ☐

Normal ☐

Other food than milk Yes No

Type : .....

Amount : .....

Frequency : .....

Common food texture given to child

Liquid ☐

Puree ☐

Mashed ☐

Chopped ☐

Soft ☐

Solid ☐

Breastfeeding : Yes ☐ No ☐

Formula : Yes ☐ No ☐

Type : _____
Amount : _____
Frequency : _____

Other problems related to food and nutrition

_____
_____
_____
_____
_____

Problems during breastfeeding

Sucking : Yes ☐ No ☐ Swallowing : Yes ☐ No ☐

EXCRETION

Defecation : Normal ☐ Abnormal ☐

Urin : Normal ☐ Abnormal ☐

Toilet trained : Yes ☐ No ☐
(for children ≥3 years)

If abnormal, specify .....

COMMUNICATION

The main ways to communicate with family:

Speak ☐

Body/ signal language ☐

Cry ☐

No communication ☐

Others ☐

Specify .....

MOVEMENTS/ MOBILITY

The main movements in the house :

Walk ☐

Walk with assistance ☐
(hold/using walking sticks etc)

Crawling ☐

Shuffling ☐

Rolling ☐

Carry ☐

Others ☐

Specify .....

BEHAVIOUR

Behaviour - normal ☐

No eye contact ☐
(the child does not look at the face during interaction)

Temper tantrum ☐

Hyperactive ☐

Always being alone ☐
no interaction or playing with other children)

Hurting oneself ☐
(e.g. hitting his head, pinching etc.)

Aggressive towards others ☐
(e.g. biting, hitting others, damage to property etc.

Repetitive behavior ☐
(e.g. washing hands over and over / open and close door etc.)

Disturbed sleep pattern ☐

Others ☐

Specify .....

PHYSICAL EXAMINATION

ANTHROPOMETRY

Body Weight : ☐☐☐.☐☐ kg

Height / Length : ☐☐☐ cm

Head Circumference : ☐☐☐ cm

Until 2 years old except for Hydrocephaly until 4 years

Normal ☐ Abnormal ☐

If abnormal, specify .....

NUTRITIONAL STATUS

BMI-FOR-AGE

Normal body weight ☐

Wasted ☐

Severely wasted ☐

Overweight ☐

Obese ☐

HEIGHT-FOR-AGE

Normal height ☐

Stunted ☐

Severely stunted ☐

WEIGHT-FOR-AGE (until 5 years old only)

Normal body weight ☐

Underweight ☐

Severely underweight ☐

HEAD INSPECTION

Fontanelles :

Anterior Normal ☐ Abnormal ☐

Posterior Normal ☐ Abnormal ☐

If abnormal, specify : .....

EYE INSPECTION

Normal ☐

Squint ☐

Congenital cataract ☐

Nystagmus ☐

Eye discharge ☐

Other problems ☐

Specify: .....

Vision Inspection :

Right : Normal ☐ Impaired ☐ Blind ☐

Left : Normal ☐ Impaired ☐ Blind ☐

MOUTH INSPECTION

Normal : ☐

Tooth carries : ☐

Defects of the oral cavity : ☐

Specify: .....

Other problems:

Specify: .....

NOSE INSPECTION

Nose deformalities : Yes ☐ No ☐

Specify: .....

Other problems: ☐

Specify: .....

EAR INSPECTION

Normal

Ear discharge

Ear deformalities

Specify: .....

Other problems:

Specify: .....

Hearing Inspection :

Right : Normal ☐ Hearing Impairment ☐

Left : Normal ☐ Hearing Impairment ☐

SKIN INSPECTION

Pressure Sore : Yes ☐ No ☐

Injury (e.g.: bruise) : Yes ☐ No ☐

Other problems:

Specify: ……..……..

MUSCULOSKELETAL INSPECTION

Back Bone : Normal ☐ Abnormal ☐

Arm/ Hand/ Fingers : Normal ☐ Abnormal ☐

Club Foot / CTEV : Yes ☐ No ☐

Other problems : ☐

Specify: ……..……..

NEUROLOGY INSPECTION

Muscle tone : Normal ☐ Abnormal ☐

GENITAL INSPECTION

Genital : Normal ☐ Abnormal ☐

If abnormal, specify: .....……

Assessor's Signature : ……..

Name : ……..……..……..

Position : ……..……..……..

Date : ……..……..……..

Name: **R/N:**

ANTHROPOMETRY RECORD

Date	Age	Body Weight (kg)	Height (m)	Head circumference (cm)	Diet History (24 hours)	Notes





APPENDIX H

EATING AND FEEDING PRACTICES EVALUATION FORM FOR CHILDREN WITH SPECIAL NEEDS

EATING AND FEEDING PRACTICES EVALUATION FORM FOR CHILDREN WITH SPECIAL NEEDS

(To be filled by nutritionist/ dietitian)

A. PERSONAL PARTICULAR

Child's name:

……

Parent/ Guardian's name:

……

Address & telephone:

……

D.O.B: …….. Age: ……. month/years old

Gender : ☐ Boy ☐ Girl

Ethnic : ☐ Malay ☐ Chinese ☐ Indian ☐ Others (specify : ……..)

B. HEALTH INFORMATION

Diagnosis:

……

Medical history (Include surgery):

……

Medicine intake:

……

Food allergy :

……

Any sight/hearing/ speech problem?

……

Heart beat : …….. per minute

Blood pressure : ……..... mmHg

C. ANTHROPOMETRIC

Height/ Length : ……..cm Weight : ……..kg

Head circumference : ……..cm

D. NUTRITION

(Please Tick √ In The Box Provided)

Appetite:

☐ Very good ☐ Good ☐ Moderate ☐ No appetite

☐ Uncertain

Feeding problem :

☐ Sucking ☐ Swallowing ☐ Chewing ☐ Gagging/ Choking

☐ Vomiting ☐ Drooling

Current food texture taken:

☐ Crispy ☐ Hard ☐ Mashed ☐ Blended

☐ With gravy ☐ Thick liquid ☐ Chopped/diced

Favourite food conditions:

☐ Cold ☐ Hot ☐ With herb & spices ☐ Finger food

☐ Dried

Digestion system condition :

☐ Constipation ☐ Diarrhea ☐ Normal

Time Pattern of Meal Intake:

12 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11
Mid night *noon*

Positioning During Mealtime :

☐ Normal Seat ☐ Bed-ridden ☐ High chair ☐ Walker
☐ Chair attached table ☐ Car chair ☐ Special chair ☐ Others

Feeding utensils :

☐ Breastfeeding ☐ Bottle feeding ☐ Tube feeding ☐ Finger/hand
☐ Normal cup feeding ☐ Cup with lid ☐ Straw ☐ Spoon
☐ Normal spoon & fork ☐ Others :……

Most favourite food / beverages : ……

Most unfavourite food / beverages : ……

Did the child have any problems/conditions as indicated below? :
(Please tick √ in the box provided)

Problems/ Conditions	Frequently (every day)	Sometimes (3-4 times per week)	Never
Drooling			
Throw food/ utensil during mealtime			
Spit out the food			

Problems/ Conditions	Frequently (every day)	Sometimes (3-4 times per week)	Never
Difficult to sit down during mealtime			
Take food from other people's plate			
Refuse to try new food			
No signal of hunger			
No signal of thirst			
Vomiting during/ after eating			
Gagging/ chocking during mealtime			
Coughing during/ after meal			
Hoarse or husky voice after drinking			

Current fluid intake:

☐ Breast milk ☐ Infant Formula ☐ Plain water ☐ Juice

☐ Others. Specify…….

(Please specify type & brand of milk:……..……)

Favourite cooking type/ method:
(Please tick √ in the box provided)

☐ Steamed ☐ Braised/ Stewed ☐ Soup/ Boiled ☐ Blanched

☐ Baked ☐ Stir -fired ☐ Fried ☐ Deep fried

Supplement (such as vitamin/ mineral/ special formula/ others):

……..

Notes:

……..

……..

……..

E. DIET HISTORY

Name: ..... Date: .....

i. 24 Hour Diet Recall

Record for 24 Hour Diet Recall	Advice/ Suggestion
Breakfast Food | Serving Size	Breakfast
Morning Snack Food | Serving Size	Morning Snack
Lunch Food | Serving Size	Lunch
Afternoon snack Food | Serving Size	Afternoon snack
Dinner Food | Serving Size	Dinner
Supper Food | Serving Size	Supper

ii. Food Frequency (7 days)

Name: ..... Ref. No. : ..... Date: .....

Meal Time	Food Item	Serving Size	Weekly Frequency	Calorie (kcal)	CHO (g)	Protein (g)	Fat (g)	Fibre No. serving	Notes

APPENDIX I

TEXTURE MODIFICATION BASED ON FOOD GROUPS

APPENDIX I

Texture Modification Based on Food Groups

Group 1:	Rice, noodles, bread, other cereals and cereal products, and tubers			
Food Texture	**Pureed**	**Mashed**	**Chopped**	**Soft**
Food Group				
Rice/ Porridge	Porridge	Thick porridge	Thick porridge	Soft rice
Noodles (Mee hoon, mee, kue teow)	-	-	Cut or chopped noodles into small pieces	All kind of noodles and pasta in soup
Sliced bread	Cut into quarters or bite-size pieces and dip into beverages such as milk	Cut into quarters or bite-size pieces and dip into beverages such as milk	Cut into quarters or bite-size pieces	White bread
Bun	Cut into quarters or bite-size pieces and dip into beverages such as milk	Cut into quarters or bite-size pieces and dip into beverages such as milk	Cut into quarters or bite-size pieces	Soft roll/ assortment of bun. Avoid crispy pastry.
Biscuits	Serve grits (fine blended biscuits) with milk		Cut into quarters or bite-size pieces Serve grits (fine blended biscuits) with milk	

Group 1:	Rice, noodles, bread, other cereals and cereal products, and tubers			
Food Texture	**Pureed**	**Mashed**	**Chopped**	**Soft**
Potato	-	Mashed potato with gravy/ margarine/ butter	Baked potatoes, cut into cubes or mashed	Boiled potatoes
Oat	Oat blended with milk	-	-	Oat/ cereal with milk
Corn flakes served with milk	Fine blended	-	Blended into smaller pieces Fine blended	-

Group 2: Fruits and vegetables				
Food Texture	**Pureed**	**Mashed**	**Chopped**	**Soft**
Food Group				
Fruits	Pureed	Mashed with fork	Cut into slices Cut into sliced/ diced	Skinless and seedless fruits such as mango or watermelon, and fruit juice with pulp
Orange	Orange juice	-	Peeled and sliced into sections without membrane	-
Banana or papaya	Pureed	Mashed	Cut into slices	Naturally soft textured

Group 2: Fruits and vegetables				
Food Texture	**Pureed**	**Mashed**	**Chopped**	**Soft**
Apple/ pear	Pureed	Peeled and mashed	Peeled and cut into cubes	
Star Fruit	Juice with pulp	-	Cut into cubes, without seed	
Tomato	Fresh tomato - pureed/ juice	Stewed tomato	Chopped into cube	
Vegetables	Pureed Blended vegetables pulp with fruit juice	Mashed vegetables	-	Cooked vegetables Braised carrot/ cabbage
Spinach	Well cooked, pureed with soup	Well cooked and mashed	Finely chopped	-
Peas/ carrot	Pureed	Mashed	Well cooked and chopped Well cooked and soft Cut carrot into small cubes	-

Group 3:	Fish/ poultry/ meat / legumes / eggs			
Food Texture	**Pureed**	**Mashed**	**Chopped**	**Soft**
Food Group				
Fish/ Chicken/ Meat	Fine blended fish, chicken or meats with soup	Mashed fish	Chopped fish, chicken or meat Fish ball/ Chicken ball/ Meat ball	Skinless chicken/ lean meat slices Fish flakes
Nuts/ Legumes	Braised & blended beans/ nuts	braised & mashed peanuts	braised and chopped nuts/ legumes	Braised beans/ nuts
Eggs	If egg is introduced, do not blend it with other foods to avoid unfavourable flavour.	Mashed eggs	Steamed/ scrambled egg	Eggs cooked in various styles

Group 4:	Milk and dairy products			
Food Texture	**Pureed**	**Mashed**	**Chopped**	**Soft**
Food Group				
Milk	Milk	-	-	Milk
Milk Products	Yoghurt, curd	-	-	Yoghurt, Cheese

Group 5:	Fat, Oil, Sugar, Salt			
Food Texture	**Pureed**	**Mashed**	**Chopped**	**Soft**
Food Group				
Oil/ Butter/ Margarine	Margarine mixed with pureed potatoes	Oil added in porridge	Peanut butter spread on crackers/ bread	Use sparingly (butter, margarine, cooking oil, mayonnaise, animals fat)

Group 6:	Dessert			
Food Texture	**Pureed**	**Mashed**	**Chopped**	**Soft**
Food Group				
Dessert	Milkshake, pudding, custard, jelly Pudding, custard, jelly, soft kueh	-	Soft ice cream, pudding, custard, jelly, soft kueh	Pudding, custard, jelly, soft kueh, cake, biscuits, jelly

Group 7:	Beverage			
Food Texture	**Pureed**	**Mashed**	**Chopped**	**Soft**
Food Group				
Consistent beverage texture	AVOID insoluble granulated food	-	-	Beverage with a little bit of granulated food such as cereal

**Salt, sugar, syrup, mayonnaises are optional items and should be used sparingly.*

Modified from: National Dysphagia Diet (2003)

Consult speech therapist/ nutritionist/ dietitian before making any decision on food texture or dietary modifications.





APPENDIX J

SUMMARY TYPES OF DIET MODIFICATION

APPENDIX J

Summary Types of Diet Modification

No	Diet	Indications	Tips
1	**High fibre diet**	Required for children who are obese or has hypercholesterolemia, cardiovascular disease or constipation *Note: Be careful in menu planning to avoid bulky food.*	Serve: • Double serving of vegetables. • Whole meal bread, instead of white bread. • Oatmeal, if cereal is ordered. • Fresh fruits
2	**Bland diet/ light diet**	Required for children who have gastrointestinal malfunction, gastritis and peptic ulcer.	• **No** fruits with skin • **No** spices which has strong taste and smell. • **No** spicy/ spices food. • **No** deep fried food. • **No** wholegrain bread/ cereal • **No** coffee/ tea. • **No** citrus fruits or juices such as orange juice and lime juice. • **No** vinegar.
3	**Low salt or low sodium diet**	Required for children who have hypertension, renal disease or heart disease.	• Limit • **No** MSG (monosodium glutamate). • Cut down or halve the usage of salt and sauces in cooking. • Minimize usage of sauce. • **AVOID** salted fish, salted egg, soy sauce, oyster sauce, canned food and meat/vegetable extract.
4	**Low fat diet**	Required for children who are obese or have malfunction in pancreas and problems in absorption. *Note: Low fat diet not recommended for children less than 2 years old.*	• **AVOID** or reduce coconut or coconut milk. • **AVOID** or reduce butter / margarine. • **AVOID** deep fried foods and minimize usage of oil in cooking. • Recommended cooking methods: blanched, steamed, boiled/ soup, stir fry with less oil • Serve chicken without skin and lean meat.

No	Diet	Indications	Tips
5	**Low cholesterol diet**	Required for children who have heart disease, hyperlipidemia or hypercholesterolemia. *Note: Minimize source of cholesterol food in menu planning but not to avoid at all.*	• **No** egg yolk • **No** butter • **No** beef or mutton • **No** internal organ meat • **No** coconut milk • Limit the amount of prawns, cuttlefish, shrimps
6	**High calorie diet**	Required for children who are underweight or under recovery.	• Mix a bit of margarine in the porridge or rice. • Add 2 tbsp of milk powder or oat/ cornflakes in the beverages. • Spread some margarine or peanut butter on the bread or cream crackers. • To increase appetite, mix anchovy (finely chopped) or fried onion with porridge.
7	**Low calorie diet**	Required for overweight children. *Note: Low calorie diet recommended for older obese children (10 years old and above). Younger obese or overweight children should recommended diet according to their needs rather than low calorie diet. Because the children need the nutrients to grow.*	• Reduce deep fried and high calorie food. Examples: *nasi lemak*, curry noodles, dishes with coconut milk, fried fish/ chicken, *roti canai*, deep fried *kueh* etc. • Reduce consumption of all types of fat and oil. Examples: butter, margarine, cooking oil and coconut milk. • Reduce consumption of sugar in food and beverage. Example: syrup, soft drink, chocolate, kaya, jam, cake and sweet *kueh*. • Serve more food which high in fibre, such as fruits, vegetables, beans, lentils and cereal. • Serve the rice, noodles, bread, potatoes and other sources of carbohydrate according to the child needs. Do not over serve. • Reduce the portion size of food during every meal.

Adapt from: KKM[c] (2005)





APPENDIX K

MENU ADJUSTMENT FOR SOFT DIET

APPENDIX K

Menu Adjustment for Soft Diet

There is no necessity to prepare a new set of menu for a child who needs diet modification (soft diet). The same menu that is being served to the family/ residents of the institution can be adjusted according to the conditions of the child.

Menu for Normal Diet	Menu for Texture Modification (Soft Diet)
BREAKFAST: 1 bowl *Bihun* soup (1 rice scoop of *Bihun* + 1 ½ ladle of soup with vegetables + 2 tablespoons shredded chicken) 1 glass Milk	**BREAKFAST:** 1 bowl *Bihun* soup (1 rice scoop of *Bihun* - cut into small size + 1 ½ ladle of soup with vegetables - cut into small size + 2 tablespoons shredded chicken) 1 glass Milk
MORNING TEA BREAK: 1 piece *Kueh apam* 1 glass Milk	**MORNING TEA BREAK:** 1 piece *Kueh apam* 1 glass Milk
LUNCH: 1 rice scoop Rice 5 tablespoons Long beans with sambal 1 piece Skinless curry chicken 1 whole Orange (medium size) 1 glass Plain water	**LUNCH:** 1 rice scoop Soft rice 5 tablespoons Stir-fried spinach with fish cake slices 4 slices Braised chicken 1 slice Papaya 1 glass Plain water

Menu for Normal Diet	Menu for Texture Modification (Soft Diet)
AFTERNOON NOURISHMENT: 2 pieces Samosa 1 glass Milk	**AFTERNOON NOURISHMENT:** 1 slice White bread with jam 1 glass Milk
DINNER: 1 scoop Rice 1 piece *Ikan masak asam pedas* 1 bowl Mix vegetables soup 1 slice Star fruit 1 glass Plain water	**DINNER:** 1 scoop Soft rice 1 piece Steam fish 1 bowl Mix vegetables soup (carrot & cabbage) 1 whole Medium size banana 1 glass Plain water
SUPPER: 1 piece Raisin bun 1 glass Milk	**SUPPER:** 1 piece Raisin bun 1 glass Milk
Note: • Normal menu can be used as a based for texture modification. • Certain menu needs to be changed if the food served has hard or crispy texture or spicy.	

** Sample menu based on 1300 kcal*





APPENDIX L

SUMMARY TABLE: RECOMMENDED NUTRIENT INTAKES FOR MALAYSIA 2017

(0-18 YEARS OLD)

Recommended Nutrient Intakes (RNI) for Malaysia 2017 Summary Tables 1. Energy Requirements (by physical activity level) and Protein Requirements

Age	Males					Females				
	Estimated Energy Requirements[1] kcal/day				Protein[2] g/day	Estimated Energy Requirements[1] kcal/day				Protein[2] g/day
Infants										
0 - 2 months	470				8	420				8
3 - 5 months	540				8	500				8
6 - 8 months	630				10	570				10
9 - 11 months	720				10	660				10
	PAL 1.4	**PAL 1.6**	**PAL 1.8**	**PAL 2.0**		**PAL 1.4**	**PAL 1.6**	**PAL 1.8**	**PAL 2.0**	
Children										
1 - 3 years	980				12	900				12
4 - 6 years	1300	1490	1670		16	1210	1380	1560		16
7 - 9 years	1530	1750	1970		23	1410	1610	1810		23
Adolescents										
10 - 12 years	1690	1930	2170	2420	30	1500	1710	1920	2140	31
13 - 15years	1930	2210	2480	2760	45	1580	1810	2040	2260	42
16 -<18 years	2050	2340	2640	2930	51	1660	1890	2130	2370	42
Adults										
≥ 18 - 29 years	1960	2240	2520	2800	62	1610	1840	2080	2310	53
30 - 59 years	1920	2190	2470	2740	61	1660	1900	2130	2370	52
≥ 60 years	1780	2030	2280	2540	58	1550	1770	1990	2220	50
Pregnancy										
1st trimester						+80				+0.5
2nd trimester						+280				+8
3rd trimester						+470				+25
Lactation										
1st six months						+ 500				+19
2nd six months										+ 13

Note: [1] For children aged 4 – 6 years, PAL 1.4 is recommended to be used for the general population. For children above 7 years, adolescents and adults, PAL of 1.6 (i.e. moderately active) is recommended to be used for the general population. For individuals, energy recommendation should be based on individual PAL.
[2] Protein calculated based on reference body weight.

Recommended Nutrient Intakes (RNI) for Malaysia 2017 Summary Tables 2: Vitamins

	Age	Thiamin mg/day	Riboflavin mg/day	Niacin mg NE/day	Pantothenic Acid mg/day	Pyridoxine mg/day	Folate µg/day	Cobalamin µg/day	Vitamin C mg/day	Vitamin A µg/day	Vitamin D µg/day	Vitamin E mg/day	Vitamin K µg/day
Infants (boys)	0 - 5 months	0.2	0.3	2	1.7	0.1	80	1.2	25	375	10	3	5
	6 - 11 months	0.3	0.4	4	1.8	0.3	80	1.5	30	400	10	3	10
Infants (girls)	0 - 5 months	0.2	0.3	2	1.7	0.1	80	1.2	25	375	10	3	5
	6 - 11 months	0.3	0.4	4	1.8	0.3	80	1.5	30	400	10	3	10
Children (boys)	1 - 3 years	0.5	0.5	6	2.0	0.5	160	1.5	30	400	15	5	15
	4 - 6 years	0.6	0.6	8	3.0	0.6	200	1.5	30	450	15	5	20
	7 - 9 years	0.9	0.9	12	4.0	1.0	300	2.5	35	500	15	7	25
Children (girls)	1 - 3 years	0.5	0.5	6	2.0	0.5	160	1.5	30	400	15	5	15
	4 - 6 years	0.6	0.6	8	3.0	0.6	200	1.5	30	450	15	5	20
	7 - 9 years	0.9	0.9	12	4.0	1.0	300	2.5	35	500	15	7	25
Adolescent (boys)	10 - 12 years	1.2	1.3	16	5.0	1.3	400	3.5	65	600	15	10	35-55
	13 - 14 years	1.2	1.3	16	5.0	1.3	400	4.0	65	600	15	10	35-55
	15 years	1.2	1.3	16	5.0	1.3	400	4.0	65	600	15	10	35-55
	16 - 18 years	1.2	1.3	16	5.0	1.3	400	4.0	65	600	15	10	35-55
Adolescent (girls)	10 - 12 years	1.1	1.0	16	5.0	1.2	400	3.5	65	600	15	7.5	35-55
	13 - 14 years	1.1	1.0	16	5.0	1.2	400	4.0	65	600	15	7.5	35-55
	15 years	1.1	1.0	16	5.0	1.2	400	4.0	65	600	15	7.5	35-55
	16 - 18 years	1.1	1.0	16	5.0	1.2	400	4.0	65	600	15	7.5	35-55
Men	19 - 29 years	1.2	1.3	16	5.0	1.3	400	4.0	70	600	15	10	65
	30 - 50 years	1.2	1.3	16	5.0	1.3	400	4.0	70	600	15	10	65
	51 - 59 years	1.2	1.3	16	5.0	1.7	400	4.0	70	600	15	10	65
	60 - 65 years	1.2	1.3	16	5.0	1.7	400	4.0	70	600	15	10	65
	> 65 years	1.2	1.3	16	5.0	1.7	400	4.0	70	600	20	10	65
Women	19 - 29 years	1.1	1.1	14	5.0	1.3	400	4.0	70	600	15	7.5	55
	30 - 50 years	1.1	1.1	14	5.0	1.3	400	4.0	70	600	15	7.5	55
	51 - 59 years	1.1	1.1	14	5.0	1.5	400	4.0	70	600	15	7.5	55
	60 - 65 years	1.1	1.1	14	5.0	1.5	400	4.0	70	600	15	7.5	55
	> 65 years	1.1	1.1	14	5.0	1.5	400	4.0	70	600	20	7.5	55
Pregnancy	1st trimester	1.4	1.4	18	6.0	1.9	600	4.5	80	800	15	7.5	55
	2nd trimester	1.4	1.4	18	6.0	1.9	600	4.5	80	800	15	7.5	55
	3rd trimester	1.4	1.4	18	6.0	1.9	600	4.5	80	800	15	7.5	55
Lactation	1st 6 months	1.5	1.6	17	7.0	2.0	500	5.0	95	850	15	7.5	55
	2nd 6 months	1.5	1.6	17	7.0	2.0	500	5.0	95	850	15	7.5	55

Recommended Nutrient Intakes (RNI) for Malaysia 2017 Summary Tables 3a: Minerals & Trace Elements

	Age	Calcium mg/day	Iodine µg/day	Selenium µg/day	Zinc mg/day	Iron mg/day	
						10%	15%
Infants (boys)	0 - 5 months	200 (bf) 250 (ff)	67.5 (0 - 2 months) 105.0 (3 - 5 months)	6	1.1 (bf) 2.8 (ff)	a	a
	6 - 11 months	260	124.5 (6 - 8 months) 138.0 (9 - 11 months)	10	4.1	9	6
Infants (girls)	0 - 5 months	200 (bf) 250 (ff)	63.0 (0 - 2 months) 96.0 (3 - 5 months)	6	1.1 (bf) 2.8 (ff)	a	a
	6 - 11 months	260	114.0 (6 - 8 months) 127.5 (9 - 11 months)	9	3.7	9	6
Children (boys)	1 - 3 years	700	73.2	17	4.2	6	4
	4 - 6 years	1000	109.8	21	5.2	6	4
	7 - 9 years	1000	101.6	22	5.7	9	6
Children (girls)	1 - 3 years	700	69.0	16	4.0	6	4
	4 - 6 years	1000	109.2	21	5.2	6	4
	7 - 9 years	1000	100.0	21	5.6	9	6
Adolescent (boys)	10 - 12 years	1300	133.6	21	7.0	15	10
	13 - 14 years	1300	99.2	31	9.3	15	10
	15 years	1300	99.2	31	9.3	19	12
	16 - 18 years	1300	118.4	37	9.9	19	12
Adolescent (girls)	10 - 12 years	1300	141.6	19	6.3	14 (nm) 33 (m)	9 (nm) 22 (m)
	13 - 14 years	1300	93.0	24	7.7	14 (nm) 33 (m)	9 (nm) 22 (m)
	15 years	1300	93.0	24	7.7	31	21
	16 - 18 years	1300	100.6	26	7.7	31	21
Men	19 - 29 years	1000	122.8	32	6.6	14	9
	30 - 50 years	1000	121.2	32	6.5	14	9
	51 - 59 years	1000	121.2	32	6.5	14	9
	60 - 65 years	1000	116.2	31	6.3	14	9
	> 65 years	1000	116.2	30	6.2	14	9
Women	19 - 29 years	1000	105.8	25	4.7	29	20
	30 - 50 years	1000	104.4	24	4.6	29	20
	51 - 59 years	1200	104.4	24	4.6	11	8
	60 - 65 years	1200	99.0	23	4.4	11	8
	> 65 years	1200	99.0	23	4.3	11	8
Pregnancy	13 - 19	1300					
	1st trimester	1000	200	25	5.5	b	b
	2nd trimester	1000	200	27	7.0	b	b
	3rd trimester	1000	200	29	10.0	b	b
Lactation	13 - 19	1300	200				
	1st 6 months	1000	200	34	9.5 (1 - 3mths) 8.8 (4 - 6 mths)	15	10
	2nd 6 months	1000	200	41	7.2 (7 - 12mths)	15 (nm) 32(m)	10 (nm) 21(m)

Note: a – no recommendations. Neonatal iron stores are sufficient to meet iron requirement for first 6 months in full-term intants. Premature infants and low birth weight infants require additional iron.
b – iron supplements in table form recommended for all pregnant women. In the non-anaemic pregnant woman, daily supplements of 100 mg iron given during second half of pregnancy are adequate. In anaemic women, higher doses are usually required. bf – breast fed ff – formula fed nm – non-menstruating m – menstruating

Recommended Nutrient Intakes (RNI) for Malaysia 2017 Summary Tables 3b: Minerals & Trace Elements

	Age	Phosphorus mg/day	Sodium mg/day	Potassium g/day	Magnesium mg/day	Chromium µg/day	Copper µg/day	Manganese mg/day	Molybdenum µg/day	Fluoride mg/day
Infants (boys)	0 - 6 months	100	120	0.4	30	0.2	200	0.003	2	0.01
	7 - 12 months	275	370	0.7	75	5.5	220	0.6	3	0.5
Infants (girls)	0 - 6 months	100	120	0.4	30	0.2	200	0.003	2	0.01
	7 - 12 months	275	370	0.7	75	5.5	220	0.6	3	0.5
Children (boys)	1 - 3 years	460	1000	3.0	80	11	340	1.2	17	0.7
	4 - 8 years	500	1200	3.8	130	15	440	1.5	22	1.0
Children (girls)	1 - 3 years	460	1000	3.0	80	11	340	1.2	17	0.7
	4 - 8 years	500	1200	3.8	130	15	440	1.5	22	1.0
Adolescent (boys)	9 - 13 years	1250	1500	4.5	240	25	700	1.9	34	2.0
	14 - 18 years	1250	1500	4.7	410	35	890	2.2	43	3.0
Adolescent (girls)	9 - 13 years	1250	1500	4.5	240	21	700	1.6	34	2.0
	14 - 18 years	1250	1500	4.7	360	24	890	1.6	43	3.0
Men	19 - 29 years	700	1500	4.7	400	35	900	2.3	45	4.0
	30 - 50 years	700	1500	4.7	420	35	900	2.3	45	4.0
	51 - 59 years	700	1500	4.7	420	30	900	2.3	45	4.0
	60 - 69 years	700	1500	4.7	420	30	900	2.3	45	4.0
	> 70 years	700	1200	4.7	420	30	900	2.3	45	4.0
Women	19 - 29 years	700	1500	4.7	310	25	900	1.8	45	3.0
	30 - 50 years	700	1500	4.7	320	25	900	1.8	45	3.0
	51 - 59 years	700	1500	4.7	420	20	900	1.8	45	3.0
	60 - 69 years	700	1500	4.7	420	20	900	1.8	45	3.0
	> 70 years	700	1200	4.7	320	20	900	1.8	45	3.0
Pregnancy	14 - 18 years	1250	1500	4.7	400	29	1000	2.0	50	3.0
	19 - 30 years	700	1500	4.7	350	30	1000	2.0	50	3.0
	31 - 50 years	700	1500	4.7	360	30	1000	2.0	50	3.0
Lactation	14 - 18 years	1250	1500	5.1	360	44	1300	2.6	50	3.0
	19 - 30 years	700	1500	5.1	310	45	1300	2.6	50	3.0
	31 - 50 years	700	1500	5.1	320	45	1300	2.6	50	3.0





APPENDIX M

PROPER FEEDING SKILL

APPENDIX M

Proper Feeding Skill

For younger group, the guidance should practice responsive or active feeding, applying the principles of psycho-social care.
Apply this:

1. Feed infants directly and assist young children when they feed themselves.
2. Feed infants and young children slowly and patiently. They should be encouraged to eat and do not forced.
3. Be sensitive to the hunger and satiety cues of infants and young children.
4. Build a positive and loving relationship with infants and young children in a conducive and comfortable environment. Interact with them during mealtimes.

Proper Feeding for Special Needs Children

The more difficult it is for a child to control his body movements, the more difficult it will be for him to feed himself. A child with special needs may have trouble feeding because of weak oral muscles and lips closure and poor head control. But the feeding problems of a child with cerebral palsy are more complex. They may include: lack of oral motor control, head and body control; positioning; difficulty bending hips enough to reach forward; poor hand-eye coordination; and difficulty holding things and taking the food to his mouth. We must consider all these in helping the child's feeding to be more effectively.

It is not just putting and pouring the food and drinks into the mouth of a child who has difficulties in sucking, eating, and drinking. We must consider few techniques that may help the child learn how to suck, swallow, eat, and drink more effectively.

POSITIONS FOR FEEDING

Ensure child is in a good position before start feeding. The position will make feeding either easier and safer; or more difficult and unsafe.

Do not feed the baby while she is lying on her back because this it will it will increase the chance of choking.

Child with cerebral palsy often has backward stiffening that makes sucking and swallowing are more difficult.

Feed the baby in a half sitting position in 45 degrees with her **head bend slightly forward.**

In order to avoid the head of child with cerebral palsy from pushing back, **hold her shoulders forward, keep the hips bend, and push firmly on the chest.**

Do not let the head tilted backward during feeding.

It makes swallowing harder and may cause choking.
For a child with cerebral palsy, **avoid pushing the head forward** as it will cause the baby to push her head back more forcefully.

Positions for Feeding with a Bottle, Spoon, or Finger are Similar to the Breastfeeding Method

Common practice in community:

If the baby does not suck and swallow well, the mother may think she should put a bigger hole in the nipple, tilt the baby's head back, and pour the milk into the baby's mouth. However, these are the WRONG techniques. Please avoid these techniques as they may cause choking and it will not help him learn how to suck well.

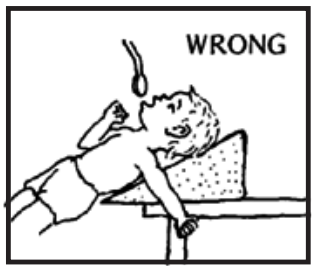
Position the baby at 45 degrees so that the head is slightly forward. Give the bottle from front direction and not from above. Pushing gently on the chest would help to stop backward stiffening so the baby can swallow better. If possible, let the baby holds the bottle.

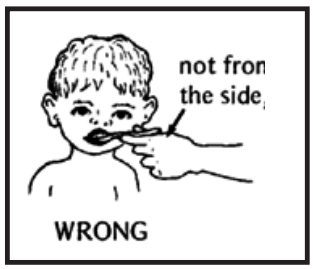
To avoid the backward stiffening, bend the shoulders and back forward, keeping the hips and knees bent. Be sure the head bends a little forward. Place food at lower lip and in front of child's mouth, not above the child's head or behind him. Foot lift to keep the baby's knees higher.

REMEMBER: When feeding a child with cerebral palsy, giving food from above often causes the head to press back and body to stiffen. It makes swallowing difficult. Giving food from front helps stop stiffness and makes eating and swallowing easier.

Spoon feeding

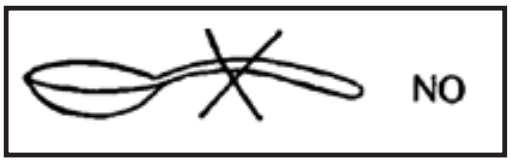
The child who has no sucking-swallowing reflex needs to be fed with a spoon.

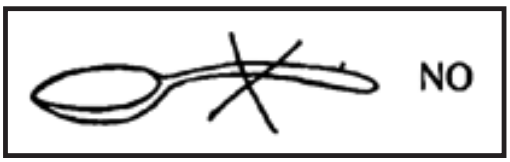




The best spoon is rounded and shallow.

Not deep because this makes it hard for the lips to get out the food.
And not long and pointed as this could cause choking.





Note:

1. Further reference, please refer to *Manual on Activity of Daily Living: Self-help Skills (MOH, 2006).*
2. Feeding skill will be advised by the nurses.

SUGGESTED INTERVENTION FOR CHILDREN WITH FEEDING DIFFICULTIES

1) To improve overall tounge and lip control

(1.1) Desensitisation techniques

A child is said to experience over-sensitive to touch, if the consistently reacts in a number of ways such as:-

- Go into spasm (jumps)
- Makes grimaces
- Open his mouth very wide with long pause before closing
- Thrust his tounge
- Bite very hard
- Cry

The techniques involves touching, stroking, tapping and brushing methods.

Points to remember when doing desensitisation techniques:

1 Begin with face, NOT the mouth, as it is usually the most sensitive area.

2 Do the exercise seperately, NOT prior to feeding.

3 Exercises should be done frequently daily (at least 4 times a day), for short period. Increase the duration of exercise gradually until the child is able to tolerate your touch.

4 Do it in steps as shown below.

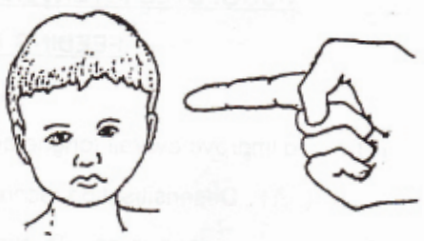
5 Do the exercise as part of child's play.

DESENSITISATION TECHNIQUES

STEP 1

With your fingers, stroke around the forehead, cheeks, jaw and under the chin.

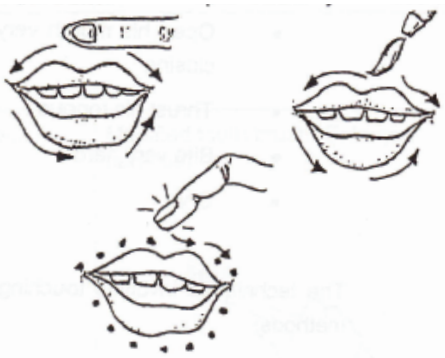
When the child can tolerate your stroking, try gentle tapping in these areas with your finger.



STEP 2

With your finger, gently stroke the outside of the lips. You may also use a soft brush or soft cloth.

Later try tapping lightly around the lips with your fingers.



STEP 3

With your finger gently rub the outside of the lips and outer surface of the gums.

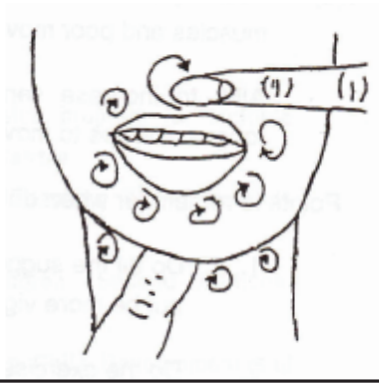
Later move around the outer surface of the gums towards the back teeth.

STEP 4

When the child is able to tolerate gentle touch, appy a little more pressure.

Make small circular motion around the mouth and under the chin.

DO NOT press the next or over the larynx.



STEP 5

Use your finger, lolly-pop or tooth brush handle, stroke or tap the tounge tip.

'Walk' your finger to the midline of the tounge about half way back and press down gently.

Then touch the sides of the tonge.

DO NOT go too far back as it will cause gagging

Encourage child to put his fingers in his mouth or give him plastic toys/pacifier to suck.

2) Techniques for the child who is not oversensitive but has lax muscles and poor movement.

AIM: to increase sensitivity and awareness and encourage the tongue and lips to move.

Points to remember when doing the excercise:

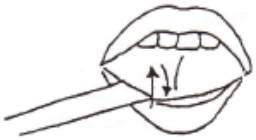
1 Do all the suggestions covered in desensitization techniques but more vigorous.

2 Do the exercise as part of child's play.

Tap and flick but NOT stroke.
Make your touch firmer.
Sharp tapping is encourage, as it encourages the muscle to move.

Flick lips

Flick tongue



Flick hands up cheeks

GLOSSARY

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1. **Acromion**
   An anatomical feature on the shoulder blade (scapula), together with the coracoid process extending laterally over the shoulder joint.

2. **Aspiration**
   The drawing of a foreign substance, such as the gastric contents, into the respiratory tract during inhalation.

3. **Children With Special Needs**
   Refer to those who have long term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society (Persons With Disabilities Act 2008).

4. **Craniofacial Abnormality (CFA)**
   A group of deformities in the growth of the skull and facial bones. These abnormalities are congenital (present at birth) and there are numerous variations. While some are mild, may require reconstructive surgery. Example: Pfeiffer Syndrome, Cleft palate

5. **Femoral Condyle**
   One of a pair of large flared prominences on the distal end of the femur. Identified as lateral and medial femoral condyles, they are covered with a thick layer of hyaline cartilage and articulate with the patella and the tibia at the knee joint.

6. **Gag**
   To cause to retch or choke. To experience the sudden uncomfortable feeling of tightness in the throat and stomach that makes you feel like you are going to vomit.

7. **Head Of The Radius**
   The disk-shaped upper extremity articulating with the capitulum of the humerus.

8. Health care providers

Any health professional working in the health care system or any person promotes health or provide health maintenance as its charitable purpose (Adapt from Gitterman & Friedlander 2004).

9. Health complications

Long-term disability from traumatic injuries or individuals with chronic diseases such as heart disease, kidney failure and diabetes mellitus (WHO 2011).

10. Paralysis

A loss or impairment of voluntary movement in a body part, caused by injury or disease of the nerves, brain, or spinal cord. A disease characterized by this, especially palsy.

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