



Feeding Matters:

FTT, Growth Charts, and How to get beyond that toddler weight plateau

I have no financial disclosures, and will discuss no medications



Growth and Weight gain: the public perceptions

- Bigger is always better
- Future weight gain and growth are related to birthweight and length
- We are a nation of food sufficiency, hence every child has equal opportunity

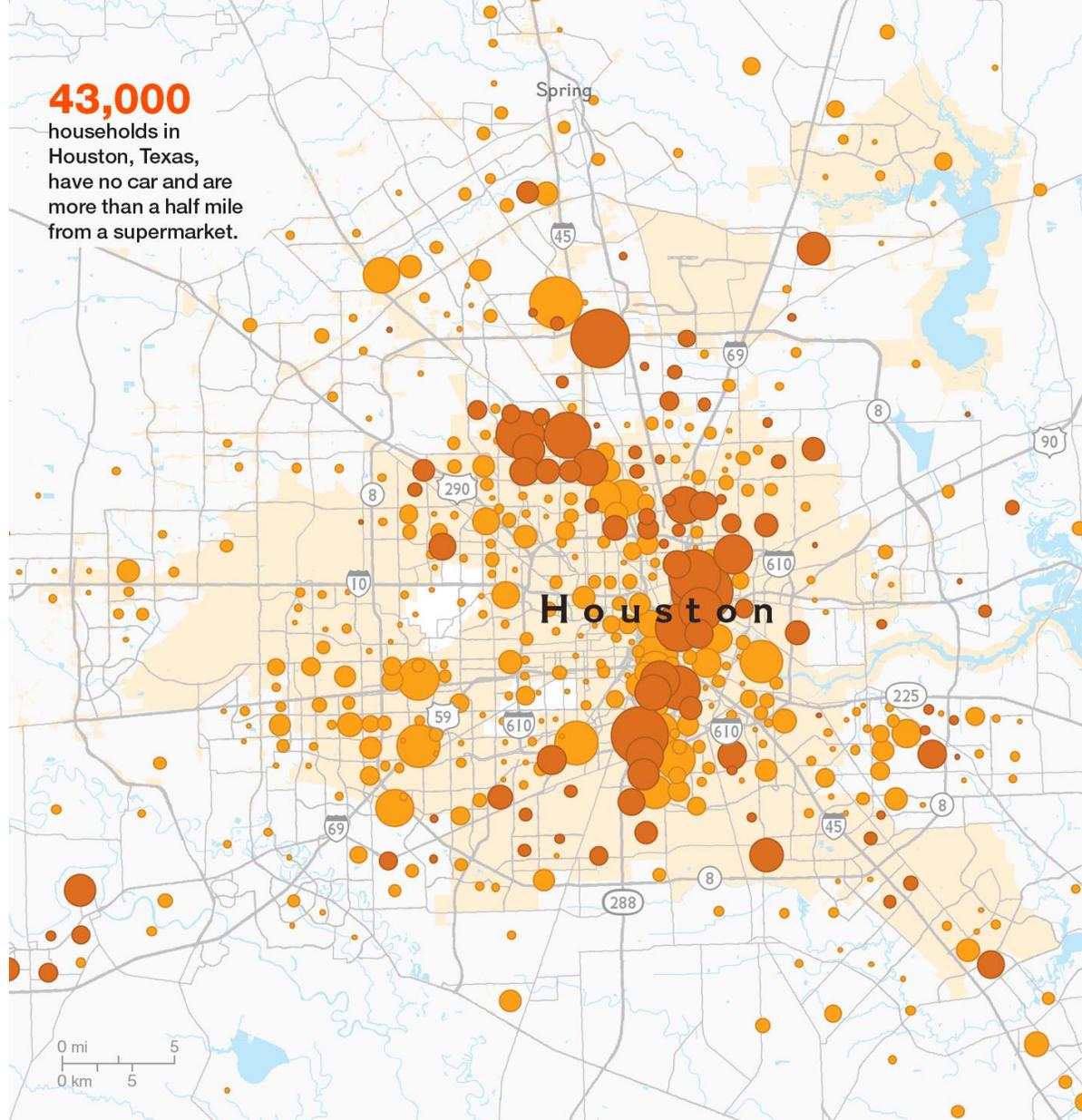


Growth and weight gain: the realities

- Bigger is not always better: the rise in obesity rates
- Birth parameters not predictive of future growth and weight gain
- Multiple determinants of children's intake: food availability, family dynamics, cultural patterns, behavioral (autonomy factors in intake), diagnosed or undiagnosed medical issues

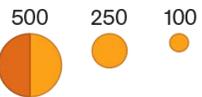
43,000

households in Houston, Texas, have no car and are more than a half mile from a supermarket.



Households lacking a car and located more than half a mile from a supermarket

DARK ORANGE: Households in neighborhoods with the greatest poverty



City of Houston



Filling pantries. Filling lives.



Did you know?

- Texas has one of the highest rates of child food insecurity in the country
- Every day 53,000 people in Houston are hungry
- Each week the Houston Food Bank feeds 137,000 people, 47% of which are children
- 43% of hungry families must choose between food and medicine

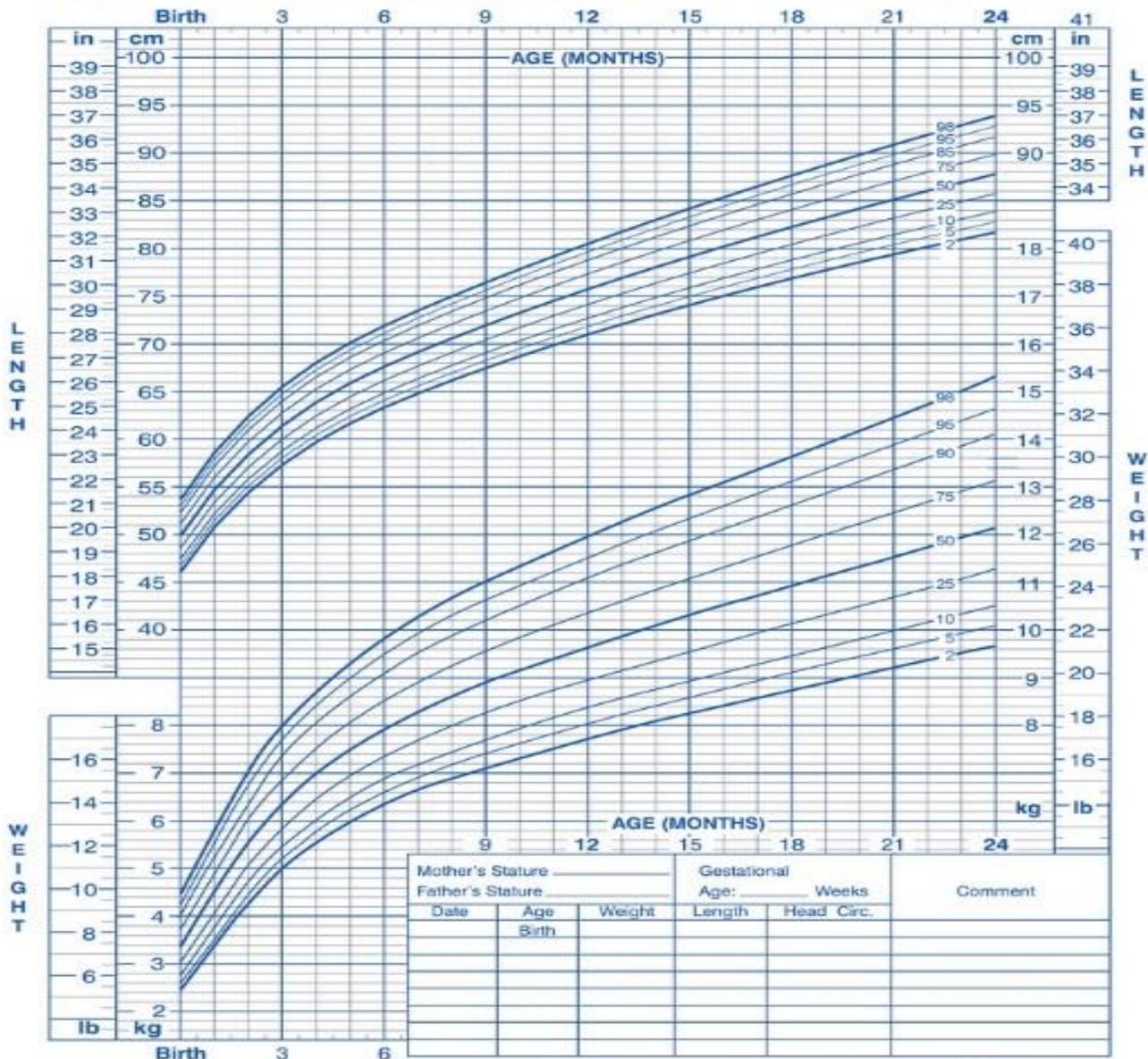
Pediatricians rely on growth charts as means to determine whether growth and weight gain are 'normal'

- We rely on these charts daily, but what do they really mean?
- Is there an ideal percentile for a child?

Birth to 24 months: Boys
Length-for-age and Weight-for-age percentiles

NAME _____

RECORD # _____



Mother's Stature _____			Gestational Age: _____ Weeks		Comment
Father's Stature _____			Length	Head Circ.	
Date	Age	Weight			
	Birth				

Published by the Centers for Disease Control and Prevention, November 1, 2009
 SOURCE: WHO Child Growth Standards (<http://www.who.int/childgrowth/en>)



Which Chart? Which Method?



Centers for Disease Control and Prevention

CDC 24/7: Saving Lives. Protecting People. Saving Money through Prevention.

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Growth Charts

Growth Charts

[CDC Growth Charts](#)

[WHO Growth Charts](#)

Related Sites

[National Health and Nutrition Examination Survey](#)

[NCHS Home](#)

Growth charts consist of a series of percentile curves that illustrate the distribution of selected body measurements in children. Pediatric growth charts have been used by pediatricians, nurses, and parents to track the growth of infants, children, and adolescents in the United States since 1977.

CDC recommends that health care providers:

- Use the [WHO growth standards](#) to monitor growth for infants and children ages 0 to 2 years of age in the U.S.
- Use the [CDC growth charts](#) for children age 2 years and older in the U.S.

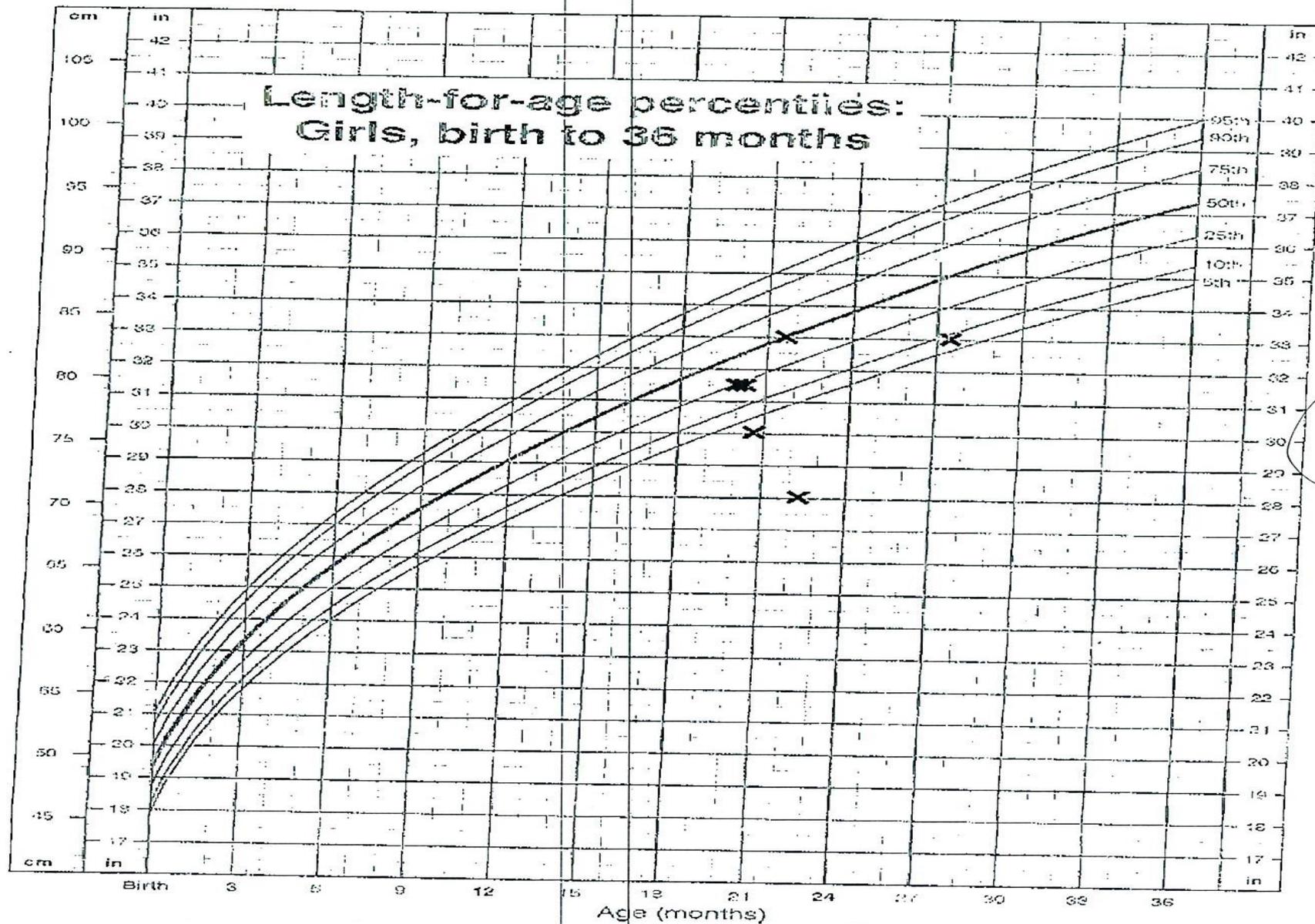
Growth charts are not intended to be used as a sole diagnostic instrument. Instead, growth charts are tools that contribute to forming an overall clinical impression for the child being measured.

Correct Measurements Essential!

Consistent weighing method, same scale if necessary (to detect small changes)

Length on measuring device until child able to stand independently





20mo 80cm
 21 mo 76cm
 22mo 71cm
 28mo 83cm

Failure to Thrive

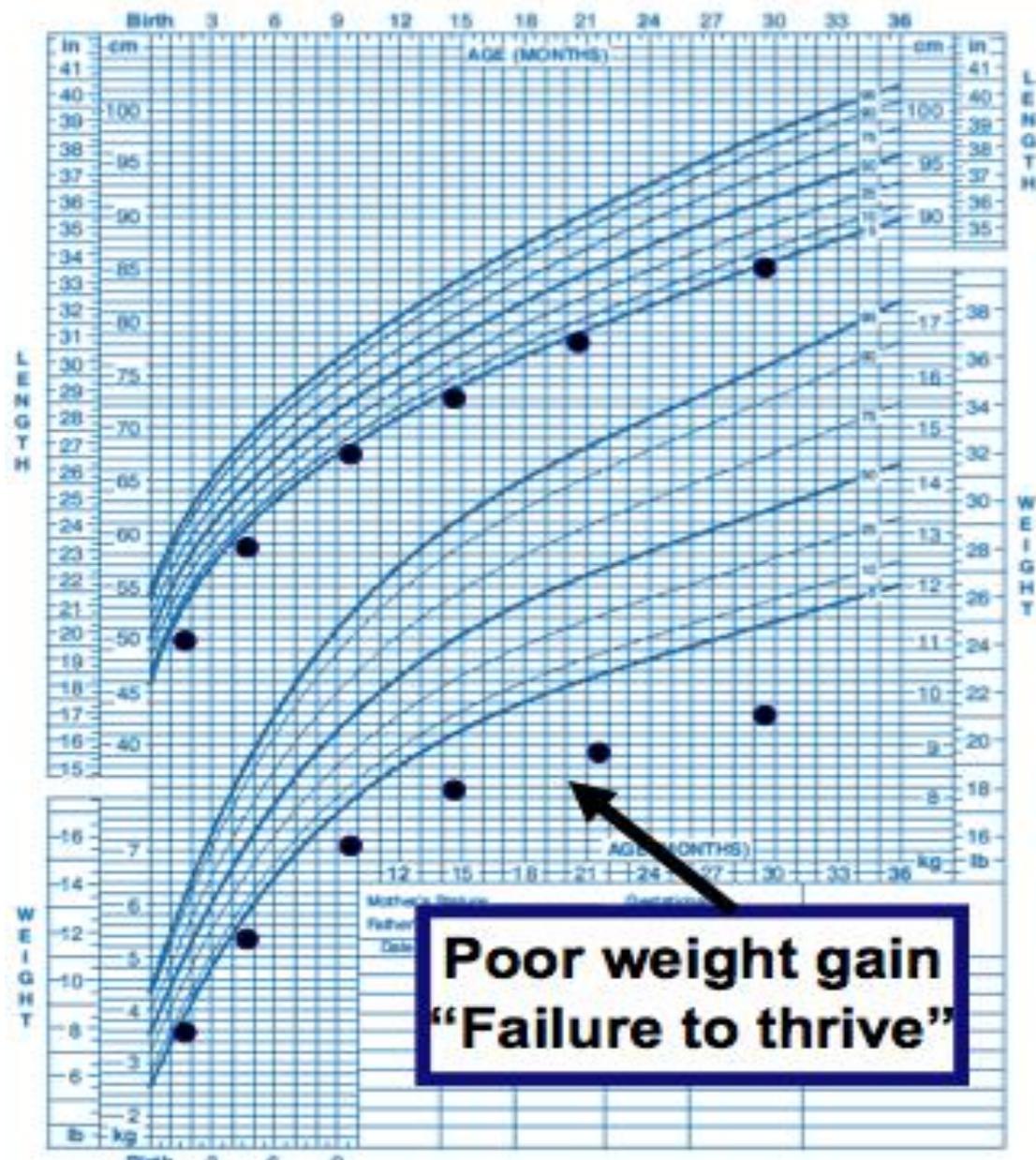
- First described in childhood in 1897 as 'ceased to thrive'; first noted as a diagnosis in 1933
 - Problems of poverty/insufficient food/social deprivation
 - Generally applied to children less than school age
 - Now has evolved to organic vs nonorganic classification of faltering weight when compared to peers
- No consensus on definition; no universally accepted anthropometric measurements; several approaches:
 - Weight Crossing 2 major percentiles
 - Weight < 3% or 5%
 - <80% of IBW for age
 - <3% or 5% weight for length



Birth to 36 months: Boys
Length-for-age and Weight-for-age percentiles

NAME _____

RECORD # _____



Poor weight gain
"Failure to thrive"

Failure To Thrive

- Best considered a sign of inadequate nutrition to support weight gain
- Etiology becomes task of examiner
 - Medically based
 - Food intolerance: Emesis, Malabsorption
 - Ongoing illness: cardiac, pulmonary, endocrine, neurological, metabolic, infectious, allergic/immunological and/or GI disorders
 - Psychosocially based
 - Not enough food offered or consumed
 - Social complexities of parental psychopathology or substance abuse, inadequate parenting skills



A Diagnostic Approach

Identify FTT

Obtain detailed
history

Perform physical
exam

Consider: further
diagnostic testing vs
nutritional therapy

Elements of history

Prenatal history

Delivery, neonatal events

Any medical or surgical history

Emesis and stooling history

Allergies

Family history, +adult stature, body build

Social history, +life stressors

Nutrition history

The Nutrition History

- Early infancy feeding practices, volumes accepted
- Developmental milestones in feeding
- Food allergies
- Food preferences
- Expression of hunger
- Intake over a typical day
- Mealtime management (schedules, duration, distractions, who is present, how refusal is handled)



Elements of the Physical Exam

Customary
elements,
plus

- Any dysmorphic features
- Signs of abuse or neglect
- Reciprocity and development for age
- Severity of malnutrition

TABLE 3.

Failure to Thrive Defined by Malnutrition Z-Scores

Anthropometric Measurements	Mild Malnutrition	Moderate Malnutrition	Severe Malnutrition
Weight-for-height/BMI z-score	-1 to -1.9	-2 to -2.9	≤ -3
Length/height z-score	-	-	≤ -3
Mid-upper arm circumference z-score	-1 to -1.9	-2 to -2.9	≤ -3
Weight gain velocity ^a (<2 years)	<75% expected	<50% expected	<25% expected
Weight loss (≥ 2 years)	5% body weight	7.5% body weight	10% body weight
Deceleration of weight-for-length z-score	-1 z-score	-2 z-scores	-3 z-scores

Abbreviation: BMI, body mass index.

^aBased on World Health Organization data.²⁰

Adapted from a consensus statement from the American Society for Parenteral and Enteral Nutrition.⁷

Effectiveness of Nutrition Therapy

- Achieving ideal weight for length, or normal BMI in child >2yrs of age
- Catch up weight gain
 - 12-18mo of age: >10g/d
 - >18mo-24mo of age: > 8g/d

That early toddler weight plateau

- Developmental contributors:
 - Motor skills translates into increased kcal need
 - Oral motor skills needed to eat solids different from sucking
 - Developmental assertiveness of child can impact willingness to eat
- Household dietary contributors:
 - Transition from breast or bottle on demand to meals, snacks
 - Parental desire to avoid specific foods: gluten containing, dairy, sweetened
 - Use of low kcal dense items, especially low fat items

High Calorie Snacks



- Whole milk yogurt with granola, nuts, and berries
- Banana and whole milk smoothie with peanut butter
- Whole wheat bagel topped with avocado
- Whole milk cottage cheese with mayonnaise and pineapple
- Hummus with olive oil on top served with whole wheat pita chips
- Deviled eggs with mayonnaise and mustard
- Whole wheat full fat Triscuit crackers topped with nut butter, cream cheese, or avocado
- Trail mix with nuts, dried fruit, and coconut
- Oatmeal with whole milk topped with coconut shavings, nuts, and dried fruit
- Guacamole with tortilla chips
- Granola bars with nut butter
- Whole wheat macaroni and cheese with broccoli
- $\frac{1}{2}$ tuna fish sandwich with whole wheat bread, tuna canned in olive oil, and mayonnaise.
- Avocado smoothie (1 ripe avocado, $\frac{1}{2}$ cup vanilla yogurt, $\frac{1}{4}$ cup honey, 1 cup milk, 8 ice cubes)
- Toasted whole wheat bread with peanut butter and honey
- Canned fruit in heavy syrup topped with coconut shavings
- Pizza roll ups (whole wheat tortilla topped with marinara sauce, full fat cheese, and spinach, heated in the microwave for 30 seconds, rolled up, and sliced)
- Mediterranean roll ups (whole wheat tortilla topped with hummus, feta cheese, and olives rolled up and sliced.)
- Whole wheat cookies (1 cup oats, 1 cup whole wheat flour, 1 cup wheat germ, $\frac{1}{2}$ cup oil, $\frac{1}{2}$ cup honey, $\frac{1}{2}$ cup milk, $\frac{1}{2}$ cup chocolate chips, 1 teaspoon salt, 1 teaspoon vanilla. Mix together, spoon into 2 inch cookies and back at 400 F for 15 minutes or until set.)

FOODS FOR INCREASING CALORIES AND PROTEIN

FOOD	CALORIES	SUGGESTED USES
Milk Products		
Whole Milk*	20 in 1 fluid oz	Add to Carnation Breakfast Essentials, hot cocoa, milkshakes, soups, cereals, puddings, and baked goods.
Evaporated Milk*	25 in 1 Tbsp	Instead of whole milk in baked goods, meat dishes, milkshakes, soups, and cooked cereals.
Dry, Powdered Milk*	25 in 1 Tbsp	Add to whole milk, milkshakes, desserts, casseroles, sauces/gravies, meat dishes, cereals, macaroni & cheese, potato, soups, salad dressings and yogurt.
Half & Half	20 in 1 Tbsp	Add to cereals, cocoa, milkshakes, soup, baked foods, sauce and whole milk.
Sour Cream	25 in 1 Tbsp	Add on vegetables, potatoes; in salads, casseroles, and guacamole.
Cheese*	120 in 1 oz (1" cube)	As a snack. On bread, toast, crackers, vegetables, pasta, eggs, hot dogs, hamburgers; in salads, dips, sandwiches; mixed in meatloaf, meatballs, soups, potatoes, gravies, scrambled eggs; as a sauce.
Cream Cheese	50 in 1 Tbsp	On toast, sandwiches, bagels, baked goods, dips, and scrambled eggs.
Cream	60 in 1 Tbsp	On cereal, Jell-O. In puddings, hot chocolate, milk shakes, soups, sauces, and casseroles.
Ice Cream	17 in 1 Tbsp	In milk shakes; as a topping for dessert.
Butter or Margarine	100 in 1 Tbsp	On pancakes, waffles, toast, bread, crackers, mashed potatoes, pasta, and veggies. In baked goods, casseroles, and sauces.
Sweetened Condensed Milk	60 in 1 Tbsp	Add to pies, puddings, and milkshakes. As a topping for ice cream, fruit, and desserts.
Nuts, Seeds, Legumes		
Peanut butter**	94 in 1 Tbsp	On toast, bread, crackers, fruits, veggies, tortillas, hot cereal, pancakes, and baked goods. In milkshakes.
Chopped Nuts**	50 in 1 Tbsp	In puddings, salads, casseroles, baked goods. On cereals, vegetables, fruits, ice cream.
Wheat Germ	25 in 1 Tbsp	In baked goods, cereals, meatloaf, casseroles; As a topping for fruit. (Add cinnamon and sugar)
Granola	115 in 1 oz	Topping for yogurt, ice cream, and applesauce. Add to trail mix as a snack.
Hummus or bean spread*	17 in 1 Tbsp	As a spread on bread, toast, crackers. As a dip for veggies, mixed with cheese or potatoes.
Fats, Oils, Sweets		
Vegetable oil	110 in 1 Tbsp	In soups, casseroles, vegetables, gravies, cooked cereals, and sauces.
Butter or Margarine	100 in 1 Tbsp	On pancakes, waffles, toast, bread, crackers, mashed potatoes, pasta, and veggies. In baked goods, casseroles, and sauces.
Chocolate syrup, sugar, jams, jellies, corn syrup	45-60 in 1 Tbsp	On cereals, fruits, milkshakes, milk, cookies, crackers, toast, waffles, pancakes, as a topping for ice creams and desserts.
Avocadoes	40 in 1/8 each	As a topping on salads, casseroles, quesadillas, mashed into guacamole, added to soups, rice.
Coconut Dried Sweetened	60 in 1 oz	As a topping for ice cream and desserts, or added in baked goods.
Egg Products		
Egg yolks* or Whole eggs	60 per yolk; 75 per whole egg	Mixed in casseroles, meatloaf, baked goods, cooked meats spreads, soups, rice dishes, cooked and added to sandwiches and salads. Cook eggs before eating.
Mayonnaise	100 in 1 Tbsp	On sandwiches. In pasta, salads, deviled eggs, and dip.
Others		
Baby food	100-150 jar	In sandwiches, mixed in meats, soups, dips, casseroles, pasta, grain dishes, meatloaf, toast.
Gravy	26 in 1 Tbsp	On meats, potatoes, pasta, and vegetables. Mix in casseroles.
* These foods are also good sources of protein.		
** Do not offer these foods to children less than 2 years of age or those with oral-motor delays.		



Kcal dense supplements for children

- Followup formulas
 - Have been heavily marketed
 - May be of benefit where no solids ingested
 - Per WHO: not necessary and marketing misleads parents
- Oral supplements
 - Various brands, dairy or soy based
 - All pleasing to toddler palate—ie sweet
 - Can be useful for catch up
 - Available from WIC under specific circumstances
 - Excessive use can result in decreased interest in solid foods
 - Expensive!

The final goal: healthy weight and eating habits

- Scheduled mealtimes of healthy foods, snacks as needed
- No distractions at mealtimes
- No force feeding, child accepts task of eating willingly
- Meal duration <30min



Useful Resources

- Patient Education Resources, TCH webpage, as well as TCH blog posts related to nutrition
- Gikids.org (Children's Digestive Health information, partners with NASPGHAN)
- Healthychildren.org (AAP)
- WeArePediatricians Facebook page
- Superhealthykids.com—owned by health educator and dietitian—blog updates, recipes, menu ideas