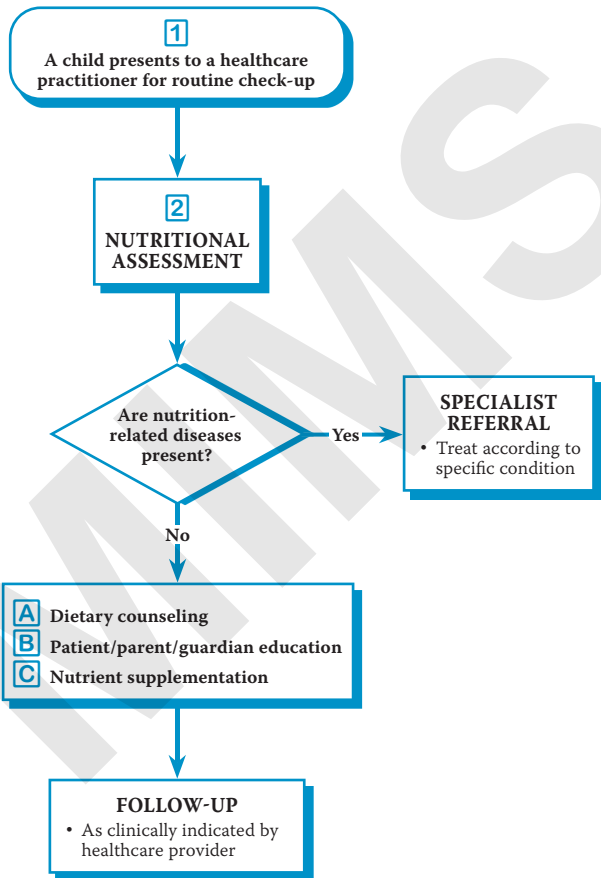


Nutrition in Children (1 of 14)



*Not all products are available or approved for above use in all countries.
Specific prescribing information may be found in the latest MIMS.*

Give them the guts to explore the world.

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Formulated with NOVAS* milk nutrient, 2'-FL, and GOS.

NEW



*Novas: Refer to protein digestion and absorption.

Disclaimer: Please do not attempt this act under any circumstance. Visuals displayed are for metaphorical purposes only.

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1 NUTRITION IN CHILDREN

- Pediatric mortality from undernutrition is estimated at 2.7 million annually, contributing to 45% of all deaths in children
- In 2022, global incidence of stunting in children <5 years old was recorded at 149 million, at 45 million for children suffering from wasting & at 37 million for overweight or obese children
- Nutrients are substances that are absorbed by the body to provide nourishment for growth & metabolism
- Composed of vitamins, minerals, carbohydrates, proteins & fats
 - Macronutrients include carbohydrates, proteins, fiber, fats & cholesterol
 - Micronutrients include vitamins (eg thiamine, riboflavin, niacin, etc) & minerals (eg calcium, sodium, iron, iodine, etc)
- The goal of providing adequate supply of nutrients is to ensure that a child achieves his full growth potential, achieve developmental milestones without significant delay, & to prevent possible health concerns in the future
 - Providing proper nutrition depends on the age, developmental stage, gender, & energy requirement of the child
 - Malnutrition during the first 2 years of a child's life can cause stunting & impaired intellectual development
- Good nutrition is achieved w/ an adequate, well-balanced diet, including all consumed food & beverages
 - A well-balanced diet should include vegetables, fruits, grains, fat-free or low-fat dairy, protein & oils
 - Limit intake of saturated fats, trans fat, added sugars & sodium
 - Recommended limits:
 - Added sugars: <10% calories/day
 - Saturated fats: <10% calories/day
 - Sodium chloride: 2.3 g/day
- The estimated nutritional requirements per age are as follows:

Age (months)	Energy (kcal/kg/day)
0-2	100-110
3-5	85-95
6-8	80-85
9-11	80

Age (months)	Energy (kcal/day)	
	Male	Female
12	800	800
15	900	800
18	1,000	900
21-23	1,000	1,000

Age (years)	Energy (kcal/day)	
	Male	Female
2	1,000	
3	1,000-1,400	
4	1,200-1,600	1,200-1,400
5	1,200-1,600	1,200-1,600
6	1,400-1,800	1,200-1,600
7	1,400-1,800	1,200-1,800
8	1,400-2,000	1,400-1,800
9	1,600-2,000	1,400-1,800
10	1,600-2,200	1,400-2,000
11	1,800-2,200	1,600-2,000
12	1,800-2,400	1,600-2,200
13	2,000-2,600	1,600-2,200
14	2,000-2,800	1,800-2,400
15	2,200-3,000	1,800-2,400
16	2,400-3,200	1,800-2,400
17	2,400-3,200	1,800-2,400
18	2,400-3,200	1,800-2,400

2 NUTRITIONAL ASSESSMENT

- Evaluation of nutritional status in children includes history, physical examination & anthropometric evaluation, laboratory & radiologic tests
- Helps identify individuals at risk for nutritional disorders & those who will benefit from nutritional interventions

History

Eating Pattern

- Infants (birth to 2 years)
 - Feeding per demand, especially breastfed infants
 - At 6 months, able to swallow pureed foods, begins to learn how to munch by moving jaw vertically, & tries to use hands to pick up food & put it in their mouth
 - Opens mouth & leans forward when wants to be fed, or turns away when full or rejects food
 - Child may protrude tongue when given solid food
 - At 9 months, tries to use spoon & demands to spoon-feed self or uses thumb & forefinger (pincer grasp)
- Toddlers (2 years old)
 - Drinks from cup
 - Feeds self using fingers or kitchen utensils
 - Can consume adult food (both solid & liquid) w/ choking precaution
 - Plays w/ food: Normal behavior that exhibits their willingness to explore new food
 - May be resistant to new food
 - Offering the new food several times before child eats is normal
- Preschoolers (3-4 years old)
 - Follows mealtime same as adults (3 meals a day w/ snacks in-between)
 - Able to handle eating w/ utensils & cups w/ ease
 - Agrees to sit w/ the members of the family during meals but w/ limited period of time
 - May be resistant to new food
- School-age children (≥5 years old)
 - Understands the difference between good & bad food
 - Able to decide on own meal & can participate in the choice of food prepared for the family

Physical Examination

Anthropometry

- Used to estimate calorie requirements, & diagnose nutritional status, malnutrition, weight problems & growth disorders
- Anthropometric measurements & indices used in children <5 years old:
 - Weight-for-height/length (WFH/L): Used to measure wasting
 - Height/length-for-age (H/LFA): Used to measure stunting
 - Weight-for-age (WFA)
 - Mid-upper arm circumference (MUAC): Used to measure wasting
 - Not recommended for infants under 6 months & in people w/ edema
 - MUAC cutoffs to classify nutritional status in children 6 months to 14 years old are as follows:

Age	Severe Acute Malnutrition (SAM)	Moderate Acute Malnutrition (MAM)	Normal Nutritional Status
6-59 months	<115 mm	≥115 to <125 mm	≥125 mm
5-9 years	<135 mm	≥135 to <145 mm	≥145 mm
10-14 years	<160 mm	≥160 to 185 mm	≥185 mm

- Body mass index (BMI): Assess status of body weight to height in children ≥2 years old
- Other indices used include triceps skinfold thickness, subscapular skinfold, head circumference, muscular circumference, waist circumference
- Please see *Growth Chart clinical reference table for further information*

2 NUTRITIONAL ASSESSMENT (CONT'D)**Red Flags per Age****Birth to 6 Months**

- Less than six soaked diapers/day at 5 days old
- More than 10% weight loss from birth to 2 weeks of age, or no weight gain 2 weeks after birth, or weight gain is ≥ 20 g/day
- Child consumes either of the following:
 - Cow's or goat's milk, soy or rice beverage, or homemade or evaporated milk
 - Water, juice, herbal teas or other forms of liquid
 - Infant cereal or pureed foods at <4 months of age
 - Unprescribed thickened formula w/ infant cereal
- Child is left unsupervised during meals
- Child is force-fed or meals & snacks are restricted

Six to Nine Months

- Shows delays in growth
- Lack of iron-rich foods in diet
- Child consumes any of the following:
 - Cow's or goat's milk, vegetarian beverages, or homemade formula as main source of milk
 - Water, juice, herbal teas or other forms of liquid
 - Unprescribed thickened formula w/ infant cereal
- Child is left unsupervised during meals
- Child is force-fed or meals & snacks are restricted

Nine to Twelve Months

- Shows delays in growth
- Lack of iron-rich foods in diet
- Food w/ texture has not been introduced by age 9 months
- Child consumes any of the following:
 - Fluids more than solid food (>750 mL/day of cow's or goat's milk, &/or >175 mL of juice per day)
 - Skim milk, low-fat milk, goat's milk, vegetarian milk (eg soy, rice, almond), or homemade formula as the main source of milk
 - Consumes fruit drinks, sports drinks, or beverages w/ artificial sweeteners or caffeine (eg coffee, softdrinks, tea)
- Child is left unsupervised during meals
- Child is force-fed or meals & snacks are restricted

One to Two Years

- Shows delays in growth
- Food w/ texture & different groups of food including iron-rich food are missing in the daily meals
- Recommended dietary fat intake is restricted
- Child consumes any of the following:
 - Breastmilk more than solid food
 - Fluids more than solid food (>750 mL/day of cow's or goat's milk, &/or >175 mL of juice per day)
 - Skim milk, low-fat milk, goat's milk, vegetarian milk (eg soy, rice, almond), or homemade formula as the main source of milk
 - Consumes fruit drinks, sports drinks, or beverages w/ artificial sweeteners or caffeine (eg coffee, softdrinks, tea)
- Child still bottle-fed & has not transitioned into open-cup feeding
- Child is left unsupervised during meals
- Child is force-fed or meals & snacks are restricted
- Child chokes or coughs when eating at age 2 years
- Categorized as high-nutrition risk upon screening

Two to Six Years

- Shows delays in growth
- A variety of food from the 4 food groups are missing in the daily meals
- Child consumes any of the following:
 - Fluids more than solid food (>750 mL of milk per day or >175 mL of juice per day)
 - Breastmilk more than solid food
 - Consumes fruit drink, sports drink, or beverages w/ artificial sweeteners or caffeine (eg coffee, softdrinks, tea)
- Child has not been taught to use a glass yet & still consumes milk or other beverages from a bottle or sippy cup
- Child is force-fed or meals & snacks are restricted

2 NUTRITIONAL ASSESSMENT (CONT'D)

Red Flags per Age (Cont'd)

Two to Six Years (Cont'd)

- Child rarely or never eats w/ his/her family
- Nutrition is acquired from supplements instead of food varieties
- Categorized as high-nutrition risk upon screening

Laboratory Studies

- May be used to identify specific nutritional deficiency, evaluate children at risk for malnutrition, or to confirm if a child is suffering from malnutrition despite lack of signs & symptoms
 - Not to be used routinely for the diagnosis of malnutrition
- The following tests may be used as identifiers of nutritional status
 - Serum protein levels: Albumin, prealbumin (transthyretin), transferrin, retinol-binding protein
 - Total body nitrogen/nitrogen balance
 - Complete blood count (hemoglobin count, mean corpuscular volume, mean corpuscular hemoglobin, prothrombin time)
 - Total lymphocyte count
 - Serum concentration of specific vitamins & minerals: Vitamin A, vitamin E, 25-hydroxyvitamin D, copper, zinc, magnesium
 - Parameters to evaluate overweight & obese children: Serum total cholesterol, LDL, HDL, triglycerides, fasting glucose levels, insulin, HbA1c, oral glucose tolerance test, serum hormones (thyroid stimulating hormone, free thyroxine [FT4], serum insulin, serum cortisol), liver enzymes (AST, ALT, alkaline phosphatase, bilirubin levels)
 - Other parameters: Serum sodium, magnesium, trace minerals

Imaging

- Radiologic tests may help evaluate children w/ signs of malnutrition especially those at risk for osteopenia/rickets
- Bone age & density may be assessed using scans of the spine, hips & the whole body
 - Bone age may also be assessed using radiograph of the hand & wrist (AP view) (Greulich & Pyle method)

Diseases Secondary to Malnutrition

- Poor nutrition causes increased risk for illnesses & certain vitamin & mineral deficiencies, which may be the cause of several diseases

Types of Malnutrition Based on Anthropometric Measurements for Children <5 Years Old

Nutritional Problem		Index
Wasting	Wasting	WFH/L <-2 standard deviations (SD) MUAC <125 mm
	Moderate wasting	WFH/L between -3 SD & -2 SD MUAC between 115 & 125 mm
	Severe wasting	WFH/L <-3 SD MUAC <115 mm
Stunting	Stunting	H/LFA <-2 SD
	Moderate stunting	H/LFA between -3 SD & -2 SD
	Severe stunting	H/LFA <-3 SD
Underweight	Underweight	WFA <-2 SD
	Moderate underweight	WFA between -3 SD & -2 SD
	Severe underweight	WFA <-3 SD
Edematous malnutrition/ Kwashiorkor	+	Bilateral edema below the ankles
	++	Bilateral edema up to the knees
	+++	Bilateral edema up to the arms & higher

References: World Health Organization (WHO) and United Nations Children's Fund (UNICEF). WHO child growth standards and the identification of severe acute malnutrition in infants and children. A joint statement by the WHO and UNICEF. WHO. <https://www.who.int/>. 2009; Frison S, Kerac M, Checchi F, et al. Anthropometric indices and measures to assess change in the nutritional status of a population: a systematic literature review. BMC Nutrition. 2016 Dec;2:76.

Vitamin Deficiencies

- Vitamin A: Xerophthalmia, night blindness, measles complication
- Vitamin B1/Thiamine: Beriberi
- Vitamin B3/Niacin: Pellagra
- Vitamin B9: Folate: Megaloblastic anemia
- Vitamin C: Scurvy
- Vitamin D: Rickets, hypocalcemia, hypophosphatemia
- Vitamin E: Retinal degeneration, hemolytic anemia
- Vitamin K: Bleeding diathesis
- Please see Vitamin Deficiency clinical reference table for further information

2 NUTRITIONAL ASSESSMENT (CONT'D)

Diseases Secondary to Malnutrition (Cont'd)

Mineral Deficiencies

- Zinc: Acute persistent diarrhea, acrodermatitis enteropathica
- Iodine deficiency: Goiter, hypothyroidism, mental retardation
- Iron: Anemia
- Calcium: Hypocalcemia manifested as tetany, Chvostek sign, Trousseau sign, seizures
- Phosphate: Hypophosphatemia manifested as myopathy, rhabdomyolysis, bone pain & rickets
- Copper: Sideroblastic anemia, neutropenia, failure to thrive, skeletal abnormalities

A DIETARY COUNSELLING

Recommended Dietary Intake by Food Group

	Age (years)				
	1	2-3	4-8	9-13	14-18
Milk/Dairy (cups)	2	2	2	3	3
Lean Meat & Beans (ounces)	1.5	2	(M) 4	5	(M) 6
			(F) 3		(F) 5
Fruits (cups)	1	1	1.5	1.5	(M) 2
					(F) 1.5
Vegetables (cups)	¾	1	(M) 1.5	(M) 2.5	(M) 3
			(F) 1	(F) 2	(F) 2.5
Grain (ounces)	2	3	(M) 5	(M) 6	(M) 7
			(F) 4	(F) 5	(F) 6

Based on a sedentary lifestyle. Additional 0-200 kcal/day for moderate physical activity; 200-400 kcal/day if very physically active

M = Male; F = Female

- Vegetables are a good source of vitamins A, C, K, E & B6, folate, thiamine, iron, manganese, copper, niacin & choline
- Whole fruits & fruit juices provide dietary fiber, potassium, & vitamin C
- Grains (eg rice, quinoa, oatmeal, popcorn, bread, cereal, crackers, pasta, etc) help provide dietary fiber, iron, zinc, manganese, folic acid, magnesium, copper, thiamine, niacin, vitamin A & B6, selenium, riboflavin, & phosphorus
 - White bread, pasta & rice should be limited
- Dairy products (eg milk, yogurt, & cheese) contribute calcium, phosphorus, protein, potassium, zinc, choline, magnesium, selenium, & vitamins A, D, & B12 to everyday diet
- Protein-dense food (eg meat, poultry, seafood, tofu, nuts) are good sources of protein, B vitamins, vitamin D, vitamin E, & minerals such as selenium, choline, phosphorus, zinc, & copper

Dietary Recommendations for Infants 0-5 Months

Initiation of Breastfeeding

- Breastfeeding should be started immediately after birth
- Place newborn baby on mother's chest for at least 1 hour to encourage skin to skin contact & possible latching

Exclusive Breastfeeding

- Exclusive breastfeeding of infants within the first 6 months of life is mandatory based on the recommendation by the World Health Organization (WHO)
 - Breastmilk contains fat, protein, carbohydrates, water, vitamins (except vitamin D) & minerals
 - Adequate to meet the required nutritional needs of an infant from birth to 6 months of age
- Breastfeeding improves gastrointestinal function & immune defense which helps prevent various diseases during infancy, throughout childhood & even beyond
 - Lower incidences of diarrhea, respiratory tract disease, otitis media & urinary tract infection in breastfed infants compared to those given infant formula
 - Increases gastric emptying, increases lactase activity, decreases intestinal permeability early in life, & decreases risk of necrotizing enterocolitis in premature infants
 - Antimicrobial contents: Immunoglobulins, white blood cells, proteins (lactoferrin, lysozyme), oligosaccharides, epidermal growth factor
- Long-term benefits of breastfeeding include protection against acute illnesses (eg otitis media) & chronic diseases (eg obesity, diabetes mellitus [DM], malignancies, cardiovascular diseases, inflammatory bowel disease, & some allergic conditions)

A DIETARY COUNSELLING (CONT'D)**Dietary Recommendations for Infants 0-5 Months (Cont'd)**

- Colostrum has the highest content of antimicrobials & macronutrients compared to later milk
- Some studies showed improvement of cognitive development in breastfed infants compared to formula-fed infants
- Temporary or permanent discontinuation of breastfeeding may only be considered if any of the following are present:
 - Infant conditions: Classic galactosemia, infant maple syrup urine disease, phenylketonuria, weight of <1,500 g, prematurity, at risk for hypoglycemia due to impaired metabolic adaptation or increased glucose demand unresponsive to breastmilk
 - Maternal conditions: Infection (HIV infection, Herpes simplex virus type I, hepatitis B or C, tuberculosis), medications (psychotherapeutic drugs, anti-epileptic drugs, opioids, radioactive iodine-131, topical iodine or iodophors, cytotoxic chemotherapy agents), breast abscess, mastitis, substance use (nicotine, alcohol, amphetamines, opioids)
- Infants should be fed w/ iron-fortified infant formula when human milk is not available

Dietary Recommendations for Infants 6-12 Months**Continue Breastfeeding & Complementary Feeding**

- Introduction of complementary food (also called beikost or weaning foods) should be started at 6 months of age while continuing breastfeeding
- Continue adequate & timely complementary feeding w/ breastfeeding up to 2 years or beyond
 - Complementary feeding should be started at 6 months of age using small quantities of food, then increasing gradually as the child ages, while continuously consuming breastmilk
 - For infants 6-8 months of age, 2-3 meals per day is recommended
 - Fortified complementary foods & dietary supplements may be used in infants as deemed necessary
 - Iron-rich foods (eg seafoods, iron fortified infant cereals, meats) & zinc-rich foods (meat, beans, zinc-rich cereals) are preferred
 - Fat & cholesterol should not be restricted
 - Increase food consistency & variety as the child ages, to be able to fulfill the nutritional requirements based on age
- Delay consumption of cow's milk or other milk alternatives up to 9-12 months; may cause iron deficiency due to its low iron content
- Avoid foods w/ additional sugars, high-sodium foods, honey, unpasteurized foods & beverages
- During sickness, increase fluid & food intake by serving child's favorite food while sticking to soft, varied meals
- Food intake should be increased while child is recuperating from a previous illness
- Consumption of small amounts of water (4-6 oz/day) from an open cup should start by 6 months of age
- May offer a limited amount of juice, up to ½ cup/day (4-6 oz/day) but consumption of whole vegetables or fruits is preferred

Dietary Recommendations for Children 1-2 Years Old

- Continue breastfeeding up to 24 months; may offer pasteurized whole milk formula if breastfeeding is contraindicated
- Meals should be composed of nutrient-dense foods from various food groups to match the child's daily energy requirement
- For infants 9-23 months of age, 3-4 meals per day is recommended, w/ 1-2 additional snacks
- Fortified complementary foods & dietary supplements (eg vitamin D) may be used especially for those who are exclusively breastfed
- For children 1 year of age, limit consumption of fat to 30-40% of total energy intake
- May offer water (preferred) when child is thirsty & 100 % fruit juice (up to 125 mL [4 oz]/day) from an open cup
- Avoid overfeeding the child; avoid forcing child to finish meal if already full

Dietary Recommendations for Children 2-6 Years Old

- May continue breastfeeding up to 3 years old or as long as child & mother mutually want to
- For children no longer breastfed, whole cow's milk or other milk alternatives should be offered daily
- Water & a limited amount of juice (½ cup/day) may be offered in an open cup
 - Pure fruit juice should not be consumed on a daily basis or >2 days per week
- Increase food variety of meals to meet the required nutrients of the child
- For children 2-3 years old, limit consumption of fat to 30-35% & saturated fat to <10% of total energy intake; intake of trans fat should be as low as possible
- For children ≥4 years old, fat consumption should be 25-35% of the total energy intake; limit intake of saturated fat to <10% of total energy intake & intake of trans fat should be as low as possible
- Limit salt intake to a maximum of 1.2 g/day for children 4-6 years of age
- Encourage drinking at least 2-3 cups of whole cow's milk per day
- Avoid overfeeding the child; avoid forcing child to finish meal if already full

Dietary Recommendations for Children 7-18 Years Old

- For adolescents aged ≥14 years old, limit sodium chloride to 2.3 g/day & other food high in solid fat & added sugars
- Limit sodium chloride to 2 g/day for children 7-10 years of age
- Drinking at least 3 cups per day of whole cow's milk is recommended for children 9-18 years old
- Calcium-rich cow's milk & other milk products are preferred

RECOMMENDED DAILY NUTRITIONAL GOALS BASED ON DIETARY REFERENCE INTAKES

Recommended Daily Nutritional Goals Based on Dietary Reference Intakes									
Age	6-11 months	12-23 months	2-3 years	4-8 years		9-13 years		14-18 years	
				Female	Male	Female	Male	Female	Male
Macronutrients									
Protein (g)	11	13	13	19	19	34	34	46	52
Protein (% kcal) ¹	N/A	N/A	5-20	10-30	10-30	10-30	10-30	10-30	10-30
Carbohydrate (g)	95	130	130	130	130	130	130	130	130
Carbohydrate (% kcal) ¹	N/A	N/A	45-65	45-65	45-65	45-65	45-65	45-65	45-65
Dietary Fiber (g) ²	N/A	19	14	16.8	19.6	22.4	25.2	25.2	30.8
Added Sugars (% kcal) ³	N/A	N/A	<10%	<10%	<10%	<10%	<10%	<10%	<10%
Total Fat (% kcal) ¹	N/A	30-40	30-40	25-35	25-35	25-35	25-35	25-35	25-35
Saturated Fat (% kcal) ³	N/A	N/A	<10%	<10%	<10%	<10%	<10%	<10%	<10%
Linoleic acid (g) ⁴	4.6	7	7	10	10	10	12	11	16
Linolenic acid (g) ⁴	0.5	0.7	0.7	0.9	0.9	1	1.2	1.1	1.6
Minerals									
Calcium (mg)	260	700	700	1000	1000	1300	1300	1300	1300
Iron (mg)	11	7	7	10	10	8	8	15	11
Magnesium (mg)	75	80	80	130	130	240	240	360	410
Phosphorus (mg)	275	460	460	500	500	1250	1250	1250	1250
Potassium (mg) ⁴	860	2000	2000	2300	2300	2300	2500	2300	3000
Sodium (mg) ⁵	370	1200	1200	1500	1500	1800	1800	2300	2300
Zinc (mg)	3	3	3	5	5	8	8	9	11
Copper (mcg)	220 ⁴	340	340	440	440	700	700	890	890
Manganese (mg) ⁴	0.6	1.2	1.2	1.5	1.5	1.6	1.9	1.6	2.2
Selenium (mcg)	20 ⁴	20	20	30	30	40	40	55	55
Vitamins									
Vitamin A (mcg RAE)	500	300	300	400	400	600	600	700	900
Vitamin E (mg AT)	5	6	6	7	7	11	11	15	15
Vitamin D (IU)	400	600	600	600	600	600	600	600	600
Vitamin C (mg)	50	15	15	25	25	45	45	65	75
Thiamine (mg)	0.3	0.5	0.5	0.6	0.6	0.9	0.9	1	1.2
Riboflavin (mg)	0.4	0.5	0.5	0.6	0.6	0.9	0.9	1	1.3
Niacin (mg)	4	6	6	8	8	12	12	14	16
Vitamin B6 (mg)	0.3	0.5	0.5	0.6	0.6	1	1	1.2	1.3
Vitamin B12 (mcg)	0.5	0.9	0.9	1.2	1.2	1.8	1.8	2.4	2.4
Choline (mg) ⁴	150	200	200	250	250	375	375	400	550
Vitamin K (mcg) ⁴	2.5	30	30	55	55	60	60	75	75
Folate (mcg DFE)	80	150	150	200	200	300	300	400	400

Reference: U.S. Department of Health and Human Services and U.S. Department of Agriculture. 2020-2025 Dietary guidelines for Americans. 9th Edition. Dec 2020.

N/A = not available; RAE = Retinol Activity Equivalents; AT = alpha-tocopherol; IU = International Units; DFE = Dietary Folate Equivalent

¹Based on Acceptable Macronutrient Distribution Range (AMDR)

²Source of goal: 14 g/1,000 kcal

³Based on 2020-2025 dietary guidelines recommended limit

⁴Based on Adequate Intake (AI)

⁵Based on Tolerable Upper Intake Level (UL)

B PATIENT/PARENT/GUARDIAN EDUCATION**Milk Formula**

- Choice of infant formula should be based on child's nutritional requirement, medical status & the family's cultural & religious background
- Ensure that infant formula contains sufficient proportions of protein, fat, carbohydrates, vitamins & minerals appropriate for child's age
 - Unmodified cow's milk, plant-based milk (except soy-based), or goat's milk is not recommended for infants <12 months since these may not contain the needed nutrients for the child's development
 - For children ≥1 year of age, may offer pasteurized, homogenized whole cow's milk if breastmilk is not available
 - Pasteurized, full-fat goat's milk w/ additional vitamin D & folic acid may be used for children ≥1 year of age if whole cow's milk is not available
 - Soy-based milk formula may be offered to children ≥1 year of age who are no longer breastfed & not given whole cow's or goat milk
- Calcium-rich food should be consumed w/ low-fat or fat-free cow's milk or calcium- & vitamin D-fortified soy milk in children >2 years of age
- *Please see Enteral/Nutritional Pediatric Products clinical reference table for further information*

Parental Influence on Child's Food Habit

- Set a good example for the child by exhibiting healthy eating patterns
- Encourage both feeding & self-feeding (responsive feeding) by 9-12 months
 - Teaching a child to feed himself using child-friendly, age-appropriate kitchen utensils or clean hands promote self-regulation of food
 - A child will learn to naturally stop eating once full
 - Encourage the child by patiently & slowly feeding him directly or assisting him w/ feeding himself
 - Refrain from pressuring children to eat by scolding, bribing, pleading or praising for this may lead to poor eating habits
 - Guidance should always be provided while practicing responsive feeding
 - Small portions should be offered first, & may give the child more food once he asks
 - Drinking appropriate amounts of water during meals are allowed; drinking milk, soda or juice during mealtime should be discouraged
 - Toys, electronic devices & other things that can distract the child's attention should be removed during mealtime
 - Tolerate mess during feeding while child learns to feed himself
 - Food should be removed once child is done feeding himself
- Encourage eating together as a family
- Create a mealtime setting that promotes family interaction
- Involving children during food preparation may help peak their interest in food
- Picky eating should be discouraged
- Proper handling of food & good hygiene should always be implemented

Food Allergies

- High-risk infants for food allergies have a personal history of atopy or may have a first-degree relative w/ atopy (eg asthma, allergic rhinitis, eczema, food allergies)
- Introduction of potentially allergenic food (eg egg, peanuts, wheat, shellfish, soy, cow milk products) at 4-6 months of age to high-risk children may help prevent allergy
 - Should be done one at a time to determine reaction & tolerability at regular intervals (eg every 2 days or 2-3x/week) between each foods to sustain tolerance
- *Please see Food Allergy disease management chart for further information*

Choking Prevention

- Children ≤4 years of age who are at high risk for choking should always be supervised during mealtime
 - Avoid offering hard candies, dried fruits, peanuts, olives, grapes, cherry tomatoes, hotdog & food w/ shape or texture that is difficult to swallow
- Proper positioning of a child during mealtime may help decrease the risk of choking
- Educate parents about gagging gestures & its role in the prevention of choking
- Decrease the risk of choking by cutting, dicing, grating or finely chopping foods

Exercise & Physical Activity

- Physical activity of at least 60 minutes per day is recommended for children & adolescents
- Improves muscular, cardiorespiratory fitness & bone health & decreases depression
- Limit sedentary behavior to 1-2 hours/day (eg watching videos, playing online games, etc)
- Achieve or maintain the appropriate body weight based on age by eating healthy & engaging in physical activities

*Not all products are available or approved for above use in all countries.
Specific prescribing information may be found in the latest MIMS.*

B PATIENT/PARENT/GUARDIAN EDUCATION (CONT'D)**Nutrition Assistance Programs****Fortification Strategies**

- A strategy to help decrease micronutrient malnutrition by deliberately increasing the micronutrient content in food
- Supported by global organizations such as WHO, UNICEF, the World Food Programme (WFP), the United States Centers for Disease Control & Prevention (CDC), the Global Alliance for Improved Nutrition (GAIN), & Nutrition International
- Flour fortification should be implemented & is mandatory in some countries that consume flour-based food regularly
 - Nutrients added to flour as recommended by the WHO include iron, folic acid, vitamin B12, vitamin A, & zinc
 - These nutrients may be modified depending on the nutritional needs of the concerned population
- Rice fortification aims to promote food fortification in countries where flour fortification programs are not implemented, & where rice is consumed more than flour-based products
 - Nutrients added to rice as recommended by the WHO include iron, folic acid, & vitamin A
- Oil fortification promotes addition of vitamin A in cooking oil, which in turn incorporates vitamin A when used during meal preparation

Meal Programs

- School feeding programs are being implemented in different countries to help provide nutritionally-balanced meals to schoolchildren (eg School Supplementary Feeding Programme in Malaysia, U.S. Department of Agriculture's [USDA] National School Lunch Program, USDA's School Breakfast Program, Healthy Meals in Schools Programme in Singapore, School-Based Feeding Program in the Philippines)

C NUTRIENT SUPPLEMENTATION

- Supplementation should be considered for children at increased risk for vitamin &/or mineral deficiency
 - Poor living conditions
 - Anorexia or decreased appetite
 - Lead poisoning
 - Failure to thrive
 - Inadequate sun exposure
 - Exclusively breastfed or intake of milk products without vitamin D fortification
 - Chronic disease (eg chronic liver disease, cystic fibrosis, hemolytic anemia)
 - Following weight loss or restrictive diet (eg vegetarians)
- Excessive intake of vitamin & mineral supplements should be discouraged due to its potential to cause adverse events

Vitamin A

- Recommended for infants & children 6-59 months of age in areas w/ increased rates of night blindness & vitamin A deficiency
- Supplementation is also recommended for children w/ measles living in areas w/ known vitamin A deficiency & w/ measles case fatality of >1%
- Recommended dosing scheme depends on child's age
 - Six to 11 months: 100,000 IU (30 mg retinol equivalent [RE]) once
 - Twelve to 59 months: 200,000 IU (60 mg RE) every 4-6 months
 - Children w/ measles, to be given 2 doses, 24 hours apart:
 - Less than 6 months: 50,000 IU
 - Six to 11 months: 100,000 IU
 - More than or equal to 12 months: 200,000 IU
 - If w/ clinical signs of vitamin A deficiency, another dose should be given 4-6 weeks after last dose
- Studies showed reduced mortality rates & incidence of infectious diseases in areas given vitamin A supplementation

Vitamin B12

- Recommended for breastfed infants of mothers who are under strict vegan diet not taking vitamin B12 supplements

*Not all products are available or approved for above use in all countries.
Specific prescribing information may be found in the latest MIMS.*

C NUTRIENT SUPPLEMENTATION (CONT'D)**Vitamin D**

- Recommended for children <24 months currently being breastfed
 - Recommended dose: 400 IU/day

Iron

- Recommended for children 6-23 months old especially those living in areas w/ increased prevalence of anemia, low-birthweight & preterm infants, & infants & children not consuming iron-fortified food
 - Recommended dose: 2 mg/kg/day for 3 months duration
- Also recommended for children <2 years old w/ iron-deficiency anemia or those in malaria-endemic areas
 - Recommended dose: 3 mg/kg once daily until hemoglobin level is within normal range
- May be considered in children living in areas w/ hookworm prevalence of >20%
- Signs of iron deficiency are irritability, pallor, slowed growth & development & poor appetite
- Heme iron are more absorbed compared to non-heme iron
 - Food rich in heme iron (eg beef, pork, fish chicken) & non-heme iron (eg tofu, eggs, peanut, beans)

Zinc

- An essential micronutrient that promotes protein synthesis, cell growth & differentiation, immune function, & gastrointestinal system regulation (mucosal barrier integrity, enterocyte brush-border enzyme activity)
- Studies showed reduced incidence, intensity, & duration of acute diarrhea in children when given zinc supplements together w/ oral rehydration salts
 - Recommended dose for diarrhea: 20 mg/day for 10-14 days (infants <6 months: 10 mg/day)

Iodine

- Iodine supplementation should be considered in young children living in areas w/ known severe iodine deficiency
- For exclusively breastfed infants aged 0-6 months, may give iodine supplementation w/ breastmilk

Dosage Guidelines

CALCIUM/WITH VITAMINS		
Drug	Dosage	Remarks
Calcium carbonate	<u>Ca supplementation:</u> 6-10 yr: 500 mg PO 24 hrly >10 yr: 1,000 mg PO 24 hrly	Adverse Reactions - GI effects (stomach cramps, N/V); Other effects (flushing, headache) Special Instructions - Use w/ caution in patients w/ gout, hemochromatosis, sideroblastic anemia, thalassemia, hyperoxaluria
Calcium lactate	<u>Prophylaxis of Ca deficiency:</u> 0-3 yr: 400-800 mg PO 24 hrly 4-10 yr: 800 mg PO 24 hrly	Adverse Reactions - Acute hypercalcemic syndrome (drowsiness, continuing N/V, weakness), calcific renal calculi (difficult or painful urination) Special Instructions - Contraindicated in patients w/ primary or secondary hypercalcemia, hypercalciuria, renal calculi, risk of Ca exacerbation & sarcoidosis

VITAMINS A, D & E ¹		
Drug	Dosage	Remarks
Vitamin A Derivative		
Retinol palmitate	<6 mth: 1,300 IU PO 24 hrly 7-12 mth: 1,650 IU PO 24 hrly 1-3 yr: 1,000 IU PO 24 hrly 4-8 yr: 1,300 IU PO 24 hrly 9-13 yr: 2,000 IU PO 24 hrly 14-17 yr: 3,000 IU PO 24 hrly for males & 2,300 IU PO for females	Adverse Reactions - W/ chronic use: Hypervitaminosis A (fatigue, anorexia, wt loss, vomiting, low-grade fever, hepatomegaly, joint pain), acute vitamin A intoxication (sedation, dizziness, confusion, diarrhea, vomiting, sore mouth, bleeding gums, increased intracranial pressure) Special Instructions - Should be taken w/ food - Use w/ caution in patients w/ liver impairment, cholestatic jaundice & fat-malabsorption conditions - Contraindicated w/ patients w/ hypervitaminosis A

¹Various strengths & combination products are available. Please see the latest MIMS for specific formulations & prescribing information.

All dosage recommendations are for children w/ normal renal & hepatic function unless otherwise stated.

Not all products are available or approved for above use in all countries.

Products listed above may not be mentioned in the disease management chart but have been placed here based on indications stated in locally approved product monographs.

Please refer to local product monograph in the latest copy of MIMS or in www.mims.com for country-specific prescribing information.

Dosage Guidelines

VITAMINS A, D & E ¹ (CONT'D)		
Drug	Dosage	Remarks
Vitamin D Derivatives		
Alfacalcidol (1 α -hydroxycholecalciferol, 1- α -hydroxyvit D ₃)	<1 mth: 0.05-0.1 mcg/kg PO/IV 24 hrly >1 mth & <20 kg: 0.05 mcg/kg PO/IV 24 hrly >1 mth & >20 kg: Initial dose: 1 mcg PO/IV 24 hrly Maintenance dose: 0.25-1 mcg PO/IV 24 hrly	Adverse Reactions - Hypercalcemia which may result in thirst, polyuria, constipation, muscle weakness, fatigue & confusion Special Instructions - Use w/ caution in patients w/ pulmonary tissue calcification, granulomatous diseases eg sarcoidosis, renal bone disease or severely reduced renal function, hepatic disease, epilepsy, fructose intolerance, sesame oil allergy - Avoid long-term use in patients w/ arteriosclerosis, cardiac valve sclerosis, nephrolithiasis - Avoid Ca supplementation to avoid risk of hypercalcemia & renal stones - Monitor serum Ca & phosphate 2x/wk initially. If hypercalcemia occurs, stop treatment immediately until serum Ca normalizes (1 wk), then restart w/ half the previous dose
Colecalciferol (Cholecalciferol) (equivalent to 1,000 IU of Vitamin D ₃) ²	<i>Individualize dose</i> <12 yr: 5-10 mcg PO 24 hrly ≥12 yr: 25 mcg PO 24 hrly	Adverse Reactions - GI disturbances, hypersensitivity reactions Special Instructions - Use w/ caution in patients w/ arteriosclerosis, cardiac conditions, hyperlipidemia, liver disease, renal impairment, sarcoidosis or other granulomatous disease; concomitant use w/ Ca- & other vit D-containing preparations, D-analog or thiazide diuretics - Avoid in patients w/ hypercalcemia, metastatic calcification, severe renal impairment

¹Various strengths & combination products are available. Please see the latest MIMS for specific formulations & prescribing information.

²Various combinations w/ Ca salts & other vitamins/minerals are available. Please see the latest MIMS for specific formulations & prescribing information.

VITAMIN C		
Drug	Dosage	Remarks
Ascorbic acid (Sodium ascorbate) ³	<u>Supplementation in vitamin C deficiency:</u> 2-6 yr: 100 mg PO 24 hrly 7-12 yr: 200 mg PO 24 hrly <u>Therapeutic treatment:</u> 2-6 yr: 100 mg PO 8-12 hrly 7-12 yr: 200 mg PO 8-12 hrly	Adverse Reactions - GI effects (stomach cramps, N/V); Other effects (flushing, headache) Special Instructions - Use w/ caution in patients w/ gout, hemochromatosis, sideroblastic anemia, thalassemia, hyperoxaluria, DM, G6PD deficiency & renal impairment

³Various strengths & combination products are available. Please see the latest MIMS for specific formulations & prescribing information.

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Dosage Guidelines

VITAMINS & MINERALS/ANTIANEMICS ¹		
Drug	Dosage	Remarks
Ferrous sulfate	<u>Prevention of iron-deficiency anemia:</u> As elemental iron: ≥4 mth solely breastfed: 1 mg/kg PO 24 hrly ≥6 mth-<2 yr: 10-12.5 mg PO 24 hrly 2-<5 yr: 30-60 mg PO 24 hrly <u>Treatment of iron-deficiency anemia:</u> As elemental iron: 3-6 mg/kg PO divided 8 hrly Max dose: 200 mg PO 24 hrly	Adverse Reactions - GI effects (pressure in the epigastric region, nausea, constipation, diarrhea, dark coloration of stool) Special Instructions - Should be taken on an empty stomach - Use w/ caution in patients w/ anemia due to infections or tumors, existing GI diseases - Avoid in patients w/ anemia not due to iron deficiency, patients w/ iron overload eg hemochromatosis, hemosiderosis, iron utilization disturbances eg lead & sideroachrestic anemia, thalassemia, hemolytic or megaloblastic anemia due to vit B12 deficiency - Monitor RBC count & indices, hemoglobin & hematocrit, serum ferritin, total iron-binding capacity
Iron polymaltose	<u>Prophylactic therapy:</u> <1 yr: 5-10 mg PO 24 hrly >1 yr: 10-30 mg PO 24 hrly	Adverse Reactions - GI effects (irritation, epigastric pain, stomach cramping, constipation, N/V, diarrhea, dark stools); Other effect (discoloration of urine) Special Instructions - Contraindicated in patients w/ iron overload or disturbances in utilization of iron - Take during or immediately after a meal. May be mixed w/ fruit or vegetable juices/other liq/d/ bottle-feed
Zinc gluconate	0-6 mth: 21 mg PO 24 hrly 6-12 mth: 35 mg PO 24 hrly 1-10 yr: 70 mg PO 24 hrly >10 yr: 70 mg PO 24 hrly	Adverse Reactions - GI effects (abdominal pain, dyspepsia, N/V, diarrhea, gastric irritation, gastritis); Other effects (lethargy, irritability, dizziness, headache) Special Instructions - Should be taken on an empty stomach, 1 hr before or 2 hr after meals - Use w/ caution in patients w/ renal impairment - Contraindicated in patients w/ copper deficiency - Monitor CBC, serum level of copper, zinc & alkaline phosphatase
Zinc sulfate monohydrate	1-3 yr: 13.75 mg PO 24 hrly 4-8 yr: 27.5 mg PO 24 hrly 9-13 yr: 27.5-55 mg PO 24 hrly	

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Please see the end of this section for the reference list.