

### Preface xiv

All chapters include Resources and References

CHAPTER 1

## Nutrition Basics 1

Introduction 2

Principles of the Science of Nutrition 2

Essential and Nonessential Nutrients 3

Dietary Intake Standards 3

Standards of Nutrient Intake for Nutrition Labels 4

Carbohydrates 4

Protein 5

Fats (Lipids) 8

Vitamins 10

Phytochemicals 13

Minerals 13

Water 23

Nutrient Functions at the Cellular Level 23

Nutritional Labeling 36

Nutrition Facts Panel 37

Ingredient Label 37

Dietary Supplement Labeling 37

Herbal Remedies 38

The Life-Course Approach to Nutrition and Health 39

Meeting Nutritional Needs Across the Life Cycle 39

Dietary Considerations Based on Ethnicity 39

Dietary Considerations Based on Religion 39

Nutrition Assessment 40

Community-Level Assessment 40

Individual-Level Nutrition Assessment 40

Clinical/Physical Assessment 40

Dietary Assessment 40

Anthropometric Assessment 42

Biochemical Assessment 42

Monitoring the Nation's Nutritional Health 42

Public Food and Nutrition Programs 43

WIC 43

Nationwide Priorities for Improvements in Nutritional Health 44

Nutrition and Health Guidelines for Americans 44

Dietary Guidelines for Americans 44

MyPlate.gov 45

USDA's Food Groups 45

### CHAPTER 2

## Preconception Nutrition 50

Introduction 51

Preconception Overview 51

2020 Nutrition Objectives for the Nation Related to

Preconception 51

Reproductive Physiology 52

Female Reproductive System 52

Male Reproductive System 55

Nutrition and Fertility 56

Undernutrition and Fertility 56

Body Fat and Fertility 56

# CASE STUDY 2.1 Cyclic Infertility with Weight Loss and Gain 57

Nutrient Status and Fertility 58

Nutrition During the Periconceptional Period **60** 

Periconceptional Folate Status 60

Periconceptional Iron Status 62

Recommended Dietary Intake and Healthy Dietary

Patterns for Preconceptional Women 63

Influence of Contraceptives on Preconceptional Nutrition

Status 64

Nutritional Side Effects of Hormonal Contraception 64

Model Preconceptional Health and Nutrition

Programs 65

Preconceptional Benefits of WIC 65

Decreasing Iron Deficiency in Preconceptional Women in

Indonesia 65

Preconception Care: Preparing for Pregnancy 66

The Nutrition Care Process 66

The Nutrition Care Process Related

to the Preconception Period 66

CASE STUDY 2.2 Nutrution Care Process (NCP) Male Infertility 67

CASE STUDY 3.1 Anna Marie's Tale 74 Underweight and Fertility 74 Negative Energy Balance and Fertility 74 Women, Exercise, and Fertility 75 Diabetes Prior to Pregnancy 75 Nutritional Management of Diabetes Prior to Pregnancy 76 Polycystic Ovary Syndrome and Fertility 77 Nutritional Management of PCOS 78 Maternal PKU 80 Nutritional Management of PKU 80 Celiac Disease 80 CASE STUDY 3.2 Celiac Disease 81 Nutritional Management of Celiac Disease 81 Premenstrual Syndrome 84 Treatment of PMS 84  The Status of Pregnancy Outcomes 88  The Status of Pregnancy Outcomes 88  Effect of Taste and Smell Changes on Dietary Intake During Pregnancy 120 Cultural Considerations 121  Healthy Dietary Patterns for Pregnancy 122 Dietary Supplements during Pregnancy 122 CASE STUDY 4.1 Vegan Dietary Patterns During Pregnancy 125 Food Safety During Pregnancy 127 Assessment of Nutritional Status During Pregnancy 127 Nutrition Biomarker Assessment 128 Exercise and Pregnancy 0utcome 128 Exercise and Pregnancy 0utcome 128 Exercise Recommendations for Pregnant Women 129 Nausea and Vomiting 129 Heartburn 130 Constipation 130 The Montreal Diet Dispensary 130 The WIC Program 131  CHAPTER 5  Nutrition During Pregnancy 133		The Need for Fat
Introduction 72 Weight Status and Fertility 72 Obesity, Body Fat Distribution, and Fertility 72 CASE STUDY 3.1 Anna Marie's Tale 74 Underweight and Fertility 74 Negative Energy Balance and Fertility 74 Anorexia Nervosa, Bulimia Nervosa, and Fertility 75 Diabetes Prior to Pregnancy 75 Nutritional Management of Diabetes Prior to Pregnancy 76 Polycystic Ovary Syndrome and Fertility 77 Nutritional Management of PCOS 78 Phenylketonuria (PKU) 78 Maternal PKU 80 Nutritional Management of PKU 80 Celiac Disease 80 CASE STUDY 3.2 Celiac Disease 81 Nutritional Management of Celiac Disease 81 Premenstrual Syndrome 84 Treatment of PMS 84  The Status of Pregnancy Outcomes 88  The Status of Pregnancy Outcomes 88  CHAPTER 4  Nutrition During Pregnancy 0utcomes 88  Case of Pregnancy Outcomes 119  Case of Taste and Smell Changes on Dietary Intake During Pregnancy 120  Cultural Considerations 121  Healthy Dietary Patterns for Pregnancy 122  Dietary Supplements during Pregnancy 122  Dietary Supplements during Pregnancy 127  Assessment of Nutritional Status During Pregnancy 127  Nutritional Management of Celiac Disease 128  Exercise and Pregnancy Out	Preconception Nutrition 71	
Introduction 72 Weight Status and Fertility 72 Obesity, Body Fat Distribution, and Fertility 72 CASE STUDY 3.1 Anna Marie's Tale 74 Underweight and Fertility 74 Negative Energy Balance and Fertility 74 Women, Exercise, and Fertility 75 Diabetes Prior to Pregnancy 75 Nutritional Management of Pto 78 Polycystic Ovary Syndrome and Fertility 77 Nutritional Management of Pto 80 Nutritional Management of PKU 80 Nutritional Management of PKU 80 Celiac Disease 80 CASE STUDY 3.2 Celiac Disease 81 Nutritional Management of Celiac Disease 81 Premenstrual Syndrome 84 Treatment of PMS 84  The Status of Pregnancy Outcomes 88  Bioactive Components of Food 119 The Need for Water 120 Factors Affecting Dietary Intake During Pregnancy 120 Cultural Considerations 121 Healthy Dietary Patterns for Pregnancy 122 Dietary Supplements during Pregnancy 122 CASE STUDY 4.1 Vegan Dietary Patterns During Pregnancy 125 Food Safety During Pregnancy 127 Assessment of Nutritional Status During Pregnancy 127 Nutritional Biomarker Assessment 128 Exercise and Pregnancy Outcome 128 Exercise and Pregnancy Outcome 128 Exercise Recommendations for Pregnant Women 129 Common Health Problems During Pregnancy 120 Common Health Problems During Pregnancy 120 Common Health Problems During Pregnancy 120 The Montreal Diet Dispensary 130 The Wortion During Pregnancy 130 The Wortion During Pregnancy 131	Conditions and Interventions	
Weight Status and Fertility 72 Obesity, Body Fat Distribution, and Fertility 72 CASE STUDY 3.1 Anna Marie's Tale 74 Underweight and Fertility 74 Negative Energy Balance and Fertility 74 Anorexia Nervosa, Bulimia Nervosa, and Fertility 75 Diabetes Prior to Pregnancy 75 Nutritional Management of Diabetes Prior to Pregnancy 75 Nutritional Management of PCOS 78 Phenylketonuria (PKU) 78 Maternal PKU 80 Nutritional Management of PKU 80 CASE STUDY 3.2 Celiac Disease 81 Nutritional Management of Celiac Disease 81 Premenstrual Syndrome 84 Treatment of PMS 84  The Status of Pregnancy Outcomes 88  The Status of Pregnancy Outcomes 88  The Status of Pregnancy Outcomes 88  Factors Affecting Dietary Intake During Pregnancy 120 Effect of Taste and Smell Changes on Dietary Intake During Pregnancy 120 Cultural Considerations 121  Healthy Dietary Patterns for Pregnancy 121 Vegetarian Diets in Pregnancy 122 Dietary Supplements during Pregnancy 122 CASE STUDY 4.1 Vegan Dietary Patterns During Pregnancy 125  Food Safety During Pregnancy 127 Nassessment of Nutritional Status During Pregnancy 127 Nutrition Biomarker Assessment 128 Exercise and Pregnancy Outcome 128 Exercise Recommendations for Pregnant Women 129 Common Health Problems During Pregnancy 129 Nausea and Vomiting 129 Heartburn 130 Constipation 130 The Montreal Diet Dispensary 130 The Montreal Diet Dispensary 130 The Will Pregnancy 130 The Wi		Bioactive Components of Food 119
CASE STUDY 3.1 Anna Marie's Tale 74 Underweight and Fertility 74 Negative Energy Balance and Fertility 74 Anorexia Nervosa, Bulimia Nervosa, and Fertility 74 Women, Exercise, and Fertility 75 Diabetes Prior to Pregnancy 75 Nutritional Management of Diabetes Prior to Pregnancy 75 Nutritional Management of PCOS 78 Phenylketonuria (PKU) 78 Maternal PKU 80 Nutritional Management of PKU 80 Celiac Disease 80 CASE STUDY 3.2 Celiac Disease 81 Nutritional Management of Celiac Disease 81 Premenstrual Syndrome 84 Treatment of PMS 84  Nutrition During Pregnancy 87 Introduction 88 The Status of Pregnancy Outcomes 88  Pregnancy 120 Cultural Considerations 121  Healthy Dietary Patterns for Pregnancy 122 Case STUDY 4.1 Vegan Dietary Patterns During Pregnancy 125 Food Safety During Pregnancy 127 Assessment of Nutritional Status During Pregnancy 127 Nutrition Biomarker Assessment 128 Exercise and Pregnancy Outcome 128 Exercise and Pregnancy Outcome 129 Nausea and Vomiting 129 Nausea and Vomiting 129 Heartburn 130 Constipation 130  Model Nutrition Programs for Risk Reduction in Pregnancy 130 The Montreal Diet Dispensary 130 The WIC Program 131  CHAPTER 5  Nutrition During Pregnancy 125  Food Safety During Pregnancy 127 Assessment of Nutritional Status During Pregnancy 127 Nutrition Biomarker Assessment 128 Exercise and Pregnancy Outcome 128 Exercise and Pregnancy Outcome 129 Nausea and Vomiting 129 Nausea and Vomiting 129 Nausea and Vomiting 129 Nausea and Vomiting 130 The Montreal Diet Dispensary 130 The WIC Program 131	Weight Status and Fertility 72 Obesity, Body Fat Distribution, and Fertility 72	Factors Affecting Dietary Intake During Pregnancy 120 Effect of Taste and Smell Changes on Dietary Intake During Pregnancy 120
Anorexia Nervosa, Bulimia Nervosa, and Fertility 74 Women, Exercise, and Fertility 75 Diabetes Prior to Pregnancy 75 Nutritional Management of Diabetes Prior to Pregnancy 76 Polycystic Ovary Syndrome and Fertility 77 Nutritional Management of PCOS 78 Phenylketonuria (PKU) 78 Maternal PKU 80 Nutritional Management of PKU 80 Celiac Disease 80 CASE STUDY 3.2 Celiac Disease 81 Nutritional Management of Celiac Disease 81 Premenstrual Syndrome 84 Treatment of PMS 84  CHAPTER 4  Nutrition During Pregnancy 0utcomes 88  Nutrition During Pregnancy 129 Nausea and Vomiting 129 Heartburn 130 Constipation 130 The Montreal Diet Dispensary 130 The Wic Program 131  Vegetarian Diets in Pregnancy 122 Dietary Supplements during Pregnancy 122 CASE STUDY 4.1 Vegan Dietary Patterns During Pregnancy 127 Assessment of Nutritional Status During Pregnancy 127 Nutrition Biomarker Assessment 128  Exercise and Pregnancy Outcome 128 Exercise Recommendations for Pregnancy 129 Nausea and Vomiting 129 Heartburn 130 Constipation 130 The Montreal Diet Dispensary 130 The Wic Program 131  CHAPTER 5  Nutrition During Pregnancy 132  Assessment of Nutritional Status During Pregnancy 127 Nutrition Biomarker Assessment 128  Exercise and Pregnancy Outcome 128 Exercise Recommendations for Pregnancy 129 Nausea and Vomiting 129 Heartburn 130 Constipation 130 The Montreal Diet Dispensary 130 The Wic Program 131	Underweight and Fertility 74	
Diabetes Prior to Pregnancy 75 Nutritional Management of Diabetes Prior to Pregnancy 76 Polycystic Ovary Syndrome and Fertility 77 Nutritional Management of PCOS 78 Phenylketonuria (PKU) 78 Maternal PKU 80 Nutritional Management of PKU 80 Celiac Disease 80 CASE STUDY 3.2 Celiac Disease 81 Nutritional Management of Celiac Disease 81 Premenstrual Syndrome 84 Treatment of PMS 84  CHAPTER 4  Nutrition During Pregnancy 127  Assessment of Nutritional Status During Pregnancy 127 Nutrition Biomarker Assessment 128  Exercise and Pregnancy Outcome 128 Exercise Recommendations for Pregnant Women 129  Common Health Problems During Pregnancy 129  Nausea and Vomiting 129 Heartburn 130 Constipation 130  Model Nutrition Programs for Risk Reduction in Pregnancy 130 The Montreal Diet Dispensary 130 The WIC Program 131  CHAPTER 5  Nutrition During Pregnancy 133	Anorexia Nervosa, Bulimia Nervosa, and Fertility 74	Vegetarian Diets in Pregnancy 122 Dietary Supplements during Pregnancy 122
Polycystic Ovary Syndrome and Fertility Nutritional Management of PCOS 78  Phenylketonuria (PKU) 78 Maternal PKU 80 Nutritional Management of PKU 80 Celiac Disease 80  CASE STUDY 3.2 Celiac Disease 81 Nutritional Management of Celiac Disease 81 Premenstrual Syndrome 84 Treatment of PMS 84  Nutrition During Pregnancy 127 Nutrition Biomarker Assessment 128  Exercise and Pregnancy Outcome 128 Exercise Recommendations for Pregnant Women 129 Common Health Problems During Pregnancy 129 Nausea and Vomiting 129 Heartburn 130 Constipation 130  Model Nutrition Programs for Risk Reduction in Pregnancy 130 The Montreal Diet Dispensary 130 The WIC Program 131  CHAPTER 4  Nutrition During Pregnancy 133  CHAPTER 5  Nutrition During Pregnancy 133	Diabetes Prior to Pregnancy 75	
Phenylketonuria (PKU) 78 Maternal PKU 80 Nutritional Management of PKU 80 Celiac Disease 80 CASE STUDY 3.2 Celiac Disease 81 Nutritional Management of Celiac Disease 81 Premenstrual Syndrome 84 Treatment of PMS 84  Nutrition During Pregnancy 127 Nutrition Biomarker Assessment 128  Exercise and Pregnancy Outcome 128 Exercise Recommendations for Pregnancy 129 Nausea and Vomiting 129 Heartburn 130 Constipation 130  Model Nutrition Programs for Risk Reduction in Pregnancy 130 The Montreal Diet Dispensary 130 The WIC Program 131  The Status of Pregnancy Outcomes 88  Nutrition During Pregnancy 127 Nutrition Biomarker Assessment 128  Exercise and Pregnancy Outcome 128 Exercise Recommendations for Pregnancy 129 Nausea and Vomiting 129 Heartburn 130 Constipation 130 The Montreal Diet Dispensary 130 The WIC Program 131  CHAPTER 5  Nutrition During Pregnancy 133		• •
Phenylketonuria (PKU) 78 Maternal PKU 80 Nutritional Management of PKU 80 Celiac Disease 80 CASE STUDY 3.2 Celiac Disease 81 Nutritional Management of Celiac Disease 81 Nutritional Management of Celiac Disease 81 Treatment of PMS 84  CHAPTER 4 Nutrition During Pregnancy 87 Introduction 88  Nutrition Biomarker Assessment 128  Exercise and Pregnancy Outcome 128 Exercise Recommendations for Pregnant Women 129  Common Health Problems During Pregnancy 129  Nausea and Vomiting 129 Heartburn 130 Constipation 130  Model Nutrition Programs for Risk Reduction in Pregnancy 130 The Montreal Diet Dispensary 130 The WIC Program 131  CHAPTER 5  Nutrition During Pregnancy 133		
Nutritional Management of PKU 80  Celiac Disease 80  CASE STUDY 3.2 Celiac Disease 81  Nutritional Management of Celiac Disease 81  Premenstrual Syndrome 84  Treatment of PMS 84  Nutrition During Pregnancy 87  Introduction 88  The Status of Pregnancy Outcomes 88  Exercise and Pregnancy Outcome 128  Exercise and Pregnanty Outcome 128  Exercise and Pregnanty Outcome 128  Exercise and Pregnant Women 129  Common Health Problems During Pregnancy 129  Nausea and Vomiting 129  Heartburn 130  Constipation 130  Model Nutrition Programs for Risk Reduction in Pregnancy 130  The WIC Program 131  CHAPTER 5  Nutrition During Pregnancy 139	·	•
Celiac Disease 80  CASE STUDY 3.2 Celiac Disease 81  Nutritional Management of Celiac Disease 81  Premenstrual Syndrome 84  Treatment of PMS 84  Nutrition During Pregnancy 87  Introduction 88  Celiac Disease 81  Nausea and Vomiting 129  Heartburn 130  Constipation 130  Model Nutrition Programs for Risk Reduction in Pregnancy 130  The Montreal Diet Dispensary 130  The WIC Program 131  CHAPTER 5  The Status of Pregnancy Outcomes 88  Nutrition During Pregnancy 139		Exercise and Pregnancy Outcome 128  Exercise Recommendations for Pregnant Women 129
Nutritional Management of Celiac Disease 81  Nutritional Management of Celiac Disease 81  Premenstrual Syndrome 84  Treatment of PMS 84  Constipation 130  Model Nutrition Programs for Risk Reduction in Pregnancy 130  The Montreal Diet Dispensary 130  The WIC Program 131  CHAPTER 5  The Status of Pregnancy Outcomes 88  Nausea and Vomiting 129  Heartburn 130  Constipation 130  The Model Nutrition Programs for Risk Reduction in Pregnancy 130  The Montreal Diet Dispensary 130  The WIC Program 131	Celiac Disease 80	
Premenstrual Syndrome 84 Constipation 130  Treatment of PMS 84 Model Nutrition Programs for Risk Reduction in Pregnancy 130  The Montreal Diet Dispensary 130  The WIC Program 131  The Status of Pregnancy Outcomes 88  CHAPTER 5  Nutrition During Pregnancy 138		Nausea and Vomiting 129
Treatment of PMS 84  Model Nutrition Programs for Risk Reduction in Pregnancy 130  The Montreal Diet Dispensary 130  The WIC Program 131  The Status of Pregnancy Outcomes 88  Model Nutrition Programs for Risk Reduction in Pregnancy 130  The Montreal Diet Dispensary 130  The WIC Program 131  CHAPTER 5  Nutrition During Pregnancy 139		
Introduction 88 CHAPTER 5 The Status of Pregnancy Outcomes 88 Nutrition During Pregnancy 135	CHAPTER 4	Pregnancy 130  The Montreal Diet Dispensary 130
The Status of Pregnancy Outcomes 88 Nutrition During Pregnancy 135	3	
NUTTION TO THE CONTROL OF THE CONTRO		TO 27 1 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Infant Mortality 88  Low Birthweight, Preterm Delivery, and Infant Mortality 89  Conditions and Interventions	Infant Mortality 88	Nutrition During Pregnancy 135 Conditions and Interventions
Reducing Infant Mortality and Morbidity 90 Introduction 136		Introduction 136
Normal Physiological Changes During Pregnancy 92 During Pregnancy 137	Maternal Physiology 91  Normal Physiological Changes During Pregnancy 92	Nutritional Recommendations and Interventions for Obesity During Pregnancy 137
The Placenta 95  Embryonic and Fetal Growth and Development Critical Periods of Growth and Development 97  Fetal Body Composition 99  Nutrition, Miscarriage, and Preterm Delivery 101  Developmental Origins of Health and Disease 102  Hypertensive Disorders of Pregnancy 138  Nutrition 138  Gestational Hypertension 139  Preeclampsia–Eclampsia 139	Embryonic and Fetal Growth and Development 97 Critical Periods of Growth and Development 97 Fetal Body Composition 99 Nutrition, Miscarriage, and Preterm Delivery 101	Hypertensive Disorders of Pregnancy, Oxidative Stress, and Nutrition 138 Chronic Hypertension 138 Gestational Hypertension 139
Pregnancy Weight Gain 104 CASE STUDY 5.1 A Case of Preeclampsia 141  Pregnancy Weight Gain Recommendations 104 Nutritional Recommendations and Interventions for		Nutritional Recommendations and Interventions for
Nutrition and the Course and Outcome of Preeclampsia 141  Pregnancy 107 Diabetes in Pregnancy 141  Famine and Pregnancy Outcome 107 Gestational Diabetes 142	Pregnancy 107	Diabetes in Pregnancy 141
Energy and Nutrient Needs During Pregnancy 108 CASE STUDY 5.2 Elizabeth's Story: Gestational		

Diabetes 145

The Need for Energy 109

Type 2 Diabetes in Pregnancy 146  Management of Type 2 Diabetes in Pregnancy 146  Type 1 Diabetes During Pregnancy 147  Nutritional Management of Type 1 Diabetes in Pregnancy 147	Benefits of Breastfeeding 169 Breastfeeding Benefits for Mothers 169 Breastfeeding Benefits for Infants 169 Benefits 171
Multifetal Pregnancies 148  Background Information about Multiple Fetuses 148  Risks Associated with Multifetal Pregnancy 149  Nutrition and the Outcome of Multifetal Pregnancy 150  Dietary Intake in Twin Pregnancy 151	Breast Milk Supply and Demand 171  Can Women Make Enough Milk? 171  Does the Size of the Breast Limit a Woman's Ability to Nurse  Her Infant? 172  Is Feeding Frequency Related to the Amount of Milk
CASE STUDY 5.3 Twin Pregnancy and the Nutrition Care Process 152  Nutritional Recommendations for Women with Multifetal Pregnancy 152	a Woman Can Make? 172  Can Women Pump or Express Enough Milk? 172  Can Women Breastfeed after Breast Reduction or Augmentatio  Surgery? 172
HIV/AIDS During Pregnancy 153  Consequences of HIV/AIDS During Pregnancy 154  Nutritional Factors and HIV/AIDS During Pregnancy 154  Nutritional Management of Women with HIV/AIDS During  Pregnancy 154	The Breastfeeding Process 173  Preparing the Breast for Breastfeeding 173  Breastfeeding Positioning 173  Presenting the Breast to the Suckling Infant 173  The Breastfeeding Infant 174
Eating Disorders in Pregnancy 155  Consequences of Eating Disorders in Pregnancy 155  Treatment of Women with Eating Disorders During  Pregnancy 155  Nutritional Interventions for Women with Eating Disorders  During Pregnancy 155	The Breastfeeding Infant 174 Infant Reflexes 174  CASE STUDY 6.1 Breastfeeding and Adequate Nourishment 175  Mechanics of Breastfeeding 175 Identifying Hunger and Satiety 175
Fetal Alcohol Spectrum Disorders 155  Nutrition and Adolescent Pregnancy 156 Growth During Adolescent Pregnancy 157 Obesity, Excess Weight Gain, and Adolescent Pregnancy 157 Nutritional Recommendations for Pregnant Adolescents 157 Evidence-Based Practice 157	Feeding Frequency 176 Identifying Breastfeeding Malnutrition 176 Tooth Decay 176 Vitamin Supplements for Breastfeeding Infants 176 Maternal Diet 176 Nutrition Assessment of Breastfeeding Women 177 Energy and Nutrient Needs 178
CHAPTER 6  Nutrition During Lactation 160  Introduction 161  Lactation Physiology 161  Functional Units of the Mammary Gland 161  Mammary Gland Development 161  Lactogenesis 162  Hormonal Control of Lactation 162  Secretion of Milk 162	Maternal Energy Balance and Milk Composition 178 Weight Loss During Breastfeeding 178 Exercise and Breastfeeding 179 Vitamin and Mineral Supplements 179 Vitamin and Mineral Intakes 179 Functional Foods 179 Fluids 179 Vegetarian Diets 179 Infant Colic 179 Public Food and Nutrition Programs 180
The Letdown Reflex 163  Human Milk Composition 163  Colostrum 164  Water 164  Energy 164  Lipids 165  Protein 165  Milk Carbohydrates 167  Fat-Soluble Vitamins 167  Water-Soluble Vitamins 168  Minerals in Human Milk 168  Taste of Human Milk 169	Optimal Duration, Influential Factors, and U.S. Goals for Breastfeeding 180  Optimal Breastfeeding Duration 180  Breastfeeding Goals for the United States 180  The Surgeon General's Call to Action to Support  Breastfeeding 181  Breastfeeding Rates in the United States 181  Breastfeeding Promotion, Facilitation, and Support 183  Prenatal Breastfeeding Education and Support 183  Breastfeeding Support for Individuals 183  Role of the Health Care System in Supporting  Breastfeeding 184

Lactation Support in Hospitals and Birthing Centers 185	Human Milk and Preterm Infants 214
Model U.S. Baby-Friendly Hospital Programs 185  Lactation Support after Discharge 186	Medical Contraindications to Breastfeeding 215 Breastfeeding and HIV Infection 215
The Workplace 186 The Business Case for Breastfeeding 187 The Community 187	Human Milk Collection and Storage 216 Milk Banking 216
Public Health Support of Breastfeeding 188	Model Programs 218
Model Breastfeeding Promotion Programs 188  WIC National Breastfeeding Promotion Project—Loving Support  Makes Breastfeeding Work 188  Wellstart International 189	Breastfeeding Promotion in Physicians' Office Practices (BPPOP) <b>218</b> The Rush Mothers' Milk Club <b>218</b>
	CHAPTER 8
CHAPTER 7	Infant Nutrition 221
Nutrition During Lactation 192	Introduction 222
Conditions and Interventions	Assessing Newborn Health 222
Introduction 193	Birthweight and Gestational Age as Outcome Measures 222 Infant Mortality 222
Common Breastfeeding Conditions 193	Combating Infant Mortality 223
Sore Nipples 193 Flat or Inverted Nipples 193	Newborn Growth Assessment 223
Letdown Failure 193	Normal Physical Growth and Development 224
Hyperactive Letdown 194	Motor Development 224 Critical Periods 224
Hyperlactation 194	Cognitive Development 225
Engorgement 194 Plugged Duct 195	Digestive System Development 226
Mastitis 195	Parenting <b>226</b>
CASE STUDY 7.1 Chronic Mastitis 196	Energy and Nutrient Needs 227
Low Milk Supply 196	Energy Needs 227
Maternal Medications 197	Protein Needs 227 Fat Needs 227
Herbal Remedies 199	Metabolic Rate, Energy, Fats, and Protein—How Do They All Tie
Specific Herbs Used in the United States 201	Together? 228
Alcohol and Other Drugs and Exposures 202	Other Nutrient and Non-Nutrient Needs 228
Alcohol 202	Growth Assessment 229 Interpretation of Growth Data 229
Nicotine (Smoking Cigarettes) <b>204</b> Marijuana <b>205</b>	Feeding in Early Infancy 231
Caffeine 205	Breast Milk and Formula 231
Other Drugs of Abuse 205	Cow Milk 232
Environmental Exposures 205	Development of Infant Feeding Skills 232
Neonatal Jaundice and Kernicterus 207	Introduction of Complementary Foods 233
Bilirubin Metabolism 207	The Importance of Infant Feeding Position 234
Physiologic Versus Pathologic Newborn Jaundice 207	Preparing for Drinking from a Cup 234
Hyperbilirubinemia and Breastfeeding 208  Prevention and Treatment for Severe Jaundice 210	CASE STUDY 8.1 Baby Samantha Will Not Eat 235
Information for Parents 210	Food Texture and Development 235  Complementary Feeding 236
Breastfeeding Multiples 211	Inappropriate and Unsafe Food Choices 236
Infant Allergies 211	Fluids 236
Food Allergy (Hypersensitivity) 212	How Much Food Is Enough for Infants? 236
Food Intolerance 212	Influence of Food Preferences on Feeding Behavior 237
Late-Preterm Infants 212	Nutrition Guidance 237
CASE STUDY 7.2 Breastfeeding Premature Infants 213	The Infant's Home Environment 238

Supplements for Infants 238  Cross-Cultural Considerations 238	CHAPTER 10 Toddlor and Droschoolor
Common Nutritional Issues and Concerns 238 Colic 238	Toddler and Preschooler Nutrition 260
Iron-Deficiency and Iron-Deficiency Anemia 239 Diarrhea and Constipation 239 Early Childhood Caries (ECC) 239 Food Allergies 240	Introduction 261  Definitions of the Life-Cycle Stage 261  Importance of Nutrition 261
Food Allergies 240 Vegetarian Diets 241	Tracking Toddler and Preschooler Health 261 Healthy People 2020 261
Nutrition Intervention for Risk Reduction 241  Model Program: Newborn Metabolic Screening 241	Normal Growth and Development 261  Measuring Growth 262  The WHO and CDC Growth Charts 262
CHAPTER 9	WHO Growth Standards 263
Infant Nutrition 244 Conditions and Interventions	Common Problems with Measuring and Plotting Growth Data <b>264</b>
Introduction 245	Physiological and Cognitive Development <b>264</b> Toddlers <b>264</b>
Infants at Risk 245 Families of Infants with Special Health Care Needs 246 Energy and Nutrient Needs of Preterm Infants and Infants with Special Health Care Needs and/or Developmental	CASE STUDY 10.1 Meal Time with a Toddler 266 Preschool-Age Children 266 Temperament Differences 268 Food Preference Development, Appetite, and Satiety 268
Delay 246 Energy Needs 246 Protein Requirements 247 Forms of Protein 247 Fat 247	Energy and Nutrient Needs 270 Energy Needs 270 Protein 270 Vitamins and Minerals 270
Vitamins and Minerals 247  Growth of Infants at Risk or with Special Health Care Needs 247  Growth in Preterm Infants 248  Corrected Age 248  Does Intrauterine Growth Predict Extrauterine Growth? 250	Common Nutrition Problems 270 Iron-Deficiency Anemia 270 Dental Caries 273 Constipation 273 Elevated Blood Lead Levels 273 Food Security 274 Food Safety 275
Interpretation of Growth 250  Nutrition for Infants with Special Health  Care Needs 251  Nutrition Risks to Development 251	Prevention of Nutrition-Related Disorders 275 Overweight and Obesity in Toddlers and Preschoolers 275 Assessment of Overweight and Obesity 276
Severe Preterm Birth and Nutrition 252 How Sick Babies Are Fed 252 Food Safety 253 What to Feed Preterm Infants 253 Preterm Infants and Feeding 254	Prevention of Overweight and Obesity 276 Treatment of Overweight and Obesity Expert Committee: Recommendations 276 Dietary Guidelines for Americans 2010 277 Nutrition and Prevention of Cardiovascular Disease in Toddlers
CASE STUDY 9.1 Premature Birth in an At-Risk Family 255	and Preschoolers <b>277</b> Vitamin and Mineral Supplements <b>278</b> Herbal Supplements <b>279</b>
Infants with Congenital Anomalies and Chronic Illness 255 Infants with Genetic Disorders 256	Dietary and Physical Activity Recommendations 279 Dietary Guidelines for Americans 2010 279 MyPlate 280
CASE STUDY 9.2 Noah's Cardiac Condition 257	Recommendations for Intake of Iron, Fiber, Fat, and Calcium 282
Feeding Problems 257	Fat Soluble Vitamins 282
Nutrition Interventions 258	Recommended Versus Actual Food Intake <b>283</b> Cross-Cultural Considerations <b>284</b>
Nutrition Services 258	Vegetarian Diets <b>284</b>

Child Care Nutrition Standards <b>284</b> Physical Activity Recommendations <b>285</b>	Normal Growth and Development 306 The 2000 CDC Growth Charts 307
Nutrition Intervention for Risk Reduction 285 Nutrition Assessment 285 Model Program 286  Public Food and Nutrition Programs 286 WIC 286 WIC's Farmers' Market Nutrition Program 286	WHO Growth References 308  Physiological and Cognitive Development of School-Age Children 308  Physiological Development 308  Cognitive Development 310  Development of Feeding Skills and Eating Behaviors 310
Head Start and Early Head Start 286 Supplemental Nutrition Assistance Program 287	Energy and Nutrient Needs of School-Age Children 312 Energy Needs 313 Protein 313
CHAPTER 11	Vitamins and Minerals 313
Toddler and Preschooler	Common Nutrition Problems 313 Iron Deficiency 313
Nutrition 289	Dental Caries 313
Conditions and Interventions	Prevention of Nutrition-Related Disorders in School-Age
Introduction 290	Children 314
Who Are Children with Special Health Care Needs? 290	Overweight and Obesity in School-Age Children 314
Nutrition Needs of Toddlers and Preschoolers with Chronic Conditions 292	Addressing the Problem of Pediatric Overweight and Obesity 316
Growth Assessment 293	CASE STUDY 12.1 Pediatric Overweight 317
Feeding Problems 294  Behavioral Feeding Problems 294  Excessive Fluid Intake 295	Nutrition and Prevention of Cardiovascular Disease in School-Age Children 317 Dietary Supplements 318
eeding Problems and Food Safety 295 E STUDY 11.1 A Picky Eater 296 eeding Problems from Disabilities Involving Neuromuscular Control 296	Dietary Recommendations 318  Recommended Versus Actual Food Intake 320  Cross-Cultural Considerations 321  Vegetarian Diets 321
Nutrition-Related Conditions 297  Failure to Thrive 297  Toddler Diarrhea and Celiac Disease 297  Autism Spectrum Disorders 299  Muscle Coordination Problems and Cerebral Palsy 299	Physical Activity Recommendations 322 Recommendations Versus Actual Activity 322 Determinants of Physical Activity 323 Organized Sports 323 Nutrition Intervention for Risk Reduction 324
SE STUDY 11.2 Early Intervention Services for toy at Risk for Nutrition Support 300 Pulmonary Problems 300 Developmental Delay and Evaluations 301	Nutrition Education 324  Nutrition Integrity in Schools 324  Nutrition Assessment 327  Model Programs 327
Food Allergies and Intolerance 301	Public Food and Nutrition Programs 328
Dietary Supplements and Herbal Remedies 302	The National School Lunch Program 328 School Breakfast Program 328
Sources of Nutrition Services 302	School Breakfast Program 328 Summer Food Service Program 328 Team Nutrition 329
CHAPTER 12	
Child and Preadolescent	CHAPTER 13
Nutrition 305	Child and Preadolescent
Introduction 306  Definitions of the Life-Cycle Stage 306 Importance of Nutrition 306	Nutrition 331 Conditions and Interventions

Introduction 332

Tracking Child and Preadolescent Health 306

Healthy People 2020 306

"Children Are Children First"—What Does That Mean? 332 Counting Children with Special Health Care Needs 332	Carbohydrates <b>361</b> Dietary Fiber <b>361</b> Fat <b>361</b>
Nutritional Requirements of Children with Special Health Care Needs 333 Energy Needs 333 Protein Needs 334 Other Nutrients 334	Calcium <b>361</b> Iron <b>362</b> Vitamin D <b>362</b> Folate <b>363</b> Dietary Intake and Nutritional Adequacy <b>363</b>
Growth Assessment 334 Growth Interpretation in Children with Chronic Conditions 335	Nutrition Screening, Assessment, and Intervention 364 Dietary Assessment and Screening 364 Nutrition Education and Counseling 366 Dromoting Hoalthy Esting and Physical Activity
Body Composition and Growth 335  CASE STUDY 13.1 Adjusting Energy Intake for a Child with Spina Bifida 336  Special Growth Charts 337	Promoting Healthy Eating and Physical Activity Behaviors 370 The Home Environment and Parental Involvement 371 School-Based Education, School Meals, and Wellness
Nutrition Recommendations 337  Methods of Meeting Nutritional Requirements 338  Fluids 339	Activities <b>371</b> Community Engagement to Create Nutritionally Supportive Environments <b>376</b>
Eating and Feeding Problems in Children with Special Health Care Needs 340 Feeding Challenges for Children with Health Care Needs 340 Specific Disorders 340	CHAPTER 15 Adolescent Nutrition 378 Conditions and Interventions
Dietary Supplements and Herbal Remedies 345	Introduction 379
Sources of Nutrition Services 346  CASE STUDY 13.2 Dealing with Food Allergies in School Settings 347  Nutrition Intervention Model Program 347	Overweight and Obesity 379  Health Implications of Adolescent  Overweight and Obesity 380  Assessment and Treatment of Adolescent Overweight and  Obesity 380
CHAPTER 14 Adolescent Nutrition 349	Supplement Use Among Adolescents 383 Vitamin/Mineral Supplements 383 Ergogenic Supplements Used by Teens 384
Introduction 350  Nutritional Needs in a Time of Change 350  Normal Physical Growth and Development 350	Nutrition for Adolescent Athletes 384  Special Dietary Concerns Among Adolescents 387  Substance Use 387
Changes in Weight, Body Composition, and Skeletal Mass 352 Psychosocial and Cognitive Development 353 Health and Nutrition-Related Behaviors During Adolescence 354 Snacking 355 Meal Skipping 355 Eating Away from Home and Family Meals 355 Vegetarian Diets 356	Iron-Deficiency Anemia 387 Hypertension 388 Hyperlipidemia 390 Diabetes and Metabolic Syndrome 391 Children and Adolescents with Chronic Health Conditions 391
	Dieting, Disordered Eating, and Eating Disorders 392 Disordered Eating Behaviors and Eating Disorders 393 CASE STUDY 15.1 Following Ana's Medical History 398
CASE STUDY 14.1 Moral and Ethical Dietary Considerations Leading to Changes in Dietary Habits in Late Adolescence 357	CHAPTER 16
Physical Activity 358  Dietary Requirements, Intake, and Adequacy Among Adolescents 358  Energy and Nutrient Requirements of Adolescents 358  Energy 360  Protein 360	Adult Nutrition 401 Introduction 402 Importance of Nutrition 402 Tracking Adult Nutritional Health and Its
HOTCH JOV	Determinants 402

Physical Activity for Weight Management 429 Health Objectives for the Nation 403 Health Disparities Among Groups of Adults 403 The Challenge of Weight Maintenance 429 Physiological Changes During the Adult Years 405 CASE STUDY 17.1 Maintaining a Healthy Weight 430 Pharmacotherapy for Weight Loss 430 Hormonal and Climacteric Changes 406 Bariatric Surgery 431 Body Composition Changes in Adults Continuum of Nutritional Health 406 Cardiovascular Disease 431 States of Nutritional Health Prevalence of CVD 431 Energy Recommendations 408 Etiology of Atherosclerosis 432 Age-Related Changes in Energy Expenditure Physiological Effects of Atherosclerosis 432 Risk Factors for CVD 432 Estimating Energy Needs in Adults 409 Screening and Assessment of CVD 432 Energy Adjustments for Weight Change 409 Energy Balance 410 Nutrition Assessment 434 Nutrition Interventions for CVD 434 Nutrient Recommendations 410 Pharmacotherapy of CVD 435 Macro and Micro Nutrient Recommendations 410 Risk Nutrients 410 Metabolic Syndrome 436 Prevalence of Metabolic Syndrome 436 Dietary Recommendations for Adults 412 Etiology of Metabolic Syndrome 437 Total Diet Approach 413 Effects of Metabolic Syndrome 437 Water Intake Recommendations 414 Screening and Assessment 437 Beverage Intake Recommendations 414 **Nutrition Interventions** Caffeine and Coffee Intake 414 for Metabolic Syndrome 437 Alcoholic Beverages 414 Dietary Supplements and Functional Foods 415 Diabetes Mellitus 437 The Eating Competence Model 415 CASE STUDY 17.2 Managing Metabolic Syndrome in Adults: Dan Goes Dancing 438 Physical Activity Recommendations 417 Guidelines for Physical Activity 417 Prediabetes 438 Prevalence of Diabetes 438 Promotion of Physical Activity 417 Etiology of Diabetes 438 CASE STUDY 16.1 Run, Kristen, Run 418 Physiological Effects of Diabetes 439 Physical Activity, Body Composition, and Metabolic Screening and Assessment 439 Change 418 Nutrition Assessment 439 Diet and Physical Activity 418 Interventions for Diabetes 440 Nutrition Intervention for Risk Reduction 419 Carbohydrate Management 441 A Model Health-Promotion Program 419 Self-Monitored Blood Glucose 441 Public Food and Nutrition Programs 420 Physical Activity in Diabetes Management 442 Putting It All Together 421 Pharmacotherapy for Type 2 Diabetes 442 Herbal Remedies and Other Dietary Supplements 442 CHAPTER 17 Adult Nutrition 423 Cancer 442 Prevalence of Cancer 442 Conditions and Interventions Etiology of Cancer 443 Introduction 424 Physiological and Psychological Effects of Cancer 443 Screening and Assessment 443 Overweight and Obesity 424 Nutrition Assessment Following Diagnosis and During Prevalence of Obesity and Overweight 424 Treatment 444 Etiology of Obesity 424 Nutrition Interventions for Cancer 444 Effects of Obesity 425 Alternative Medicine and Cancer Treatment 445 Screening and Assessment 426 Nutrition Assessment 427 HIV Disease 445 Intervention in Obesity and Overweight 427 Prevalence of HIV 445 Comprehensive Weight Management Program 427 Etiology of HIV 445 Weight Loss Goals 427 Physiological Effects of HIV 445 Cognitive Behavioral Therapy Nutrition Assessment in HIV 446

Nutrition Interventions in HIV 446

for Weight Management

CHAPTER 18	Heart Disease 482
Nutrition and Older Adults 449	Prevalence 482
Introduction 450 What Counts as Old Depends on Who Is Counting 450 Food Matters: Nutrition Contributes to a Long and Healthy Life 450 A Picture of the Aging Population: Vital Statistics 451 Global Population Trends: Life Expectancy and Life Span 451 Health Objectives for Older Adults 452	Risk Factors 483 Nutritional Remedies for Cardiovascular Diseases 483  Stroke 484 Prevalence 484 Etiology 485 Effects of Stroke 485 Risk Factors 485 Nutritional Remedies 485
Theories of Aging 452 Programmed Aging 453 Wear-and-Tear Theories of Aging 453 Calorie Restriction to Increase Longevity 454 Physiological Changes 455 Body-Composition Changes 455	Hypertension 486 Prevalence 486 Etiology 486 Effects of Hypertension 486 Risk Factors 486 Nutritional Remedies 486
Changing Sensual Awareness: Taste and Smell, Chewing and Swallowing, Appetite and Thirst 456  Nutritional Risk Factors 457	Diabetes: Special Concerns for Older Adults 488 Effects of Diabetes 488 Nutritional Interventions 488
Dietary Recommendations for Older Adults 462	Obesity 489
Nutrient Recommendations 464 Estimating Energy Needs 464 Nutrient Recommendations for Older Adults: Energy Sources 466	Definition <b>489</b> Prevalence <b>490</b> Etiology, Effects, and Risk Factors of Obesity <b>490</b> Nutritional Remedies <b>491</b>
Age-Associated Changes: Nutrients of Concern 468 Nutrient Supplements: When, Why, Who, What, and How Much? 470 Dietary Supplements, Functional Foods, and Complementary Medicine 472 Nutrient Recommendations: Using the Food Label 472 Cross-Cultural Considerations in Making Dietary Recommendations 472	Osteoporosis 491 Definition 491 Prevalence 492 Etiology 492 Effects of Osteoporosis 493 Nutritional Remedies 493 Other Issues Affecting Nutritional Remedies 494 Oral Health 495
Food Safety Recommendations 474	Oral Health 495 Gastrointestinal Diseases 496
Physical Activity Recommendations 474 Physical Activity Guidelines 474	Gastroesophageal Reflux Disease (GERD) <b>496</b> Stomach Conditions Affect Nutrient Availability: Vitamin B <sub>1</sub>
CASE STUDY 18.1 JT—Spiraling Out of Control? 475	Malabsorption <b>497</b> Constipation <b>498</b>
Nutrition Policy and Intervention for Risk Reduction 475  Nutrition Education 475	Inflammatory Diseases: Osteoarthritis 500
Community Food and Nutrition Programs 476  Store-to-Door: A Nongovernmental Service that Supports Aging in Place 477	Etiology <b>500</b> Effects of Osteoarthritis <b>500</b> Risk Factors <b>500</b>
OAANP: Promoting Socialization and Improved Nutrition 477	CASE STUDY 19.1 Bridget Doyle Remembers Laura 501
The Promise of Prevention: Health Promotion 478	Cognitive Impairment, Dementia and Alzheimer's Disease 502
CHAPTER 19	Definition <b>502</b> Prevalence <b>502</b>
Nutrition and Older Adults 480	Etiology of Cognitive Impairment 503 Effects of Cognitive Impairment 503

Nutrition Interventions for

Cognitive Impairment 503

Conditions and Interventions

Introduction: The Importance of Nutrition 481

Nutrition and Health 481

Polypharmacy: Prescription and Over-the-Counter
Medications 504

Medication Effects on Physical, Mental
and Financial Status 504

Medication Effects on Food Consumption 504

Low Body Weight/Unintentional Weight Loss 505
Definition 505
Etiology and Effects 506
Nutrition Interventions 506

CASE STUDY 19.2 Ms. Wetter: A Senior Suffering
Through a Bad Stretch 507

Dehydration 507

Definition 507

Effects of Dehydration 508

Etiology 508

Nutritional Interventions 508
Rehydrate Slowly 509
Dehydration at End of Life 509

Bereavement 509

ANSWERS TO REVIEW QUESTIONS 511

APPENDIX A

Measurement Abbreviations and Equivalents 518

APPENDIX B

Body Mass Index (BMI) 520

References 521

Glossary 567

Index 578