Index

Page numbers in italics denote figures, those in bold denote tables.

About Teenage Eating (ATE) study 34-5
accelerated growth 241-2
ACHOIS study 136
adaptive programming see Barker hypothesis
additives 66, 74, 213, 214, 263
adipocytes 21, 82, 91, 140, 162, 173, 267, 287
adipokines 156, 162, 173, 267, 287
adiponectin 154, 156, 242, 287
and cancer risk 173
adipose tissue 24, 87, 154, 155, 172, 175, 207, 250
cytokine production 156, 173
development 21
gender differences in distribution 90-2
hormone production 225
maternal 17
adiposity see obesity
adolescents
micronutrient intake 243, 263
pregnancy 29-31, 30, 242-3, 254, 284
recommendations 183, 230, 237, 251, 269
vitamin D status 235
adrenocorticotropic hormone (ACTH) 111, 154
age and breastfeeding initiation 47
maternal 28-31, 29, 30
agouti-related peptide 102
Albania, breastfeeding rate 50
alcohol 23, 34, 38-41, 53, 91, 157, 180, 239, 248, 283
and DNA methylation 171
fetal alcohol spectrum disorders (FASD) 1-2, 217, 289
pre-pregnancy intake 246
All Babies in Southwest Sweden (ABIS) study 62
alleles 83, 147, 169, 171, 225, 287
allergic disease 191-204, 226-7, 262, 281
antenatal and early life influences 194-5
early life nutrient intake 199-203, 200
impact 193-4
infant food allergen intake 198-9
maternal food allergen intake 195-8
and obesity 203
pathogenesis 191-3, 192
prevalence 193, 193
research priorities 268
see also specific conditions
allergic rhinitis 191
allergies 67-8
coeлиce disease 67-8, 288
development of 67-8, 218, 260
IgE-mediated 191, 194
see also food allergens
α-linolenic acid (ALA) 201, 287
maternal diet 207
ALSPAC study 58, 59, 64, 65, 131, 133, 158, 176
maternal diet 207
Alzheimer's disease 206, 227
American Academy of Pediatrics 44, 186, 196, 197-8, 227
amniotic fluid 14, 16, 21, 35, 59, 117-8, 196, 227
AMP-activated protein kinase (AMPK) 161
amygdala 103
androgens 87, 89–91, 93, 159, 217, 225, 259, 275–6
perinatal 88, 95
animal studies
  cancer 172, 173, 174
  early life and adult disease 3, 3
  neurological development 97–8
  nutritional manipulation in early life 158–62
  cardiovascular disease and over-nutrition 160–1
  hypertension and under-nutrition 159–60
  programming of cardiac function 161–2
obesity 138–9
  maternal diabetes 138–9
  maternal obesity 139, 141
  maternal under-nutrition 138
  neonatal overfeeding 139
  type 2 diabetes 145–7
anti-inflammatory mediators 173
antioxidant hypothesis of asthma/allergy 199–200, 201
apoptosis 99, 110, 147, 172, 287
appetite regulation, disturbances in 139–41
  cellular pathways of energy metabolism 140
    modification of gene expression 140–1
  hyperinsulinaemia 139–40
  hyperleptinaemia 140
  maternal obesity 140
arachidonic acid 41, 61, 200, 209, 229
arachis oil 198
arcuate nucleus 101–2, 102, 105, 141
arginine vasopressin (AVP) 111
asthma 191–204, 226–7, 262, 281
  antenatal and early life influences 194–5
  and breastfeeding 198
  early life nutrient intake 199–203, 200
  impact 193–4
  infant food allergen intake 198–9
  maternal food allergen intake 195–8
  and obesity 203
  pathogenesis 191–3
  prevalence 193, 193
  research priorities 268
atherogenic lipoprotein phenotype (ALP) 155, 155, 287
atherosclerosis 150, 287
  programming of 153–7, 154, 155
  see also cardiovascular disease
atherosclerotic plaques 150
atopic dermatitis 191
  and breastfeeding 198
atopy 67, 182, 227, 287
ATRX syndrome 112
Australasian Society of Clinical Immunology and Allergy 197–9
Austria, breastfeeding rate 50
autocrine, definition 287
autoimmune disease 217, 222, 259, 276, 287
Avon Longitudinal Study of Parents and Children see ALSPAC study
baby drinks 62
baby foods 63, 65
  see also infant feeding
Baby Friendly Hospital Initiative 44, 46, 48, 240, 252, 270
baby-led weaning 59
Bacteroides spp. 118, 119, 121, 123, 124, 128
bariatric surgery 137, 156, 287
Barker hypothesis 8, 99, 130, 132–3, 144, 287
BAX 173
behavioural development 211–12
behavioural effects of sex hormones 90
Belarus, breastfeeding rate 50
Bifidobacterium spp. 118, 119, 124
  B. breve 116, 121, 128, 218, 260
bile acid stimulated lipase (BASL) 209
birth anthropometry see birthweight; head circumference
birth spacing 31–2, 227, 229, 234, 238
birthweight 15, 22–3, 23, 131
  and adiposity 133
disease associations
  asthma and allergy 194
  cancer 167–8, 279
  cardiovascular disease 5, 151, 152, 278
  obesity 131, 132, 135, 151, 278
  type 2 diabetes 144, 278
high see macrosomia
increasing 274
intrauterine growth restriction see intrauterine growth restriction
LGA 106, 290
low see low birthweight
  and maternal nutrition 9
  optimal 273–4
secular changes 25
SGA 22, 31, 100, 101, 151, 292
Black African populations, hypertension in 158
blood pressure 287
  programming of 157–8
  regulation of 161
BMI see body mass index

Index
<table>
<thead>
<tr>
<th>Index</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>body composition</td>
<td>3</td>
</tr>
<tr>
<td>adult</td>
<td>168</td>
</tr>
<tr>
<td>childhood</td>
<td>135</td>
</tr>
<tr>
<td>maternal</td>
<td>10, 41</td>
</tr>
<tr>
<td>in pregnancy</td>
<td>95</td>
</tr>
<tr>
<td>neonatal</td>
<td>131, 133</td>
</tr>
<tr>
<td>body fat</td>
<td></td>
</tr>
<tr>
<td>and cancer risk</td>
<td>168</td>
</tr>
<tr>
<td>distribution</td>
<td>91–2</td>
</tr>
<tr>
<td>maternal</td>
<td>17</td>
</tr>
<tr>
<td>body mass index (BMI)</td>
<td>6, 6–7, 32–3, 131, 246, 248, 287</td>
</tr>
<tr>
<td>and asthma/allergy</td>
<td>203, 226</td>
</tr>
<tr>
<td>and blood pressure</td>
<td>157</td>
</tr>
<tr>
<td>and cardiovascular disease risk</td>
<td>152</td>
</tr>
<tr>
<td>maternal</td>
<td>10, 106–7, 134–5</td>
</tr>
<tr>
<td>and fetal/infant death</td>
<td>219</td>
</tr>
<tr>
<td>see also obesity</td>
<td></td>
</tr>
<tr>
<td>bone</td>
<td></td>
</tr>
<tr>
<td>development</td>
<td>14, 19–20, 177–8, 179</td>
</tr>
<tr>
<td>early influences</td>
<td>180</td>
</tr>
<tr>
<td>growth</td>
<td>178–80</td>
</tr>
<tr>
<td>peak mass</td>
<td>180</td>
</tr>
<tr>
<td>bone health</td>
<td>177–90, 225–6, 261–2, 280–1</td>
</tr>
<tr>
<td>maternal nutrition</td>
<td>180–4</td>
</tr>
<tr>
<td>osteoporosis risk</td>
<td>177–80</td>
</tr>
<tr>
<td>and physical activity</td>
<td>188–9</td>
</tr>
<tr>
<td>research priorities</td>
<td>268</td>
</tr>
<tr>
<td>bone mass</td>
<td>225</td>
</tr>
<tr>
<td>bone mineral content (BMC)</td>
<td>178, 182, 185–6, 185, 187, 288</td>
</tr>
<tr>
<td>bone mineral density (BMD)</td>
<td>177–8, 181, 225, 262, 268, 287</td>
</tr>
<tr>
<td>and smoking</td>
<td>7</td>
</tr>
<tr>
<td>bottle feeding see formula feeding</td>
<td></td>
</tr>
<tr>
<td>brain</td>
<td></td>
</tr>
<tr>
<td>anatomy</td>
<td>100</td>
</tr>
<tr>
<td>epigenetics</td>
<td>111, 218</td>
</tr>
<tr>
<td>growth spurt</td>
<td>97, 217</td>
</tr>
<tr>
<td>hormonal feedback</td>
<td>104–6</td>
</tr>
<tr>
<td>ghrelin</td>
<td>105–6</td>
</tr>
<tr>
<td>insulin</td>
<td>99, 105, 289</td>
</tr>
<tr>
<td>leptin</td>
<td>99, 103, 104–5, 290</td>
</tr>
<tr>
<td>neural circuits</td>
<td></td>
</tr>
<tr>
<td>energy balance</td>
<td>101–6, 102</td>
</tr>
<tr>
<td>hedonic</td>
<td>103</td>
</tr>
<tr>
<td>integration</td>
<td>103–4</td>
</tr>
<tr>
<td>sex hormone effects</td>
<td>90, 275</td>
</tr>
<tr>
<td>see also individual structures</td>
<td></td>
</tr>
<tr>
<td>brain development</td>
<td>15, 18, 24, 78, 99–101, 207, 276</td>
</tr>
<tr>
<td>humans</td>
<td>99–100, 100</td>
</tr>
<tr>
<td>nutritional influences</td>
<td>106–10, 206–7, 217–8, 227, 276, 282</td>
</tr>
<tr>
<td>global over-nutrition</td>
<td>107–8</td>
</tr>
<tr>
<td>global under-nutrition</td>
<td>108–9</td>
</tr>
<tr>
<td>long-chain polyunsaturated fatty acid deficiency</td>
<td>110</td>
</tr>
<tr>
<td>micronutrient deficiency</td>
<td>109–10</td>
</tr>
<tr>
<td>risk factors</td>
<td>106–7</td>
</tr>
<tr>
<td>pregnancy outcome</td>
<td>100–1</td>
</tr>
<tr>
<td>timing</td>
<td>99, 100</td>
</tr>
<tr>
<td>vulnerability during</td>
<td>97</td>
</tr>
<tr>
<td>brainstem</td>
<td>102, 103</td>
</tr>
<tr>
<td>BRCA1 gene</td>
<td>170–1</td>
</tr>
<tr>
<td>bread, infant feeding</td>
<td>65</td>
</tr>
<tr>
<td>breast abscess</td>
<td>53</td>
</tr>
<tr>
<td>breast cancer</td>
<td>79, 164, 167, 168, 170, 174</td>
</tr>
<tr>
<td>and phenotype</td>
<td>172</td>
</tr>
<tr>
<td>risk factors</td>
<td>224, 279</td>
</tr>
<tr>
<td>breast milk</td>
<td>22</td>
</tr>
<tr>
<td>composition</td>
<td>41–3</td>
</tr>
<tr>
<td>contraindications</td>
<td>52</td>
</tr>
<tr>
<td>breastfeeding</td>
<td>10–11, 240, 249, 286</td>
</tr>
<tr>
<td>and allergic disease</td>
<td>198, 226</td>
</tr>
<tr>
<td>and asthma</td>
<td>198, 226</td>
</tr>
<tr>
<td>benefits of</td>
<td>43</td>
</tr>
<tr>
<td>and blood pressure</td>
<td>157</td>
</tr>
<tr>
<td>and bone mass</td>
<td>184</td>
</tr>
<tr>
<td>and cancer risk</td>
<td>167, 224–5, 280</td>
</tr>
<tr>
<td>contraindications</td>
<td>52</td>
</tr>
<tr>
<td>diet and lifestyle</td>
<td>38, 41–2, 248, 284</td>
</tr>
<tr>
<td>exercise</td>
<td>248</td>
</tr>
<tr>
<td>food allergen intake</td>
<td>195–8, 226</td>
</tr>
<tr>
<td>foods to avoid</td>
<td>248</td>
</tr>
<tr>
<td>duration of</td>
<td>42, 48–9, 49, 49</td>
</tr>
<tr>
<td>ethnic disparities</td>
<td>48–9, 49</td>
</tr>
<tr>
<td>exclusive</td>
<td>49, 55</td>
</tr>
<tr>
<td>fluid intake</td>
<td>284–5</td>
</tr>
<tr>
<td>gut microbiota</td>
<td>120–3, 122, 125–7</td>
</tr>
<tr>
<td>historical perspective</td>
<td>71–3, 72, 73</td>
</tr>
<tr>
<td>initiation</td>
<td>45–8, 46, 46, 47</td>
</tr>
<tr>
<td>maternal health conditions</td>
<td>53</td>
</tr>
<tr>
<td>mental development/ageing</td>
<td>209–12</td>
</tr>
<tr>
<td>behavioural development</td>
<td>211–12</td>
</tr>
<tr>
<td>central nervous system</td>
<td>211</td>
</tr>
<tr>
<td>cognitive development</td>
<td>209–10, 282</td>
</tr>
<tr>
<td>long-term benefits</td>
<td>210–11</td>
</tr>
<tr>
<td>optimal duration</td>
<td>212</td>
</tr>
<tr>
<td>and obesity risk</td>
<td>132, 220, 277</td>
</tr>
<tr>
<td>problems</td>
<td>49–50, 51</td>
</tr>
<tr>
<td>rates by country</td>
<td>49</td>
</tr>
<tr>
<td>recommendations</td>
<td>43–5, 252, 254, 270</td>
</tr>
<tr>
<td>supplementation</td>
<td>62, 235, 249</td>
</tr>
<tr>
<td>see also infant feeding</td>
<td></td>
</tr>
<tr>
<td>British Nutrition Foundation</td>
<td>249</td>
</tr>
<tr>
<td>Term</td>
<td>Page Numbers</td>
</tr>
<tr>
<td>------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>bronchitis</td>
<td>4, 194</td>
</tr>
<tr>
<td>brown adipocytes</td>
<td>21</td>
</tr>
<tr>
<td>caffeine</td>
<td>34, 239–40</td>
</tr>
<tr>
<td>and IUGR</td>
<td>89</td>
</tr>
<tr>
<td>in lactation</td>
<td>41</td>
</tr>
<tr>
<td>in pregnancy</td>
<td>38, 89, 283</td>
</tr>
<tr>
<td>unsuitability for young children</td>
<td>61–2</td>
</tr>
<tr>
<td>calcium</td>
<td>231, 237</td>
</tr>
<tr>
<td>fetal plasma concentration</td>
<td>177–8, 179</td>
</tr>
<tr>
<td>recommended intake</td>
<td>38, 183, 225, 231, 237</td>
</tr>
<tr>
<td>infants</td>
<td>184–5, 185</td>
</tr>
<tr>
<td>older children</td>
<td>186</td>
</tr>
<tr>
<td>pregnancy</td>
<td>183, 183, 247</td>
</tr>
<tr>
<td>vulnerable groups</td>
<td>243</td>
</tr>
<tr>
<td>canalisation</td>
<td>25–6</td>
</tr>
<tr>
<td>cancer</td>
<td>164–76, 224–5, 261, 279–80, 288</td>
</tr>
<tr>
<td>biology</td>
<td>165–6</td>
</tr>
<tr>
<td>in children</td>
<td>165</td>
</tr>
<tr>
<td>and early nutrition</td>
<td>166–8</td>
</tr>
<tr>
<td>adult stature and body composition</td>
<td>168</td>
</tr>
<tr>
<td>birth anthropometry</td>
<td>167</td>
</tr>
<tr>
<td>breast vs bottle feeding</td>
<td>167</td>
</tr>
<tr>
<td>childhood anthropometry and growth</td>
<td>168</td>
</tr>
<tr>
<td>famine</td>
<td>167</td>
</tr>
<tr>
<td>interventions</td>
<td>166–7</td>
</tr>
<tr>
<td>mechanisms</td>
<td>168–74, 174</td>
</tr>
<tr>
<td>incidence and trends</td>
<td>164–5</td>
</tr>
<tr>
<td>research priorities</td>
<td>267–8</td>
</tr>
<tr>
<td>see also specific types</td>
<td></td>
</tr>
<tr>
<td>cancer stem cells</td>
<td>166, 169–70</td>
</tr>
<tr>
<td>carcinoma in situ</td>
<td>165, 288</td>
</tr>
<tr>
<td>cardiac development</td>
<td>161</td>
</tr>
<tr>
<td>cardiomyocytes</td>
<td>18</td>
</tr>
<tr>
<td>cardiovascular disease</td>
<td>150–63, 153, 223–4, 278–9</td>
</tr>
<tr>
<td>clinical endpoints</td>
<td>151–2, 152</td>
</tr>
<tr>
<td>gender differences</td>
<td>92</td>
</tr>
<tr>
<td>mortality</td>
<td>5</td>
</tr>
<tr>
<td>research priorities</td>
<td>267</td>
</tr>
<tr>
<td>see also coronary heart disease; stroke</td>
<td></td>
</tr>
<tr>
<td>Carnegie stages</td>
<td>75, 288</td>
</tr>
<tr>
<td>carunclectomy</td>
<td>159, 288</td>
</tr>
<tr>
<td>catch-down growth</td>
<td>25–6, 180</td>
</tr>
<tr>
<td>catch-up growth</td>
<td>3, 25–6, 131, 135–6, 179, 219–20, 241–2, 249, 253, 258, 288</td>
</tr>
<tr>
<td>and obesity risk</td>
<td>131</td>
</tr>
<tr>
<td>recommendations</td>
<td>253, 271</td>
</tr>
<tr>
<td>cell proliferation</td>
<td>100, 274, 288</td>
</tr>
<tr>
<td>centiles</td>
<td>22, 23, 24, 179, 288</td>
</tr>
<tr>
<td>Centre for Maternal and Child Enquiries (CMACE)</td>
<td>219, 256</td>
</tr>
<tr>
<td>cheese</td>
<td></td>
</tr>
<tr>
<td>avoidance in pregnancy</td>
<td>34, 39, 60, 247, 281</td>
</tr>
<tr>
<td>infant feeding</td>
<td>64</td>
</tr>
<tr>
<td>children</td>
<td></td>
</tr>
<tr>
<td>anthropometry and growth</td>
<td>168</td>
</tr>
<tr>
<td>exercise</td>
<td>285</td>
</tr>
<tr>
<td>nutrition</td>
<td>8–11</td>
</tr>
<tr>
<td>obesity</td>
<td>221–2</td>
</tr>
<tr>
<td>see also early life and adult disease</td>
<td></td>
</tr>
<tr>
<td>chloride, recommended intake</td>
<td>38</td>
</tr>
<tr>
<td>cholesterol ester transfer protein</td>
<td>288</td>
</tr>
<tr>
<td>choline</td>
<td>83, 147, 172, 207–8, 268, 282, 288</td>
</tr>
<tr>
<td>deficiency</td>
<td>110</td>
</tr>
<tr>
<td>chondrocytes</td>
<td>177, 178</td>
</tr>
<tr>
<td>chorion</td>
<td>16</td>
</tr>
<tr>
<td>chromosomes</td>
<td>13, 84, 217, 288</td>
</tr>
<tr>
<td>chronic kidney disease</td>
<td>158</td>
</tr>
<tr>
<td>cleavage</td>
<td>13</td>
</tr>
<tr>
<td>Clostridium spp.</td>
<td>118, 121, 123</td>
</tr>
<tr>
<td>C. paraputricum</td>
<td>121</td>
</tr>
<tr>
<td>cocaine and amphetamine-regulated transcript (CART)</td>
<td>102–3, 105, 108–9</td>
</tr>
<tr>
<td>Cochrane Review</td>
<td>288</td>
</tr>
<tr>
<td>coeliac disease</td>
<td>67–8, 288</td>
</tr>
<tr>
<td>coffee</td>
<td>see caffeine</td>
</tr>
<tr>
<td>cognitive development</td>
<td>209–11, 276</td>
</tr>
<tr>
<td>research priorities</td>
<td>266</td>
</tr>
<tr>
<td>cognitive function</td>
<td>206, 227–8, 282, 288</td>
</tr>
<tr>
<td>research priorities</td>
<td>268</td>
</tr>
<tr>
<td>see also mental development/ageing</td>
<td></td>
</tr>
<tr>
<td>colorectal carcinoma</td>
<td>164–5</td>
</tr>
<tr>
<td>and birthweight</td>
<td>167</td>
</tr>
<tr>
<td>Committee on Medical Aspects of Food Policy (COMA)</td>
<td>73, 235</td>
</tr>
<tr>
<td>Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment see COT</td>
<td></td>
</tr>
<tr>
<td>complementary foods</td>
<td></td>
</tr>
<tr>
<td>age of introduction</td>
<td>54–6</td>
</tr>
<tr>
<td>baby and herbal drinks</td>
<td>61</td>
</tr>
<tr>
<td>current practice</td>
<td>55–8, 57, 59</td>
</tr>
<tr>
<td>energy content</td>
<td>55</td>
</tr>
<tr>
<td>fruit juices</td>
<td>61</td>
</tr>
<tr>
<td>introduction of</td>
<td>199</td>
</tr>
<tr>
<td>milk and dairy products</td>
<td>60</td>
</tr>
<tr>
<td>taste preferences and texture</td>
<td>58–9</td>
</tr>
<tr>
<td>tea and coffee</td>
<td>61</td>
</tr>
<tr>
<td>see also infant feeding; weaning</td>
<td></td>
</tr>
<tr>
<td>Confidential Enquiry into Maternal and Child Health (CEMACH)</td>
<td>256</td>
</tr>
<tr>
<td>confounding</td>
<td>10, 88, 180, 186, 198, 202–3, 208–10, 268, 277, 288</td>
</tr>
</tbody>
</table>
congenital adrenal hyperplasia (CAH)  88

cord blood mononuclear cell (CBMC) response  195

maternal allergen exposure  196–7

and subsequent allergic disease  197

coronary heart disease (CHD)  150, 223, 288

and fetal growth  5–6, 6

hazard ratios  7

mortality  4, 4, 223

corticotrophin-releasing hormone (CRH)  111

COT  195–6, 197, 226, 239–40

cows’ milk  43

homemade infant formulas  73

infant feeding  51, 52, 60, 64

introduction of  198, 226

protein allergy  52, 67, 68

COX-2  173–4

cretinism  2, 77, 208, 217, 239, 290

critical windows of development  17, 75–85, 158,

216–17, 257, 258, 263, 266, 288

cryptorchidism  87

cytokines  155, 156, 173, 191, 195, 288

Cytophaga spp.  123

Czech Republic, breastfeeding rate  50

dairy products

infant feeding  61, 65

see also cheese; cows’ milk

dementia  227, 282

denaturation  288

denaturing gradient gel electrophoresis (DGGE)  117,

121
dental health in pregnancy  247

development  13–27

embryo  16

fetal  16–18

postnatal  24

stages of  14

developmental plasticity  8, 8, 257

DHA see docosahexanoic acid

diabetes mellitus  222–3, 260–1, 278

and IUGR  23

maternal  138–9, 146

interventions  136–7

and obesity risk  132–5

research priorities  267

type 1  222, 293

type 2  143–9, 222–3, 293

and birthweight  144

and early nutrition  145–6

and fetal growth  6

mechanisms  147–8

and postnatal growth  144–5

DIAMOND study  113

diagnosis  38, 41–2, 248, 284

cafeteria-style  160

eye feeding and weaning  240–2

and epigenetics  171–2

gender differences in preference  91

and gut microbiota  120

mortality  4, 4, 223

pregnancy and early life  8–11, 9, 17, 36–9, 38,

130–2, 228–40, 246–7, 262–3, 282–3

antioxidant status  201

and bone health  180–4

food allergen intake  195–8

foods to avoid  38–9, 39

and infant feeding choices  93–4

macronutrients  229

mental development/ageing  207–9

micronutrients  230–9

recomendations  245–7

teenage mothers  29, 31

vegetarians/vegans  38

see also infant feeding; nutrition

dietary reference intakes (DRIs)  31

dietary supplements  9–10

DNA methylation  83–4, 95, 111–12, 147, 148, 170,

171–2, 212, 217, 225, 290

docosahexanoic acid (DHA)  17, 288

and asthma  200

breast milk  41–2, 209

deficiency  110

maternal diet  207

requirement for  217

supplements  113–14

dopamine reuptake transporter (DAT)  111

dual X-ray absorptiometry (DXA)  135, 181, 183,

189, 288

Dutch Hunger Winter  9, 78–80, 79, 106, 132, 138,

145, 148, 172, 207–8, 262, 288

dyslipidaemia  153, 223, 288

eating disorders  90–1

early life and adult disease  3–7

animal studies  3, 3

fetal and postnatal experience  5–6, 6

population studies  3–5, 4, 4, 5

vulnerability to stressors  6–7

early nutrition see infant feeding

EARNEST project  36, 136, 142, 267

eating disorders  90–1
Index

eggs
  allergy to 55, 67, 194
  avoidance during weaning 66, 198
  DHA in 36
  infant feeding 65
eicosapentaenoic acid (EPA) 36, 288
  and asthma 200
  maternal diet 207
embryonic development 13, 16, 257, 274–5
  stages of 75, 76, 78
endocrine, definition 288
endocrine development 217
endocrine disruption 81–3
  glucocorticoids 81–2
  homeostatic regulation 82–3
energy balance
  maternal 228–9
  pregnancy 246
energy balance circuits 101–6, 102
energy intake in pregnancy 35–6
Enterobacter spp. 121
  E. asburiae 121
Enterococcus spp. 118, 119, 121
  E. faecium 118
environmental influences 1–3, 274
epigenetics 83–4, 170, 217, 289
  cancer risk 170–2
  and diet 171–2
  fetal programming 95
  and neurological development 111–13
type 2 diabetes 147–8
epigenome 111
Escherichia coli 118–19, 121, 126
ethnic minority groups 32, 243–4
  folic acid deficiency 244
  obesity 244
  vegetarian diet 244
  vitamin D deficiency 244
EU-BRAFO project 33
Euro-Growth study 62
European Commission Scientific Committee for Food (ECSCF) 74
European Early Nutritional Programming Project (EARNEST) 36, 136, 142, 267
European Food Safety Authority (EFSA) 36, 41, 68
European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) 68, 227
EURRECA (European Micronutrient Recommendations Aligned) project 37–8, 230, 280
exercise
  and bone health 188–9, 226
  breastfeeding mothers 248
  infants and children 285
  pre-pregnancy 246
  in pregnancy 229, 284
familial hypercholesterolaemia 154
famine
  and cancer risk 167
  effects on fetal development 78–80, 79, 132
  see also Dutch Hunger Winter
fatty acids
  recommended intake
    breastfeeding mothers 41, 43
    early life 36–7, 229
    pregnancy 36–7, 229, 247
    weaning 61, 249
  vegetarian diet 244
fatty streaks 150, 155
fertilisation 13, 14
fetal alcohol spectrum disorders (FASD) 1–2, 289
fetal development 16–22, 274
  critical windows see critical windows of development
  effects of famine 78–80, 79
  mobilisation of maternal stores 17
  nutritional programming 77–80
  placental glucose transport 17–18
  stages of 78
  see also specific organs and systems
fetal growth 14–15, 16–17, 88–90
fetal growth restriction (FGR) 100–1, 289
fetal programming 7–8, 257, 273
epigenetics 95
  see also Barker hypothesis
fetal-placental circulation 16
Finland, breastfeeding rate 50
Flexibacter spp. 123
fluid intake 284–5
folic acid 230, 235–7, 258
  breastfeeding 42
  fortification of flour 236, 237
  and neural tube defects 2, 235, 237
  recommendations 252, 253, 271
  recommended intake 38, 232, 236
  pre-pregnancy 246
  pregnancy 246
  supplements 33–5, 34, 95
  and cancer risk 166–7
  ethnic minority groups 244
  vulnerable groups 243
food allergens
cows’ milk protein 52, 67, 68, 281
dietary intake
infants 198–9
maternal 195–8
weaning 249
eggs 55, 68, 194
peanuts see peanut allergy
wheat 68
see also specific allergens
food industry, recommendations to 254, 272
food intolerance, and mental development 213
formula feeding 42–3, 240, 248
Allenbury system 73
and bone mass 184
and cancer risk 167
commercially prepared 73–4
composition 50–1, 136
cows’ milk-based 51
current practice 53
galactose-free 289
goats’ milk-based 52
gut microbiota 120–3, 122, 125–7
historical perspective 73–4
homemade formulas 73
introduction of
by age 53
by maternal age 54
by socioeconomic status 54
recommendations 270
soy-based 51–2
and testis volume 94
use of 52–3, 53
see also infant feeding
fructo-oligosaccharides (FOS) 123, 124
fruit
infant feeding 63, 64, 65, 66
intake in pregnancy 33, 37, 40, 201
fruit juices, infant feeding 61–2, 65
funders, recommendations to 254
galacto-oligosaccharides (GOS) 123, 124
galactosaemia 52, 289
gastric cancer 165
gastrointestinal (GI) 289
gatekeeper hypothesis 84, 84, 289
Gateshead Millennium Study 60, 222
gender differences 90–2
body fat distribution 91–2
cardiovascular disease/hypertension 92, 223
dietary preferences 91
disease susceptibility 88, 259, 275–6
eating disorders 90–1
immune system 93
kidney disease/hypertension 92–3
kisspeptin system 91
lung development 93
gender dysphoria 87, 275
genome 1, 11, 257, 289
genotype 8, 289
and cancer risk 168–70, 169
and cardiovascular disease risk 152–3, 153
embryo selection 158–9
glucose intolerance, and mental development 213
funding, recommendations to 254
growth 13–27
accelerated 241–2
fetal 14–15, 16–17, 88–90
postnatal 24
and cancer risk 168
and cardiovascular disease risk 152–3, 153
and glucose metabolism 82
and neurological development 110–11
impaired tolerance 6, 143, 144, 146, 156, 223, 289
metabolism 82
placental transport 17–18
and testis volume 94
placental transport 17–18
and diabetes 144–5
variations in 2–3
and testis volume 94
growth hormone-IGF-I axis 90
growth monitoring 2–3, 23, 24–5
gut microbiota 116–29, 218, 260, 276–7, 290
acquisition of 117–18
factors affecting 118–20
Index

diet 120
diabetes 120
diabetes mellitus 6, 143, 144, 146, 156, 223, 289

geography and/or lifestyle 119–20
gestational age 118–19
host genetics 119
mode of delivery 119
human 117
investigation 116–17
milk-fed infants 120–3, 122, 125–7
and obesity 128
prebiotic feeding studies 123, 124
research priorities 266
weaning effects 123–4

haematopoiesis 20, 231, 289
haematopoietic tissue 21
head circumference 167, 207
asthma and allergy 194
and cardiovascular disease risk 151
and IQ 106
health professionals
recommendations to 252–4, 270–2
role in pregnancy 247–50
Healthy Start vouchers and vitamins 62, 66, 235, 249, 251, 269, 285
heart, development 18
hedonic circuits 101, 103, 107
height
and blood pressure 157
and cancer risk 168
and cardiovascular disease risk 153
secular changes 25
hepatic lipase 155, 289
hepatitis B 53
hepatitis C 53
herbal drinks 61
herpes simplex virus type 1 (HSV-1) 52
high-density lipoprotein (HDL) 7, 155, 289
high-fat diet 9
and type 2 diabetes 146
high-fibre foods, avoidance during weaning 66
hippocampus 100, 109–10, 112
HIV, breastfeeding contraindication 52
Hodgkin’s lymphoma 289
homeostatic regulation 82–3
glucose metabolism 82
hypothalamo-pituitary-adrenal axis 82
renin-angiotensin system 83, 292
honey, avoidance during weaning 66
hormone-sensitive lipase 156, 289
human immunodeficiency virus see HIV
hydroxyapatite 19, 180
hygiene hypothesis 119
hyperglycaemia 23, 33, 99, 108, 134, 139, 143, 147, 289
hyperinsulinaemia 139–40, 289
obesity-related 172
hyperleptinaemia 140, 160–1
hypermethylation in cancer aetiology 170–1
hypertension 150, 289
definition 157
and fetal growth 6
gender differences 92–3
and oxidative stress 160
and under-nutrition 159–60, 159
hypoglycaemia 22, 52
hypoparathyroidism 178
hypoplasia 87
and folic acid supplements 95
and vegetarian/vegan diet 94
hypothalamic-pituitary-adrenal (HPA) axis 82, 110–11, 208, 217, 289
hypothalamus 101–3, 102
arcuate nucleus 101–2
IGF see insulin-like growth factor
immune system
development 22
gender differences 93
immunoglobulins 289
IgE 191
secretory IgA 43, 209
immunology, neonatal 195
impaired glucose tolerance (IGT) 6, 143, 144, 146, 156, 223, 289
see also diabetes mellitus
implantation 13
infant feeding 42–3, 228–40
Asian vs. white mothers 64
breastfeeding see breastfeeding
calcium intake 184–5, 185
and cancer 166–8
adult stature and body composition 168
birth anthropometry 167–8
breast vs bottle feeding 167
childhood anthropometry and growth 168
famine 167
interventions 166–7
mechanisms 168–74, 174
and cardiovascular disease risk 153
central nervous system 211
complementary foods 53–67
current practices 286
food allergen intake 198–9
formula see formula feeding
infant feeding (cont’d)
nutrient intake 61–2
    and asthma/allergy prevalence 199–203, 200,
    202–3
post-weaning diet 212–13
preference and maternal diet 93–4
recommendations 43–5, 249, 252, 253–4, 270,
    271–2
vegetarian/vegan diet 65–6
vitamin D intake 185–6,
    187
Infant Feeding Surveys 40, 45, 48, 49, 56, 58, 64,
    245
inhibitors of apoptosis (IAPs) 173
Institute of Nutrition of Central America and Panama
    (INCAP) trial 10
insulin 99, 105, 289
    hyperinsulinaemia 139–40, 172, 289
insulin resistance 289–90
insulin-like growth factor (IGF) 147, 171, 289
intelligence quotient (IQ) 100–1, 106
interferon-γ 192
interleukins 173, 191, 290
International Child Development Steering
    Group 208
INTERSALT study 157
intrauterine, definition 290
intrauterine growth restriction (IUGR) 22–3, 208,
    275, 290
    intrauterine malnutrition 99
    susceptibility to 88–90
iodine 231, 238–9
    deficiency 290
    and mental development 208
recommended intake 38, 232
    pre-pregnancy 246
    pregnancy 247
vulnerable groups 243
iron 231, 237–8
    childhood diet 213
    and mental development 208
recommended intake 38, 232
    pre-pregnancy 246
    pregnancy 246
weaning 249
supplements, and cancer risk 166–7
vegetarian diet 244
vulnerable groups 243
weaning diet 61
iron deficiency 109
anaemia 208, 290
in pregnancy 80
Italy, breastfeeding rate 50
IUGR see intrauterine growth restriction
junk food 108, 147
kidney development 21
kidney disease, gender differences 92–3
kisspeptin 91, 290
Klebsiella pneumoniae 118
Kupffer cells 20
lactation see breastfeeding
Lactobacillus rhamnosus 116, 218, 260, 276
lactulose 123, 124
large for gestational age (LGA) 23, 106, 290
Learning Early About Peanut Allergy (LEAP)
    study 67, 199
Leningrad siege 80
leptin 99, 104–5, 107, 156, 259, 290
    and cancer risk 173
    hyperleptinemia 140, 160–1
    neonatal surge 161
    ob/ob mice model 104, 291
    postnatal surge 104–5
    role of 103, 105
    selective resistance 161
leptin-leptin receptor-POMC–melanocortin-4 receptor
    pathway 104
leukaemia 165, 279, 290
LGA see large for gestational age
lifestyle
    breastfeeding 248
    early feeding and weaning 240–2
    pre-pregnancy 246
    pregnancy and early life 228–40, 246–7
    alcohol 239
    caffeine 239–40
    recommendations 245–7, 246–7
linoleic acid 201, 209, 247, 248, 249
lipase
    bile acid stimulated 209
    hepatic 155, 289
    hormone-sensitive 156, 289
    lipoprotein 154, 154, 290
    lipolysis 17, 154, 155, 156, 290
    lipoprotein lipase 154, 290
Listeria monocytogenes 55
liver development 20
long-chain polyunsaturated fatty acids
    in breast milk 209
    deficiency 110
    in pregnancy 207
    see also individual fatty acids
low birthweight 1, 2, 8, 29, 84, 84
    definition 22, 23
    disease associations
CKD 158
hypertension 157, 161
obesity 131, 132, 151
type 2 diabetes 144
indicators for 100
infant feeding 52
reducing 135
risk factors 32, 89, 106
low-calorie foods, avoidance during weaning 66
low-density lipoprotein (LDL) 7, 150, 154, 154, 290
low-fat foods, avoidance during weaning 66
lungs, development 18–19, 93
macronutrients
deficiency, and type 2 diabetes 146
pregnancy and early life 229
see also specific macronutrients
macrosomia 23, 151, 290
definition 23
and type 2 diabetes 144
magnesium
recommended intake 38
vulnerable groups 243
major depressive disorder (MDD) 206, 290
male-female differences see gender differences
maple syrup urine disease 52, 290
marlin
during weaning 66, 281
pregnancy and lactation 227, 247, 248
masculinisation 217, 259, 275
disorders of 87
timing of 86–7
masculinisation programme window 275
mast cells 290
mastitis 53, 290
maternal
age 28–31, 29, 30
BMI 10, 106–7, 134–5
and fetal/infant death 219
body composition 10, 41, 95
body fat 17
diabetes mellitus 138–9, 146
interventions 136–7
and obesity risk 132–5
diet 9, 17, 262–3
antioxidant status 201
food allergy intake 195–8
and infant feeding choices 93–4
mental development/ageing 207–9
energy balance 228–9
glycaemia 290
nutrition 8–11, 9, 130–2, 257
and bone health 180–4
vitamin D 180–1
obesity 93–4, 106–7, 134–5, 139, 219–21, 219
and appetite regulation disturbance 140
and blood pressure 157
and hyperleptinaemia 160–1
interventions 137
recommendations 251, 253, 268–9, 271
and type 2 diabetes 146–7
smoking, and sperm count 94–5
under-nutrition, and offspring obesity 138
vitamin D status 225
weight 228–9
maternal depletion syndrome 207
MAVIDOS trial 183
melanocortins 102, 108
Mental Development Index 113
mental development/ageing 206–15, 227–8, 282
breastfeeding 209–12
behavioural development 211–12
central nervous system 211
cognitive development 209–10
long-term benefits 210–11
optimal duration 212
post-weaning diet 212–13
metabolic syndrome 88–90, 156, 162, 223, 279, 290
definition 156
methylation of DNA 83–4, 95, 111–12, 147, 148, 170–2, 212, 217, 225, 290
microbiota see gut microbiota
micronutrients 230–1
deficiency 109–10
adolescents 243
in pregnancy 77–8, 283
and type 2 diabetes 146
pregnancy and early life 37–8, 38, 77–8, 230–9
recommended intake 232
see also specific micronutrients
Millennium Cohort 22, 23, 25, 45, 46, 48
minerals see micronutrients; and individual minerals
mini puberty 87, 94, 275
MTHFR gene 169, 171
mu-opioid receptor (MOR) 111
muscle development 20
myelination 18, 99, 100, 217
myocardial infarction 290
NADPH oxidase 150
National Diet and Nutrition Survey 34, 236
National Dried Milk 42–3
National Study of Adolescent Health 210
natural experiments 98
necrotising enterocolitis 116, 118–19
neonate/neonatal 290
  body composition 131, 133
  feeding see infant feeding
  immunology 195
  leptin surge 161
  lung function 194–5
  overfeeding 139
Netherlands, breastfeeding rate 50
neural crest 16
neural tube defects (NTDs) 2, 237, 290
  prevention 33, 34
neuroblastoma 290
neurological development 97–115, 217–18, 259, 276
  animal studies 97–8
  brain 18, 99–101
    humans 99–100, 100
    nutritional influences 106–10
    pregnancy outcome 100–1
    timing 99, 100
  vulnerable period 97
environments 98–9
  levels of nutritional effect 98
  nutritional interventions 113–14
  programming mechanisms 110–13
    epigenetics 111–13
    glucocorticoids 110–11
    research priorities 266
neuron anatomy 106
neuropeptide Y 102
New Zealand Medicines and Medical Devices Safety Authority 196
niacin
  recommended intake 38
  vulnerable groups 243
non-esterified fatty acids (NEFA) 154, 155, 156, 290–1
Norway, breastfeeding rate 49
nuclear factor κB 173
nucleotides 291
nucleus accumbens 102, 103
nucleus solitarius 103
nutrition 1–3
  and development 130–42
    asthma and allergy 191–204
    bone health 177–90
    cancer 164–76
    cardiovascular disease 150–63
    mental development/ageing 206–15
    type 2 diabetes 143–9
  early see infant feeding
maternal 8–11, 9, 130–2, 257
Index

  and bone health 180–4
  vitamin D 180–1
  postnatal 10–11
  pre-pregnancy 32–3
  in utero 8–11, 9, 130–2
  young women 11
nutritional deficiency 98
nutritional interventions 113–14
nutritional programming 77–80
  mechanisms 80–4
    disruption of organ development 81
    endocrine disruption 81–3
    epigenetics 83–4
    gatekeeper hypothesis 84, 84
    telomere length 84
  micronutrient deprivation in pregnancy 77–8
nuts
  allergy to see peanut allergy
  avoidance during weaning 66
oat drinks 60
obesity 107–8, 130, 218–22, 245, 258, 260, 277–8
  animal studies 138–9
    maternal diabetes 138–9
    maternal obesity 139
    maternal under-nutrition 138
  and asthma/allergy 203
  and birthweight 23, 131, 132, 133, 151
  body fat distribution 91–2
  and cancer risk 225
  childhood 221–2
  current practices 286
  and diabetes 99
  ethnic minority groups 244
  and gut microbiota 128
  interventions 135–6
    obese women 137–8
    pregnant diabetics 136–7
maternal 93–4, 106–7, 134–5, 139, 219–21, 219
  and appetite regulation disturbance 140
  and blood pressure 157
  and hyperleptinaemia 160–1
  interventions 137
  recommendations 251, 253, 268–9, 271
  and type 2 diabetes 146–7
research priorities 267
risk factors
  breastfeeding 132
  catch-up growth 131
  gestational weight gain 135
  maternal diabetes 132–5
maternal obesity 93–4, 106–7, 134–5
in utero nutrition 130–2

see also body mass index

oblob mice 104, 291
observational studies 9, 44, 134, 137, 158, 186, 203, 208, 291
odds ratio (OR) 291

oesophageal cancer 165
oil fish 62, 285
oleic acid 209
oligosaccharides 291
oncogenes 171, 225, 291
organ development, disruption of 81
osteoblasts 19
osteoclasts 19
osteoporosis 177–80, 291
epidemiology 177
fracture risk 180
over-nutrition 107–8
and cardiovascular disease 160–1
and type 2 diabetes 146–7
oxidative stress
and cancer risk 168
and DNA damage 84
and hypertension 160

palmitic acid 209
pancreatic development 20–1
parathyroid hormone (PTH) 177–8, 291
parathyroid hormone-related peptide 177–8
paraventricular nuclei 291
peanut allergy 67, 226
ethnic prevalence 199
non-oral exposure routes 197–8
and in utero exposure 196, 197
periconceptional, definition 291
perinatal, definition 291

peripheral quantitative computed tomography see pQCT
peroxisome proliferator-activated receptor α (PPARα) 147, 172
phenotype 8, 291
and cancer risk 172–4, 173
phenylketonuria (PKU) 52, 291
phosphorus, recommended intake 38
placenta 179, 216, 257, 274, 291
development 16, 75–7, 78
and glucose transport 17–18
role of 274

policy makers, recommendations to 250–2, 268–70
polycystic ovarian syndrome (PCOS) 88, 291
polydextrose (PDX) 123, 124
polymerase chain reaction (PCR) 117, 121

polyunsaturated fatty acids (PUFAs) 262
and asthma/allergy 200, 201–2
and bone metabolism 184
and brain development 227
ponderal index 291
and coronary heart disease 7
population studies, early life and adult disease 3–5, 4, 4, 5
post-traumatic stress disorder (PTSD) 111
postnatal growth 24
and cancer risk 168
and cardiovascular disease risk 152–3, 153
catch-down 25–6, 180
catch-up 3, 25–6, 131, 135–6, 219–20, 241–2, 249, 253, 258, 288
and type 2 diabetes 144–5

postnatal period
maternal weight loss 228–9
nutrition 10–11
overfeeding during 139

potassium
recommended intake 38
vulnerable groups 243

pQCT 292
pre-eclampsia 29, 33, 135, 183, 268, 278, 291
pre-pregnancy 32–5, 34

diet and lifestyle 34–5, 34, 246
nutrition 32–3

prebiotics 50, 123, 218, 276, 291
prefrontal cortex 100, 103

pregnancy
adolescents 29–31, 30, 242–3
recommendations 251, 269
vitamin D 180–1
current practices 39–41
dental health 247
diet and lifestyle 8–11, 9, 36–9, 38, 130–2, 228–40, 246–7, 282–3
antioxidant status 201
and bone health 180–4
calcium intake 183, 183
energy intake 35–6
exercise 229, 284
food allergen intake 195–8
foods to avoid 38–9, 39, 247
mental development/ageing 207–9
vitamin D intake 181–3, 182
weight gain 35, 36, 135, 228

fluid intake 284–5

health professionals' role 247–50
maternal characteristics 28–32

see also maternal
prenatal development 13–16, 14–15
embryonic period 13, 16
placenta 16
preservatives 213
preterm infant feeding 52
primordium 291
principal component analysis (PCA) 124, 125, 126, 127, 213, 291
pro-opiomelanocortin (POMC) 102–3, 141
prolactin 292
proliferation 292
Promotion of Breastfeeding Intervention Trial (PROBIT) 11
Propionibacterium acnes 118
prostate cancer 164, 224–5
and birthweight 167–8
prostate specific antigen (PSA) 164
protein
pregnancy and early life 229
recommended intake 38
pregnancy 246
puberty
mini puberty 87, 94
timing of 88–90
public health implications 216–55
chronic conditions 218–28
diet and lifestyle
early feeding and weaning 240–2
pregnancy and early life 228–40
recommendations 245–7
health professionals’ role 247–50
recommendations 250–4
vulnerable groups 242–5
Public Health Interventions Advisory Committee (PHIAC) 248
randomised controlled trials (RCT) 45, 50, 136, 166, 183, 186, 197, 199, 243, 292
regulatory T-cells see Tregs
relative risk 152, 153, 292
re-methylation 83, 292
renin-angiotensin system 83, 160, 292
research priorities
allergic disease and asthma 268
bone health 268
cancer 267–8
cardiovascular disease 267
cognitive function 268
cognitive and neurological development 266
critical windows of development 266
current practices 265

Index

diabetes mellitus 267
gut microbiota 266
normal growth and development 265
obesity 267
sex hormones and disease susceptibility 266
researchers, recommendations to 254
Rett syndrome 112
riboflavin
recommended intake 38
vulnerable groups 243
ribonucleic acid see RNA
rickets 181, 185
RNA 292
Royal College of Obstetricians and Gynaecologists (RCOG) 219, 229, 256
Ruminococcus spp. 121
S-adenosylmethionine (SAM) 171
salt
avoidance during weaning 66
dietary reduction 224
Scientific Advisory Committee on Nutrition (SACN) 45, 220, 235, 256
Scottish Index of Multiple Deprivation (SIMD) 40
secular, definition 292
secular growth trends 25
selenium 200, 231
deficiency 290
recommended intake 38
vulnerable groups 243
Sertoli cells 89
sex differences see gender differences
sex hormones
brain and behavioural effects 90
development 21
and disease susceptibility 266, 275
disorders of masculinisation 87
male-female differences in disease risk 88
perinatal effects 86–96
timing of masculinisation 86–7
see also individual hormones
SGA see small for gestational age
shark, avoidance during weaning 66
sheep’s milk, infant feeding 60
shellfish allergy 67
small for gestational age (SGA) 22, 23, 31, 100, 101, 292
and cardiovascular disease risk 151
smoking 244–5
and bone mineral density 7
maternal
and offspring obesity 137–8
and sperm count 94–5
socioeconomic status
  and breastfeeding initiation 46
  and complementary feeding 58
  and formula feeding 54
  and health risks 244
sodium, recommended intake 38
sodium benzoate 213
solid foods, introduction of see complementary foods; weaning
South Asian populations, metabolic syndrome in 156
Southampton Women’s Study 40, 181
soy allergy 67
soy-based infant formulas 51–2
stakeholders, recommendations to 250–4, 265–72
  food industry 254, 272
  funders 254
  health professionals 252–4, 270–2
  policy makers 250–2, 268–70
  researchers 254
Staphylococcus epidermidis 118
statis 154
stem cells 75, 76, 166, 169, 170, 174, 292
Streptococcus spp. 121
  S. mutans 218
  S. sanguinis 118
stressors, vulnerability to 6–7, 192, 257
striatum 292
stroke 150, 292
  mortality 4
sugar
  avoidance during weaning 66
  see also glucose
surrogate risk markers 292
Sweden, breastfeeding rate 50
swordfish, avoidance during weaning 66
synaptogenesis 99, 100
T-helper cells 191–2, 196–7
T-score 292
tartrazine 213
Task Force
  conclusions 256–64
  recommendations see stakeholders, recommendations to; and specific areas
taste preferences 58–9
tea, infant feeding 61
Teenage Pregnancy Strategy 251
teenagers see adolescents
telemere 292
  length 84
  shortening 217
temperature gradient gel electrophoresis (TGGE) 117
teratogens 292
  nutrients as 2
terminal-restriction fragment length polymorphism (T-RFLP) 117
testicular cancer 164, 217, 224–5
testosterone 87, 89, 90, 92, 94, 160, 275, 292
texture, importance of 58–9
thiamin
  recommended intake 38
  vulnerable groups 243
thrift phenotype hypothesis see Barker hypothesis
thymus 292
thyroid axis 292
thyroid hormone 292
tissue stem cells 293
Tobacco Control Plan 245
tracking, bone growth 178–80
triaclyglycerols (TAGs) 153, 154, 154, 155, 155–6, 293
trophic factor 293
tuberculosis, breastfeeding 53
  maternal, and offspring obesity 138
  and type 2 diabetes 145–6
UPBEAT study 137, 220
vaccenic acid 209
vagus nerve 293
vascular endothelial growth factor (VEGF) 147, 173
vegetables, infant feeding 63
vegetarian/vegan diet 38
  breastfeeding mothers 248
  ethnic minority groups 244
  and hypospadias 94
  infant feeding 64–6
  weaning 249
Veillonella spp. 118
ventral tegmental area (VTA) 102, 103
ventromedial hypothalamic nucleus 105
very-low-density lipoprotein (VLDL) 154, 155, 293
visceral obesity 153, 293
index

vitamins see micronutrients; and individual vitamins
vitamin A 230
  recommended intake 38, 232
    pre-pregnancy 246
    pregnancy 247
    weaning 249
  vulnerable groups 243
vitamin B6 230, 237
  recommended intake 38
  vulnerable groups 243
vitamin B12 230, 237
  recommended intake 38, 232
    pregnancy 247
  vulnerable groups 243
vitamin C
  recommended intake 38
    weaning 249
  vulnerable groups 243
vitamin D 230, 232–5
  deficiency 180–1, 185
    ethnic minority groups 244
    in pregnancy 258
  prevalence 233
dietary sources 233
intake
  and asthma/allergy 200–1, 202
  infants 185–6, 187
  older children 186
  in pregnancy 180–3, 182
  recommended 38, 188
normal levels 186–8
receptors 208
recommendations 251–2, 253, 269–70, 271
recommended intake 232
  breastfeeding mothers 293
  pre-pregnancy 246
  pregnancy 246
  weaning 249
status
  maternal 225
  pre-menopausal women 233
supplements 181–2, 183, 234–5
  safety of 182–3
  weaning diet 61–2
vitamin D receptor (VDR) 177, 293
vitamin drops 62, 66, 249, 285
volumetric bone mineral density (vBMD) 293
vulnerable groups 242–5, 283–4
  ethnic minority groups 243–4
  lower socioeconomic groups 244
  obese women 245
  pregnant adolescents 242–3
  smokers 244–5
  women with poor diets 242
weaning 53–67, 240–1, 248, 249, 258, 293
  baby-led 59–60
complementary foods see complementary foods
current practice 62–3, 63, 64
  drinks 65
  foods 62–4
  foods to avoid 66, 66
  and gut microbiota 123–4
  recommendations 252, 253–4, 270, 271–2
  recommended nutrients 62–3, 285
  timing of 285
weanling’s dilemma (mental development) 212, 293
weight
  BMI see body mass index
  breastfeeding mothers 248
  gain in pregnancy 35, 36, 246
  maternal 228–9
  pre-pregnancy 32–3, 246
  see also birthweight
wheat allergy 67
white adipocytes 21
Wilms’ tumour 171
World Health Organization (WHO), Child Growth Standards 258
Z-score 293
zinc 231, 238
deficiency 109–10, 290
recommended intake 38, 232
  breastfeeding mothers 248, 293
  pre-pregnancy 246
  pregnancy 246
  weaning 249
vegetarian diet 244
vulnerable groups 243
weaning diet 62