

INDEX

- AACD. *See* Aggressive active case detection
- ABATE® Larvicide, 285
- ACT therapy. *See* Artemisinin-based combination therapy
- Acute watery diarrhea, 67–68
- Adenovirus, diarrhea etiology, 69, 71–72
- Aedes aegypti*, 215–219
 - climate change impact, 218
 - distribution, 217, 218, 220
- Aedes albopictus*, 219–221
- Aeromonas*, diarrhea etiology, 69, 75–76
- Afghanistan, food security and nutrition projects, 117
- Africa, population, 33–35
- AFOLU. *See* Agriculture, forestry, and land-use change
- Aggressive active case detection (AACD), 138
- Agriculture. *See also* Food and Agriculture Organization of United Nations
 - Angola fire, 45
 - anthropogenic greenhouse gas emissions, 43–46, 119, 120
 - black carbon produced, 43–44
 - Brazilian Amazon malaria with settlement, 133–134
 - climate change impacts, 119–120
 - Democratic Republic of Congo fire, 45
 - food supply, 40
 - forestry, and land-use change (AFOLU), 119
 - fresh water storage's effects, 43–46
 - India fire, 44
 - Intended Nationally Determined Contributions, 122
 - Population, 25
 - Water, 3
 - Zambia fire, 45
- Albendazole, STHs infection treatment, 95, 101–104, 106
- Algeria, water availability, 54
- AMR. *See* Antimicrobial Resistance
- Ancylostoma ceylanicum*, 95, 96, 97
- Ancylostoma duodenale*, 18, 95, 96
 - clinical characteristics, 97
 - photo, 99
- Angola, agricultural fire, 45
- Animal-source foods (ASFs), 114, 117
- Anopheles*, Brazilian Amazon malaria vectors, 132–133
- Anopheles gambiae*, 221–224
 - WHO eradication strategy, 130
- Antibiotics
 - regulatory authority, 179
 - resistance, 179
 - SAFE strategy (*see also* trachoma), 164
 - water pollutants, 177–179
- Antimicrobial Resistance (AMR)
 - environmental, 180–181
 - Global Health Security Agenda (GHSA), 183
 - methicillin-resistant *Escherichia coli* (MRSA), 180
 - One Health approach, 183
 - shared in different environments, 181
 - Staphylococcus, 180
 - wastewater treatment, 181–183
 - water pollutants, 179–184
 - way forward, 183–184
 - WHO's Global Action Plan on Antimicrobial Resistance, 183
- Antimicrobials
 - diarrhea management, 81
 - water pollutants, 177–179
- APV. *See* “Fair Start in Life”

- Arab World, population, 32
- Argentina, mercury-based medical devices, 193
- Armed conflict
- health consequences of violent, 55–56
 - preventing, 56
 - soft path alternative, 56–57
 - water availability, 53–57
 - women's role in preventing, 56
- Arraque Parejo en la Vida, also known as “Fair Start in Life”, 279
- Arsenic
- PUR sachets for reducing levels of, 204
 - water pollution, 10
- Artemisinin-based combination therapy (ACT), 137
- Ascaris lumbricoides* (Roundworm), 18, 95–96
- clinical characteristics, 97
 - photo, 99
- ASFs. *See* Animal-source foods
- Astrovirus, diarrhea etiology, 69, 71
- Azithromycin, 106
- Bacterial pathogens, diarrhea etiology, 69, 72–76
- Bangladesh
- child marriage rate, 31
 - stunting rates among pre-school children, 117
- Basic sanitation, 21, 22
- Bilamellar tarsal rotation (BLTR), 163
- Biodiversity
- climate change impacts, 118–119
 - freshwater ecosystem, 245–246
 - TEEB, 256, 261, 263
 - Biomass burning, 48
- Biomphalaria alexandrina*, 148
- Biomphalaria pfeifferi*, 148
- Biomphalaria smithi*, 148
- Biomphalaria sudanica*, 148
- Bio-sand filter, 203
- Birth Control Pill, 28, 174
- Black carbon, 43–44
- Bloody diarrhea, 68
- BLTR. *See* Bilamellar tarsal rotation
- Borneo malaria control case study, 237
- Brazil
- administrative divisions of, 128
 - agricultural settlement and environmental change, 133
 - antimalaria campaigns, 130
 - anopheles, 231, 232, 233, 234, 236, 239, 240
 - Anopheles gambiae*, 221–224
 - Asymptomatic and Submicroscopic Infections, 138
 - conflicts over water, 54
 - control efforts, 130, 138, 139, 232, 233
 - Extreme Climatic Events, 128, 139
 - frontier malaria, 133, 134, 140
 - historical controls, malaria, 234
 - historical perspective, human malaria, 129, 230, 231, 237
 - housing examples, 131, 136
 - malaria transmission, 127–140
 - mercury in health care, 190
 - number of cases, malaria, 137, 140
- Opening Amazon Frontier, 131
 - Planned Large-Scale Infrastructure Projects, 139
 - prevention and curative medicine, malaria, 238
 - prevention and mitigation, malaria, 137
 - strategies for prevention and control, malaria, 229
- Breastfeeding, diarrhea prevention in children, 84
- Bugs, disease vectors, 216
- Bulinus africanus*, 148
- Bulinus forskalii*, 148
- Bulinus globosus*, 148
- Bulinus nasutus*, 148
- Bulinus reticulatus*, 148
- Burkina Faso
- children's drinking water access, 12
 - conflicts over water, 55
- Burundi
- adult women's drinking water access, 13
 - children's drinking water access, 12
 - water availability, 54
- Calicivirus, diarrhea etiology, 69, 70–71
- California, 40, 43
- Cambodia, food security and nutrition projects, 117
- Cambodia Rural Sanitation and Hygiene Improvement Programme (CRSHIP), 301
- Cameroon
- adult women's drinking water access, 13
 - children's drinking water access, 12
- Campylobacter*
- antimicrobial recommendations, 81
 - diarrhea etiology, 69, 75
- Campylobacter coli*, 75
- Campylobacter jejuni*, 75
- Centre for Alternative Water and Sanitation Technologies, 203
- Ceramic filters, 203
- Ceratophyllum demersum*, 251
- CGRFA. *See* Commission on Genetic Resources for Food and Agriculture
- Chad
- Certification of Dracunculiasis Eradication, 289
 - deaths due to diarrhea, 65
- Chagas, Carlos, 231
- Chara intermedia*, 251
- Chikungunya, 215–217, 219, 221, 223
- Child Marriage Restraint Act, 31
- Child Survival, 177, 178
- Children
- Bangladesh marriage, 31
 - breastfeeding as diarrhea prevention, 84
 - de-worming, 18
 - diarrhea, 64–66, 68–86
 - drinking water access, 12
 - malaria, 229
 - mass drug administration school-age, 96, 154
 - Mexico health reform for survival
 - diagonal approach, 277–278
 - MDG 4, 279–280
 - Mexican health reform, 278–279

- norovirus, 71
- One-Child Policy, 27, 31
- rotavirus, 70, 82
- stunting, 112, 113, 116, 117
- China
 - malaria incidence and mortality, 239
 - mercury in health care, 190
 - mercury-based medical devices responses, 194
 - One-Child Policy, 27, 31
 - population, 27–28, 31, 33
- China malaria control case study, 237–238
- Chlamydia trachomatis*, 159–166
- Chlorination
 - HWTS methods, 201–202
 - wastewater treatment, 182
- Cholera
 - Haitians outbreak, 17
 - vaccines, 79, 83–84
 - water supply interventions' impacts on, 3
- Climate change. *See also* Global warming
 - Aedes aegypti*, 218
 - Disease (See specific diseases, e.g. malaria)*
 - Disease vectors*, 218, 222, 223, 225
 - enabling frameworks for action, 122
 - food systems and nutrition context, 111–124
 - food systems, impacts
 - agriculture sectors, 119–120
 - dietary pattern changes, 120
 - food demand, 120
 - food loss and waste, 120
 - global policy goals, 271–272
 - greenhouse gas emissions, 43–46, 119, 120
 - malaria, 116
 - malnutrition related impacts, 111, 112, 114–118
 - biodiversity, 118–119
 - ecosystems, 118–119
 - food insecurity further exacerbation, 115–116
 - food production, 118
 - health and living environments, 119
 - nutrient content of food, 118
 - seasonality, 117–118
 - vulnerable people, 119
 - multistakeholder partnerships, 272–273
 - policy recommendations, 123–124
 - open defecation, 6, 9
 - sanitation, 4–6, 8–10, 14, 274
 - SDG Goal 13, 272
 - UN Framework Convention on Climate Change (UNFCCC), 272
 - waste reduction as cross-cutting opportunity, 121–122
 - water, sanitation, and health nexus, 271–272
- Clostridium difficile*, diarrhea etiology, 69, 76
- CLTS. *See* Community-led total sanitation
- Commission on Genetic Resources for Food and Agriculture (CGRFA), 123
- Community-led total sanitation (CLTS)
 - characteristics, 22–23
 - collective behavior change, 298, 300
 - defined, 22
 - District Health Offices implementing, 305
 - empowerment of disadvantaged, 304
 - gender and social inclusion, 301
 - global sanitation fund, 298, 300, 302, 304
 - human rights perspective, 23
 - open defecation, 297, 298
- Contraception
 - cost, 36
 - unmet need, 34–35
- COP 21. *See* 21st Conference of Parties
- Copper Mines in Northern Rhodesia malaria control case study, 235–236
- Cote d'Ivoire
 - adult women's drinking water access, 13
 - children's drinking water access, 12
- CRSHIP. *See* Cambodia Rural Sanitation and Hygiene Improvement Programme
- Cryptosporidium*, diarrhea etiology, 69, 76–77
- Cryptosporidium parvum*, antimicrobial recommendations, 81
- Culex tritaeniorhynchus*, 222
- CW-MFC. *See* Microbial fuel cell with constructed wetland
- Cyanobacteria, 247, 251
- DALY. *See* Disability-adjusted life year
- Darrow, Daniel, 79
- Deep Tunnel Sewerage System (DTSS), 294
- Dehydration, diarrhea, 78
- Deforestation, 131, 133, 134, 140
- Demographic dividend, 34
- Demography, 34
- Democratic Republic of Congo
 - agricultural fire, 45
 - deaths due to diarrhea, 65
- Dengue, 216–219, 221–224, 230, 241
- Developing countries, mercury-based medical devices responses, 193
- Deworming, school children, 18, 101, 104–106
- Diarrhea
 - childhood, 64–66, 68–86
 - complications and management
 - antimicrobial therapy, 81
 - continued feeding, 81
 - dehydration, 78
 - intravenous fluid therapy, 79
 - malnutrition, 80–81
 - nonantimicrobial drug therapy, 81–82
 - oral rehydration solution, 79–80, 85–86
 - vitamin A, 79, 84
 - zinc supplementation, 81
 - defined, 67
 - epidemiology, 65–67
 - etiology
 - adenovirus, 69, 71–72
 - Aeromonas*, 69, 75–76
 - astrovirus, 69, 71
 - bacterial pathogens, 69, 72–76
 - calicivirus, 69, 70–71

Diarrhea (*cont'd*)

- Campylobacter*, 69, 75
 - Clostridium difficile*, 69, 76
 - Cryptosporidium*, 69, 76–77
 - Entamoeba histolytica*, 69, 78
 - Escherichia coli*, 69, 73–74
 - Giardia lamblia*, 69, 77–78
 - measles, 69, 72
 - norovirus, 69, 70–71
 - parasitic pathogens, 69, 76–78
 - rotavirus, 69, 70
 - salmonella, 69, 74
 - Shigella*, 69, 74
 - Vibrio cholerae*, 69, 75
 - viral pathogens, 69–72
 - human excreta causing, 17–18
 - incidence per population, 66
 - intravenous fluid therapy, 79
 - manifestations
 - acute watery diarrhea, 67–68
 - bloody diarrhea (also known as dysentery), 68, 72–74, 81
 - infectious, 86
 - malnutrition, 65, 68, 69, 74, 78, 80, 86
 - persistent diarrhea, 68
 - morbidity and mortality by age, 66
 - morbidity and mortality by income, 66
 - physiology, 67
 - prevention. *See also*, HTWS
 - breastfeeding, 84
 - global control efforts, 84–86
 - hygiene, 79, 84
 - nutritional interventions, 84
 - sanitation, 84
 - vaccines, 79, 82–84
 - water, 84
 - protected wells to eliminate, 10
 - rate of death, 67
 - reduction in morbidity from, 7–8
 - risk for children and infants, 65
 - sanitation interventions' impact on, 18
 - Sodis method, 202
 - water supply interventions' impacts on, 3, 7
- Disability-adjusted life year (DALY)
- Ascaris* infection with, 96
 - cost-effectiveness of diarrhea prevention in, 205
 - global burden from hookworm in, 95
 - hookworms with, 96
 - hygiene promotion in, 8
 - improved water supplies results in, 8
 - Trichuris* infection with, 96
- Disease vectors
- air transport, 222
 - bugs, 216
 - database, 224
 - dispersal without human assistance, 223
 - flies, 216
 - geographic distribution change, 215–225
 - human vector-borne infections, 216
 - intensity of transmission without change in vector distribution, 223
 - Japanese encephalitis, 222–223
 - migratory birds' role, 223
 - mosquitoes
 - Aedes aegypti*, 215–219
 - Aedes albopictus*, 219–221
 - Anopheles gambiae*, 132–133, 221–224
 - shift in distribution related to climate change, 223
 - ticks, 216
 - tools, 224
 - vector without disease, 223–224
 - vectors and pathogens presence in absence of recognized disease, 224
- Dracunculiasis (Guinea worm disease)
- campaign to eradicate, 283–289
 - impact and final challenges, 288–289
 - implementing, 285–288
 - indigenous cases, distribution, 286
 - WHO certification of free, 289
- Drinking water
- countries by percentage of population, 11
 - JMP ladder and SDG baseline for, 7
 - Mexico sources, 278
 - population as factor, 26
 - regional trends in service levels, 5, 6
 - regions by percentage of population, 11
 - schools and healthcare facilities, 7
 - SDG and monitoring, 3, 7
 - SDG relevant goals, 6
 - SDGs safe and affordable, 199
 - universal access to
 - background, 3
 - inequities, 10–14
 - MDG to SDG transition, 5–7
 - past efforts to improve, 4–5
 - resource requirements, 9
 - sustainability, 13–14
 - water pollution, 10
 - water supply interventions' impact, 7–9
- DTSS. *See* Deep Tunnel Sewerage System
- EAEC. *See* Enteroaggregative *E. coli*
- Early inflammatory hepatosplenic disease, 151
- The Economics of Ecosystems and Biodiversity. *See* TEEB
- Ecosystem
- change, 250–252
 - connectivity's importance, 246–248
 - degradation of nature impacts, 259–261
 - freshwater
 - biodiversity, 245–246
 - human uses, 258
 - functioning, 246–252
 - functions, 253–255
 - future challenges, 263
 - human health impacts from degradation of nature, 259–261
 - niche, 250

- policy's role, 255
- political challenges in sustainability, 261–263
- processes, 253–255
- regime shift in shallow lakes, 252
- resilience to perturbation, 250
- resource for human existence, 255–258
- resource use, 249
- roles, importance, and value, 252–255
- services, 253–256
- simplified drawing of rudimentary beginnings, 249
- species in habitat, 250, 255
- tree of life, 247
- valuing, 252–253
- EDCs. *See* Endocrine disrupting compounds
- Egypt
- annual population growth rates, 54
 - conflicts over water, 55
 - population, 32
- EHEC. *See* Enterohemorrhagic *E. coli*
- EID. *See* Emerging infectious diseases
- EIEC. *See* Enteroinvasive *E. coli*
- El Niño Southern Oscillation (ENSO), 118
- climate variability, 117
 - food insecurity risks, 114
 - food prices in affected regions, 112
- Elodea canadensis*, 251
- Emerging infectious diseases (EID), 216
- Endocrine disrupting compounds (EDCs), 174
- ENSO. *See* El Niño Southern Oscillation
- Entamoeba histolytica*
- antimicrobial recommendations, 81
 - diarrhea etiology, 69, 78
- Enterococci (EAEC), 69
- Enterohemorrhagic *E. coli* (EHEC), 69
- Enteroinvasive *E. coli* (EIEC), 69–70
- Enteromorpha intestinalis*, 251
- Enteropathogenic *E. coli* (EPEC), 69
- Enterotoxigenic *E. coli* (ETEC), 69
- Environment
- agricultural settlements changing, 133–134
 - antimicrobial resistance, 180–181
 - enabling, 304–306
 - global warming, 40–41, 43, 46, 48, 153, 159
 - greenhouse gas emissions, 43–46, 119, 120
 - human well-being with sustainability, 261–262
 - mercury in, 189–190
 - population problem, 46–48
 - PPCPs in, 173–174
 - SAFE strategy for improved, 165
- Environmental Protection Agency (EPA)
- chlorinated water treatment, 202
 - mercury, 190
- EPEC. *See* Enteropathogenic *E. coli*
- Equality and non-discrimination (EQND), 297, 300–304
- Equity, drinking water access, 10–13
- Escherichia coli*
- antimicrobial recommendations, 81
 - diarrhea etiology, 69, 73–74
- ETEC. *See* Enterotoxigenic *E. coli*
- Ethiopia
- adult women's drinking water access, 13
 - annual population growth rates, 54
 - Certification of Dracunculiasis Eradication, 289
 - children's drinking water access, 12
 - conflicts over water, 55
 - deaths due to diarrhea, 65
- European Union, mercury-based medical devices responses, 193
- FAA. *See* Fond d'Appui pour l'Assainissement
- “Fair Start in Life” (APV or Arranque Parejo en la Vida), 279
- FAO. *See* Food and Agriculture Organization of United Nations
- FBDGs. *See* Food-based dietary guidelines
- Fecal contamination
- dangers, 17–18
 - spread, 18
- Federated Malay States malaria control case study
- control at Flat Land Coastal Rubber Estates, 234–235
 - control at Hilly Estates, 235
 - control at Klang Town, 233–234
 - control at Port Swettenham, 234
- Fertility rate
- actual fertility above desired, 35
 - Arab World, 32
 - Bangladesh, 31
 - China's policy, 27, 31
 - constant, 28–29, 33
 - contraception, 35, 36
 - economic considerations, 34
 - Egypt, 32
 - high, 28, 33–34
 - Iraq, 32
 - low, 28, 33–34
 - medium variant, 28
 - Nigeria, 29, 35
 - Sub-Saharan Africa, 31–32
 - UN projections, 28–29
 - world total, 27
- Filtration, 203
- Flies, disease vectors, 216
- Flocculation and disinfection combination, 203–204
- Fluoride, water pollution, 10
- Follow-up MANDONA (FUM), 298
- Fond d'Appui pour l'Assainissement (FAA), 298
- Food
- fresh water storage's effects, 43–46
 - water supply as factor in security, 39
- Food and Agriculture Organization of United Nations (FAO)
- drinking water treatment, 202
 - food security and nutrition projects, 117
 - Global Action Plan, 183
 - natural climate-related hazards, 117
 - undernourishment data, 113
- Food insecurity
- climate change impact, 114–119, 215
 - prevalence of undernourishment, 112–113
 - trends, 112

- Food systems
 climate change context, 111–124
 current situation and trends
 changing diets, 114
 diet-related non-communicable diseases, 114
 food insecurity, 112
 micronutrient deficiencies, 113–114
 overweight and obesity, 114
 stunting, wasting, and underweight prevalence, 112–113
 undernourishment prevalence, 112
 defined, 112
 enabling frameworks for action, 122
 food production's ecological foundation, 120–121
 impact of climate change
 agriculture sectors, 119–120
 dietary pattern changes, 120
 food demand, 120
 food loss and waste, 120
 Intended Nationally Determined Contributions, 122
 policy recommendations, 123–124
 post-harvest, 121
 promoting healthy dietary patterns, 123
 strengthening natural resource base, 120–121
 sustainable, 112
 waste reduction as cross-cutting opportunity, 121–122
- Food-based dietary guidelines (FBDGs), 123
- Framework Convention on Tobacco Control, 274
- Fresh water storage
 depletion, 40–45
 estimates of global, 42–43
 food and agriculture's effects, 43–46
 glaciers, 40–46, 48, 53
 groundwater, 40
 Indo-Gangetic plain case study, 41
 Indus Basin of Pakistan case study, 41–42
 irregularity of precipitation smoothed, 40
 population's effects, 46
- FUM. *See* Follow-up MANDONA
- Gaia hypothesis, 246
- Gambia
 adult women's drinking water access, 13
 children's drinking water access, 12
- Ganges, 42, 43
- GDWQ. *See* Guidelines for Drinking-Water Quality
- GEMS. *See* Global Enteric Multicenter Study
- Ghana
 adult women's drinking water access, 13
 children's drinking water access, 12
 conflicts over water, 55
 extreme weather affects women, 119
- GHG. *See* Greenhouse gas emissions
- GHSA. *See* Global Health Security Agenda
- Giardia lamblia*, 8
 antimicrobial recommendations, 81
 diarrhea etiology, 69, 77–78
- Glaciers, fresh water storage, 40–46, 48, 53
- Gleick, Peter, 54, 55, 56
- Global Enteric Multicenter Study (GEMS), 69, 77, 201
- Global governance, 59, 60
- Global Health Security Agenda (GHSA), 183
- Global Sanitation Fund (GSF)
 collective behavior change, 298–300
 enabling environment, 304–306
 equality and non-discrimination, 300–304
 lessons learned, 297–308
 new frontiers for sustainability, 306–307
 SDG target 6.2, 297–298, 306
 slippage, 307–308
 targeting entire administrative areas, 297–298
- Global Trachoma Mapping Project (GTMP), 159, 161, 166
- Global warming
 climatic changes induced, 159
 glacier melting caused, 40–41, 43, 46, 48
 parasite development caused, 153
- Global Waste Water Initiative, 273
- Greenhouse gas emissions (GHG), 43–46, 119, 120
- Groundwater, fresh water storage, 40
- GSF. *See* Global Sanitation Fund
- GTMP. *See* Global Trachoma Mapping Project
- Guidelines for Drinking-Water Quality (GDWQ), 200
- Guinea worm disease. *See* Dracunculiasis
- Guinea Worm Eradication Program, 284–289
- Guinea-Bissau
 adult women's drinking water access, 13
 children's drinking water access, 12
- Haiti, cholera outbreak, 17
- HDR. *See* Human Development Report
- Health. *See also* World Health Organization
 armed conflict consequences, 55–56
 climate change impacting malnutrition, 119
 mercury, 190–192
 Mexican reform, 278–279
 multistakeholder partnerships, 272–273
 promoting dietary, 123
 protocol on water and, 60
 water, sanitation, and climate change nexus, 271–272
 water supply improvements impacting, 3
- Health Care Without Harm, 192
- Health for All by the Year 2000* (WHO), 292
- Hepatosplenic disease, 152
- High-income countries, 66
- Hookworms
Ancylostoma ceylanicum, 95–97
Ancylostoma duodenale, 18, 95–97, 99
 malaria co-endemic, 100
 mouthparts, 99
Necator americanus, 18, 97, 99
 prevalence, 97
- Household water treatment and safe storage (HWTS), 199–200
 achieving targeted coverage, 205–206
 cost-effectiveness, 205
 diarrhea, 199–202, 204–207
 drinking water, 199–208
 effectiveness, 204–205

- ensuring uptake, 206–207
- household, 199–207
- impact, 207–208
- methods
 - boiling, 200–201
 - chlorination, 201–202
 - combination flocculation and disinfection, 203–204
 - filtration, 203
 - safe storage, 204
 - solar disinfection, 202–203
- optimizing, 205–206
- scaling up coverage among target populations, 206–207
- waterborne disease, 200
- Human Development Report (HDR), 25, 46–47
- Human excreta, untreated dangers, 17–18
- Human rights perspective
 - community-led total sanitation, 23
 - Swachh Bharat Abhiyan, 23–24
 - water, 53, 54
- Human vector-borne infections, 216
- HWTS. *See* Household water treatment and safe storage
- Hydrology
 - Borneo case study, 237
 - China case study, 237–238
 - Copper Mines in Northern Rhodesia case study, 235–236
 - Federated Malay States case study, 233–235
 - Panama Canal Zone case study, 236–237
- Hygiene, 3. *See also* Water, sanitation, and hygiene
 - cost-effectiveness of, 9
 - diarrhea prevention, 79, 84
 - handwashing, 5, 6, 8, 18, 297, 308
 - SDG goals relevant to, 6
 - sanitation and hygiene behaviors, 298
- IEC. *See* Information, education, and communication
- IIASA. *See* International Institute for Applied Systems Analysis
- Improved and limited sanitation, 21, 22
- Immigration and disease, 159
- INDCs. *See* Intended Nationally Determined Contributions
- India
 - agricultural fire, 44
 - annual population growth rates, 54
 - childhood diarrhea, 80
 - conflicts over water, 55
 - deaths due to diarrhea, 65
 - mercury in health care, 190
 - mercury-based medical devices, 193
 - protests over water release, 39
 - sanitation, 18
 - Swachh Bharat Abhiyan, 23–24
- Indo-Gangetic plain case study, 41
- Indonesia, deaths due to diarrhea, 65
- Indoor residual spraying (IRS), 230
- Indus Basin of Pakistan case study, 41–42
- Indus River, 41
- Inequity, 252, 261, 262
- Infectious diarrhea. *See* Diarrhea
- Information, education, and communication (IEC), 123
- Insecticide-treated mosquito nets (ITNs), 230, 233
- Integrated water resources management (IWRM), 272
- Intended Nationally Determined Contributions (INDCs), 122
- Intergovernmental Panel on Climate Change (IPCC)
 - extreme climate events, 139
 - undernutrition risks, 115
- Intermittent preventive treatment for pregnant women (IPTp), 230
- International Commission for Certification of Dracunculiasis Eradication, 289
- International Drinking Water Supply and Sanitation Decade, 4
- International Institute for Applied Systems Analysis (IIASA), 28
- Intravenous fluid therapy, diarrhea management, 79
- IPCC. *See* Intergovernmental Panel on Climate Change
- IPTp. *See* Intermittent preventive treatment for pregnant women
- Iran, population, 31
- Iraq, annual population growth rates, 54
- Irrigation, 258, 261
- IRS. *See* Indoor residual spraying
- Israel
 - annual population growth rates, 54
 - water availability, 54
- ITNs. *See* Insecticide-treated mosquito nets
- Ivermectin, 101, 106, 166
- Ivory Coast, conflicts over water, 55
- IWRM. *See* Integrated water resources management
- Japanese encephalitis (JE), 222–223
- Joint Monitoring Programme for Water Supply and Sanitation (JMP)
 - baseline for WASH with, 7
 - safely managed sanitation services estimates with, 22, 24
 - SDG drinking water baseline with, 7
 - service ladders for, 6–7
 - unimproved sanitation estimates with, 21
 - water in schools and healthcare facilities monitoring with, 7
 - water treatment in household survey data by, 206, 207
- Jordan
 - annual population growth rates, 54
 - birthrate, 32
 - water availability, 54
- Kato-Katz method, 152
- Kenya
 - conflicts over water, 55
 - deaths due to diarrhea, 65
 - school-based antiparasitics, 104
 - water availability, 54
- Laos, food security and nutrition projects, 117
- Latta, Thomas, 79
- Laveran, Charles-Louis-Alphonse, 231
- LCA. *See* Life Cycle Assessment
- Lemna trisulca*, 251
- Lesotho
 - adult women’s drinking water access, 13
 - children’s drinking water access, 12

LGV. *See* Lymphogranuloma venereum

Liberia

adult women's drinking water access, 13

children's drinking water access, 12

Libya, water availability, 54

Life Cycle Assessment (LCA), 120

Long-lasting insecticidal nets (LLINs), 230, 233

Low-income countries, 8, 55, 56, 65, 82, 114

household water treatment and safe storage, 199–208

Lymphogranuloma venereum (LGV), 159

Madagascar

adult women's drinking water access, 13

children's drinking water access, 12

sanitation behavior change, 298–299

Madeira–Mamoré Railway construction, 130

Malaria, 151, 156. *See also* Multiple-intervention malaria control programs

azithromycin helps control, 164

Brazilian Amazon, 127–140

agricultural settlement and environmental change, 133–134

Amazon frontier opening, 131–132

Anopheles vectors, 132–133, 231–234, 236, 239, 240

asymptomatic infections prevention, 138–139

cases reported, 129

control efforts, 130–131

extreme climatic events mitigation, 139

frontier malaria, 134–137

historical perspective, 129–132

Madeira–Mamoré Railway construction, 130

planned large-scale infrastructure projects, 139

political and economic instability, 139–140

prevention and mitigation, challenges, 137–140

childhood mortality and morbidity, 118

children, 229

Chinese National Malaria Control Program, 241

climate change cause, 116

co-endemic to hookworm prevalence, 100

control, 231, 241

Disease the, 230

Evolutionary Operation (EVOP), 239

Frontier malaria, 133, 134, 135, 140

Geographical distribution, 230

Hippocrates, 229

incidence and mortality in China, 239

MDA in control, 106

Malaria Elimination Challenges, 138–140

Plasmodium falciparum, 229

reassessing multiple-intervention, 229–241

systemic view, 231

transmission, 223, 224

Malawi

adult women's drinking water access, 13

children's drinking water access, 12

MAL-ED. *See* Malnutrition and the Consequences for Child Health and Development

Mali

adult women's drinking water access, 13

children's drinking water access, 12

Malnutrition

climate change impact, 114–119

diarrhea complications, 65, 68, 69, 74, 78, 80–81, 86

Mexico in, 277, 278, 280

Malnutrition and the Consequences for Child Health and Development (MAL-ED), 69

Marine Protected Areas (MPAs), 261

Mass drug administration (MDA)

albendazole, 101

cost-effectiveness, 104

mebendazole, 101

schistosomiasis 154, 155

school-age children, 96, 154

soil-transmitted helminths control, 101–105

trachoma control, 160, 163

weight gain, 104

Mauritania

adult women's drinking water access, 13

children's drinking water access, 12

McArthur, John, 237

MDA. *See* Mass drug administration

MDGs. *See* Millennium Development Goals

Measles

diarrhea etiology, 69, 72

vaccine, 79, 84

Meat, 46

Mebendazole, STHs infection treatment, 95, 101–102, 104–106

Mercury, 189

Mercury sphygmomanometers, 192

Mercury thermometer, 192

Mercury-based medical devices

global substitution, 189–195

mercury in health care, 190–192

problem, 189–190

responses

developing countries, 193

European Union, 193

importance of China, 194

Minamata Convention on mercury, 193–194

United States, 192–193

toxicity outside healthcare sector, 192

Mexico

Arranque Parejo en la Vida, 279

child survival

diagonal approach, 277–278

MDG 4, 279–280

Mexican health reform, 278–279

drinking water sources, 278

health reform, 279

malnutrition, 277, 278, 280

mercury in health care, 190

Oportunidades and Prosper (a.k.a. PROGRESA), 278

Policy, 280

sanitation facilities access, 278

under 5 mortality rate, 280

- Mexico City Policy, 33
- Microbial fuel cell with constructed wetland (CW-MFC), 182–183
- Micronutrient deficiencies, 113–114
- Middle East, population, 32
- Middle-income countries, 8, 55, 56, 65
- Migration, 255
 - People and, 153, 255, 302
 - Ecosystems and, 151, 250
- Millennium Development Goals (MDGs)
 - Mexico health reform for child survival, 279–280
 - safe and affordable drinking water, 199
 - transition to SDG from, 5–7
 - UN adoption of, 4
 - water, sanitation, health, and climate change nexus, 271–272
 - water-related indicators in, 9
 - in WHO health report, 272
- Millennium Ecosystem Assessment, 253, 254, 261
- Minamata Convention on mercury, 193–194
- Mongolia, mercury-based medical devices, 193
- Mosquitoes
 - Aedes aegypti*, 215–219
 - Aedes albopictus*, 219–221
 - Anopheles gambiae* and Brazil, 221–224
 - disease vectors, 215–224
- Mozambique
 - adult women’s drinking water access, 13
 - children’s drinking water access, 12
- MPAs. *See* Marine Protected Areas
- Multiple-intervention malaria control programs
 - challenges for elimination, 230
 - disease description, 230–231
 - geographically, 230
 - historical literature, 229
 - hydrology
 - Borneo case study, 237
 - China case study, 237–238
 - Copper Mines in Northern Rhodesia case study, 235–236
 - Federated Malay States case study, 233–235
 - Panama Canal Zone case study, 236–237
 - performance-based ratings, 240
 - systemic view, 231, 232
 - types of control interventions, 232–233
 - vector control strategies critiques, 238–240
- Multistakeholder partnerships
 - global policy goals, 271–273
 - recommendations for future, 273–274
 - water, sanitation, health, and climate change nexus, 271–272
- Myriophyllum spicatum*, 251
- NaDCC. *See* Sodium dichloroisocyanurate
- NAMAs. *See* Nationally Appropriate Mitigation Actions
- Namibia
 - adult women’s drinking water access, 13
 - children’s drinking water access, 12
- National Adaptation Plans (NAPs), 122
- National Malaria Prevention and Control Program (NMPCP), 138
- National Sanitation Working Group (NSWG), 305
- Nationally Appropriate Mitigation Actions (NAMAs), 122
- Naturally occurring water pollutants, 10. *See also* Mercury-based medical devices
- NCDs. *See* Non-communicable diseases
- Necator americanus*, 18
 - clinical characteristics, 97
 - photo, 99
- Neglected Tropical Diseases (NTDs), 166, 272
 - control, 107
 - SAFE strategy, 159
 - schistosomiasis, 155, 156
 - soil-transmitted helminths (STHs), 95, 106
 - trachoma, 159
- NGOs. *See* Non-governmental organizations
- Niger
 - adult women’s drinking water access, 13
 - children’s drinking water access, 12
 - deaths due to diarrhea, 65
- Nigeria
 - adult women’s drinking water access, 13
 - children’s drinking water access, 12
 - deaths due to diarrhea, 65
 - population, 29, 32, 34, 35
 - Rural Sanitation and Hygiene Promotion in Nigeria (RUSHPIN), 299
 - total fertility rate, 29, 35
- NMPCP. *See* National Malaria Prevention and Control Program
- Nonantimicrobial drug therapy
 - diarrhea management, 81–82
 - ondansetron, 79, 81–82
 - probiotics, 79, 81–82
- Non-communicable diseases (NCDs)
 - diet-related, 114
 - SDGs, 272
 - WHO report, 272
- Non-governmental organizations (NGOs), 207, 287, 299
- Norovirus
 - childhood, 71
 - diarrhea etiology, 69, 70–71
- NSWG. *See* National Sanitation Working Group
- NTDs. *See* Neglected Tropical Diseases
- Nutrition
 - climate change context, 111–124
 - current situation and trends
 - changing diets, 114
 - diet-related non-communicable diseases, 114
 - food insecurity, 112
 - micronutrient deficiencies, 113–114
 - overweight and obesity, 114
 - stunting, wasting, and underweight prevalence, 112–113 (see also stunting)
 - undernourishment prevalence, 112
 - Diarrhea, 65, 68, 78, 80, 81, 82, 84
 - enabling frameworks for action, 122
 - extreme weather events’ impact, 117
 - food production’s ecological foundation, 120–121, 245, 246, 248, 250, 253–256, 258, 260, 263
 - Intended Nationally Determined Contributions, 122
 - Nutritional Interventions, 84

- Nutrition (*cont'd*)
- policy recommendations, 123–124
 - post-harvest, 121
 - promoting healthy dietary patterns, 123
 - seasonality impact, 117–118, 249, 250, 260
 - strengthening natural resource base, 120–121, 249, 250, 252, 254, 257
 - waste reduction as cross-cutting opportunity, 112, 121–122
- Obesity, food systems trends, 114
- OCP. *See* Onchocerciasis Program
- ODF environments. *See* Open-defecation-free environments
- Onchocerciasis, 216, 240
- Onchocerciasis Program (OCP), 240
- Ondansetron, 79, 81–82
- One-Child Policy, 27, 31
- Open defecation, 6, 9, 20, 22, 105, 297–299, 306
- open-defecation-free (ODF) environments, 297
 - Global Sanitation Fund (GSF), 297, 298
 - Sustainability, 299, 304, 306
- Open-defecation-free (ODF) environments, 297–300, 304, 307, 308
- Oral rehydration solution (ORS)
- diarrhea management, 79–80, 85–86
 - severe dehydration treatment, 79
- Oral rehydration therapy (ORT), 65, 278
- ORS. *See* Oral rehydration solution
- ORT. *See* Oral rehydration therapy
- PAHO. *See* Pan American Health Organization
- Pakistan
- annual population growth rates, 54
 - deaths due to diarrhea, 65
- Pan American Health Organization (PAHO), 138
- Panama Canal Zone malaria control case study, 236–237
- Parasitic pathogens, diarrhea etiology, 69, 76–78
- Persistent diarrhea, 68
- Personal care products, 173–174
- Pharmaceuticals, 256
- proper use, 178
 - safe disposal of unwanted, 178
- Pharmaceuticals and personal care products (PPCPs)
- active ingredients, 174
 - antibiotics, 173, 174
 - chronic exposure, 173
 - endocrine disrupting compounds, 174
 - estrogen, 174
 - harmful concentrations, 173
 - intersex, 174
 - limiting consumption, 174
 - pharmaceuticals and personal care products (PPCPs), 173
 - toxicity, 173
- Philippines, mercury-based medical devices, 193
- Planned Parenthood, de funding, 33
- Plasmodium falciparum*, 129, 133
- cases reported in Brazil, 137
 - mosquito vector, 216
 - probability of introduction, 222
- PLTR. *See* Posterior lamellar tarsal rotation
- Polio vaccine, 82
- Pollution, 9, 10, 190
- Population
- Agriculture, 3, 25
 - annual increments 1950–2017, 27
 - annual population growth rates, 54
 - China, 27–28, 31, 33
 - consumption issue, 48
 - drinking water access, 26
 - drinking water services percentage using, 11
 - economic considerations, 34
 - Egypt, 32
 - environmental problems, 46–48
 - food consumption, 46
 - growth, 53–55
 - future situation to 2100 forecast, 28–29
 - future surprise, 29–33
 - high fertility–low fertility, 33–34
 - human demand on Earth's resources, 47
 - Iran, 31
 - Migration, 33
 - Middle East, 32
 - near future to 2050 forecast, 27–28
 - Nigeria, 29, 32, 34, 35
 - policy considerations, 47–48
 - probabilistic projections, 30, 33
 - sanitation needs, 26
 - time scale of forecasts, 26–27
 - UN data, 27–30
 - water needs policy implications, 35–36
 - water supply needs, 25–26, 46–48
 - world total fertility rate, 27
 - population projections, 33
- Posterior lamellar tarsal rotation (PLTR), 163
- Potamogeton pectinatus*, 251
- PPCPs. *See* Pharmaceuticals and personal care products
- Practice Greenhealth, 192
- Probiotics, diarrhea management, 79, 81–82
- Protocol on Water and Health, 60
- PUR® brand, 203–204
- Randomized controlled trial (RCT), STHs infection treatment, 101
- Reactive case detection (RCD), 138
- Refugee camps, 32
- Resilience, 250
- RESP. *See* Rural Environmental Sanitation Program
- Ross, Ronald, 231
- Rotarix®, 82
- Rotateq™, 82
- Rotavirus
- childhood, 70, 82
 - diarrhea etiology, 69, 70
 - vaccine, 79, 82–83
- Roundworm. *See* *Ascaris lumbricoides*
- Rural Environmental Sanitation Program (RESP), 291
- Rural Sanitation and Hygiene Promotion in Nigeria (RUSHPIN), 299
- Rwanda, water availability, 54

- Safe storage, HWTS methods, 204
- SAFE strategy, 159
 - antibiotics, 164
 - environmental improvement, 165
 - facial cleanliness, 165
 - surgery, 163–164
- Safe Water System (SWS), 202
- Safely managed sanitation, 22
- Salmonella, diarrhea etiology, 69, 74
- Salmonella enterica*, 74
- Sanitation, 3, 4–6, 8–10, 14
 - access, 19–22, 297
 - benefits, 17–19
 - Behavior change, 297–300, 304, 306, 307
 - case studies
 - rural Thailand, 291–293
 - Singapore, 293–294
 - community-led Total Sanitation (CLTS), 22–24, 298, 300, 301, 303–305
 - Deep Tunnel Sewerage System, 294
 - diarrhea prevention, 84
 - efforts to improve, 22–24
 - empowerment, 304
 - Enabling Environment, 304, 306, 307
 - equality and non-discrimination (EQND), 297, 300–302, 306
 - global policy goals, 271–272
 - Global Sanitation Fund (GSF), 297–300, 304, 305, 307
 - human right to, 17–24
 - Indian, 18
 - Madagascar behavior change, 298–299
 - Mexico, 278
 - multistakeholder partnerships, 272–273
 - open defecation, 6, 9, 20, 22, 105
 - population as factor, 26
 - Programming, 298, 304
 - safely managed sanitation services, 297
 - Scale, 297–299, 302, 304–306, 308
 - SDG goals relevant to, 6, 271–273, 297
 - Sustainability, 299, 304, 306
 - social and economic impact of interventions, 19
 - targeting whole populations, 297
 - Universal Rural Sanitation, 291
 - untreated human excreta dangers, 17–18
 - Water, Sanitation, and Hygiene (WASH), 5–9
 - water, health, and climate change nexus, 271–272
- Sanitation ladder
 - basic sanitation, 21, 22
 - defined, 19
 - importance, 22
 - improved and limited sanitation, 21, 22
 - open defecation, 20, 22
 - safely managed sanitation, 22
 - unimproved sanitation, 21, 22
- Sao Tome & Principe
 - adult women’s drinking water access, 13
 - children’s drinking water access, 12
- Satellite gravimetry, 45
- Saudi Arabia, water availability, 54
- SBSTA. *See* Subsidiary Body for Scientific and Technological Advice
- Schistosoma haematobium*, 147, 152
- Schistosoma intercalatum*, 147, 152
- Schistosoma japonicum*, 147, 148, 151–153, 155
- Schistosoma mansoni*, 147–149, 151, 152, 154
- Schistosoma mekongi*, 147, 152, 155
- Schistosomiasis, 241, 261
 - classification of control strategies, 154
 - clinical manifestations, 151–152
 - community diagnosis, 153
 - community directed approach, 155
 - complementary interventions, 155
 - control, 153–156
 - diagnosis, 152–153
 - elimination programs, 106
 - epidemiology, 150–151
 - fresh water, 147
 - health education, 154, 155
 - human water contact, 149–150, 157
 - hybridization, 155
 - hydroelectric power, 153
 - infected water, 150
 - irrigation, 153
 - life cycle, 147–150
 - MDA programs, 103
 - medical services, 153
 - Neglected Tropical Diseases (NTDs), 155, 156
 - piped water, 153
 - sanitary facilities, 153
 - pathogenesis, 151
 - sanitation, 153–156
 - sociocultural factors, 156
 - social dynamics influencing transmission, 153
 - transmission cycle, 147–150
 - vector snails, 148
- SDGs. *See* Sustainable Development Goals
- Seasonality, climate change impacts, 117–118
- Service Delivery Approach, 14
- Sex selective abortion, 31
- Shigella*
 - antimicrobial recommendations, 81
 - diarrhea etiology, 69, 74
- Shigella dysenteriae*, 74
- Shigella flexneri*, 74
- Shigella sonnei*, 74
- Shigellosis, 68, 73, 82
- Sierra Leone
 - adult women’s drinking water access, 13
 - children’s drinking water access, 12
- Singapore
 - Deep Tunnel Sewerage System, 294
 - demographic information, 293
 - Public Utilities Board, 294
 - sanitation case study, 293–294
- Sodis method, 202
- Sodium dichloroisocyanurate (NaDCC), 202

- Sodium hypochlorite, 202
- Soft path, 56–57
- Soil-transmitted helminths (STHs)
- clinical manifestations, 100
 - control and elimination
 - mass drug administration, 101–105
 - program integration, 106
 - WASH, 105–106
 - diagnosis, 100–101
 - disease associated, 18
 - epidemiology, 96–99
 - geohelminths, 95
 - neglected tropical diseases (NTDs), 95, 106
 - organisms
 - Ascariasis*, 95–96
 - hookworms*, 96
 - Trichuris*, 96
 - pathogenesis, 99–100
 - pathology, 99–100
 - treatment, 101
 - vaccination, 106–107
- Solar disinfection, 202–203
- Somalia
- adult women’s drinking water access, 13
 - children’s drinking water access, 12
- South Africa
- mercury in health care, 190
 - mercury-based medical devices, 193
- South Sudan, Certification of Dracunculiasis Eradication, 289
- South Sudan Guinea Worm Eradication Program (SSGWEP), 288
- SSPH. *See* System for Social Protection in Health
- STHs. *See* Soil-transmitted helminths
- Stunting, 8, 18, 104, 112–113, 116, 117, 199, 205, 278
- Sub-Saharan Africa, fertility rate, 31–32
- Subsidiary Body for Scientific and Technological Advice (SBSTA), 124
- Sustainability
- global sanitation, 306–307
 - human well-being with environmental, 261–262
 - political challenges, 261–263
 - water supplies, 13–14
- Sustainable Development Goals (SDGs)
- action to combat climate change, 111
 - challenges and opportunities with, 3–15
 - child stunting, 113
 - drinking water baseline, 7
 - drinking water services monitored under, 3
 - food security, 111
 - goal 1, 6
 - goal 3, 271–273
 - goal 4, 6
 - goal 6, 6, 17, 60, 271–273
 - goal 13, 272, 273
 - goals relevant to drinking water, sanitation, and hygiene, 6
 - GSF for target 6.2, 297–298, 306
 - multistakeholder partnerships, 272–273
 - NCDs, 272
 - resource requirements for, 9
 - Rural Environmental Sanitation Program, 291
 - safe and affordable drinking water, 199
 - transition from millennium development goals to, 5–7
 - UN Member States 2030 Agenda for, 5
 - water, sanitation, health, and climate change nexus, 271–272
 - water-related indicators in, 9
- Swachh Bharat Abhiyan, 23–24
- Swaziland
- adult women’s drinking water access, 13
 - children’s drinking water access, 12
- Swellengrebel, N. H., 231
- SWS. *See* Safe Water System
- Syria
- annual population growth rates, 54
 - birthrate, 32
- System for Social Protection in Health (SSPH), 279
- Tanzania, deaths due to diarrhea, 65
- TEEB (The Economics of Ecosystems and Biodiversity), 256, 261, 263
- Terrorism, water resources, 55
- TF. *See* Trachomatous follicular
- TFR. *See* Total Fertility Rate
- Thailand
- deaths due to diarrheal disease, 292
 - demographic information, 292
 - sanitation case study for rural, 291–293
 - Universal Rural Sanitation, 291
 - Rural environmental sanitation program, 291
- TI. *See* Trachomatous inflammation
- Ticks, disease vectors, 216
- Total Fertility Rate (TFR), 27, 29, 32, 33, 35
- Total Sanitation Campaign (TSC), 18, 23
- Trachoma
- age and sex distribution, 162
 - causative organism and natural history, 159–160
 - clinical appearance, 161
 - clinical manifestations, 160
 - diagnosis, 160–161
 - Elimination, 161, 163–166
 - epidemiology, 161–163
 - Facial hygiene, 165
 - Latrines, 162, 165
 - mass drug administration, 160, 163
 - neglected tropical diseases (NTDs), 159
 - path toward elimination by 2020, 166
 - prevention and control, 163
 - risk factors, interaction, 162
 - SAFE strategy, 159
 - antibiotics, 164
 - environmental improvement, 165
 - facial cleanliness, 165
 - surgery, 163–164
 - coordinated with other NTDs, 159, 166
 - water and sanitation, 163
 - WHO prevalence estimates, 159

- Trachomatous follicular (TF), 160–161
 Trachomatous inflammation (TI), 160–161
 Trachomatous scarring (TS), 160
 Trachomatous trichiasis (TT), 160–161
 Tree of life, 247
Trichuris trichiura (Whipworm), 18, 95–96
 clinical characteristics, 97
 photo, 98
 tropicus/truncatus complex, page 148
 Trump, Donald, 33
 TS. *See* Trachomatous scarring
 TSC. *See* Total Sanitation Campaign
 TT. *See* Trachomatous trichiasis
 Tunisia, water availability, 54
 21st Conference of Parties (COP 21), 122
 Typhoid, water supply interventions' impacts on, 3
- Uganda Sanitation Fund (USF), 304–305
 UHC. *See* Universal health coverage
 Ultraviolet light, wastewater treatment, 182
 UN. *See* United Nations
 Undernourishment, 112–113
 seasonality impact, 117–118
 UNEP. *See* United Nations Environment Programme
 UNESCO. *See* United Nations Educational, Scientific and Cultural Organization
 UNFCCC. *See* United Nations Framework Convention on Climate Change
 Unimproved sanitation, 21, 22
 United Arab Emirates, water availability, 54
 United Nations (UN)
 MDG adoption by, 4
 population data, 27–30
 Protocol on Water and Health, 60
 SDG in 2030 Agenda of, 5
 World Population Prospects, 27–30
 United Nations Educational, Scientific and Cultural Organization (UNESCO), 123
 United Nations Environment Programme (UNEP), mercury pollution's adverse effects identification, 190
 United Nations Framework Convention on Climate Change (UNFCCC), 122
 United States, mercury-based medical devices, 192–193
 Universal health coverage (UHC), 274
 Unmet need for contraception, 34
 USF. *See* Uganda Sanitation Fund
- Vaccines
 cholera vaccines, 79, 83–84
 diarrhea prevention, 79, 82–84
 measles vaccine, 79, 84
 polio vaccine, 82
 rotavirus vaccine, 79, 82–83
 soil-transmitted helminths, 106–107
 Vestergaard–Frandsen LifeStraw Filter, 203, 204
Vibrio cholerae
 antimicrobial recommendations for, 81
 diarrhea etiology, 69, 75
- Viral mutation, 123
 Viral pathogens, diarrhea etiology, 69–72
 Vision 21, 4
 Vitamin A supplementation, diarrhea prevention, 79, 84
- War and climate change, 53, 55
 WASH. *See* Water, sanitation, and hygiene
 WASHCOMs. *See* Water, Sanitation, and Hygiene Committees
 Wastewater treatment
 antimicrobial resistance, 181–183
 chlorination, 182
 ultraviolet light/ozonation, 182
 Wasting, 112–113
 Water, 39, 40
 clean water, 25, 26, 56, 59, 60, 65, 95, 106, 116, 127, 235, 253, 254, 263, 285
 Conflicts, 53–56
 Conventions, 60
 Freshwater, 40, 46
 Governance, 59
 Groundwater, 39, 40, 41, 43, 45
 piped water, 153
 public-private partnerships, 60
 quality, 60
 War, 54, 55
 Water loss, 46
 Water collection, 7, 8, 12, 13
 Water, sanitation, and hygiene (WASH)
 annual costs to achieve universal access to, 9
 HWTS interventions to prevent diarrhea with, 205
 JMP ladders in monitoring, 7
 Nexus approach, 271
 nutrition with, 111
 partnerships for, 273
 resource requirements for, 9
 SDGs related to, 5–6, 9
 sanitation and hygiene behaviors, 298
 soil-transmitted helminths control with, 105–106
 Water, Sanitation, and Hygiene Committees (WASHCOMs), 299–300, 303
 Water and Sanitation Programme (WSP), 19
 Water pollutants
 antibiotic-resistant bacteria, 180
 antibiotics, 177–179
 antimicrobial resistance, 179–184
 environmental, 180–181
 shared in different environments, 181
 wastewater treatment, 181–183
 way forward, 183–184
 WHO's Global Action Plan, 183
 antimicrobials, 177–179
 mercury, 190
 Water pollution
 arsenic and fluoride as, 10
 government regulation, 59–60
 naturally occurring and anthropogenic, 10
 prevention, 59–60
 Water scarcity, 39, 46

- Water Supply and Sanitation Collaborative Council (WSSCC), 297
- Water supply improvements
- benefits of, 3
 - cost-effectiveness of, 8
 - health impacts of, 3
 - impacts of interventions to, 7–9
 - people who received, 4
- Water supply needs
- achieving food security, 39
 - armed conflict, 53–57
 - health consequences of violent, 55–56
 - preventing, 56
 - availability and accessibility, 53–54
 - contraception, 34–36
 - coping, 25–36
 - depletion of storage, 40–45
 - estimates of global, 42–43
 - Indo-Gangetic plain case study, 41
 - Indus Basin of Pakistan case study, 41–42
 - development disputes, 55
 - economic considerations, 34
 - food and agriculture's effects, 43–46
 - future situation to 2100 forecast, 28–29
 - future surprise, 29–33
 - global policy goals, 271–272
 - high fertility–low fertility, 33–34
 - human right, 53, 54
 - near future to 2050 forecast, 27–28
 - personal need, 25–26
 - policy implications, 35–36
 - population effected, 25–26
 - population size effecting, 46–48
 - probabilistic projections, 33
 - sanitation, health, and climate change nexus, 271–272
 - source, 39–40
 - terrorism, 55
 - time scale of forecasts, 26–27
- Watson, Malcolm, 231, 233, 237–240
- West Nile virus, 215–216, 222, 223
- Whipworm. *See Trichuris trichiura*
- WHO. *See World Health Organization*
- WIPO. *See World Intellectual Property Organization*
- World Conference on Water and Sanitation, 4
- World Health Organization (WHO)
- Anopheles gambiae* eradication strategy, 130
 - antimalarials recommendation, 232
 - Certification of Dracunculiasis Eradication, 289
 - dracunculiasis free certification, 289
 - Framework Convention on Tobacco Control, 274
 - Global Action Plan on Antimicrobial Resistance, 183
 - global burden of disease estimates, 199
 - global policy goals, 272
 - global sanitation coverage of 2015, 20
 - Health for All by the Year 2000* strategy, 292
 - McArthur presentation to, 237
 - MDGs in health report, 272
 - mercury in healthcare policy, 193, 194
 - mercury pollution's adverse effects identification, 190
 - NCDs in report, 272
 - ORS formulation recommendation, 79, 80, 82
 - pharmaceuticals safe disposal guidelines, 178
 - pregnancy category C, 101
 - recommending ORS, 79–80
 - sanitation inequalities, 21
 - trachoma prevalence estimates, 159
 - water supply challenges, 25
- World Intellectual Property Organization (WIPO), 123
- World Population Prospects (WPP), 27–30
- World total fertility rate, 27
- World Water Development Report, 59
- WPP. *See World Population Prospects*
- WSP. *See Water and Sanitation Programme*
- WSSCC. *See Water Supply and Sanitation Collaborative Council*
- Yellow fever, 215–216, 219, 221, 224, 236, 241
- Yemen, water availability, 54
- Zambia
- agricultural fire, 45
 - food security and nutrition projects, 117
- Zika virus, 215–217, 219, 221, 223, 241
- Zimbabwe
- adult women's drinking water access, 13
 - children's drinking water access, 12
- Zinc supplementation
- diarrhea prevention, 79, 84
 - malnutrition management, 81