

Pathogens in Sewage contaminated bathing waters.

Table: Pathogens in Sewage contaminated bathing waters.

Source: *Swimming in Sewage*, author Mark Dorfman MSPH, published by Natural Resources Defence Council (www.nrdc.org) and Environmental Integrity Project (www.environmentalintegrity.org), 2004.

Pathogenic Agent	Acute, Chronic or Ultimate Effects †	Origin of Waste ♦
Bacteria:		
<i>Campylobacter jejuni</i>	Gastroenteritis/death from Guillain-Barre syndrome	Human/animal faeces
<i>E coli (pathogenic or enterovirulent strains)</i>	Gastroenteritis/E coli 0157:H7, adults: death from thrombocytopenia; children: death from kidney failure	Domestic sewage
<i>Leptospira</i>	Leptospirosis	Animal urine
<i>Salmonella typhi</i>	Typhoid fever/reactive arthritis from certain strains	Domestic sewage
Other salmonella species	Various enteric fevers (often called paratyphoid), gastroenteritis, septicemia (generalised infections in which organisms multiply in the bloodstream)	Domestic sewage, animal wastes, food, compost
<i>Shigella dysenteriae</i> and other species	Bacillary dysentery	Human faeces, domestic sewage
<i>Vibrio cholera</i>	Cholera/death	Domestic sewage, shellfish, saltwater
<i>Yersinia</i> spp.	Acute gastroenteritis (including diarrhea, abdominal pain)/reactive arthritis	Water, milk, mammalian alimentary canal
Viruses:		
Adenovirus	Respiratory and gastrointestinal infections	Domestic sewage
Astrovirus	Gastroenteritis	Domestic sewage
Calicivirus	Gastroenteritis	Domestic sewage
Coxsackievirus (some strains)	Various, including severe respiratory diseases, fevers, rashes, paralysis, aseptic meningitis, myocarditis	Domestic sewage
Echovirus	Various, similar to Coxsackievirus (evidence is not definitive, except in experimental animals)	Domestic sewage
Hepatitis A	Infectious hepatitis (liver malfunction); also may affect kidneys and spleen	Domestic sewage
Norwalk and Norwalk-like viruses	Gastroenteritis	Domestic sewage
Poliovirus	Poliomyelitis	Domestic sewage
Reovirus	Respiratory infections, gastroenteritis	Domestic sewage
Rotavirus	Gastroenteritis	Domestic sewage
Protozoa:		
<i>Balantidium coli</i>	Dysentery, intestinal ulcers	Human/animal faeces (especially swine)
<i>Cryptosporidium parvum</i>	Gastroenteritis/death in immunocompromised host	Human/animal faeces
<i>Cyclospora cayetanensis</i>	Gastroenteritis	Human faeces
<i>Dientamoeba fragilis</i>	Mild diarrhea	Human faeces

<i>Entamoeba histolytica</i>	Amoebic dysentery, infections of other organs	Human/animal faeces, domestic sewage
<i>Giardia lamblia</i>	Giardiasis, diarrhea, abdominal cramps/failure to thrive, severe hypothyroidism, lactose intolerance, chronic joint pain	Human faeces
<i>Isospora belli</i> and <i>Isospora hominus</i>	Intestinal parasites, gastrointestinal infection	
<i>Toxoplasma gondii</i>	Newborn syndrome, hearing and visual loss, mental retardation, diarrhea/dementia and/or seizures	Cat faeces
Helminths (worms):		
Digenetic trematodes (flukes):		
<i>Schistosoma haematobium</i>	Schistosomiasis	Human faeces
<i>Schistosoma japonicum</i>	Schistosomiasis	Human faeces
<i>Schistosoma mansoni</i>	Schistosomiasis	Human faeces
<i>Echinostoma</i> spp.	Diarrhea	Animal faeces
<i>Fexiola hepatica</i>	Liver necrosis and cirrhosis	Animal; faeces
<i>Paragonimus westermani</i>	Paragonimiasis	Animal faeces and crustaceans
<i>Clonorchis sinensis</i>	Bile duct erosion	Human faeces, raw fish
<i>Heterophyes heterophyes</i>	Diarrhea and myocarditis	Human faeces, raw fish
Cestodes (tapeworms):		
<i>Diphyllobothrium latum</i>	Diarrhea and anaemia	Human faeces, raw fish
<i>Taeniarrhynchus saginatus</i>	Dizziness, nausea, pain, inappetance	Human faeces, raw fish
<i>Taenia solium</i>	Dizziness, nausea, pain, inappetance, cysticercosis	Human faeces, raw fish
<i>Echinococcus granulosus</i>	Hydatidosis	Dog, other animal faeces
<i>Hymenolepis nana</i>	Dizziness, nausea, pain and inappetance	Human faeces
Nematodes (roundworms):		
<i>Trichuris trichiura</i>	Asymptomatic to chronic hemorrhage	Human faeces
<i>Strongyloides stercoralis</i>	Strongyloidiasis	Human faeces
<i>Necator americanus</i>	Iron-deficiency anemia and protein deficiency	Human faeces
<i>Ancylostoma duodenale</i>	Iron-deficiency anemia and protein deficiency	Human faeces
<i>Ascaris lumbricoides</i>	Ascariasis	Human, pig and other animal faeces

† Source: Centers for Disease Control and Prevention, *Emerging Infectious Diseases*, vol 3, no. 4, Oct-Dec. 1997, as presented in J. B. Rose, et al, *Microbial Pollutants in*

Our Nation's Waters :Environmental and Public Health Issues, American society for Microbiology, Washington D. C. , 1999, p.8.

◆ Source: Katonak, R, and J. B. Rose, *Public Health Risks Associated with Wastewater Blending*, Michigan State University, East Lansing, November 17, 2003, pp30,39.