

What are the micro-organisms involved?

Human and animal pathogens (disease-producing bacteria and viruses) can be observed in recreational waters or in shellfish from time to time. The presence of micro-organisms such as norovirus (NoV), astrovirus, rotavirus, hepatitis A virus (HAV), and pathogenic bacteria (e.g., *Salmonella*, *Listeria monocytogenes*, Shiga-Toxin-Producing *Escherichia coli* (STEC), *Vibrio cholerae* and *Vibrio parahaemolyticus*) are reported in coastal waters. There is only little evidence of infection transmission by protozoan parasites via shellfish or coastal bathing waters.

The pathogens involved in recreational exposure and shellfish food borne diseases can be placed in two classes.

The first class includes environmental pathogens that normally spend a substantial part of their life cycle outside human hosts, but which when introduced to humans cause disease with a measurable frequency. Among them vibrios (*V. cholerae*, *V. parahaemolyticus*, *V. vulnificus*) are common in marine environmental infections, especially in countries where climatic conditions allow them to proliferate (Southeast US coast, South America and Asian countries), while few cases are reported in Europe, especially in warm summers.

The second class relates to enteric pathogens which are non-native micro-organisms, discharged into the sea by raw or insufficiently treated waste waters during epidemics in the population. Most of the time they have been excreted by sick people living on coastal watersheds, but they may be present in the intestines of healthy humans or in the animal population. Among them viruses (especially Noroviruses and HAV) are the chief concern in shellfish-borne diseases, while bacterial infections (salmonellosis, typhoid fever) have decreased due to sanitary control measures set up over the past century. A recent example of control measures is Regulation EC 854/2004 which sets out requirements for sanitary surveys of shellfish production areas and improvements in shellfish depuration technology.

Recently, new methods based on molecular techniques have become available for the detection of pathogens in the environment including emerging micro-organisms. Quantitative Polymerase Chain Reaction (PCR), gene probes, DNA fingerprinting techniques can now detect human enteric pathogens in seafood and seawater. The major interest in developing and using such techniques is that they have been shown to be rapid, sensitive, specific and cost-effective. Traditional methods of detection and enumeration of pathogens are time-consuming, monospecific and cannot afford adequate protection to public health. Those new techniques allow to address risk assessment due to the dispersion of human pathogen in the sea.

➔ [Go to full QSR assessment report on the impacts of microbiological contamination on the marine environment of the North-East Atlantic \(publication number 466/2009\)](#)