A Systematic Review of Water-Related Disease in the Florida Environment

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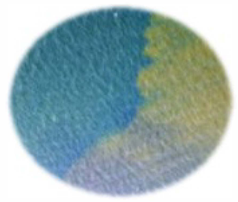
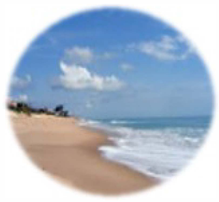
Introduction

- Florida's environments are suitable reservoirs for many pathogenic microorganisms
- Water-related pathogens present or transmissible through Florida's extensive coastline and intersecting waterways hold the potential to infect vectors, animal populations and human hosts
- Understanding where these agents are found within our environment can lead to targeted disease prevention and interventions efforts across the state

Our objective in this review was to determine which waterborne, water-based, and water-related pathogenic organisms have been documented in Florida's environments over the last twenty years.



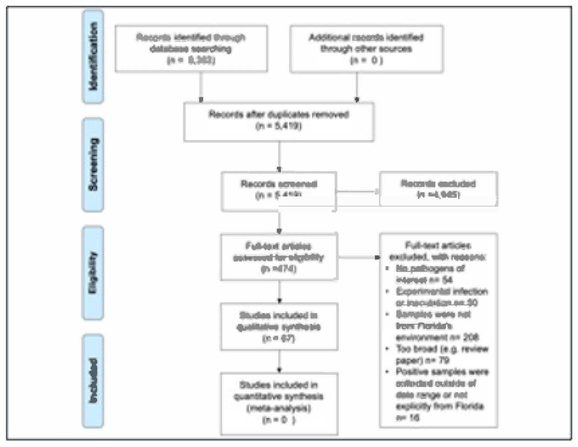

Methods

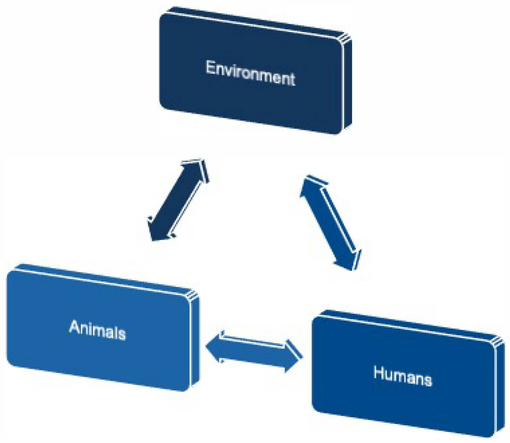
- Thirty-three pathogens from the Florida Department of Health's reportable disease list were identified as a waterborne disease, a water-related vector-borne disease or a water-based toxin of public health importance for the purposes of this study
- Nineteen databases were searched using keywords relating to these water-related diseases
- Criteria for study inclusion:
  1. Peer-reviewed journal articles written in English
  2. Published between January 1, 1999 and December 31, 2019
  3. Contained original data on a water-related pathogen of interest
  4. Pathogen of interest was found within a Florida environmental reservoir

Waterborne	Water-Related Vector-Borne	Water-Based Toxins
• Amebic encephalitis • Campylobacteriosis • Cholera (Vibrio cholerae type O1) • Cryptosporidiosis • Cyclosporiasis • Escherichia coli infection, Shiga toxin producing • Giardiasis • Hepatitis A • Hepatitis E • Legionellosis • Leptospirosis • Melioidosis • Poliomyelitis • Salmonellosis • Shigellosis • Tularemia • Typhoid fever (Salmonella serotype Typhi) • Vibriosis (Not Vibrio cholerae type O1)	• Arboviral diseases not otherwise listed • California serogroup virus disease • Chikungunya fever • Dengue fever • Eastern equine encephalitis • Malaria • St. Louis encephalitis • Venezuelan equine encephalitis • Viral hemorrhagic fevers • West Nile virus disease • Yellow fever • Zika fever	• Ciguatera fish poisoning • Neurotoxic shellfish poisoning • Saxitoxin poisoning (paralytic shellfish poisoning)

Results

- Of the 8,363 articles found, 5,419 titles remained after the removal of duplicates
- After screening titles and abstracts, 474 articles were selected for full-text review with 67 articles accepted in the final analysis
- Pathogens were found in Florida environmental samples of water (n=45), mosquito pools (n=12), soil/sediment (n=11), air (n=5), sand (n=4), algae and/or aquatic vegetation (n=4), biofilm (n=2), food (n=1), dry swabs (n=1), and unspecified environmental samples (n=1)
- Miami-Dade and Sarasota counties were the most common study sites (n= 9 each) followed by Pinellas and Monroe counties (n= 7 each)
- The studies of environmental pathogens found waterborne diseases (n=49), water-related vector-borne disease (n=9), and water-based toxins (n=16) **Several studies examined multiple pathogens at once*





Conclusion

- Many waterborne, water-related vector-borne, and water-based toxins and diseases of public health and veterinary importance are present in Florida environments
- Multidisciplinary and joint agency collaboration is needed to prevent disease transmission from environmental exposure, particularly related to marine and freshwater contact
- A One Health approach will be imperative to maintaining healthy waterways and shared environments throughout Florida to protect the health of humans, animals, and our ecosystems

Waterborne Organisms in Environmental Samples:
- Escherichia coli (n=27)
- Salmonella (n=8)
- Cryptosporidium (n=8)
- Giardia (n=6)

Water-Related Vector-Borne Organisms in Environmental Samples:
- West Nile Virus (n=6)
- Eastern Equine Encephalitis (n=1)
- Zika Virus (n=1)
- Dengue Virus (n=1)

Water-Based Toxins in Environmental Samples:
- Neurotoxic Shellfish Poisoning (*Karenia brevis;* n=10)
- Saxitoxin or Paralytic Shellfish Poisoning (n=5)
- Ciguatera Fish Poisoning (*Gambierdiscus caribaeus;* n= 1)

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