



## Superbugs and the 2016 Summer Olympics

*The second of a series of articles on the challenge of antimicrobial resistance*

*By the Water Quality and Health Council*

An antimicrobial resistant “superbug” could give sailors and windsurfers competing in the 2016 Summer Olympics more to worry about than their athletic performance. Evidence of superbugs-- bacteria resistant to common antibiotics—have been found in the sewage-laden Carioca River, which flows into Guanabara Bay, the planned site of Olympic sailing and windsurfing events.



A [new study](#)<sup>1</sup> by Rio’s Instituto Oswaldo Cruz identifies a superbug enzyme at three points along the heavily polluted Carioca River. Infections from antimicrobial resistant superbug bacteria require stronger than normal antibiotics and could require hospitalization, according to the study’s coordinator (see [RT article](#)). Additionally, carriers of antimicrobial resistant bacteria can spread serious infections to others.

### *A Dirty State of Affairs*

Rio de Janeiro is the third largest metropolitan area in South America after Sao Paulo and Buenos Aires. The city’s population is estimated at 6.35 million (see [World Population Review](#)), but the population of the metropolitan area is nearly double that. A very large portion of Rio’s sewage remains untreated before discharge, and much of it flows into Guanabara Bay resulting in a threat to human health and well-being. Beaches are unsuitable for swimming and fish die-offs signal environmental deterioration.

Organizers have promised to reduce Guanabara Bay pollution by 80 percent before the start of the Olympics, but Rio’s mayor [admitted in June, 2014](#) that the city would not meet that target.

### *Reducing Opportunities for Superbugs*

Wastewater treatment is of paramount importance for at least two reasons:

#### *Wastewater Treatment Basics*

*In the first steps of wastewater treatment, known as primary treatment, particles are physically removed by screening, settling and flotation. Secondary treatment includes bubbling air through wastewater to allow bacteria to metabolize pollutants. Next, much of the bacterial load is removed by settling in a chamber known as a secondary clarifier. In the final step, municipal wastewater is disinfected, but sometimes only on a seasonal basis or if the receiving stream is to be used for recreation.*

---

<sup>1</sup> The study is available in Portuguese only.

First, releasing untreated sewage into Rio's waterways degrades the aquatic environment. As organic substances in sewage biodegrade, water is depleted of dissolved oxygen, killing fish and other aquatic life. Water is rendered disagreeable for recreational and aesthetic uses. Second, untreated wastewaters contain microorganisms that can cause disease. Scientists know that bacteria may share genes that impart antibacterial resistance. Are the dirty waters of the Carioca River spawning the superbugs recently identified? Are superbugs evolving even in treated wastewater that is not disinfected year-round? What is the appropriate level and type of wastewater disinfection needed to avoid promoting superbug development?

### *Looking Ahead*

Research is being conducted to understand how various wastewater treatment techniques affect antibiotic resistant bacteria.<sup>2</sup> The ultimate goal is to eliminate or at least reduce antibiotic resistant bacteria to safe levels in effluent released into the environment, not just in Brazil, but everywhere because antimicrobial resistance has become a global problem. We encourage Rio de Janeiro officials to work with Instituto Oswaldo Cruz and others to determine and implement the most effective action to address this public health aspect of water pollution.

The Water Quality and Health Council hopes that the intersection of the prospect of the 2016 Summer Olympics and the appearance of superbugs in the Carioca River will catalyze an appropriate response to a serious water quality problem in Rio de Janeiro. We commend those who already are striving to clean up Guanabara Bay and wish them the greatest success, but we also hope that efforts being made to adequately treat Rio's sewage prior to discharge do not wane after the Olympics. While healthy waters may not be a reality by the time of the summer games, having a serious long-term plan in place could be the first step in a shining example of recovery.

---

<sup>2</sup> See, for example, "Urban wastewater treatment plants as hotspots for antibiotic resistant bacteria and genes spread into the environment: a review" ([abstract](#))