

Antibiotic-resistant bacteria in Indian public water supply

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Disease-causing bacteria carrying the new genetic resistance to antibiotics, NDM-1, have been discovered in New Delhi's drinking water supply.

A Cardiff University-led team found new strains of resistant [bacteria](#) in the Indian capital, including species which cause cholera and dysentery. The findings are the first evidence of the environmental spread of NDM-1, which had previously only been found in hospitals.

The scientists are calling for urgent action by health authorities worldwide to tackle the new strains and prevent their global spread. The Cardiff scientists also highlight the all-round benefits of preventative measures such as better sanitation and appropriate drinking water.

Cardiff scientists were the first to identify the NDM-1 gene which makes bacteria resistant to a large range of antibiotics. Moreover, the NDM-1 gene is carried on mobile DNA called plasmids which can carry up to 13 other [antibiotic resistance genes](#). While most patients with the bacteria have recently been hospitalised in India, some cases have occurred there without recent hospital treatment, prompting the team to test the wider environment.

Samples were taken in New Delhi from public water taps and from waste seepage, such as water pools in the street. Resistant bacteria were found in 4 per cent of the water supplies and 30 per cent of the seepage sites. The researchers identified 11 new species of bacteria carrying the

NDM-1 gene, including strains which cause cholera and dysentery. Antibiotics are used to reduce excretion of bacteria in cholera patients, and to reduce the duration and severity of dysentery. Worryingly, the identified *Shigella* isolate, which can carry dysentery, is resistant to all appropriate antibiotics.

Study leader Professor Tim Walsh, of Cardiff University's School of Medicine, said: "These are extremely worrying results. We found resistant bacteria in public water used for drinking, washing and food preparation and also in pools and rivulets in heavily-populated areas where children play. The spread of resistance to cholera and to a potentially-untreatable strain of dysentery is also a cause for extreme concern."

A recent UN report showed that 650 million Indian citizens do not have access to a flush toilet and even more probably have no clean water. The New Delhi sewage system itself is reported to be unable to cater for the city's population. The research team also believes that temperatures and monsoon flooding make New Delhi ideal for the spread of NDM-1.

Professor Walsh said: "This is an urgent matter of public health. We need similar environmental studies in cities throughout India, Pakistan and Bangladesh to establish how widespread [resistant bacteria](#) are. If we are to maintain our ability to treat severe infection in vulnerable patients, this action is vital."

"The environmental spread of bacteria is also an international issue. We have discovered patients in the UK and Europe carrying NDM-1 who did not visit hospitals while in India. Our research team at Cardiff would be happy to advise the World Health Organisation and the Asian health authorities on the action that needs to be taken."

The team's findings are published today in *The Lancet Infectious Diseases*

Provided by Cardiff University

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