A combined approach needed to fight antibiotics resistance, research says

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(Medical Xpress)—In her latest report to the government, Professor Dame Sally Davies - the UK's Chief Medical Officer - says the current antibiotics resistance crisis poses a "catastrophic threat".

She uses the report to call for global action on the issue, saying that more innovation from pharmaceuticals companies in the development of new drugs is needed if we are to tackle it.

However, in a paper in *The Lancet Infectious Diseases*, Professor Wilfred Otten and colleagues argue that the solution to the antibiotic resistance crisis does not lie with medicine and the pharmaceuticals industry alone.

They believe that a combined approach addressing environmental, agricultural, social and medical factors is the only way to tackle this global problem.

Here, Professor Otten explains the key role the environment, and soils in particular, play in bringing antibiotic resistance under control.

"Society has become largely dependent on antibiotics and they have been one of the greatest success stories of modern medicine – they have transformed, and indeed prolonged, our lives.

"However, bacteria are rapidly developing resistance to antibiotics and the length of time that antibiotics will remain effective has been pinned down to just a few decades – a situation so serious that the UK's Chief

Medical Officer is again urging the government to add it to the national risk register of civil emergencies.

"This is the third time in just four months that Professor Dame Sally Davies has highlighted the urgency of the situation, and the subject has quite rightly received much attention.

"However, most of this has focused on the behavioural causes of antibiotic resistance – GPs prescribing antibiotics for patients who do not need them, patients not completing the course of antibiotics they have been prescribed.

"But there is more to it than that. The natural environment, and how we interact with it, being key.

"Soil in particular plays an important role: just 1g of soil contains more bacteria than there are people on the planet, and these bacteria each naturally produce antibiotics to maintain a competitive edge over one another.

"By adding our own manmade antibiotics into the mix, the soil becomes the perfect breeding ground for new antibiotic-resistant strains to arise, as proximity makes it easy for the bacteria to exchange genes – which is how they evolve.

"And this is an important consideration because the amount of antibiotics that enter our soil systems every year, from a variety of sources, is vast.

"For example, more than half of all antibiotics used are given by us to animals. In the UK alone, about 350-400 tonnes of antibiotics were used each year in food-producing animals between 2006 and 2011 – and an estimated 70 million tonnes of that was spread onto agricultural land

each year as well.

"And this is just one part of an ongoing cycle: the new, antibiotic-resistant bacteria in the soil can potentially enter our food chain when we eat the harvested crops and then, when they reach our gut, they can evolve again when they mix with the microflora that naturally live there.

"Once we excrete these bacteria, they enter our sewerage system and, from there, they can re-enter agricultural systems when sludge is used as a fertilizer, or when wastewater is used for irrigation.

"However, as well as agriculture and wastewater treatment, the manufacturing industry plays a major role.

"Although Professor Davies has called for pharmaceutical companies to invest in developing new antibiotics, it is current manufacturing practice in some countries that is actually exacerbating the problem.

"We have a Dangerous Substances Directive in Europe, which lists 129 substances that are regarded as so toxic that efforts to control their release should be given the highest priority. However, antibiotics are not on that list, so are not routinely tested for and their high prevalence in the environment has received little attention.

"This is a particular problem in countries such as China and India where antibiotic manufacturing occurs on a substantial scale but regulations tend to be somewhat lax. Rivers and soils become contaminated when wastewater from these factories is untreated, and both are widely used by humans and animals – for drinking, washing and for irrigation.

"And although such places may seem far away and of no consequence to us here in the UK, we travel much more widely these days, which means these pathogens are constantly crossing continents and building

resistance in new and complex ways.

"So there is more to combating this problem than simply hoping for behavioural change amongst individuals – or the much needed development of new antibiotics – and there are a great number of players in this game who need to take responsibility for helping to control the rise of antibiotic resistance in the environment.

"It is clear that if we take action in one area, but not another, it will do little to control antibiotic resistance because so many factors are interdependent. So we need to work collaboratively, and internationally, with people from many different disciplines and areas of expertise if we are to combat what has become a truly global antibiotic resistance crisis."

More information: www.thelancet.com/journals/lan … (12)70317-1/fulltext

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