

**Maggie Fox**

Hello and welcome to One World, One Health with the latest ideas to improve the health of our planet and its people. I'm Maggie Fox. Our planet and all of us are battling problems such as pollution, climate change, and new and reemerging infectious diseases, and they're all linked. This podcast is brought to you by the One Health Trust, with bite-sized insights into ways to help.

Antibiotic resistance is a huge problem, with drug-resistant bacteria alone killing more than a million people every year. Misuse and overuse of antibiotics to treat human disease is a major factor. But it's not the only factor. Farmers and other food producers also feed antibiotics to livestock, and that can help the evolution of superbugs as well.

Infectious disease specialist Kasim Allel of the London School of Hygiene and Tropical Medicine and colleagues recently did a study that showed this evolution of drug resistance goes both ways. The more antibiotics people use, the more antibiotic resistance is seen in the human population and in animal populations. And the same goes for animals. The more antibiotics are fed to animals, the more antibiotic resistance is seen in both humans and in livestock.

In this episode, we're chatting with Kasim about what he and his colleagues have found. Kasim, thanks so much for joining us.

**Kasim Allel**

Thank you so much for inviting me.

**Maggie Fox**

How is antibiotic resistance transmitted to people by the animals they're in contact with?

**Kasim Allel**

The transmission from animals to humans would be by three different sources, I'll say. The first one will be via direct contact between animals and humans.

Secondly, I'll say that the transmission between animals to humans could occur through the consumption of antibiotic residues and meat. And it's basically when on farms, antibiotic treatments are not stopped at the correct time.

And then thirdly, which is the last way of transmission between animals [and] humans, would be when the antibiotic resistant bacteria is present in meat, and it can transfer antibiotic resistance into human bacteria, for example. The risk of this to occur is very low due to different features, but mainly because of high cooking temperatures [which] kill these bacteria. But there [are] just like a couple of cases when it's actually very difficult to kill them, and it's because of the different resistant mechanisms that some bacteria have developed over time.

**Maggie Fox**

You also found that the problem is bigger in low- and middle-income countries. Can you talk about why that is?

**Kasim Allel**

Just try to think about the political, economic, social, cultural, and environmental forces that shaped these nations. For example, in low- and middle-income countries (LMICs), there [are] some underlying factors, including living in poverty, having poor hygiene and sanitation, and having limited access to healthcare. So this might act as a, let's say, motor for antibiotic-resistant bacteria to survive. So then this is crucial in these types of settings.

Also, in LMICs, low- and middle-income countries, there are some sort of difficulties or challenges when it comes to implementing surveillance of antibiotic-resistant bacteria, and also there is [a] lack of monetary resources and infrastructure. And as you probably know, to test antibiotic resistant bacteria, you need to apply antibiotic susceptibility testing, which can be a bit expensive for some countries, and specifically those [that] are low-income. And also you want to trace, for example, where the bacteria originated, but [it's] very difficult, and it requires sequencing techniques, and that's actually very, very expensive. I'll say that most low- and middle-income countries cannot afford these types of instruments.

**Maggie Fox**

So what you're saying is that you can't really track it, and so it can spread undetected and the countries can't do anything about it.

**Kasim Allel**

Yeah, because of their surveillance capacities basically, and also because of the lack of infrastructure. Also, because of these, there is reduced control regarding mandatory prescriptions, for example. In most highly developed nations, you see that you require a prescription in order to get antibiotics, but in low- and middle-income countries, the regulation is not that solid, let's say, it's not that mandatory, and there [are] even informal markets where you can access antibiotics and also over the counter. Yeah, this is something serious and [it] happens quite frequently in low- and middle-income countries.

**Maggie Fox**

So are farmers and food producers in these less wealthy countries more likely in the first place to feed antibiotics to their livestock?

**Kasim Allel**

When it comes to high income settings, we see that the use of antibiotics as growth promoters is prohibited. But in many, many low- and middle-income countries, the usage of antibiotics as growth promoters, it's something that is actually happening on the farm. So again, you can use antibiotics, they are relatively cheap for them, for the farm owners, and then they can have more meat in the very end so they can sell more meat to the people basically. This is one of the practices, I'll say, that needs to be eradicated. But yeah, it's highly prevalent in some low-income countries.

Also, on farms, there is the prophylactic use of antibiotics. By this, I mean that some antibiotics are used as a precaution to prevent infection, because let's imagine that we are on a farm. Basically, you have got a flock of animals. If I get infected, I'm probably going to transmit the bacteria to all others. In order to prevent that [from happening], farm owners tend to use antibiotics as a prevention basically. But again, this practice, I'd say it's not prevalent in high-income countries. And again, I'll say that the WHO, with some other organizations, are working on these in low- middle-income settings in order to eradicate this.

**Maggie Fox**

What are some of the answers? I think you found that good governance was a factor. Can you tell us what that looks like?

**Kasim Allel**

Political instability and corruption make the system unstable. Let's say that less effective controls of antibiotic use, not only in people here but also in the animal sector, would be strictly related to higher antibiotic resistance rates. By this I mean, for example, less supervision and enforcement on floors...would be strictly related to higher antibiotic resistance rates, again, in humans and animal species.

Also, we found that inequalities, so highly unequal countries, and also those countries where private hospitals are predominant, are also related [to] reduced supervision, uncontrolled, of antibiotic-resistant bacteria. Again, the more chaos you see in a country, the less stringent policies they will have. So then that may affect antibiotic resistance as well.

According to the WHO (World Health Organization), approximately 150 countries have developed their national action plans to combat and tackle antibiotic resistance. There is a necessity for a collaborative and multisectoral approach when it comes to tackling antibiotic resistance. It's not even enough to look at the local, but also at the regional, national and global levels, with the main objective of achieving optimal antibiotic resistance surveillance and control.

**Maggie Fox**

So what should the average person know about this? What would be your message to the average person listening to this podcast?

**Kasim Allel**

The main message [from] me and my colleagues would be that we need to acknowledge that there is an interconnection between animals, humans, environment, and government structures. In order to tackle antibiotic resistance, we need to work collaboratively in order to launch and set the appropriate and accurate policies in the near future.

**Maggie Fox**

Kasim, thank you so much for an informative chat.

**Kasim Allel**

Thank you so much, Maggie.

**Maggie Fox**

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**Ramanan Laxminarayan**

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