

+ GREEN SCHOOLS | COVER STORY | READERS-WRITERS

gobar times

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A DOWN TO EARTH SUPPLEMENT FOR THE YOUNG AND CURIOUS

THE SMARTY-PANT MICROBES

A saga of the problematic bacteria vs. the good-old medicines
and the silent world of antimicrobial resistance





#SaveMotherNature

A comprehensive wish-list sent from an avid reader to Gobar Times, providing details on what her dream magazine looks like.

Dhanvi Chakravorty

Gobar Times has been around since 1998, which is a long time. It is an insightful read, for sure. It's great to find it online as in this way, it is available anywhere and anytime.

I think, the magazine can become more interesting for kids and teenagers by conducting a bunch of activities. It can encourage cub reporters to interview inspiring people from rural areas. It can also publish about some mind-blowing creations made out of locally available natural resources. Apart from the routine environment-sensitive articles and comics, the magazine can run a 'Creativity Box' for enjoyable engagements. Like, it'd be really exciting to find in it some step-by-step DIYs on making your own terrarium; or miniature garden; or eco-friendly soaps, shampoos, and other daily necessities. Along with games, puzzles, crosswords, quizzes,

and mazes, it can also excite children to write about the nature and the wild by motivating them to go for safaris, summer camps, and zoo trips. Hence, it'd be saving the Mother Earth by positively influencing our younger generation.

Also, how about launching fund-raising campaigns or the ones like #SaveMotherNature and many more? Protecting nature from deforestation and promoting recycled paper can be some important things to do. Sometimes I even fancy reshaping the pages of the magazine into a big bushy, lush green tree. You see, the shape can speak much louder about its purpose and impact a larger audience. Isn't it? But why all such fancy? Because the Mother Earth is my only home. So, let's save it!

The author is a student of Class 6, The Shri Ram School, Moulisari, Gurugram.



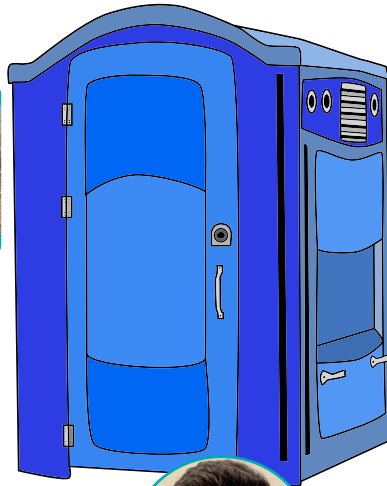
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The Biotoilet Project

The story of how a village got its first toilet.



G Nandakumar is a young farmer in Diguvapalem, a remote hamlet and a chronically drought-prone area in southern Andhra. In 2019, I met him on a school hiking trip, as part of our Geography classes. 'Nandu,' fondly addressed as so, was keen to upgrade his village by pursuing some sustainable environmental practices, like organic farming. However, he lacked the resources to execute his vision. So, as a young student, I was very inspired by his ideas and wanted to help.

I visited Diguvapalem regularly over a few months and developed a good relationship with him and the other village residents. The first project that I supported him with was about funding a nursery, where he could grow native trees from the seeds that he collected while trekking in the neighbouring area. Every monsoon, he planted their saplings in the surrounding hills to reforest and to help renew the watertable of the region. The next project I assisted him with was about funding and constructing a Learning Center for children. Its building was based on traditional architecture and used local construction materials like, eucalyptus, bamboo, lemongrass, and jamun. This centre was used for doing afterschool activities like art and craft, cooking, and movie screening.

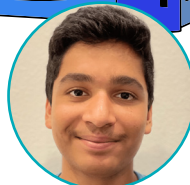
After these initial projects, I decided to focus on the issue of sanitation because, I was surprised to know that the entire village had only one toilet! So, together with my classmate, Srivar Janna Reddy, I researched about some

water-conserving and cost-efficient toilets. We discussed our findings with our teachers, and after their feedback, we

contacted Shubhra Biotech, one of the leading biotoilet manufacturers in our country. They gave us a total cost estimate of ₹ 2,27,539 for installing one toilet, one biodigester system that can

support three additional toilets in future, and the related construction costs. So, Srivar and I set-up an online fundraiser and received donations from our friends, family, and well-wishers.

This biotoilet used an innovative mechanism to convert blackwater (including urine, faecal matter, and chemicals; not useable for any purpose) from the toilet to greywater (including dust, oil, dirt, etc. but not pathogens; useable for non-potable puposes). In the biotoilet, the blackwater is passed through a biodigester, where it is broken down by microbes. This bacterial culture, used by Shubhra Biotech, was licensed from the Defence Research and Development Organisation. Then the water from the biodigester was passed through a reed bed, comprising layers of gravel, sand, and aquatic plants. The greywater received in the end was used to irrigate a nearby orchard. I am glad that the toilet has been in use since 2021. Rural India significantly lacks facilities for both water and toilets, and biotoilets can be a panacea for these issues.

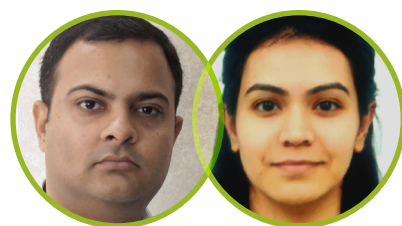


Kavi Ullal

The author was a student of class 9-10 in the Rishi Valley School, Andhra Pradesh. He is currently in class 12 at the United World College-USA.

Microbes getting Smarter, eh?

An interview with **Deepak Bhati** and **Gauri Arora**, Programme Officers in the Sustainable Food Systems team of the Centre for Science and Environment, New Delhi, simplifying the complicatedness of antimicrobial resistance for our young readers.



Hi Deepak and Gauri! We've been hearing about this complex and scary thing, 'Antimicrobial Resistance' (AMR). Can you please unpack it for our kids?

AMR is indeed scary. It happens when bacteria, viruses, fungi, and parasites that cause infections in us, humans, become resistant to the medicines we use to kill them. Thus, these microbes can no longer be killed and it becomes very difficult to treat our infections.

The major problem pertains to the growing resistance among bacteria against antibiotic medicines. This is commonly known as antibiotic resistance. When bacteria is exposed to antibiotics, some weak bacteria may die. But there are many strong ones which survive the antibiotic action. Such resistant bacteria continue to grow and multiply into more antibiotic-resistant bacteria. This is how, more and more resistant bacteria make the antibiotics ineffective in treating our infections, especially the ones caused by bacteria in children, like, ear infections, diarrhoea, lung infections, etc.

Some bacteria also become multi-drug resistant, which means that they become resistant to more than one

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antibiotic. These are called 'superbugs'. It can also happen that they become resistant to all the antibiotics available such that no medicine is able to kill them. In such cases, our diseases become untreatable and even common bacterial infections can cause death.

The sound of 'superbugs' is alarming. How problematic is AMR really?

Just as COVID-19, AMR is also a pandemic. But the difference is that unlike COVID, AMR is invisible. While COVID prevailed for a limited duration, AMR continues for many years. It worsens over the time and is expected to remain active even in future, if we do not act upon it. AMR silently kills many across the world every day and is, therefore, known as a pandemic of 'silent' nature.

In 2019, about 5 million deaths worldwide were estimated to be linked with antibiotic resistance. About 1.3 million deaths were caused directly because of bacterial AMR. This statistics is just for one year. Can you imagine the impact it will cause silently over many years? The impact is huge. This means that unless it is addressed, AMR will keep adding to our deaths.

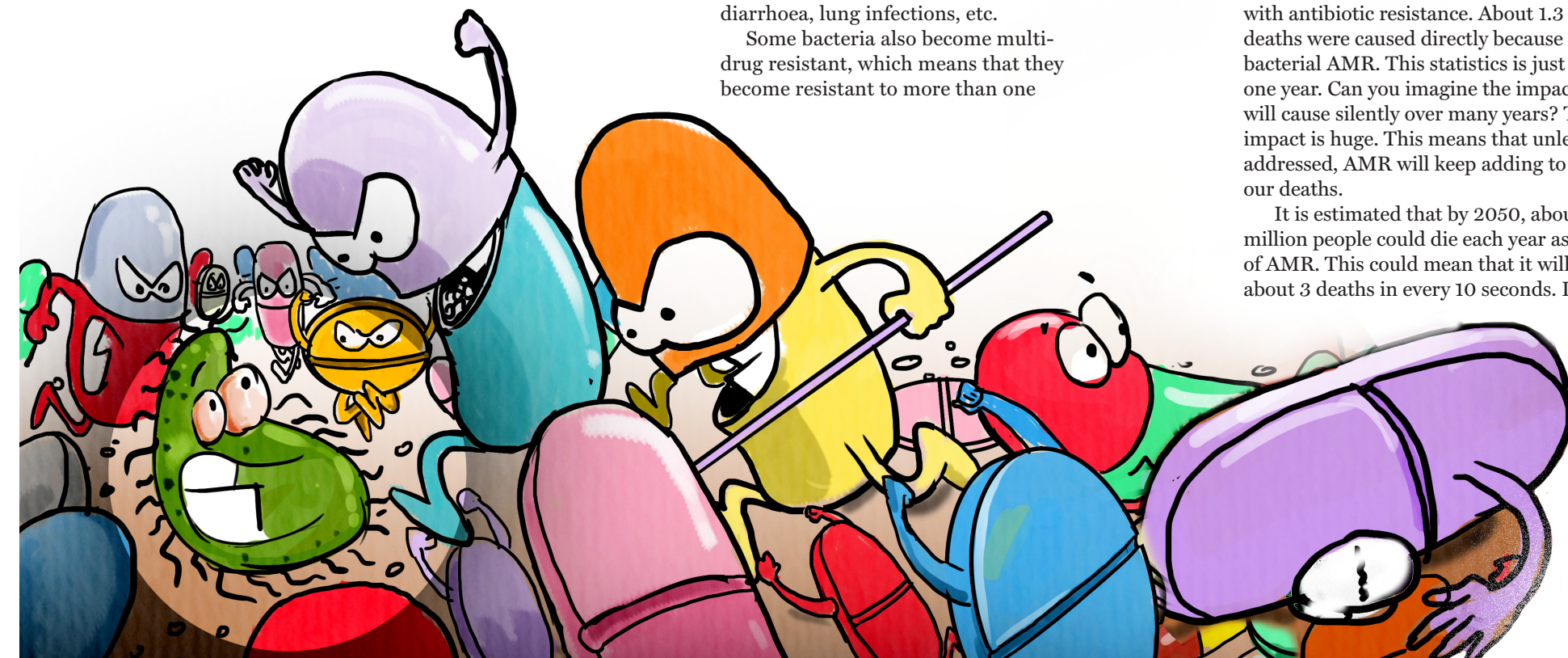
It is estimated that by 2050, about 10 million people could die each year as a result of AMR. This could mean that it will cause about 3 deaths in every 10 seconds. It can

heavily impact our livelihood, food security, and development, mainly, in the low-and-middle income countries.

We've heard that AMR is a big issue in animal farms. Can you help us connect the dots between such farms and us?

Most of you don't know but apart from us, humans, antibiotics are also used in the poultry, dairy, and fisheries sector. They are mixed with animal food and are fed to chicks to make them grow faster and fatter so that their meat can be sold quickly and at high prices. They are also given to help hens lay more eggs and, particularly, to avoid diseases among them. All this is done so that the animal farmers incur less losses.

But what is alarming is that these antibiotics are being indiscriminately used in the livestock sector in spite of them being critical for treating humans. This means that there are high chances that the bacteria present in animals—to which these antibiotics are given—will develop some



Ethnoveterinary medicines are simple herbal preparations which can be made at home using some readily available ingredients.



resistance and when we happen to consume these animals or their products, we'll gain this resistance too. For example, resistant bacteria and antibiotic residues can remain in the eggs, milk, and meat produced in such animal farms. If not cooked well, they can enter our body. Most importantly, if we use these antibiotics anytime later for curing our illness, they will be useless on us. If we catch any disease, then they may not work, which is really worrisome.

Moreover, both these things—resistant bacteria and antibiotic residues—can also be present in the animal waste produced in these farms and then they can enter our food chain. Thus, antibiotic-resistance can spread out from farms in multiple ways.

So, you suggest that we should minimise giving 'antibiotics,' to our livestock?

Yes. Particularly, the set of antibiotics which overlap with human use and are critical for saving our lives.

For example, we have seen that in India, 27 critically important antibiotics were used in rearing chickens, fish, and dairy cattle. Few among these are 'highest priority critically important antibiotics' because they are the last option for treating certain infections when even common

antibiotics don't work. Therefore, if we minimise their use in our livestock, then we can keep these life-savers for us and our future generations.

So, which medicines should we give to our animals? How else can our farmers keep them fit and fine?

We should look for alternatives to antibiotics, like ethnoveterinary medicines. These are simple herbal preparations which can be made at home using some readily available ingredients.

There is a big project that is currently studying the effectiveness of these medicines in treating diseases in milch cows. The project is led by the National Dairy Development Board and is called the Mastitis Control Popularization Project. Based on its results so far, ethnoveterinary medicines are successful in curing several diseases amongst cattle, particularly, mastitis, fever, and diarrhoea with a cure rate of about 80 per cent. They have also been successful in curing indigestion among them. This is very interesting as such herbal preparations are not only helping us save the use of antibiotics but are also being low-cost, easy-to-prepare and, most importantly, providing us with safe and antibiotic-free milk! Hence, they are very farmer-friendly.

Kids should note that antibiotics should not be purchased without a doctor's prescription and we must always complete their course, even if we are feeling better.

Also, regarding the fitness of their animals, farmers should ensure that they provide better rearing conditions to prevent any outbreak of diseases among their livestock. They should rear breeds which are naturally disease-resistant; and provide them with clean water, better sanitation, and waste management facilities. They should give a spacious environment for their animals to thrive, instead of cramping them in a small area, and avoid a mass-scale use of antibiotics for triggering their growth and preventing diseases. The antibiotic dosage should also be restricted to disease-treatment and that too when clinical symptoms are evident to a veterinarian.

General public should also minimise the use of antibiotics, especially for diseases which are otherwise preventable through herbal medicines. Use of chemicals or

antibiotics is not going to help. Real prevention lies in preventing the occurrence of diseases at their source.

As experts, how will you suggest our kids to prevent the impact of AMR? I suppose, we should definitely stop using antibiotics frequently and go herbal.

First and foremost, we need to be aware and educated about AMR and also make others aware on this subject.

Our kids should note that antibiotics should not be purchased without a doctor's prescription and we must always complete their course, even if we are feeling better. We should not share our antibiotics with anyone. Expired or any leftover/unused antibiotics must NOT be thrown in dustbins. Instead, we should dispose them separately to avoid their misuse. Lastly, you all must have heard that 'prevention is better than cure.' So, we should adopt better hygienic practices, like hand-washing, drinking clean water, and managing our waste properly. This way, we will remain healthy and not require any medicines or antibiotics. In fact, we should invest in alternatives of antibiotics as it is always best to avoid them.



The Waste of India

Food waste is an alarming issue globally. The Food and Agriculture Organization estimates that food waste releases 3.3 billion tonnes of CO₂ equivalent greenhouse gases annually. Indian households waste 50kg of food per person per year according to the Food Waste Index Report, 2021 of the United Nations Environment Programme. About 40% of our country's yearly food production is wasted, causing almost 1% of depletion of our GDP. This is worth nearly Rs. 50,000 crore as per our agriculture ministry. Food wastage not only aggravates hunger but also indicates a loss of supporting resources, like water, land, energy, labour, and capital.