There was a time when Venezuela led Latin America in the battle against malaria. No longer. The collapse of the country's economy and health system, combined with a boom in illegal mining in the malaria-ridden south, has sparked a resurgence in the disease, which is creeping across the borders into Colombia and Brazil.

The World Health Organization says that between 2010 and 2017 Venezuela witnessed a threefold increase in the number of confirmed cases of malaria, climbing to 43,000. That was the first rate of growth found anywhere in the world, according to the Lancet journal.

The disease is not slowing down. Between 2016 and 2017 alone, the number of confirmed cases jumped 70 per cent. Another study, published this month by Venezuelan lead scientists Adriana Tami and María Eugenia Gril-let, estimates new cases hit 1 million in 2018.

The global fight against malaria, commemorated today on World Malaria Day, remains centred on Africa, where malaria is most prevalent. But countries like Venezuela demonstrate the battle is far from won. Progress in eliminating the disease has faltered (see page 2). Still, scientific breakthroughs are encouraging the hope that the initiative could be reinvigorated (see page 4).

Venezuela has pushed up the malaria rate for the Americas as a whole. In 2017, it accounted for half of all cases in the region, according to WHO Latin America, Brazil, with a population seven times larger, and a vast malarious zone in the Amazon basin, accounted for just 10 per cent.

At the start of this decade, the Americas were winning the battle against the disease. Between 2010 and 2014, the number of cases worldwide in the hemisphere fell by 42 per cent to 388,000. But the trend has since reversed and in just three years the number of cases has almost doubled, reaching 774,000. Between 2014 and 2017, Venezuela accounted for 84 per cent of this increase, the WHO says.

It is a far cry from the 1950s and 1960s, when Venezuela enthusiastically embraced the spraying of DDT and other insecticides and a vast malarious zone in the Amazon basin, accounted for about a fifth. Between 2010 and 2014, the number of cases worldwide in the Americas as a whole was down by 42 per cent to 388,000. But the trend has since reversed and in just three years the number of cases has almost doubled, reaching 774,000. Between 2014 and 2017, Venezuela accounted for 84 per cent of this increase, the WHO says.

It is a far cry from the 1950s and 1960s, when Venezuela enthusiastically embraced the spraying of DDT and other insecticides and eradicated malaria from its cities and also started to defeat it in its vast southern jungle.

“Very proudly led the tropical world in eliminating malaria,” recalls Carlos Chaccour, a Venezuelan malaria expert at the Instituto de Salud Global in Malaga, Spain. “It’s gone from there — being one of the leaders 30 years ago — to where we are now is really quite tragic.”

The collapse of the economy and the disintegration of the health system are partly to blame. The World Bank says real GDP dropped 13 per cent last year and will fall an estimated 22 per cent this year. That adds up to a staggering cumulative fall of 60 per cent since 2013.

It is the biggest economic meltdown in recent Latin American history. This has dented funding for antimalarial programmes, say observers. In 2017, Venezuela spent four times on such person at risk from malaria than any other country in the American continent. From Peru, the WHO says, Doctors have fled, part of an exodus of 5,000 people in the past three years, according to one UN estimate.

Until last week, Nicolás Maduro’s government had been reluctant to allow any humanitarian aid into the country, denying there was a crisis for the spike in malaria. In April, Mr Maduro announced the creation of the “Orinoco Mining Arc” (see map above) on a vast crescent of conflict-ridden territory, the exodus is a factor in malaria’s spread. Mining is the other big reason for the spike in malaria. In 2016, Mr Maduro announced the creation of the “Strontium Mining Act” (see map above) on a vast crescent of conflict-ridden territory, the exodus is a factor in malaria’s spread.

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Global battle with disease frustrated by poor data

Malaria remains a major killer

Source: World Malaria Report 2018

Analysis

Efforts are under way to create a more accurate picture of malaria’s global spread, writes Andrew Jack

Progress has slowed globally

Incidence per ‘million population at risk’

Source: World Malaria Report 2018

Money spent fighting malaria is below target

Estimated amounts and set targets (US$)

Source: World Malaria Report 2018

Global target

1.9 million lives saved, and counting...

For the past 20 years, MMV and partners have been discovering, developing and delivering new antimalarial treatments to save lives. We will not stop until malaria is eradicated.

Help us build a healthy world for all

Join the fight to end malaria

Sutomo Chemical Co., Ltd. is a leading innovator in vector control and is committed to continue its efforts to help eliminate malaria through its wide range of mosquito vector control products, with OliveNet, Sutomo Chemical invented the Long-Lasting Insecticidal Net (LLIN) using its unique polymer incorporation technology.

In 2012, Sutomo Chemical rose to the challenge of inseccticide resistance affecting first generation LLINs and launched OliveNet, which became the first in a new class of bed nets.

Another innovation addressing resistance is SumiShield, containing the first new mode of action chemistry for Indoor Residual Spray (IRS) in over 40 years.

As manufacturers of a full range of vector control products that includes LLINs, IRS, larvicides and space sprays, Sutomo Chemical is well placed to meet the challenge of vector control now and into the future.
**‘Free riding’ deters investors**

**Funding Sarah Murray**

reports on the drive to bring private capital into the global battle against malaria

A t this October’s conference for the Global Fund — a partnership founded in 2001 by the United States, the European Union and the Bill & Melinda Gates Foundation — every dollar raised is significant, and raising more is essential. But bringing in private capital to combat malaria has been difficult.

The disease affects 219 million people each year and causes 729,000 deaths. The majority of those deaths occur in sub-Saharan Africa, where malaria is most prevalent.

While the private sector can play a role in funding the fight against malaria, it has been challenging to get private investors to see the potential for profit and to commit to the long-term, complex nature of the problem.

**Sources:**
- Malaria Group
- Bill & Melinda Gates Foundation
- Global Fund

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**Disease spreads as Venezuela unravels**

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**S**ince the turn of the century, vector control strategies such as insecticide treated bed nets and indoor residual spraying have been responsible for dramatic declines in malaria cases and saving many thousands of lives. However, the growing danger of insecticide resistance is threatening the future success of these well-established interventions.

Unless new insecticide formulations for use in vector control are developed as part of an insecticide resistance management strategy, the prospect of a devastating resurgence of malaria is high.

Since 2004, IVCC has been forming partnerships with innovators to develop a new generation of vector control tools that will ensure the future of malaria control in Africa.
Scientists model ‘gene drive’ for carrier insect

Prevention

Researchers weigh up genetic intervention in mosquito species, reports Clive Cookson

Gene editing technology, which is transforming work in research throughout biology, provides a powerful weapon against malaria. Computer modelling and laboratory experiments suggest that it could quickly suppress the mosquitoes that carry disease-consuming parasites between people. The latest research suggests that entire local populations of the Anopheles gambiae species of mosquito – the most important malarial species in Africa – could be wiped out.

The method is called a “gene drive”. It uses a gene editing technique known as CRISPR to push a desired trait mutation rapidly through a population. Under the normal rules of inheritance, there is a 50 per cent chance that a parent will pass any gene on to its offspring. This technology pushes the probability closer to 100 per cent.

Scientists at several universities in Europe and the US are working on anti-malarial gene drive research, backed by funding from the Bill & Melinda Gates Foundation, the Wellcome Trust and the European Union. The first successful laboratory demonstration of a mosquito gene drive came in September, when Andrea Crisanti and colleagues at Imperial College London were able to “crash copied populations” of the malarial vector, Anopheles gambiae in only seven to 10 generations, they say.

The experiment interacted with the insect’s natural consumer, so that the number of female mosquitoes born declined quickly from generation to generation. Soon no more were produced and the population collapsed.

“This breakthrough shows that [gene drives] are viable against malaria, the fight against a disease that has plagued mankind for centuries,” says Jim Thomas, director of ETC Group, a technology watchdog. “It puts the power back in someone else’s environment, territories without their consent, says Jim Thomas, director of ETC Group, a technology watchdog. “It shows that governments and communities will have to be proactive to prevent this weapon against malaria.”

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By the end of the year, we’ll celebrate delivery of over 2 billion life-saving bed nets

Since 2000, bed nets have played a critical role in saving 7 million lives and preventing more than 1 billion malarial cases.

Still, half the families in Africa at risk from malaria don’t sleep under a bed net.

We won’t rest until everyone in need of a bed net is ensured a safe night’s sleep.

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Environmental campaigners worry about ecological consequences

Environmental campaigners worry about the ecological consequences of genetic intervention in mosquito populations. Researchers agree that there must be thorough investigations before the technology is tested in the field.

Austin Burt, professor of evolutionary genetics at Imperial College and a pioneer in gene drive technology, says that there are “a few billion” of anopheles gambiae alive in Africa at any one time, he says, but “it is a key-step species in the ecosystem. Its ecology is closely associated with human settlements and the importance to insects in the food web.”

Researchers at the University of California and other US universities are working on different gene drives that would make populations of Anopheles gambiae resistant to infection by Plasmodium parasites and unable to transmit the disease to humans.

Since genetic interventions would not respect national borders, this technology will require global regulation. The United Nations Convention on Biological Diversity, with a secretariat based in Montreal, took up the challenge at its conference at Sharm el-Sheikh, Egypt, last November.

The meeting came up with a commo- nounce to governments and opponents of gene drive technology. The consensus decision rejected the idea of an interna- tional moratorium on gene drive research, including experimental release into the environment.

But it insisted that governments develop new safety guidelines, carry out scientifically sound case-by-case risk assessments and obtain “free, prior and informed consent” of local com- munities and those affected by the technology.

This is a matter of some controversy. Some people concern has the safeguards necessary to ensure that the technology is tested in a region where it would not be handled by local authorities or international organisations.

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