IVCC

Annual report 2017-18

VECTOR CONTROL

SAVING LIVES

CONTENTS

We are at a defining moment in the history of global development where we can either collectively show our resolve and get the job done, or turn our backs on human suffering and inequality.

I believe when people know about progress we've already made, they'll be inpsired to finish the job.

Bill Gates, Co-chair of the Bill & Melinda Gates Foundation
20 September 2017

PERSPECTIVES FROM FUNDING PARTNERS

DFID leads the UK's work to end extreme poverty. We are tackling the global challenges of our time including poverty and disease, mass migration, insecurity and conflict. Our ambitious mission depends on strong partnerships with organisations like IVCC that can drive innovation and impact. IVCC play a vital role in DFID's efforts to tackle the world's most serious infectious diseases such as malaria. As a product development partnership they harness the very best of industry, academia, communities and other key stakeholders.

IVCC and its partners continue to hit important milestones and the last 12 months have seen a number of impressive achievements, including an interim recommendation from WHO for Interceptor® G2 and prequalification for SumiShield® 50WG.

IVCC play a vital role in DFID's efforts to tackle the world's most serious infectious diseases such as malaria

IVCC's efforts to encourage greater collaboration between their industry partners, culminating in the launch of the 'ZERO by 40' initiative at the London Malaria Summit in April is impressive.

The initiative highlights one of IVCC's key strengths; the ability to bring both people and organisations together around a common goal. The development of new tools for vector control will require new disruptive thinking amongst partners. IVCC are putting in place exactly the right conditions for these new conversations and new ways of working to take place.

Sue Kinn

Team Leader - Health Research Team,
Research and Evidence Division,
Department for International Development

Jo Mulligan

Senior Health Adviser,
Research and Evidence Division,
Department for International Development

UKaid
from the British people

Australia's international development assistance program is according high priority to infectious disease control, with a growing emphasis on emerging and resurgent pathogens. Australia's A$300 million Indo-Pacific Health Security Initiative, launched in October 2017, aims to mitigate emerging and re-emerging infectious disease threats with the potential to cause social and economic harms on a national, regional or global scale.

Distinct challenges

The Indo-Pacific is geographically, economically and culturally diverse, encompassing small and fragile island nations, some of the most dynamic economies in the world, and countries that face major internal disparities. These countries face very distinct challenges in preventing, detecting and responding to infectious disease outbreaks. But all of them will benefit from product innovation in treatments, diagnostics and preventive technologies.

It is no surprise therefore that we have selected IVCC, with its strong track record and practical, partnership-based approach, as a key ally in our efforts to combat vector-borne disease in the Indo-Pacific region.

Timely

Our partnership with IVCC is timely. Asia-Pacific leaders committed in 2014 to eliminate malaria in the Asia-Pacific by 2030, and subsequently endorsed a regional malaria elimination roadmap to guide and track progress toward this goal. In 2017, there were some five million cases of malaria in the Indo-Pacific.

Countries in the region, including Bangladesh, Indonesia, Myanmar, Nepal and Timor-Leste, are making strides in malaria control and elimination. China has reduced indigenous malaria cases from nearly 5,000 in 2010 to zero in 2017, for the first time. And Sri Lanka and Maldives were declared malaria-free in 2016 and 2015, respectively, as was Vanuatu's Tafea Province in 2017.

However, growing resistance to artemisinin-based malaria treatments in the Greater Mekong Subregion, and to pyrethroids in major malaria vectors worldwide, threatens to erode this encouraging progress.

Pipeline of tools

Other mosquito-borne diseases, particularly dengue, chikungunya and lymphatic filariasis, are also creating increasing burdens in the Indo-Pacific. We are confident that our partnership with IVCC will leverage and adapt their robust pipeline of vector control tools for high impact in the Indo-Pacific region, particularly in Australia's main development assistance partner countries—Papua New Guinea, the Pacific island countries and the developing countries of Southeast Asia.

Robin Davies
Head, Indo-Pacific Centre for Health Security

Australian Government

INDO-PACIFIC CENTRE FOR HEALTH SECURITY

CHAIRMAN'S FORWARD

Sir Mark Moody-Stuart
Chairman, IVCC

This will be my last foreword as Chairman of IVCC. I have had the pleasure and honour of being involved with IVCC from the time when Janet Hemingway as Director of the Liverpool School of Tropical Medicine proposed the concept to the Bill & Melinda Gates Foundation (BMGF) through the setting up of IVCC as an independent organisation and the transition to Nick Hamon as Chief Executive. I am delighted to be able to hand over the Chairmanship of the IVCC board to Sir Stephen O'Brien.

New Chairman
Stephen has had a lifelong interest in malaria, from having been born in Tanzania and working on a student trip in Africa collecting material for a malaria research project, to his subsequent positions as a minister and UN Under Secretary General. After two decades in law and business, Stephen entered Parliament and was both Under Secretary of State for International Development and the Prime Minister's Envoy and UK Special Representative for the Sahel and then UN Under-Secretary-General for Humanitarian Affairs & Emergency Relief Coordinator.

This wide experience and long-term interest in work on malaria, including being a former board member of both IVCC and the Liverpool School until as a minister he had to step down, makes Stephen uniquely qualified. Both I and the board are delighted that he has agreed to take over as Chairman.

Stephen was present at our first overseas board meeting in Tanzania, and the board visit to the test sites at Moshi, funded by IVCC and the first in the field to achieve Good Laboratory Practice (GLP) certification.

The year has been an exciting one. The original goal of developing three new active ingredients to combat resistance in vectors is almost achieved. We are now in the final stages of qualification and delivery of new tools, with some new products already on the market.

ZERO by 40
The launch of ZERO by 40 at the Commonwealth Heads of Governments meeting in London will prove to be a real turning point in confirming industry's commitment to what is a vital but essentially non-commerical activity for companies. ZERO by 40 saw the major research based agrochemical companies making historical commitments to work together and share expertise to eradicate malaria.

Funding Partners
The challenge of the ongoing funding of the major initial goals of IVCC used to be a major concern. It is encouraging to see continued success in attracting funding for wide goals of not just developing the products but bringing them into the public health market.

The grant from the Australian Department of Foreign Affairs and Trade (DFAT) of A$18.75m to support their Indo-Pacific Health Security Initiative is just such additional support as is the $66 million awarded by Unitaid and the Global Fund to Fight Aids, TB and Malaria to support the introduction of novel dual active ingredients long lasting insecticide treated nets.

We are very grateful to those organisations for this additional support and congratulations to Nick and the team for developing the projects. When IVCC started, The Bill & Melinda Gates Foundation was our sole funder. The success that this enabled, combined with ongoing and increasing support from the foundation, has meant that Nick and the team have been able to grow other sources – UKaid, The Swiss Agency for Development and Cooperation, Unitaid, the Global Fund, DFAT and USAID.

With the support of these donors, BMGF is now less than half of our funding. At the same time we are now able to begin addressing the many challenges beyond our initial goals – not just implementation but issues such as outdoor biting and alternative means of delivery of vector control such as attractive targeted sugar baits (ATSB). Widening the range of our tools and support will be essential as we move to elimination.

Bill Gates has famously said that his aim is to eradicate malaria as a disease in his lifetime and has generously committed resources from the BMGF to that aim. We in IVCC are proud of our contribution to this collective effort. Although I am much older than Bill, it is now not beyond the realms of possibility that even I might live to see this. I am enormously grateful to all our funders, to the creative team at IVCC led by Nick and to our industry partners in ZERO by 40. They are all deserving of congratulation for their commitments and vision.

NEW PARTNERSHIPS, NEW SOLUTIONS

Moving from disease control to malaria eradication will rely on a toolbox of solutions

It is the responsibility of the entire stakeholder community to accelerate pathways to approval and implementation, identify key enabling technologies

In 2017/2018, IVCC continued to expand in scope and responsibility. In May 2018, the Australian Department of Foreign Affairs and Trade awarded IVCC a five year A$18.75m grant to support their Indo-Pacific Health Security Initiative. This program is designed to contribute to the avoidance and containment of infectious disease threats with the potential to cause social and economic harms on a national, regional or global scale. IVCC will explore the use of its launched and pipeline of vector control tools in the Indi-Pacific region.

Unitaid and the Global Fund to Fight Aids, TB and Malaria awarded IVCC $66 million to support the introduction of novel dual active ingredients long lasting insecticide treated nets, including price support and field trials to assess performance and public health value. An additional $12m in trials and volume guarantee support is being provided by the Bill & Melinda Gates Foundation.

The Swiss Agency for Development and Cooperation renewed its core grant to IVCC for an additional three years.

Troubling shift

Moving from disease control to malaria eradication will rely on a toolbox of solutions in which vector control continues to play a leading role. In many situations, current but older interventions are still continuing to protect health in many settings, but as Dr Tedros Adhanom Ghebreyesus, WHO Director General wrote last December, 'we noted a troubling shift in the trajectory of this disease. The data showed that less than half of countries with ongoing transmission were on track to reach critical targets for reductions in the death and disease caused by malaria. Progress appeared to have stalled.

The World malaria report 2017 shows that this worrying trend continues and in some countries and regions we are beginning to see reversals in the gains achieved. Vector control desperately needs new tools to combat the rapid rise of insecticide resistance; discovering developing, launching and ensuring these tools get used and have impact is IVCC's core mission. Across the world, there is a myriad of very early stage innovative vector control technologies being researched, as well as a pipeline of late-stage high potential tools designed to contribute to eliminating malaria and other vector-borne diseases.

The promise of these new technologies is high but at the same time is fragile and carries a significant risk of failure. However, in the last few years, products such as Actellic® 300 CS, and now SumiShield®, Interceptor® G2 and later this year/next year we hope Fludora Fusion® and Sylando® are starting to give the world of malaria and NTD's a whole new toolbox of effective options.

ZERO by 40

Innovation cannot just be about new product development; rather, it is the responsibility of the entire stakeholder community to accelerate pathways to approval and implementation, identify key enabling technologies, as well as innovative new funding, partnership and delivery models.

One example is a new type of partnership is represented by ZERO by 40. The CEOs of the major research based agrochemical companies gathered at the World Economic Forum in Davos back in January at a meeting hosted by Bill Gates and IVCC.

At the Commonwealth Heads of Government Meeting in London just three months later, these same companies made a public commitment on a world stage to work collaboratively to play their part in advancing vector control innovation, with a goal of eradicating malaria by the year 2040.

This represents not only an extraordinary opportunity for malaria eradication but also for leading crop protection companies to demonstrate they can be not only 'best in the World' but also 'Best for the World' at the same time. ZERO by 40 formalizes the partnership between the leading crop protection companies and IVCC in vector control to help make continued progress in the fight to end malaria.

Why might ZERO by 40 have a chance to be successful where other similar initiatives have failed?… because as one senior leader put it, "this is the first time Industry is coming together in a partnership with a single goal: to end malaria – the first time led by Industry itself and not by NGOs or government".

Dr Nick Hamon
Chief Executive Officer IVCC

Innovation cannot just be about new product development

FURTHER NEW INSECTICIDES ARE NEEDED

Good progress continues to be made

Dr Sarah Rees
Portfolio Manager

In 2016, there were an estimated 216 million cases of malaria, an increase of about 5 million cases over 2015. Deaths reached 445 000, a similar number to the previous year. Of the 76 malaria endemic countries that reported standard monitoring data for 2010 to 2016, insecticide resistance was detected in 61 countries to at least one insecticide and in 50 countries there was resistance to two or more insecticide classes. Resistance to the four insecticide classes was detected in vectors across Africa and resistance to pyrethroids, the insecticide class used in all Insecticide Treated Nets (ITNs), is widespread. The proportion of malaria endemic countries that reported pyrethroid resistance increased from 71% in 2010 to 81% in 2016. Malaria vector resistance to the four insecticide classes commonly used in ITNs or IRS threatens malaria prevention and control efforts.

The focus of IVCC's strategy remains the development and delivery of effective vector control products to combat insecticide resistance. To do this we must identify and develop effective new insecticides.

New chemistry
Two new insecticides have been introduced for vector control during the past year: Clothianidin, a neonicotinoid which is the active ingredient in Sumitomo's IRS, SumiShield® 50WG, and Chlorfenapyr, a pyrrole, which is a component of the first pyrethroid+ ITN, Interceptor® G2, developed by BASF. This is good progress, but it is not enough. Insecticides used in vector control are exposed to significant pressure of resistance developing. For example, an ITN is designed to be used for 3 years, 365 nights per year, during which time many generations of mosquitoes have the opportunity to develop the necessary mutations to overcome the lethal action of the insecticide. If the starting dose of insecticide on the ITN wears away over time, then it becomes even easier for mosquitoes to overcome the killing effect.

Insecticide Resistance Management
To maintain vector control, it is important that insecticides remain effective and that good insecticide resistance management is practised. This can be helped by using products in mixtures or rotation, as recommended by WHO, to prevent mosquito populations developing insecticide resistance. Use of products at a fully effective dose rate is also important to prevent resistance developing.

Further new insecticides are needed if vector control is going to deliver its part in malaria eradication. The requirements are for new chemistry which works in a different way to current products, to avoid pre-existing resistance mechanisms. In addition, chemistry must work through contact activity which means it has to be taken up through the mosquito tarsi (legs) in sufficient quantity to kill the insect. It also has to have suitable physical properties to be effective during the lifetime of the product; for an IRS it must be formulated so that it stays on the surface of the wall rather than soaking into the mud or concrete. For a bednet this means it has to be able to withstand washing and so should not be very water-soluble, as well as demonstrating compatible performance in mixture with a second, different insecticide to deliver a 'dual active ITN'.

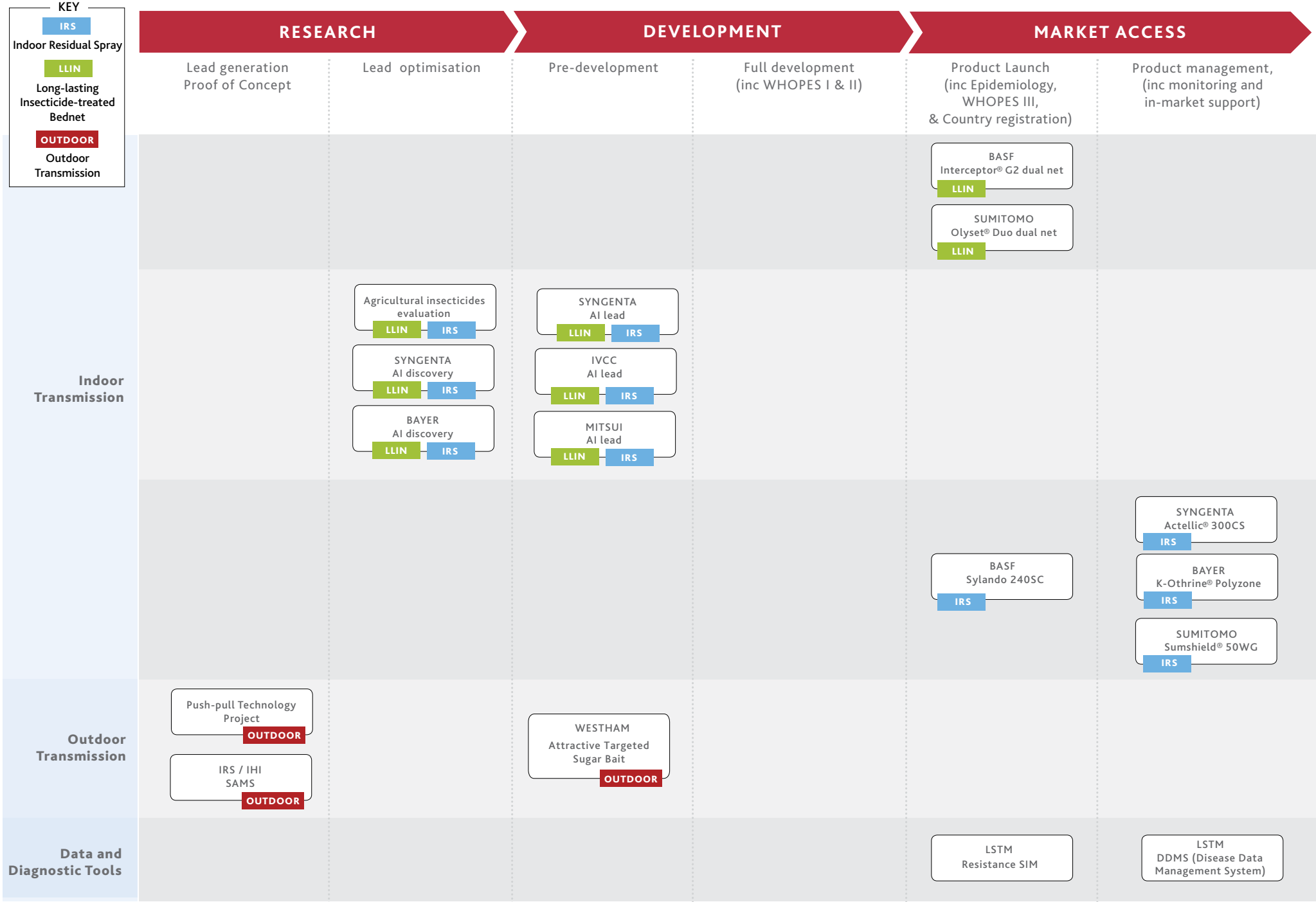
Handful of compounds
In 2018 IVCC completed the evaluation of all existing insecticides which have been developed previously for use in agriculture for their suitability for ITN and/or IRS. We have identified insecticides with different ways of working and with the suitable physical properties. From a starting point of hundreds of candidates, we now have a handful of compounds which are being evaluated as potential mixture partners for ITNs. This is complemented by our partner projects with Syngenta and Bayer where the focus in 2017-18 has been to select individual compounds as development candidates. Once identified the larger scale production of these compounds is carried out so that we can undertake more extensive safety testing and formulation development as well as testing the compound in prototype products for field performance.

New challenges
A particular challenge of working with novel chemistry at scale is the incomplete toxicological profile and while we only promote work on compounds we believe to be safe we must still take precautions, for example when making and testing prototype bednets. This is a new challenge for the industry since all previous product development has been done with old, well-characterised, insecticides and we are putting into place the necessary technical capability to support this phase of product development.

2019 will be an exciting year as we anticipate initiating with partners, several specific product developments based on new insecticides to be delivered in the mid-2020s.

The focus of IVCC's strategy remains the development and delivery of effective vector control products to combat insecticide resistance

IVCC PRODUCT DEVELOPMENT PORTFOLIO



NEW PRODUCT CLASSES

New product classes
Beyond our focus on new insecticides for the established product classes of ITN and IRS for malaria reduction, IVCC is looking more broadly for new product classes which could be an essential component of the malaria eradication agenda. Over the past two years we have been working with collaborators to explore the potential of new product classes for use outside the home. Work has been completed on two projects; targeted spraying of local swarms and push-pull systems. Work on the third area, ATSB (attractive targeted sugar bait) is continuing with the goal of setting up a new ATSB product class. The proof of product class work is being prototyped with dinotefuran, a neonicotinoid with good insecticidal properties following insect-feeding. For the ATSB product class to become a significant element in the goal of malaria eradication it will be important to develop additional examples so that insecticides can be rotated to manage the risk of insecticide resistance, in a similar way to IRS. IVCC will be looking at other insecticide candidates for development in the potential product class and in particular different types of insecticide which are known to work through ingestion rather than on contact.

Other product classes are of potential interest to IVCC as components of the arsenal to eradicate malaria, but before we invest we need to understand the investment required, the benefits that will be delivered and the chance of successful product delivery. IVCC currently has interests in personal protection against mosquito biting, autodissemination of IGRs, longer-lasting IRS, modified spray equipment, drone location for precision larviciding, non-insecticidal bednets and others.

ATTRACTIVE TARGETED SUGAR BAIT (ATSB)

Proof of concept in Mali

Mathias Mondy
Business Development Manager

Geographic location of the study in Mali
14 villages located in the flood plain of the Niger river were selected for an ATSB proof of concept in 2016-2017. The villages are densely clustered and surrounded by farmland and are typically one to several kilometres apart. LLIN coverage and usage is estimated to be about 80%.

Validation of daily feeding rate
The aim of the study was to achieve 30% daily feeding rate. This target was estimated from a preliminary modelling study designed to identify a rate which could potentially lead to epidemiological impact. The results are demonstrating that even in a competitive environment with the presence of natural sugar sources, ATSB can achieve more than 27% daily feeding rate throughout the season, using two bait stations each hanging at a height of 1.8m on the opposite sides of the houses.

Entomological impact
Mosquito sampling was carried out monthly in 14 villages; 7 treatment villages and 7 control villages. For each village, vector population densities were monitored using CDC light traps, HLC's indoors and outdoors, Malaise traps, and PSC indoor collections. Processing included mosquito identification, age grading (Polovodova method), and Plasmodium falciparum sporozoite determination by ELISA.

Key results
The use of ATSB bait stations was associated with reductions in monthly population densities of female and male malaria vector species, as assessed for every sampling method.

The observed reduced impact as population densities increased in the rainy season (July to September) are likely due to a massive influx of young mosquitoes into villages from nearby rice fields.

The use of ATSB bait stations outdoors can significantly reduce the proportion of older females capable of transmitting sporozoites to humans during blood feeding.

The use of ATSB bait stations (in conjunction with LLINs coverage/use >80% in both treatment and control villages) reduced the EIRs down to low levels.

Acceptance of the bait stations
A social study was undertaken to ascertain the acceptance by villagers. The key finding demonstrated no behavioural changes in the use of LLINS. The concept of ATSB was overall well perceived throughout villages, with women and the village council being the most accepting of ATSBs. There was some concern about the lack of information about ATSBs, their composition and how exactly they work, but this last point was overcome by additional communication measures.

Preliminary safety assessment
The human health risks of potential exposure to dinotefuran ATSB mosquito stations are considered to be low under normal use conditions. Adverse health incidents from possible misuse/abuse of the product are considered unlikely by following sound product stewardship principles.

Non-target arthropods
Based on the results of the broad arthropod survey which covered a wide variety of species, the relative proportions of those samples which were identified to have fed from the ATSB stations were shown to be minimal. It can therefore be concluded that the design of the ATSB feeding stations significantly limits exposure of the treated bait to non-target arthropods. Exposure to dinotefuran from this design would therefore be limited and not expected to have a significant effect on non-target arthropod populations under normal conditions of use.

Next steps
Large scale studies, funded by the Bill & Melinda Gates Foundation, will be conducted in Kenya, Mali and Zambia to assess the epidemiological and entomological impact, while further assessing potential factors influencing coverage as well as cost and economics.

The use of ATSB bait stations outdoors can significantly reduce the proportion of older females capable of transmitting sporozoites to humans during blood feeding

The concept of ATSB was overall well perceived throughout villages

THE NEXT GENERATION IRS PROJECT

Addressing the barriers to Access

David McGuire
Programme Director
NgenIRS

The Next Generation IRS project, NgenIRS, has been hard at work tackling the barriers that prevent malaria endemic countries from accessing new, resistance breaking insecticides for indoor residual spraying (IRS). The $65.1 million Unitaid-funded market shaping initiative was launched in early 2016 and is being implemented by IVCC and its partners through 2019. Unitaid is investing in NgenIRS through IVCC to create a sustainable, growing and competitive market for 3rd generation longer lasting insecticides for IRS.

Partnership
IVCC is working towards achieving this goal in partnership with the U.S. President's Malaria Initiative (PMI), Abt Associates (PMI/AIRS), PATH, the Global Fund, 13 African Malaria Control Programmes and the multiple manufacturers developing and producing WHO-recommended 3rd generation IRS (3GIRS) products formulated to remain effective for six months.

The project is designed to overcome five elements of 3GIRS market failure: limited demand, market instability, limited competition, high prices and the absence of a strong evidence base showing cost-effectiveness and impact.

Reduction
In its first two years, the project has already assisted twelve African countries and their implementation partners to procure Actellic® 300CS, the first of the WHO-recommended 3GIRS products to enter the market. Over the short-term the project has helped to reduce the ex-works price of Actellic® 300CS from $23.50 to $15 through the provision of a time-limited co-payment. $15 is the target price for commercial viability by the end of the project once the market grows to include multiple competing products.

Supporting procurement
Between 2017 and 2018 NgenIRS, through a Unitaid co-payment mechanism, supported the procurement of approximately 6 million units of 3GIRS insecticide, sufficient to protect an estimated 48 million people.

Co-payment support and volume discounts enabled our partners to procure approximately 2.1 million additional units of 3GIRS, enough to protect an estimated 17 million more people than would have been possible if they were paying full price.

The NgenIRS partnership and Unitaid's support has been instrumental in reversing the downward trend in IRS demand in Africa over the project period.

Reversing market decline
NgenIRS has helped to create a stable market through the development of a forecasting tool and methodology that has been used to establish volume guarantees with manufacturers, in exchange for annual volume discounts that reduce the per unit co-payment and allow partner countries not participating in the co-payment mechanism to procure at reduced prices.

An estimated 1.2 million units have been procured at a significantly discounted price by an Elimination 8 programme on the Namibia/Angola border and GFPRs in Madagascar, Zambia and Zimbabwe, representing approximately 50% of the gains in overall procurement volumes and coverage. This unexpected collateral impact on 3GIRS uptake has significantly amplified, overall market growth and the ability of our partners to protect vulnerable populations from malaria.

NgenIRS has helped to create a stable market through the development of a forecasting tool and methodology that has been used to establish volume guarantees with manufacturers

NgenIRS

Resistance management
Negotiations are currently underway with both Syngenta and Sumitomo Chemical Company for volume guarantees in return for volume discounts in 2018 on both Actellic® 300CS and SumiShield® 50WG, which is now prequalified by WHO and the 2nd 3GIRS product available to African Malaria programmes. This allows for the initiation of the rotation of two different classes of effective insecticides and the implementation of resistance management strategies for the first time in several years.

The addition of SumiShield® 50WG will also create much needed competition in the marketplace which will also help to further reduce prices. Bayer's prospective 3GIRS product, Fludora™ Fusion is currently undergoing trials under the WHO PQ process and will hopefully enter the market in 2019. The availability of multiple insecticides will allow countries and their implementation partners to consider annual sub-national rotation with different classes of insecticides.

Evidence
For products to be accepted by countries and implementation partners, evidence on their cost effectiveness and impact is imperative. A cluster randomized control trial, co-funded by PMI, is underway in Zambezia province, Mozambique.

In addition, retrospective evaluations of the impact of IRS are being supported in Zambia, Mali, Ghana, and Uganda and will shed more light on the incremental cost and impact of IRS in these settings.

The project is on track to exceed its targets, demonstrating the power and impact of a closely coordinated partnership between committed malaria programmes, donors, implementers and manufacturers supported by market shaping investments such as NgenIRS. The lessons learned and success of the NgenIRS partnership might provide a useful model as the malaria community looks to increase access to other life-saving tools such as the next generation of LLINs.

Despite the achievements to date considerable challenges remain, particularly the uncertainty around the timing of the introduction of new products to increase competition and allow for effective resistance management. According to Lelio Marmora, Executive Director of Unitaid, "Unless newer insecticides are used, we run the risk of considerable reversals in the fight against malaria. We are proud to support the NgenIRS project to combat insecticide resistance and ultimately save lives".

The availability of multiple insecticides will allow countries and their implementation partners to consider annual sub-national rotation with different classes of insecticides


ZERO 40
READY
MALARIA
SUMMIT
LONDON

ZERO BY 40

Thinking Differently

Chris Larkin
Head of Communications
and External Relations

To effect change the leaders recognized that they needed to think differently, to be bolder in their ambition

In January an unprecedented meeting took place at the World Economic Forum in Davos. Facilitated by IVCC, the CEOs of the five major research based agro chemical companies in the world met with Bill Gates to consider how they could together reinvigorate the journey towards malaria eradication, a battle which has worryingly stalled.

To effect change the leaders recognized that they needed to think differently, to be bolder in their ambition, to do things differently. In that meeting they laid the seeds to finding ways to collaborate in ways that they have never done before.

Deceleration
This meeting proved to be the catalyst to the signing of the ZERO by 40 Declaration just three months later at the Commonwealth Heads of Government meeting in London - a ground-breaking partnership between BASF, Bayer, Mitsui Chemicals, Sumitomo Chemical Company and Syngenta to share ideas and resources to find innovative vector control products and tools designed to combat insecticide resistance and eradicate malaria by the year 2040.

Historically, with the support of global funders and IVCC these companies have been the major driving force behind the development of vector control solutions, such as bed nets and indoor residual spraying.

Since 2000, nearly 4 in every 5 malaria cases successfully averted through intervention have been due to long-lasting insecticide treated bed nets (LLINs) and indoor residual spraying (IRS), saving millions of lives.

Commitment
In coming together under the ZERO by 40 banner, these companies are, reaffirming their commitment to use their expert knowledge and chemical resources to supply and develop innovative vector control solutions to help reduce the malaria burden, which today is increasingly being threatened by insecticide resistance.

Whilst we still have a long way to go to achieve our ambition this new initiative will not only secure the current supply of solutions, but will pave the way for desperately needed new forms of chemistry and new vector control tools to reduce the disease burden of malaria which still affects millions of people.

ZERO by 40 believes that eradication of malaria is possible. Because the participating companies, like IVCC, believe so strongly that the destination is achievable, they have set a goal to have zero global burden of malaria by the year 2040.

We encourage other organisations to join us. More information on ZERO by 40 can be found at ZEROby40.com.

ZIKA GRAND CHALLENGE

Supporting Proof of Concept projects

In the early days, tough decisions had to be recommended, particularly relating to non-industrial attempts to develop new insecticides

Although the Zika virus epidemic in South America and spate of associated birth defects have fortunately abated as populations have developed immunity, Zika remains a threat and the other diseases transmitted by the Aedes aegypti mosquito, dengue, yellow fever and chikungunya, continue to increase and threaten two fifths of the world's population.

The mosquito, well adapted to the urban environment and difficult to control, has become the most important vector of disease in many tropical and subtropical countries outside sub-Saharan Africa.

Proof of concept
IVCC has continued to support nine of the Proof of Concept innovation projects selected for funding by USAID under their Grand Challenge for Combating Zika and Future Threats. This support has involved defining the product characteristics required for adoption by control programmes and providing advice and expertise in a variety of areas tailored to individual project needs. Most of the projects have developed prototype products and demonstrated them successfully at lab and semi-field scale, with several projects going to small-scale field testing with first results expected before the end of 2018. Three of the projects started as partnerships with commercial organisations and IVCC has facilitated commercial collaborations for all but two of the remaining projects. We have been awarded additional funding from the UK government (DFID) to supplement the research work on two of the projects and to start up a further project that will test two products from the IVCC malaria pipeline in a field trial on Aedes aegypti in Mexico in 2019 as well as supporting an integrated vector management field trial against this mosquito species in Malaysia.

Insecticide resistance is an increasing problem in Aedes mosquitoes. Four of the projects involve solutions that overcome existing resistance mechanisms, two of which are promising biorational insecticides (based on biological systems). One of the biorational insecticide projects offers exciting potential as a technology platform for the generation of several novel, effective and safe active ingredients and has been supported by IVCC with regulatory and formulation expertise as well as arranging collaboration with suitable formulation and production organisations and a potential industrial partner.

Volatile Pyrethroids
A further three projects are based on emanation of volatile pyrethroids to provide a zone of protection around the users, indoors or outdoors. The active ingredients involved are known to be less affected by a common insecticide resistance mechanism than other pyrethroid products. IVCC has commissioned a study in LSTM to examine this in detail, to understand the impact that resistance is likely to have on these volatile pyrethroids, involving a programme of bioassay and biochemical testing with characterised resistant strains.

Project extension
The USAID Zika Grand Challenge has been extended to September 2019 and IVCC will continue to support the initiative to its conclusion. A dedicated External Scientific Advisory Committee set up by IVCC has helped not only to guide and advise the projects but also to assess their suitability for funding beyond Proof of Concept stage, considering their potential for malaria as well as Aedes-borne diseases.

Several of the projects are relevant to vector control in the Indo-Pacific region where IVCC has been awarded funding by the Australian government (DFAT), and this will provide a further opportunity to extend the support for those that appear most likely to make a significant contribution to reduction of vector-borne disease in this region.

Dr Julian Entwistle
Program Manager

Finance Report 2017/18

Duncan Preston
Finance Director

Financial audit and governance

Financial Governance
IVCC is a not for profit company limited by guarantee with charitable status in both the UK and US. The annual statutory accounts of IVCC are audited by Grant Thornton UK LLP. This ensures compliance with FRS 102, the Companies Act 2006 and the Charities SORP.

IVCC benefits from shared accounting and audit arrangements with its host institution the Liverpool School of Tropical Medicine (LSTM). A finance and investment committee made up of senior employees and trustees external to the organization give governance oversight on all financial operations of IVCC and meet 4 times a year. A specialist taxation service is provided externally. The team has extensive knowledge of all major funders within the sector and the expertise to comply with all external funder audit requirements.

All internal audit work is carried out externally by RSM Risk Assurance Services LLP, part of a global group specializing in audit, tax and consulting services. RSM's remit is to provide independent and objective assurance to add value and where appropriate make recommendations to strengthen governance and control processes and identify opportunities for operational efficiencies adopting a risk-based approach. An audit committee exists to oversee all recommendations made.

At the request of the audit committee and in light of IVCC's organizational changes and growth in funder and employee base, a bespoke internal audit assignment was commissioned during the year with the objective of ensuring that IVCC had progressed key actions identified at a Retreat held in April 2017. This audit was in addition to the regular cycle of internal audit reviews. RSM concluded that IVCC had made reasonable progress in implementing actions identified during the Retreat.

IVCC received an unqualified and unmodified clean statutory audit report and no significant control issues were identified by the external auditor.

Value for Money (VfM)

Value for money is important to IVCC and its donors.

Responsibility for the delivery of VfM is recognized at IVCC and LSTM by virtue of the group operating an integrated purchases and procurement function. This enables IVCC to benefit directly and indirectly from the synergies generated by this centralized procurement function.

The LSTM group VfM Steering Group was established in October 2015 with direct responsibility for monitoring the LSTM group's VfM programme and for driving forward the Strategy.

The VfM Strategy, approved by the audit committee has the following objectives:

- To appraise the institution's operational effectiveness and increase the efficiency and effectiveness of our systems and processes that seek to fulfil the corporate strategic plan;
- To embed the pursuit of increased efficiency and effectiveness while maintaining costs to affordable levels throughout all layers of management in the institution;
- To include a balance between economic and social factors, to help meet our sustainability aims;
- To challenge current practices and approaches in order to improve performance and position the institution to meet future challenges; and
- To apply the lessons learned from investigations and reviews in certain areas, to other areas in order to maximise the benefit of this work.

Work began in 2016/17 to implement an eProcurement system. The benefit of such a system are numerous. The first phase saw improvements to supplier management, the tendering process and supplier contract management.
The second will see the introduction of a purchase to pay system. Benefits such as online catalogues, online workflows, automatic ordering and receipts and electronic invoicing will revolutionise the procurement function in both LSTM and IVCC.

The system went live at the beginning of the 2018/19 financial year by way of a phased rollout commencing with nominated departments of LSTM. It is anticipated that IVCC will be brought on stream over the coming months.

Another major systems innovation that was launched in the 2016/17 financial year, was to automate many workflow processes to an electronic platform called FlowForma (a Business Process Management tool which sits on the Sharepoint platform).

Workflows that went live in 2016/17 have been refined and the first transaction flow to move to an end-to-end paperless process went live in 2017/18.

The FlowForma platform continues to generate further efficiency savings and will ultimately eliminate the need for paper-based completion and authorisation in a safe and secure environment.

IVCC made further progress in the process of investing in its business intelligence capability using Microsoft Power BI which introduces real time dashboard reporting for budget holders. IVCC's complex specifications, which include the capability to report in two functional currencies, required the engagement of an IT consultant.

A test file built to reporting specifications has been created and the intention is for this to be launched in the coming year.

IVCC's Portfolio Management team is poised to launch a client relationship management and project management tool using a CRM software application of Salesforce.

This has been tailored to IVCC's unique specifications.

This centralized planning and management tool is expected to be used primarily by the project delivery teams, however this information will augment and make project update dashboards readily available to the finance team for budget and forecasting purposes.

UK referendum on EU membership

On 23 June 2016, the UK voted to leave the European Union. The implications for organisations are in most cases still not yet clear, but following the referendum result, IVCC will continue to review what the key implications and impacts are likely to be. Factors still likely to be specifically relevant to IVCC include the following:

- Currency volatility
- Ability to apply for EU research funding
- UK may experience a loss of influence over EU policy in areas such as science and public health
- Restriction in the movement of labour across borders
- The general macro-economic position across Europe

Finance

Financial performance

Income for the year of £28.8m was around £7.7m up from last year, with resources expended of £28.9m up by £9.7m giving a deficit of £0.1m before other recognised gains and losses. As reported in the previous year's report, IVCC started hedge accounting under FRS102 in relation to forward contracts from 2016/17 onwards.

The statement of financial activities reflects an amount of £0.3m of foreign exchange loss which has been taken to the hedging reserve and £0.1m foreign exchange loss taken to expense in the year. Market currency fluctuations dictate the level of gain, or loss recognized in the accounts from year to year, which is out of the control of IVCC.

A total of £21.7m was spent on direct charitable project activities (2017: £14.4m) with a further £1.8m paid out on project activities undertaken in-house. Core administration support costs of £5.1m (2017: £3.9m) were also incurred in the year.

Income in 2017/18 was originally budgeted at £30.3m (2017/18 actual - £28.7m). This periodic underspend is the result of evolving scientific plans and their impact on key assumptions underpinning the phasing of expenditure and activities. It is forecast in 2018/19 that income will increase by £9.5m to £36.3m. This reflects an estimation of existing and anticipated new grants that were finalized post year-end.

DFID executed a £25m funding award through a Memorandum of Understanding ('MoU') covering the period 1 April 2017 to 31 March 2021. The first two tranches of funding totalling £4m were claimed and received in 2017/18 and a supplementary £1.4m was made available to IVCC post year end.

	2018/19*	2017/18	2016/17	2015/16	2014/15
Income	£36.29m	£28.50m	£20.81m	£18.58m	£9.91m
Expenditure	£36.29m	£28.86m	£19.16m	£18.28m	£9.61m
Surplus/(Deficit)	-	£(0.36m)	£1.65m	£0.30m	£0.31m

** forecast numbers*

Reserves policy and going concern

Unrestricted reserves of £2.3m (2017: £2.4m) are used to finance activities currently out of scope with existing funders, but within the overall mission and objectives of the organisation. Whilst IVCC does not have a policy of maintaining reserves at a specific level, or within a specific range, resources are managed and committed within a framework of financial planning that ensures it holds sufficient reserves and liquid resources to fulfil the commitments that it enters into.

No contract is entered into unless it can be fully resourced from beginning to end; this includes staffing contracts, partner contracts and all contracts in the supply chain.

IVCC has a healthy bank balance of £23m, no loans outstanding and a strong, diversified portfolio of active grant agreements.

Being part of the wider LSTM group gives IVCC enhanced security in the event of any future cash flow issues, or financial difficulty that may arise. The organisation benefits hugely from this synergistic relationship in terms of high quality shared services, scientific resources and knowledge.

Investments

IVCC continues to use a conservative investment strategy using a combination of money market deposits and secure US government and corporate bonds, in line with current unsettled market conditions. Consequently, returns are low on both the sterling and dollar funds held. Interest received during the year will be used to fund future project activity.

Funding mix

BMGF provided 27% of the charity's income in the year, down from 45% in 2016/17 which is a measure of growth in the overall grant funding base.

IVCC continues to diversify its funding base to provide a stable platform from which to deliver its mission. Funding from DFID has increased from 20% last year to 27% in 2017/18 following DFID's £25m funding award in 2016/17.

The contribution from Unitaid for work on the NgenIRS project was the largest percentage contribution (40% of funded activities in the year) and this percentage may rise further still in 2018/19 pursuant to the award of the New Nets project post year-end as detailed in the Funding section.

However, this money is ring fenced for specific implementation work on these market intervention projects.

The remaining 6% of income was split 5% USAID, and 1% from other donors, including bank interest and foreign currency fluctuations.

It is forecast for 2018/19 that the contribution from BMGF will account for around 30% of the total funding received, with Unitaid at 37%, DFID at 18%, USAID 6%, new funder DFAT 6%, with other income including core funding from SDC making up the remainder.

Funding requirements 2018-2025

Forecasting long term funding and income scenarios enables IVCC to manage its product portfolio more effectively.

It provides a base analysis for fundraising activities aimed at financing the portfolio in line with latest projections, operational updates and provides a framework for negotiation with recipients of IVCC sub-awards and proving updates to key stakeholders including IVCC's funders.

All this work will only be possible if IVCC continues to receive financial and holistic support from its funders.

During this financial year, IVCC has signed the following new grant and cooperative agreements:

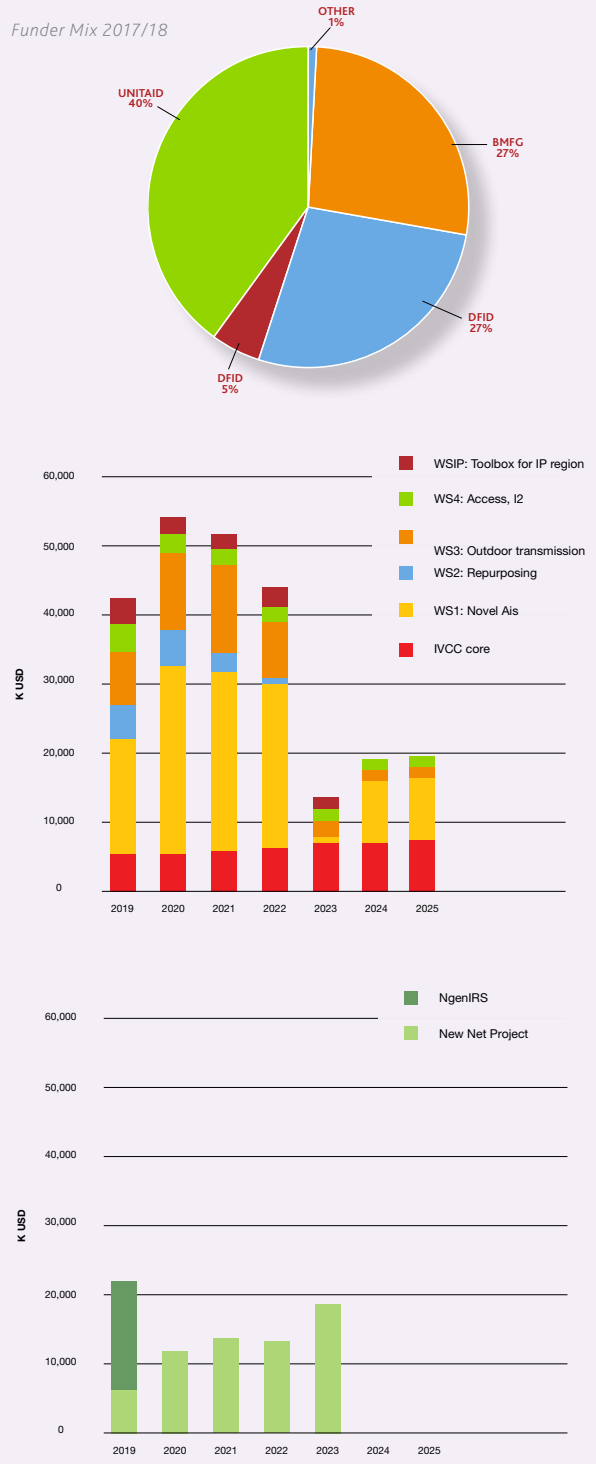
- AUS$ 18.75M from the Commonwealth of Australia (acting through its Department of Foreign Affairs and Trade "DFAT") for the development of a Vector Control Product Toolbox for the Indo-Pacific Region. This agreement confirms the introduction of DFAT as a new donor relationship within IVCC's funding portfolio.
- £1.4M from DFID increasing the award under the MOU signed on 21 July 2017 from £25m to £26.4m, core funding IVCC's work.

Since the year end, IVCC has signed the following grant and cooperative agreements:

- $66M from Unitaid to lead a market-based intervention project for Long Lasting Insecticidal Nets (New Nets Project).
- $3.1M awarded by The Bill & Melinda Gates Foundation to supplement Unitaid's New Nets Project.
- £2.5M from the Swiss Confederation (acting through the Swiss Agency for Development and Cooperation) by way of a core contribution under a grant funding agreement.

The total funding required to enable IVCC to meet all its objectives up to 2025 is highlighted here. Funding for product development is dominated by the new active ingredients portfolio until 2022, when funding requirements for this work stream reduce significantly.

Funding for market shaping intervention activities are currently fully funded until 2023. However, substantial resources are still required to bridge the funding gap to fully implement IVCC's strategic plan in the longer term. This is only one of several possible scenarios that IVCC are currently modelling.



IVCC 2018

SVETLANA RYAZANSKAYA
Project Manager

Svetlana joined IVCC in May 2018 as a Project Manager to support IVCC's product development portfolio. After graduating from the First Pavlov's Medical University in St. Petersburg, Svetlana completed her PhD in Cell Biology and Human Sciences at the University of Manchester. Following her PDRA research at the University of Manchester, Svetlana went on to work for Unilever as a Senior R&D Manager and Advanced Separation and Characterisation Team Leader. There she focused on building strategic partnerships with academia, external laboratories, Global R&D experts, including cross-fertilisation of ideas between Academia and Industry.

GARY WARD
Administrator

Gary joined IVCC in March 2018 as a Logistics Administrator primarily arranging travel for staff and consultants as well as assisting with other administration duties including liaising with finance. He previously worked at BCD Travel as a business travel consultant after spending time working in financial services in the far east.

XAVIER LACOUR
Market Access Development Manager

Xavier Lacour joined IVCC Access team end of January 2018 as Access Development Manager. Xavier has 20+ years of experience in pharmaceutical industry, consulting and entrepreneurship. He has held various positions in Marketing, Market Access and Public Affairs at national and International level to prepare and execute the launch of 12 vaccines at SpMSD, Novartis Vaccines and GSK successively.
In his recent roles as Head of Public Affairs France, he has been keen to mobilize or set up partnerships with most of the stakeholders of the healthcare system on public health related projects. Xavier holds an Engineering degree from a French college (Ecole Centrale de Lille) and an INSEAD MBA. He speaks French, English and Spanish.

NEW IN 2017/2018

CORE SUPPORTERS

Thank you to our generous funders, whose partnership makes life-saving vector control possible.

The Bill & Melinda Gates Foundation and IVCC are a long-standing partnership. BMGF works to tackle critical problems worldwide through building partnerships across the globe. The Global Development Division seeks to help the world's poorest people help themselves in alleviating hunger and poverty, harnessing advances in science and technology to save lives in poverty-stricken areas in the world. BMGF emphasises collaboration, innovation, risk-taking and results, which fits precisely with IVCC's mission and achievements. BMGF recognised the urgent need for new vector control tools to fight malaria and other insect-borne diseases and supported the establishment of IVCC as a product development partnership to make it happen.

Ukaid is the public face of the Department for International Development (DFID), which is the UK government department with a mission to promote sustainable development and eliminate world poverty. DFID aims to halve the number of people living in extreme poverty and hunger, combat HIV, AIDS, Malaria and various other diseases, and build partnerships across the world to support development. DFID's partnership with IVCC has provided a substantial boost to the practical task of developing effective vector control approaches, such as insecticide treated bednets, that have substantially reduced child and maternal deaths and the overall incidence and death rate from malaria.

Unitaid is engaged in finding new ways to prevent, treat and diagnose HIV/AIDS, tuberculosis and malaria more quickly, affordably and effectively. It turns game-changing ideas into practical solutions that can help accelerate the end of the three diseases. Established in 2006 by Brazil, Chile, France, Norway and the UK to provide an innovative approach to global health, Unitaid plays an important part in the global effort to defeat HIV/AIDS, tuberculosis and malaria, by facilitating and speeding up the availability of improved health tools, including medicines and diagnostics. Unitaid funds the IVCC NgenIRS market interventions programme to address factors hindering wide-scale use of new resistance breaking insecticides.

USAID is the leading US Government agency, which works to eradicate extreme global poverty, and allow for resilient, democratic societies to realise their own potential. USAID's mission seeks to promote economic prosperity, protect human rights, provide humanitarian assistance in all disasters, strengthen and promote democracy and improve global health.

The Australian Government's Health Security Initiative for the Indo-Pacific region, launched by the Minister for Foreign Affairs on 8 October 2017, contributes to the avoidance and containment of infectious disease threats with the potential to cause social and economic harms on a national, regional or global scale. With funding of AU$300 million over five years from 2017, the Health Security Initiative aims to inform evidence-based planning, help prevent avoidable epidemics, strengthen early detection capacity, and support rapid, effective national and international outbreak responses.

The Global Fund is a 21st-century partnership organization designed to accelerate the end of AIDS, tuberculosis and malaria as epidemics. Founded in 2002, the Global Fund is a partnership between governments, civil society, the private sector and people affected by the diseases. The Global Fund raises and invests nearly US$4 billion a year to support programs run by local experts in countries and communities most in need.

The Swiss Agency for Development and Cooperation (SDC) is Switzerland's international cooperation agency. SDC's humanitarian aid seeks to reduce global poverty through a variety of methods. This is promoted through fostering economic self-reliance and state autonomies, finding solutions to environment problems, problems in regards to access to education and basic healthcare, and enabling access to resources and services to the greatest number of people. SDC's support to IVCC acknowledges that many of the poorest countries in the world suffer from endemic malaria, which not only kills and incapacitates large numbers of people, but also seriously damages economic development.

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