vector control

saving lives

IVCC

Annual report 2015-16

Effective vector control has been the backbone of the tremendous progress we've seen in malaria control over the past decade. Millions of children in villages across Africa are alive today because they slept under an insecticide-treated bednet or in a house protected by indoor residual spraying.

Rear Admiral Tim Ziemer,
President's Malaria Initiative

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Protect the community

A little bit of mosquito killing can go a long way

Dr Tom Churcher
MRC Centre for Outbreak Analysis and Modelling, Imperial College London

Novel ways to kill mosquitoes are urgently needed if recent advances in the control of vector borne diseases are to be maintained

Mosquito borne diseases such as malaria, dengue, chikungunya and zika cause huge suffering and death. Killing mosquitoes remains the most effective way of controlling these diseases. It is so effective because it not only reduces the number of mosquitoes out there looking to bite but it also lowers their average age.

Mosquitoes don't normally live very long and it often takes a relatively long time for a mosquito infected with a parasite or virus to become infectious. For example, it will take at least 10 days for a mosquito infected with malaria to be able to transmit the parasite to someone else. This means that only the older mosquitoes are dangerous. If we can lower the average age of the mosquito population sufficiently we can halt transmission of the disease. A little bit of mosquito killing can therefore go a long way.

Effective

The widespread use of bednets have been immensely effective at preventing malaria. They do it by stopping the mosquitoes which spread the disease (and which predominantly feed at night) from biting people sleeping underneath. This is only part of the story as if the net is treated with insecticide it should kill any mosquito it comes into contact with. Mosquitoes entering a house for a meal should get killed in the process. Using an effective insecticide treated bednet, not only protects someone whilst they are underneath, but by killing mosquitoes it reduces their chance of getting infected when not under the net. A substantial proportion of mosquito bites typically occur before people go to bed or soon after they get up. Using a bednet which kills mosquitoes also provides a level of protection at these times. It also protects the wider community, as every mosquito which dies prematurely lessens the chance that others around them are bitten, lowering the average age of the mosquito population and reducing malaria transmission.

Resistance

There is a growing realisation that insecticide resistance may be a threat to malaria control. Widespread evidence indicates that mosquitoes are less likely to be killed by pyrethroids, the only class of insecticides currently approved for use in bednets.

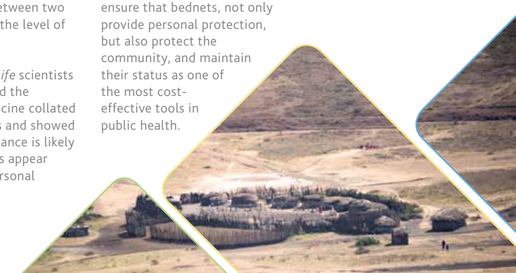
Though we know that the mosquitoes are less susceptible to pyrethroids, the impact of this on public health remains unclear. The number of malaria cases in an area is influenced by many factors, some of which are difficult to measure. It is also hard to accurately assess the level of pyrethroid resistance in wild mosquito populations so it is hard to tell whether differences in malaria between two locations is due to differences in the level of pyrethroid resistance.

In a recent article published in *eLife* scientists from Imperial College London and the Liverpool School of Tropical Medicine collated data from experimental hut trials and showed that the level of pyrethroid resistance is likely to determine its severity. Bednets appear to be providing a high level of personal protection even in areas with moderately high resistance. It is only when less than 50% of mosquitoes are killed in experimental hut trials that volunteers start to get increasingly bitten whilst under a net.

However what experimental hut trials cannot directly measure is the loss of the community impact caused by killing mosquitoes. As resistance spreads mosquitoes appear to be surviving to bite another day and the older the mosquito population gets the more deadly it becomes. If bednets are no longer killing mosquitoes and lowering their average age, then mathematical models suggest that a major component of bednet effectiveness is lost.

Urgent

Novel ways to kill mosquitoes are urgently needed if recent advances in the control of vector borne diseases are to be maintained. The drive to eliminate malaria will require the mass distribution of insecticide treated bednets, although it is imperative that they are working effectively. New insecticides and technologies will be needed to ensure that bednets, not only provide personal protection, but also protect the community, and maintain their status as one of the most cost-effective tools in public health.



Look to the future

Additional funding leads to a widening of areas of work

Sir Mark Moody-Stuart
Chairman, IVCC

This year has marked both a turning point and a period of growth for IVCC. The original objective of developing with industry partners three new resistance beating insecticides looks to be within reach. By the end of the year we had four new compounds going through the predevelopment phase so that we can now be reasonably confident that the initial goal can be achieved. That goal was funded by an initial generous five year grant of $50 million from the Bill and Melinda Gates Foundation (BMGF), followed by a further similar five year grant.

Gaps

Although there remain some gaps to achieve the full development funding we can be much more confident that with the cooperation of our industry the development of the three new compounds is achievable.

For the first time this year, IVCC funding from the BMGF has fallen to below fifty percent. This is in no way due to a decrease in funding from our original funders as indeed we have just received our third and largest grant of $75 million over five years from BMGF. It is rather due to an increase in funding from others such as UKAID, USAID and most notably a $64 million grant from UNITAID.

Along with this additional funding comes a widening of areas of work so that the development and regulatory approval of the new active ingredients is accelerated as well as supporting disease endemic countries in the application of new insecticide. This includes NgenIRS, which is hosted by IVCC and funded by UNITAID.

Congratulations

Great thanks and congratulations are due to the small but growing IVCC team led by CEO Nick Hamon. IVCC is a unique networked organisation with staff located in the UK, France, Norway and the US. It is a great credit to Nick and the team that they have handled the challenges of working in a virtual organisation, building and maintaining close contacts and relationships with both our industrial partners and our funders, who are themselves located in many countries and time zones. Thanks to this and to continued support from industrial partners and funders, we can look to the future with considerable confidence.

Thanks to the growing team and to continued support from industrial partners and funders, we can look to the future with considerable confidence

What our funding partners say

I'm a physician who is used to killing very different kinds of bugs, but I am also a physician dedicated to effective framing of problems and efficient product development. IVCC is working on some challenging developmental problems, the solutions to which are essential for the successful eradication of malaria and control of other vector-borne diseases. During the last 11 years, IVCC has evolved appropriately from finding the nature of the challenges, the solutions to those challenges, and, more recently, the solutions to those challenges. There are always risks, but IVCC has navigated them successfully so far and it is poised to provide the tools that vector control so badly needs.

Dr Dan Hartman
Director of Integrated Development and Interim Director, Malaria, Bill & Melinda Gates Foundation Global Health Program

Effective vector control has been the backbone of the tremendous progress we've seen in malaria control over the past decade. Millions of children in villages across Africa are alive today because they slept under an insecticide-treated bed net or in a house protected by indoor residual spraying. But the mosquitoes will always find a way around the insecticides we have today. PMI greatly values our crucial partnership with IVCC to push forward on new vector control tools in the fight against malaria. Success in doing so will be central to bringing a malaria-free world closer within our sights.

Rear Admiral Tim Ziemer
President's Malaria Initiative

This model of partnerships dovetails nicely with Switzerland's commitment to engage in partnerships with the private sector to gain access to knowledge and expertise, mobilise resources and promote innovation for public goods in health. IVCC, as the only PDP working in public health vector control, makes a tremendous contribution to reversing the raising problem of vector-borne diseases.

Suzanna Hausmann
Swiss Agency for Development and Cooperation

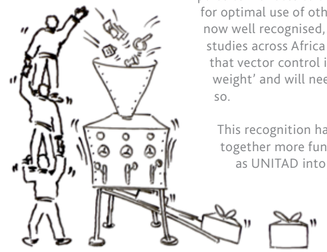
Tackling the challenges

The importance of effective vector control is now well recognised

The global malaria community has done a notable job of delivering on the Millennium Development Goals, halving the global incidence of malaria the last 15 years; but there is more work to be done. Malaria is still the leading cause of poverty in Africa and a child dies needlessly from malaria approximately every minute. Malaria can be eradicated, but it is extremely unlikely that eradication will depend on a single product or solution, but rather a suite of tools that include drugs diagnostics, vaccines and novel vector control tools. Creating the eradication toolbox requires broadly based partnerships that brings together the entire stakeholder community.

IVCC's mission is to support the malaria and NTD eradication agenda, bringing new tools and products to failed public health markets that can combat the rapidly growing problem of insecticide resistance. The importance of effective vector control to bring down parasitemia rates to a level that will allow for optimal use of other interventions is now well recognised, and data from many studies across Africa are demonstrating that vector control is 'punching above its weight' and will need to continue to do so.

This recognition has not only brought together more funding partners such as UNITAD into vector control but also secured the long term support of the Bill & Melinda Gates Foundation, USAID, SDC and UKAID. IVCC has worked hard to build a good relationship with its funding partners, but maintaining those relationships requires transparency, resisting overpromising while under-delivering and at the same time taking a true partnering approach.



Product Development Partnership (PDP) is a proven model for global collaboration

Product Development Partnership (PDP) is a proven model for global collaboration, providing a centralized product focused expert knowledge hub investing solely in R&D in failed public health markets. In the PDP model, governments, philanthropists and the private sector pool funding, sharing costs and associated risk on commercially-oriented product development goals while operating free of national, regional or local politics. PDPs apply rigorous portfolio management strategies and oversight, ensuring programs are conducted efficiently and with independent expert review.

As IVCC moves its product portfolio one step closer to market, old challenges are solved as new challenges emerge. However, ever-present is sustainable funding, which ties strongly to risk management. More funding helps to de-risk the highly risky product development process. Crop protection industry data from 2016 shows that only 1.5 novel compounds out of 160,000 will survive from discovery through to the pre-development phase; and only one through to market.

IVCC has promised new public health insecticides, each with a mode of action novel to vector control. This will allow us to create a toolbox that, through well-considered resistance management strategies, will take us all the way through to eradication in 2040 or earlier. This means that, in order to guarantee three new products in the shortest possible time, IVCC needs to support backup and follow-up chemistry through the pre-development phase as possible replacements when technical challenges are encountered.

Dr Nick Hamon
Chief Executive Officer
IVCC

Other challenges include fully understanding how best to leverage the new WHO Prequalification process to reduce the time to market, ensuring we develop high quality data through the gradually emerging Good Laboratory Practice accredited field sites around the malaria world, building robust Insecticide Resistance Management (IRM), Integrated Vector Management (IVM) and Integrated Tools Management (vector control, drugs, vaccines and diagnostic tools) strategies.

Finally, we are working to create a Global Access Strategy that ensures that new life-saving products are made available, affordable, acceptable, and adopted by implementers in target countries.

Working in true partnership with all stakeholders, we have a tremendous opportunity to tackle all the key challenges of product development.

Data from many studies across Africa are demonstrating that vector control is 'punching above its weight'

Tough testing for lead chemistries

Turning the best compounds into effective products

Sarah Rees
Portfolio Manager

The development of new insecticides for vector control is crucial to the fight against malaria. It is also increasingly urgent, as insecticide resistance is widely reported across Africa to all classes of public health insecticides approved for use today.

In 2016 work has continued apace with IVCC's partners to identify the very best compounds to develop for new indoor residual spraying (IRS) and long-lasting insecticide treated bednets (LLINs). We are investing in formulation to ensure products are fully effective for six months on walls and for three years on a bednet. We test chemistry to ensure it will be safe to use in people's homes and we optimise the economics of production. Some leads have fallen at these hurdles, which is normal in product development. Our job is to make sure we can identify the winners and focus our resources on turning them into effective, viable products.

Partners
The leads for vector control product development come from all three of IVCC's long-standing industrial partners, Bayer, Sumitomo and Syngenta. We are now pleased to be partnering with Mitsui on the development of an exciting chemistry which they have brought to IVCC.

Moving products on into full development will mean significant investment. This will be recommended only if there is strong evidence that the product can successfully navigate the challenges of the development process, and if it is likely to establish a strong position in the market place.

We use a rigorous stage gate process to manage IVCC investment choices that addresses all aspects of product development:

- Is it effective for field control of insecticide resistant mosquitoes?
- Can it be made at a bearable cost and scale?
- Will users understand it to be cost effective and attractive to use?
- Will it be used in a way that prevents insecticide resistance occurring?
- Will it provide a return on investment over the long term?

Time-consuming
The rigorous testing required to bring a new product successfully to the market is time-consuming, and it is important to look for ways to minimise the time for product development and approval in order to deliver the benefits to the people whose lives are affected. IVCC partners optimise project timelines, for example, by planning to run activities in parallel. IVCC is supporting the 'Innovation to Impact' (I2I) initiative, with the aim of streamlining product review and approval processes in WHO.

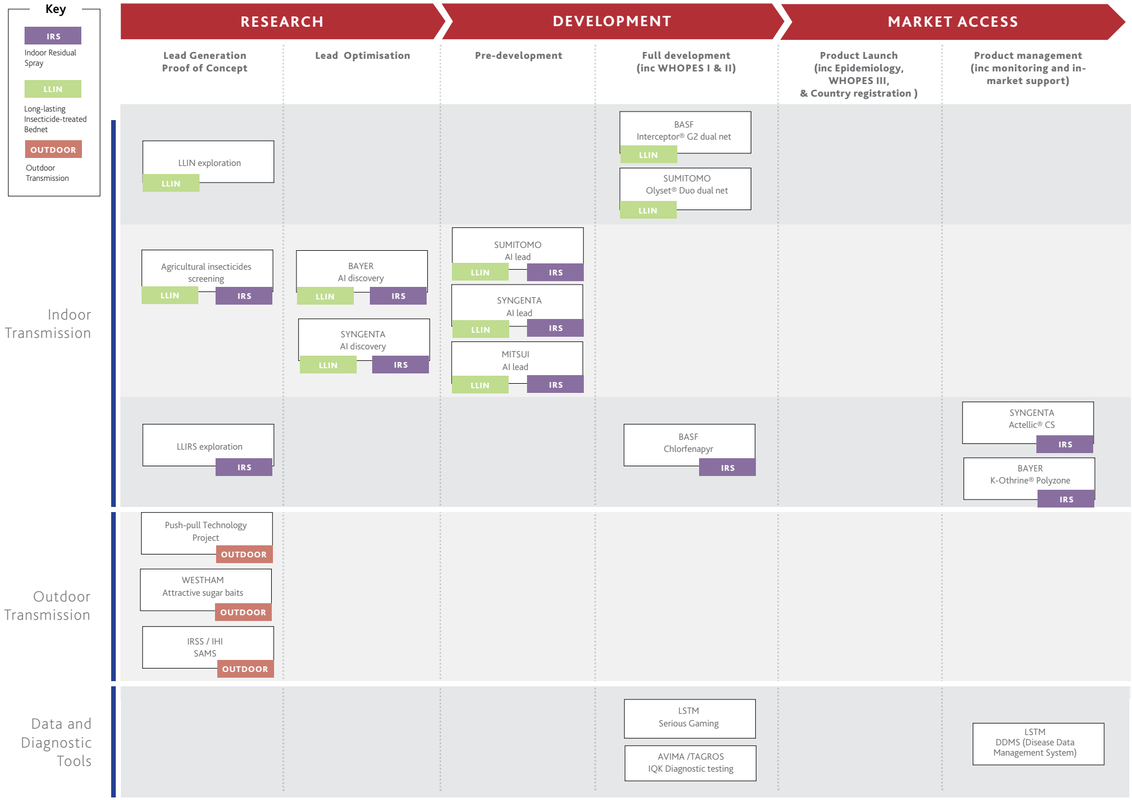
The introduction of new chemistries to the market must be carefully managed if we are to avoid wasting the investment in discovery and product development through the untimely development of resistance to new insecticides. For this reason, the development of mixtures of more than one chemical class is important, and particularly for LLINs, where the product is expected to perform for three years. Exposure of a single chemistry to many successive generations of mosquitos over this length of time creates a situation with a high risk of resistance occurring. This may lead us to consider combinations of different chemistries.

The development of combination insecticide treated bednets is a key focus of IVCC's partners with access to currently registered insecticides. In 2016 IVCC has continued to support LLIN projects with BASF and Sumitomo that are already being evaluated in WHOPES. IVCC has continued to work with BASF on the development of a chlorfenapyr-based long lasting indoor residual spray.

IVCC is always interested in opportunities to partner on product development of existing insecticides into new products which will be effective against the growing challenge of insecticide resistant mosquitoes

Our job is to make sure we can identify the best compounds and focus our resources on turning them into effective products

IVCC PRODUCT DEVELOPMENT PORTFOLIO



Developing good laboratory practice

Strengthening the quality and consistency of field trial site data

IVCC's field trial partners are an important part of the process of developing novel vector control products effectively in a field context. One of the most important elements of the field trials is the quality of the data that they generate, as this is the key to establishing the true nature of the products being tested.

IVCC has been working for some time to strengthen the quality and consistency of the data from the field trial sites it works with. Our first 'QA Management for Vector Control Studies Workshop' was held in Liverpool in 2011.

Since then we have provided further support to facilities in the development of Standard Operating Procedures (SOPs), auditing of facilities, and arranged follow-up workshops in both Tanzania and Benin as further support to our collaborating trials sites.

In July2016, IVCC sponsored a Good Laboratory Practice (GLP) workshop, which was hosted by the Killimanjaro Christian Medical University College (KCMUCo) in Moshi, Tanzania. The workshop was led by Alex Wright (LSHTM) and Graham Small (consultant) and focussed on how institutions and testing facilities in Africa can develop and implement pathways for GLP compliance and certification in relation to the testing of vector control products.

It was attended by representatives from numerous African institutions that are taking part in the roll-out of GLP to trials sites as part of the WHO transformation process under the Innovation to Impact (I2I) initiative. Attendees also included Mr Shadrak Phophi from the South African National Accreditation Service (SANAS), which is the GLP monitoring authority under which KCMUCo has applied for GLP certification.

KCMUCo has reached the point where it has started its first GLP vector control study, which will lead the way for manufacturers of vector control products to generate their own efficacy data for inclusion in their product dossiers for submission to the Pre-Qualification Process (PQ). This will replace the current WHOPES evaluation process.

Reaching this important milestone is a major achievement for KCMUCo, and credit is due to all of the staff there who have implemented enormous changes in relation to their facilities, working practices and culture over a relatively short but intense period of time. Establishment of GLP vector control product testing first in Moshi, with numerous African facilities following close behind, represents a major step forward for vector control testing, which will be key for delivering the IVCC mission and malaria elimination in the future.

David Malone
Technical Manager
IVCC

Establishment of GLP vector control product testing represents a major step forwards for vector control testing

Accelerating next generation IRS

Overcoming the barriers to Access

David McGuire
Programme Director
NgenIRS

Managing insecticide resistance is one of the most important challenges malaria control programmes face.

On February 1, 2016 representatives from UNITAID and IVCC met in Geneva at UNITAID's headquarters to sign a contract for the Next Generation IRS project (NgenIRS).

The project will employ a series of market interventions to address the factors hindering wide-scale use of new, longer lasting resistance breaking insecticides (e.g., high prices, limited competition, small and volatile market and lack of evidence of cost effectiveness). This long anticipated event was the culmination of two years of co-development of the project concept and negotiations between IVCC and UNITAID.

The $65.1 million NgenIRS project has partnered with the U.S. President's Malaria Initiative, Abt Associates, PATH and the Global Fund to work with industry and country malaria control programmes to make alternative insecticides with high efficacy more readily available in countries with a high malaria burden. It represents IVCC's first initiative under our Access strategy to ensure that the products we help develop become accessible to those who need them in a timely and sustainable manner.

NgenIRS will do this by overcoming the above-mentioned constraints through a series of market interventions designed to:

- accelerate uptake of 3rd generation IRS (3GIRS) products;
- improve global forecasts for 3GIRS products;
- facilitate the introduction of competition with new quality assured products from several manufacturers;
- reduce prices through co-payments, reliable and guaranteed forecasts; and,
- document and disseminate evidence showing the cost effectiveness of 3GIRS products.

During 2016 NgenIRS-supported spraying of 3GIRS has been completed in Ethiopia, Mali, Rwanda and Zambia where a total of 5.7 million people were protected. An additional eight malaria control programmes have been approved for 2017, tripling the number of partner programmes over 2016. Countries whose programmes will benefit from NgenIRS support starting in 2017 include: Benin, Ghana, Kenya, Madagascar, Tanzania/Zanzibar, Uganda and Zimbabwe. NgenIRS will also support two Global Fund Primary Recipients: AngloGold Ashanti in Ghana; and the National Malaria Control Programme in Mozambique. In 2017 NgenIRS support will result in over 21 million vulnerable people being protected with 3GIRS, 5.5 million more than would have been possible without NgenIRS support.

Other key activities underway include the development of a reliable global forecasting tool and a price elasticity study. The forecasting tool will allow NgenIRS to provide a volume guarantee to 3GIRS manufacturers in return for a significant discount, allowing for the increased coverage.

During the last IVCC Board of Trustees meeting and following a presentation of the first four months of NgenIRS, Rear Admiral Tim Ziemer, Co-ordinator of the United States Presidential Malaria Initiative (PMI), made the following comment: "In my ten years of doing work on malaria I have never seen a project accomplish so much in so little time. The work being done by NgenIRS is critical to our mission. UNITAID and IVCC deserve a lot of credit".

There is currently only one WHO recommended 3GIRS product (Actellic® 300CS). In 2017 it is anticipated that at least one other product will be recommended by WHO for indoor residual spraying. This will increase competition and provide malaria control programs with a second insecticide that can be rotated.

By the end of 2019, the project expects at least three products to be available for use as part of an effective resistance management strategy. NgenIRS is off to a great start, demonstrating that an effective Access Strategy with sufficient funding and strong partnerships can lead to rapid impact.

NgenIRS could serve as a model for similar market shaping interventions as other vector control products come through the IVCC pipeline.

'In my ten years of doing work on malaria I have never seen a project accomplish so much in so little time. '

An effective Access Strategy with good funding and strong partnerships leads to rapid impact

Networking and debate

Stakeholder Day hears how IVCC's mission is essential to malaria gains

The work of IVCC in developing new insecticides is essential to maintaining the malaria reduction gains of the past 15 years, was the key message from Jeremy LeFroy MP, keynote speaker at the IVCC Stakeholder Day in June

Addressing a room packed with vector control specialists from around the world, Mr LeFroy, who is Chair of the All Parties' Parliamentary Group on Malaria and Neglected Tropical Diseases, said that the group was determined to see progress continue by encouraging governments to continue supporting R&D in malaria.

'There is political will by all parties,' he said, ' but it can be fragile. The public mood can change. It is up to us to show the benefits and the effects of this work.'

IVCC CEO Nick Hamon made special presentations at the Stakeholder Dinner to Egon Weinmueller, Head of Business Management Global Public Health Professional & Specialty Solutions (BASF) for his longstanding work with IVCC developing novel vector control solutions, and to Janet Hemingway (LSTM), founder of IVCC and former CEO, for her outstanding contribution to IVCC's mission since its inception in 2005.

'IVCC's success is largely due to the large degree of cooperation, commitment and skill we get from our partners in the vector control community,' he said. 'Their involvement in our mission from the beginning has made a major contribution to the lives saved and misery averted through vector control.'

The challenge of future interventions

Tough questions on the way to adoption of new products

Dr Tom McLean
Head of Access

Tremendous progress has been made in the prevention of malaria in the past decade—malaria rates halved in sub-Saharan Africa between 2000 and 2015. Recent modelling indicates that vector control is the foundation of much of the success*.

That great progress, however, has been based predominantly on the use of long lasting insecticide treated nets (LLINs), for which the only one class of insecticide available is the pyrethroids. The inevitable emergence and spread of pyrethroid resistance is changing our expectations of vector control products.

As IVCC moves towards completion of the development of the various components of its portfolio we will see several substantial differences between the new vector control products and the long-lasting insecticide treated bednets (LLINs) and Indoor residual sprays (IRS) that we have been using up until now.

New vector control insecticides will not be able to achieve the economies of scale of the pyrethroids

Those differences fall into three areas: firstly, epidemiological mode of action (the way in which they work), secondly, cost of these products, and thirdly, strategies for implementation (which is consequent on the first two).

Epidemiology
Current reliance on LLINs is founded upon an excellent series of epidemiological trials executed in the 1990s with unprecedented support from WHO's Special Programme for Research and Training in Tropical Diseases (TDR). Many of the new products in the pipeline, however, do not work in quite the same way as a pyrethroid impregnated net. For example, a new insecticide may take a day to kill the mosquito rather than the rapid kill afforded by pyrethroids. Or an attractive toxic sugar bait may be effective against mosquitoes outdoors rather than indoors.

So far procurers have been unwilling to buy products that are not supported by epidemiological evidence of efficacy, but such evidence is expensive and time consuming to generate. Will this delay introduction of new products, or can we learn to "read across" with modelling from other interventions?

Cost
The second challenge lies in the cost of these new products. The pyrethroids have been highly successful insecticides in agriculture since their development in the 1960s and 70s, and, consequently, a huge investment in product and process development has driven their prices to remarkably low levels of which we are now the beneficiary.

New vector control insecticides will not be able to achieve the economies of scale of the pyrethroids and will incur substantial development costs within the companies that must be recouped. The global bill for LLINs is already around $400 million. How will the malaria community cope with increasing product costs?

Strategy
IVCC has already demonstrated the value of market interventions to accelerate uptake of new IRS products through the NgenIRS program (p14). In the future, further interventions will be needed to ensure that the products in the portfolio move smoothly from development to adoption.

Key topics for these interventions will include:

- Creating evidence of impact and cost effectiveness of new tools
- Pump priming interventions to accelerate product uptake
- Providing tools and evidence to support targeting of new products
- Supporting Advocacy for the evolution of the global funding for vector control

*The effect of malaria control on Plasmodium falciparum in Africa between 2000 and 2015
S. Bhatt, et al. Nature 526, 207–211 (08 October 2015)*

Finance

Change in UK Financial Reporting Environment

Duncan Preston
Finance Director

The Financial Reporting Standard (FRS 102), applicable in the UK and the Republic of Ireland, replaces all the UK Financial Reporting Standards and Urgent Issues Taskforce abstracts in issue prior to the new UK financial reporting regime.

This fundamental change to Financial Reporting in the UK is borne out of a wider initiative to overhaul and harmonise global reporting standards, which commenced with International Financial Reporting Standards (IFRS) which have been a part of financial reporting in the UK for listed entities since 2015.

FRS 102 is broadly based on the IFRS for small and medium sized entities. Topics relevant to IVCC, where the accounting treatment under FRS 102 differs substantially from existing UK standards, include recognition of grant income and expenditure, financial instruments, defined benefit pension schemes and enhanced narrative disclosures.

It was not deemed necessary to restate comparative items in the financial statements. This is because the policies applied under IVCC's previous accounting framework are not materially different to FRS102 and the Charities SORP (FRS102) and have not impacted on the reserves position of IVCC.

In this first year of adoption, the principal differences relate to enhanced disclosures and changes in terminology. Under the new Standard, income recognition criteria for grants receivable has changed such that matching of income and expenditure is no longer the guiding accounting principle. Income is recognised once entitlement to funds can be demonstrated and all performance conditions stipulated in the agreement have been met.

All active grant agreements were reviewed as part of the year end external audit and it was concluded that the terms of IVCC's active agreements did not warrant a change in income recognition. Future agreements entered into by IVCC could have reporting implications as a result, if this changes, and will be an area of focus for IVCC's dedicated grants and contracts teams moving forward.

FRS 102 is effective for accounting periods beginning on or after 1 January 2015. Accordingly, IVCC's annual statutory accounts for the year ended 31 July 2016 are prepared on the basis of FRS 102 and the Charities SORP (FRS 102). The annual report and financial statement include comprehensive notes to the financial statements including one off disclosures

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 (FRS102).

IVCC benefits from shared accounting and audit arrangements with its host institution the Liverpool School of Tropical Medicine (LSTM). A finance and investment committees made up of senior employees and trustees external to the organisation, gives governance oversight on all financial operations of IVCC, and meets four 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 by an independent external organisation whose remit is to provide independent and objective assurance to add value and improve the organisation's operations. This is carried out through the evaluation and improvement to risk management, governance and control processes. An audit committee exists to oversee all recommendations made.

IVCC received a clean unqualified audit report for the seventh year in succession and no control issues were identified by either the external or, internal auditors.

Value for money

Value for money (VfM) is important to IVCC and its donors.

Responsibility for the delivery of VfM is recognized at IVCC and LSTM group level 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.

From October 2015, responsibility for VfM at LSTM Group level became that of the Head of Procurement —a newly created post.

To support these key objectives, a new 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. In September 2016, LSTM signed up to purchase the NETpositive Supplier Engagement tool which will be used to critically access and develop supplier relationships.

Measurable cash savings made in 2015/16 across the LSTM group as a whole are estimated at £1.9m as well as big improvements in efficiency and effectiveness.

A major project during the year was to migrate key documents and contracts into SharePoint. A second was to automate a number of workflow processes to an electronic platform called FlowForma (a Business Process Management tool which sits on the Sharepoint platform). Existing and additional workflow processes are expected to move to FlowForma over the coming year. This will generate further efficiency savings and eliminate the need for paper based completion and authorisation in a safe and secure environment.

As reported in 2014/15, IVCC is in the process of investing in its business intelligence capability using Microsoft Power BI which will introduce real time dashboard reporting for budget holders. Reports were initially piloted by LSTM with roll out to IVCC anticipated by the end of 2016.

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 not yet clear, but following the referendum result, IVCC will continue to review what the key implications and impacts are likely to be. Factors likely to be specifically relevant to IVCC include the following:

- Currency volatility
- Ability to apply for EU research funding
- Restriction in the movement of labour across borders
- The general macro-economic position across Europe

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.

Finance

Financial Performance

2015/16 saw a growth in program activity, with total spending increasing to £18.3m and an increase in income of £8.7m representing an 87.5% increase compared to 2014/15.

A total of £15.12m was spent on direct charitable project activities with a further £3.2m paid out on project supporting activities and governance.

The new active ingredients portfolio has seen an increase in annual product development costs rising from £4.7m in 2014/15 to £5.7m in 2015/16. 2016/17 will see this figure double to £11m as the next phase of development starts. Due to the inherently developmental nature of this work stream, the rate and timing of expenditure on the active ingredients portfolio is likely to be sensitive to a number of factors not quantifiable at the annual budget determination stage (such as the performance of compounds under laboratory conditions and in field trials). These factors could influence the decision making processes which in turn could impact upon the level of expenditure that falls into the next financial reporting period or result in a redistribution of expenditure across partners and/or active ingredients. Short and long term forecasts are continually under review as a result of the fluidity that this causes and are based on current best estimates of the most likely scenarios taking into account funding parameters and effective use of resources.

	2016/17*	2015/16	2014/15	2013/14	2012/13	2011/12
Income	£30.77m	£18.58m	£9.91m	£8.79m	£8.30m	£6.07m
Expenditure	£30.49m	£18.28m	£9.61m	£8.25m	£8.30m	£6.07m
Surplus/(Deficit)	£ 0.28m	£ 0.30m	£0.31m	£0.54m	-	-

*forecast numbers

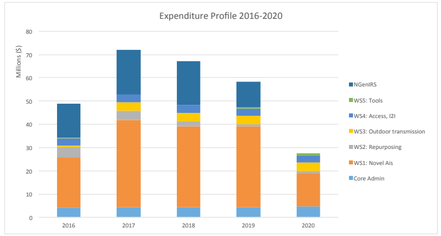
Costs for diagnostic tools and data management systems increased to £0.9m of which £0.5m related to the roll out of DDMS in Zambia. A further £0.2m has funded the development of the training application known as Resistance Sim.

Spend of £0.9m on outdoor transmission activity represents a 50% increase on 2014/15 levels and was funded by a £1m grant supplement from BMGF.

There was additional spend of £0.7m on repurposing projects that are on-going. Two dual AI nets are expected to be submitted for review in 2016/2017. Two new long-lasting IRS product testing projects, and a development of a non-pyrethroid net project were started in 2016. Additional proposals are under review demonstrating the role of IVCC as a catalyst of innovation.

In January 2016, IVCC was awarded $65m from UNITAID to launch a project that will combat resistance to insecticides by improving access to new, low-cost anti-mosquito sprays across Africa. The Next Generation Indoor Residual Spray project, known as NgenIRS, will support countries in obtaining new and effective insecticides at lower prices to spray walls in homes and fight growing insecticide resistance. Over four years, the project aims to protect as many as 50 million people from malaria in 16 African countries. A lifetime budget of $65m was approved of which £5m was expended in 2015/16. UNITAID is a new funder for IVCC and has required the recruitment of a dedicated programme team to manage the delivery of the single largest project in IVCC's current portfolio.

Core administration support costs of £1.6m were also incurred in the year representing 8.8% of total cash received from donors.



Funding Mix

BMGF provided 44% of the charity's income in the year, down from 73% in 2014/15.

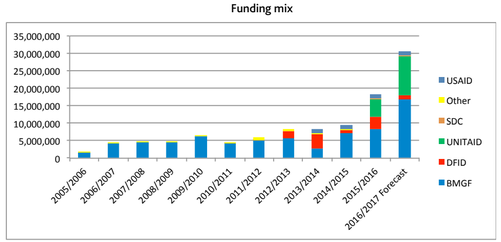
This encouraging diversification of the funding base is broadly represented by funding for IVCC's first project with UNITAID, accounting for a further 26%. However, this money is ring fenced for specific implementation work on the NgenIRS programme.

The remaining 30% of income was split 19% DFID, 6% USAID, 3% the Swiss Development Corporation (SDC) and 2% from other donors. It is forecast for 2016/17 that the contribution from BMGF will account for around 54% of the total funding received, with UNITAID at 36%, DFID at 4%, USAID 3% and SDC 2%.

In June 2016, IVCC received its third and largest grant from the Bill & Melinda Gates Foundation, with an additional $75 million over the next five years. The grant will continue to support IVCC's work in vector control, especially preserving and expanding gains against malaria by developing innovative vector control products that prevent transmission of malaria from mosquitos to vulnerable populations.

Since the 2016/17 budget setting process, and in line with budgetary assumptions, a further grant was successful with USAID for $8.1 million commencing January 2017, thereby securing funder support until 31st December 2022.

A further grant application with DFID was submitted in October 2016.



Funding Requirements 2016-2020

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 the latest projections and for negotiations with partners more effectively.

The total funding required to enable IVCC to meet all of its objectives up to 2020 is a moving target as the product pipeline matures and unforeseen events play their part. However, future costs are still dominated by the new active ingredients portfolio.

l to r: Hamish Stewart, Tom McLean, Lori Lewis, Nick Hamon, Karen Johnson, Duncan Preston, Jed Stone, Angus Spiers, Sarah Rees, Lyyn Byrne, David Malone, Silas Majambere, David McGuire, Mathias Mondy

New in 2016

Marlize Coleman
Communications Officer—NgenIRS

Marlize has worked in public health for over 20 years, mainly in operational malaria control in Africa. A Master of Public Health and Tropical Medicine degree at James Cook University in Australia was followed by a PhD focussed on operational tools to improve malaria control programmes. She has worked as a consultant to WHO and African vector control programs, and most recently at the Liverpool School of Tropical Medicine. Marlize supports communications for the NgenIRS programme, working closely with National Malaria Control Program managers, policy makers and key in-country stakeholders.

David McGuire
Programme Director—NgenIRS

David McGuire joined IVCC as the Director of the Next Generation IRS Programme (NgenIRS), which is working to increase access to 3rd generation insecticides for indoor residual spraying (IRS) for malaria prevention. David has over 25 years of experience in managing international health projects with an emphasis on public-private partnerships to increase the availability and use of health products and services and strengthen health systems in over 40 countries across Asia, Africa, the Middle East and South America.

Graham Small
GLP and Project Portfolio Support

Graham has more than 30 years' experience in entomological research including laboratory and field studies on mosquito vectors of disease. Following an academic career at the London School of Hygiene and Tropical Medicine and Cardiff University, characterising and monitoring pesticide resistance in a diverse range of insect pests, he took the sideways step into industry to become Technical Director at a CRO conducting efficacy testing for the agrochemicals and household products industry.

Lori Lewis
Administration Assistant

Lori joined IVCC in April 2016 from the Filarasius Programme Support Unit, in the Liverpool School of Tropical Medicine (LSTM). Lori is responsible for all aspects of travel for IVCC staff, and providing administration support for meetings, including scientific meetings and conferences. For two years prior to working for LSTM, Lori worked for Merseyside Police as a secretary at Superintendent level, a post that involved working as part of the critical incident team.

Jason Richardson
Technical Coordinator—NgenIRS

Jason H. Richardson holds a Bachelor's in Biology, a Master's in Entomology and a Ph.D. in Microbiology with a specialisation in arbovirology from Colorado State University. Prior to joining IVCC in June of 2016, Jason served as a medical entomologist in the U.S. Army for 22 years. He capped off his military service as the Chief of the Entomology Branch at the Walter Reed Army Institute of Research (WRAIR) followed by the Research Liaison Officer of the Armed Forces Pest Management Board.

Hamish Stewart
Finance Manager—NgenIRS

Hamish joined IVCC in February, following a 30-year international career based in Africa and Europe with a range of businesses in the agro-chemical industry, logistics, IT, accountancy and audit. More recently he was responsible for finance in a large Europe based public-private partnership concerned with climate change, and running the public service for a small island state. He is a Chartered Accountant, and graduated from Bristol University with a BSc in Economics.

Funders

A very special Thank you

None of the lifesaving advances we have made would have happened without the support of our major funders.

Their investment is at the heart of IVCC's mission to accelerate progress towards malaria eradication.

BILL & MELINDA GATES foundation

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 from the Department for International Development

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.

USAID FROM THE AMERICAN PEOPLE

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. USAID, through the President's Malaria Initiative (PMI), is a strong supporter of IVCC and their investment in the development of new public health insecticides for bednets and indoor residual spraying will help produce the new vector control tools that are urgently needed to combat insecticide resistance.

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

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.

UNITAID

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.

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IVCC