# Annual Report 2022-2023

IVCC

# OUR VALUES

**PARTNERSHIP**
We believe in the power of partnership, collaboration and teamwork

We embrace ideas that drive vector control innovation, deliver impact and save lives
**INNOVATION**

**RESPECT**
We value diversity and treat each other with respect

**IVCC**

# OUR VISION

To improve and save lives of vulnerable populations impacted by mosquito-borne diseases, through the delivery of a sustainable tool-box of vector control solutions.

# OUR MISSION

By building partnerships, we enable the creation of innovative solutions to address the evolving challenges in vector control across disease-affected countries.

# Contents


| | |
|---|---|
| Chair's foreword | 4 |
| IVCC strategy | 6 |
| CEO overview | 7 |
| Milestones 2022/23 | 10 |
| Equity, diversity and inclusion | 12 |
| External Scientific Advisory Committee (ESAC) | 13 |
| Product development | 14 |
| IVCC portfolio | 15 |
| Impact of climate change on vector-borne diseases | 16 |
| Technical development | 18 |
| Indo-Pacific Initiative | 22 |
| New Nets Project | 24 |
| Vector Expedited Review Voucher | 25 |
| Good Laboratory Practice | 26 |
| Stakeholder engagement | 28 |
| Finance report 2022/23 | 30 |
| The IVCC team | 34 |
| Funding partners | 35 |

# Chair's foreword

It was an honour and privilege to be asked to take up the position of Chair of the Board of Trustees following the retirement of Sir Stephen O'Brien at the end of 2022. As the first African to hold such a position, I am, perhaps more than many, acutely aware of the crippling impact that malaria can have on people's lives.

Sherwin Charles
**Chair,**
**IVCC Board of Trustees**

Malaria not only brings unnecessary sickness, suffering and death on a scale that many would regard as a cruel annual pandemic, but is the root cause of so many other economic and social hardships. Sickness from malaria can, and will often, overwhelm fragile health systems, disrupt communities, hamper local productivity, and in so doing, perpetuate a cycle of poverty.

The aspirations and hopes of young children can be decimated by malaria with crucial learning days at school missed through continued and repeated cycles of sickness which inhibit educational attainment and the opportunity to flourish and prosper. In short, malaria continues to be a scourge that should have no place in our society today, wherever people live.

Whilst the impact of malaria and the challenges of eradication remain, I am today more optimistic than ever that we have the ability and opportunity to eradicate this blight once and for all. IVCC, an organisation that has been close to my heart for many years through my work with Goodbye Malaria, continues to deliver through its global partnerships, the innovative tools that can finally put malaria into retreat. Partnerships are the lifeblood of IVCC, without whom we could not achieve our mission.

I, and everyone at IVCC, are indebted to the private sector, African scientific research institutes and other stakeholders who collaborate and place their trust in IVCC. I would also like to express my unwavering thanks to our funding partners who have steadfastly supported IVCC through the years, enabling these innovative partnerships to deliver malaria interventions that today are saving thousands of lives. At this pivotal time for global health, I call upon the wider global community to ensure that, as IVCC and its partnerships continue with their missions, appropriate political will and funding, facilitates and strengthens our collective efforts to eradicate malaria and the neglected tropical diseases that afflict the most vulnerable members of society.

Image credit: The Global Fund/Andrew Esiebo/Panos

## New Chief Executive Officer (CEO)

Following the retirement of Nick Hamon in December, the Board of Trustees was delighted to announce the appointment of Justin McBeath as IVCC's new Chief Executive Officer (CEO). I would like to thank the board, including the nominations and governance committee, for steering this appointment process so robustly and successfully and for selecting such an outstanding candidate.

Justin brings with him more than 25 years of experience working in various international leadership positions related to the development, registration and marketing of mosquito and other pest management solutions. For the past twelve years, Justin led the malaria vector control strategy for Bayer Environmental Science (now Envu) and has been Co-Chair of the Roll Back Malaria Partnership (RBM) Vector Control Working Group (VCWG). Justin graduated from the University of Leeds with a BSc. (Hons) in Agricultural Zoology and holds an MSc. in Medical Entomology from the London School of Hygiene and Tropical Medicine (LSHTM).

We are delighted to welcome Justin to IVCC. As CEO he is responsible for the development and delivery of IVCC's strategy. Following his appointment and with the support of the board, Justin initiated a strategic review of the organisation to ensure that IVCC has a fully costed and clear strategic path to deliver on its refreshed and updated mission and vision for the next five years and beyond, the outputs of which will soon be communicated and implemented. The board looks forward to supporting Justin and the IVCC team in the successful delivery of this strategy.

## Board of Trustees and Governance

In taking up my new role, I would like to express my sincere gratitude and admiration for the way in which former Chair Sir Stephen O'Brien worked tirelessly and selflessly to support and guide IVCC through the best part of a decade. As a global champion and advocate for malaria, Sir Stephen's impact and legacy will be felt for many years to come and therefore I am both humbled and inspired to follow in his footsteps.

The role of chair cannot be successfully executed without the support and guidance of the full Board of Trustees, who I would like to express my respect and sincere gratitude to for their commitment, counsel and insight over the years. In taking up the position of chair, I am also grateful to Jon Schofield for accepting the position of vice chair which I recently vacated.

In the course of 2022, IVCC established a governance working group to oversee a review of IVCC's corporate governance. The implementation of the recommendations arising from that review is almost complete and I am grateful to my fellow members of the working group for their commitment and contributions.

Professor Qiyong stood down from the board in December after his full term and a one-year extended period. Likewise, Dr. Pascal Housset, who also agreed to extend his term for a short period, will step down from the board at the end of this calendar year. I would like to place on record my thanks for their extraordinary dedication, support and counsel over the years.

I am pleased to announce that during the year, Sue Russell, Solicitor and Vice Chair of the Board of Trustees at the Liverpool School of Tropical Medicine and Dr. Philip Welkhoff, Director of the Malaria Program at the Bill & Melinda Gates Foundation and Ray Nishimoto, President of Koei Chemical (a listed company of Sumitomo Chemical Group) joined the IVCC Board of Trustees. I am hugely grateful that such eminent and respected members of their professions are willing and able to commit to joining the board. Their collective experience, knowledge and expertise will further enhance the board's abilities to oversee and guide IVCC in the coming years.

Members of the Board of Trustees at IVCC's 2023 Stakeholder Forum

Elizabeth Chizema-Kawesha, IVCC Trustee, at the 2023 Stakeholder Forum

# IVCC strategy

**Our vision**

**To improve and *save lives* of vulnerable populations impacted by mosquito-borne diseases, through the delivery of a sustainable toolbox of vector control solutions.**

**Our mission**

By ***building partnerships***, we enable the ***creation of innovative solutions*** to address the evolving challenges in vector control across disease-affected countries.

**Portfolio Strategy**

**Insecticide-treated nets (ITNs)**

The availability and accessibility of multiple non-pyrethroid ITNs to mitigate resistance build up.

**Indoor residual spraying (IRS)**

Maintain IRS as a tailored vector control intervention.

**Spatial emanators**

Enable adoption of spatial emanators with multiple active ingredients.

**Outdoor transmission tools**

Advance innovative technologies to address outdoor transmission and alternative insecticide delivery systems.

**Preventing transmission indoors**

**Preventing transmission outdoors**

**Critical success factors**

- **Industry partnership**
- **Policy and advocacy engagement**
- **Country focus**
- **Funding mobilisation**
- **Innovation leadership**
- **In-house & external expertise**
- **Operational integrity**

**Our values**

**Partnership • Innovation • Respect**

# CEO overview

It was a great privilege to be appointed as the new CEO of IVCC in February and I thank the Board of Trustees for entrusting me with this responsibility. I take on this role with a clear focus towards those whom our mission is intended to serve: the vulnerable populations of the world who are threatened by vector-borne disease.

Justin McBeath
**CEO,**
IVCC

I recognise the trust which is placed in us to use funders' investments effectively and efficiently, the role we play working alongside industry to develop and deliver cost-effective innovations to endemic countries, and the importance of ensuring we live our values (Partnership, Innovation and Respect), and to bring clear win-win outcomes in the collaborations we embark upon whilst ensuring that equity, diversity and inclusion (ED&I) is embedded in all that we do.

I have worked in industry in the field of public health and vector-borne disease for the last 25 years and, in the latter half of that, developed familiarity with the work of IVCC. As I started to write this piece, I reflected on what has changed in that time and ultimately how IVCC needs to evolve for the future, relative to the ongoing challenges we face in the vector control community.

IVCC has now existed for approximately 17 years and has already evolved from a quite small organisation charged with supporting the development of new public health insecticide chemistry in partnership with industry, into a product development partnership with a broader skillset, supporting a much broader range of activities, a wider scope of technology assessment, and product development and steerage of market access/market-shaping initiatives for new innovations. In that time there have been notable successes in the product development portfolio, e.g. support provided for five new indoor residual spraying (IRS) insecticides most recently VECTRON™ T500; and dual active ingredient (AI) bed nets such as Interceptor® G2 – which achieved a policy recommendation from the WHO Global Malaria Program (WHO-GMP) in 2023.

There has also been significant impact from two IVCC-steered market access initiatives: the Next Generation Indoor Residual Spraying (NgenIRS) initiative and, more recently, the New Nets Project. In addition, capacity-development activities, such as the support provided to six scientific research institutions in sub-Saharan Africa leading to them achieving Good Laboratory Practice (GLP) certification as well as the establishment of a new entomology testing facility in Papua New Guinea.

Thinking towards how IVCC should evolve, a key question is whether the need for vector control innovation has changed and is likely to evolve, and if so, how? In my opinion, the answer to the first part of that question is yes, the need for innovation has become significantly more complex. The threat of insecticide resistance in malaria vector control has been looming large for more than two decades and, while there are a broader range of indoor tools now available to, in theory, maintain the effectiveness of vector control ahead of that threat, selection for resistance continues. We already see the emergence of resistance to chemistry introduced in the past five years. Add to this an increased level of understanding about the significance of outdoor malaria transmission (for which we currently have no recognised tools), *Anopheles stephensi* spreading in Africa, with a different set of vector behaviours, and the impact of climate change on mosquito abundance, as well as human population living conditions. The complex situation in endemic countries places greater emphasis on our need to be country focused and to ensure that the voice, and considerations of malaria programmes are well understood across our activities.

To the question of whether the need for support to innovation has changed, all of the complexity I have described in the need for innovation exists within a world facing significant economic challenges. The cost of staying ahead of resistance places an additional burden on malaria programmes; the cost associated with delivering insecticide-based innovation (e.g. generating data, production costs and regulatory requirements) continues to rise; and the funds available to support deployment and innovation are not increasing. We are at a time when the range of choice of vector control tools has never been greater. This brings even more commercial uncertainty for industry and an understandable scrutiny on investment in what has long been recognised as a relatively small market. We acknowledge that challenge for our traditional industry partners from the agrochemical industry who have remained committed to the cause for so long (and who show no signs of lack of commitment for the future). We must recognise, however, with more complexity comes a need for utilising a broader range of sources of innovation.

It was partly for this reason that we took the decision this year, following detailed consultation with member organisations, to dissolve the ZERO by 40 initiative. We are in the process of redefining our industry engagement and advocacy strategy (with a focus on value-adding activities for all involved). One specific short-term example where IVCC will strive to support industry is in the awareness and understanding of the new Vector Expedited Review Voucher (VERV) with the US Environmental Protection Agency (EPA), which was signed into law at the end of 2022.

IVCC currently supports a robust portfolio pipeline with industry partners; however, funding availability to support the entirety of that pipeline is not certain. Earlier in 2023 we embarked upon a strategic review to assess and realign priorities to ensure that we are focusing on the unmet needs that will have the most significant impact against vector-borne disease. I thank those in the vector control community who have contributed by providing insights in the initial phase of that process.

Given the challenge of balancing portfolio ambition vs. resource availability, "focus" has been a clear theme within this strategy review. We have updated our vision, to better define our scope of activity specifically towards mosquito-borne diseases and taken the strategic decision to prioritise our resources towards developments which have relevance for malaria and not support product development for *Aedes*-borne diseases unless those products also have clear cross-utility for malaria. This doesn't significantly change our current product development portfolio (which is already malaria focused) but provides a clearer sense of direction for the future.

Image credit: Bayer, Germany

**Our new strategy is illustrated with the strategic infographic on page six. This is largely focused around four portfolio pillars.**

### 1. Insecticide-treated nets (ITNs)

The availability of dual AI bed nets containing chlorfenapyr and the associated policy recommendation from WHO-GMP has seen an inevitable increase in demand from endemic countries for these types of nets. This has had a flow-on effect of reduced resource availability for the likes of IRS and an expectation that selection for resistance for chlorfenapyr will intensify over the next few years. Our updated strategy continues to emphasise development of new modes of action for ITNs with a renewed sense of urgency associated with that. Our strategy therefore reflects ITNs as a key pillar and this represents the most significant area of activity and resource allocation for us.

### 2. Indoor residual spraying (IRS)

There is already a range of IRS insecticides which support the implementation of insecticide rotation in country IRS programmes. At the same time the demand for IRS is projected to decrease, as countries prioritise dual-active-ingredient nets, and we take this into account in our strategic approach by adopting a "monitoring mode" when it comes to IRS. It is important for the current IRS tools to remain available and a number of market access linked initiatives are intended to try to help support that.

### 3. Spatial emanators

Recent results from field trials suggest that it is highly likely that spatial emanators (also known as spatial repellents) will achieve recognition of public health value for indoor use and therefore a WHO-GMP policy recommendation within the next few years. The establishment of this new product class will inevitably raise other important questions from countries (e.g. the relevance of resistance; relevance in different use-case scenarios). Our strategic ambition in this area is to develop answers to the key technical questions, and identify potential alternatives to volatile pyrethroids, if the risk of resistance is significant.

### 4. Other outdoor tools (and alternative insecticide delivery systems)

Currently this encompasses the work we are involved in with Attractive Targeted Sugar Baits (ATSB®) but is intended to provide an opportunity for identifying other potential innovations.

The four pillars are underpinned by key cross-cutting themes which must be addressed in order to successfully deliver on the portfolio objectives. Some of these I have already touched on (e.g. industry partnerships and country focus) but others are fundamental to who we are (e.g. operational integrity) or how we deliver on the portfolio objectives (e.g. funding mobilisation and in-house and external expertise). As we close out 2023 and plan for 2024 and beyond, we continue to review our activities and our resources taking this new strategic framework into account. We are in the midst of ensuring that the implementation plan to achieve this vision matches the funding resources we expect to have available and the skill sets we have within the organisation. We look forward to further dialogue with our funding partners to share and align on details around this strategic vision and we thank them for entrusting us with their investments to date. I am optimistic and confident that what we have defined in our strategic aspirations matches the key priorities for vector control, are within our scope of expertise and responsibility, and that we are and will be well equipped to efficiently deliver on them.

Now that I have been part of the team for nine months, some of the things I had always perceived in my previous role in industry are now reinforced. The IVCC team is a close-knit group which is passionate about what we do. There is a level of commitment and dedication which I have rarely seen before and this, coupled with a unique breadth of experience and expertise, gives me confidence that we are well equipped to deliver on our strategic priorities. I thank the IVCC team for the welcome I have received and for the continued commitment to delivering on our mission. I add my own personal commitment to our team, to our funders, to our industry partners, but most importantly, to the endemic countries and vulnerable populations whom we serve that we will continue to do so with a clear sense of responsibility towards improving and saving the lives of those impacted by mosquito-borne disease.

# Milestones 2022/23

# 2022

**July 2022**

IVCC welcomed Catherine West MP, Chair of the All-Party Parliamentary Group (APPG) on Malaria and Neglected Tropical Diseases, and local MPs to Liverpool to meet representatives from IVCC.

**September 2022**

IVCC took part in the Annual Conference of the Pan African Mosquito Association (PAMCA) in Kigali, Rwanda. Staff members and project partners contributed to conference sessions, Turbo Talks and Symposiums.

**December 2022**

The Vector Expedited Review Voucher (VERV), championed by IVCC following a policy proposal by Duke University, was signed into US law.


**August 2022**

IVCC and Medicines for Malaria Venture (MMV) launched the Global Health Priority Box to provide scientists with free access to a collection of compounds with confirmed activity against infectious and mosquito-borne diseases, and vectors of global concern.

**December 2022**

The successful completion of the New Nets Project, delivering over 35 million Interceptor® G2 nets, establishing the evidence base for a WHO policy recommendation for pyrethroid-chlorfenapyr insecticide treated nets (ITNs) and laying the groundwork for the introduction of a competitor product (PermaNet® Dual), thereby ensuring global production capacity to match growing demand.



Image credits: Top: IVCC. Middle: Medicines for Malaria Venture (MMV), Switzerland. Bottom: PSI, Mali

# 2023

**March 2023**

New indoor residual spraying (IRS), VECTRON™ T500, has had its evaluation completed by the World Health Organization (WHO) prequalification vector control assessment team and achieved its prequalification listing.

**June - September 2023**

Three of IVCC's collaborating African scientific research institutes have been granted Good Laboratory Practice (GLP) certification by the South African National Accreditation System (SANAS): the Vector Control Product Evaluation Centre Institut Pierre Richet (VCPEC IPR), the Centre Suisse de Recherches Scientifiques (CSRS) in Côte d'Ivoire, and the National Institute for Medical Research (NIMR) — Amani Research Centre in Muheza, Tanzania.

**March 2023**

The Papua New Guinea Institute of Medical Research (PNGIMR) officially opened the Belna Natnat Centre, a new entomological facility in Madang province, with funding support from IVCC through the Indo-Pacific Initiative (IPI), supported by the Australian Government.

**July 2023**

Successful proof of concept for an automated identification system. Accurate identification of mosquito species, using photographic-recognition technology, was proven. This should enable non-expert users to identify key vector species via a smartphone. The team has secured follow-on funding from elsewhere to complete development.

**August 2023**

Completion of a third year of expanded IRS implementation by mining and agricultural companies in Ghana, supported by IVCC's New Routes to Market Initiative, and the mobilisation of domestic funding to implement IRS by a local, private sector pest control company in two priority districts.

**June 2023**

Successful proof of concept for RNAi (Indiana University) and Chromobacterium (Johns Hopkins University). These biorational insecticide candidates have proven potential both as larvicides and adulticides within attractive targeted sugar baits (ATSB®) with no known cross-resistance mechanisms. RNAi has been selected for further development by a commercial partner.

**August 2023**

Bite Barrier, the first EPA-approved transfluthrin passive emanator, was licensed for commercial launch following positive entomological field trials under Project BITE. Project BITE (Bite Interruption Towards Elimination) is part of IVCC's IPI, supported by the Australian Government.

# IVCC's journey toward equity, diversity & inclusion

At IVCC we are committed to embedding equity and diversity principles across all our operations. We acknowledge the importance of doing so, not only as an employer but also as part of our core mission to have a positive impact on vulnerable populations.

We focus on three key areas to ensure the integration of equity and diversity throughout the work of our organisation:

- IVCC as an equal opportunity employer.
- Advancing equity and diversity through our partnerships.
- Ensuring the equitable impact of products in our portfolio.

Partnerships are core to IVCC's success. Our goal, through capacity sharing, is to empower, support and learn from all those who work with IVCC to achieve our equity, diversity and inclusion (ED&I) objectives.

## IVCC ED&I

Recruitment for IVCC's External Scientific Advisory Committee (ESAC) is now conducted via an open call for expertise to ensure a pool of diverse candidates.

In collaboration with our funders, IVCC has supported eight collaborating research facilities (three facilities in East Africa, four facilities in West Africa and one facility in the UK) towards Good Laboratory Practice (GLP). Funds were available for the GLP certification process and infrastructure improvements required for full GLP compliance.

IVCC contributed to a report by Malaria No More UK highlighting the role of women scientists, researchers and community health workers in the fight against malaria.

In partnership with Goodbye Malaria, data collected by IVCC on the participation of women working in indoor residual spraying (IRS) teams in Mozambique provides a blueprint for how vector control programmes can increase the role of women in intervention campaigns.

Knowledge sharing and collaboration with other Product Development Partnerships (PDPs), e.g. MMV and TB Alliance.

IVCC benefits from knowledge exchange with the Liverpool School of Tropical Medicine's (LSTM) Equity & Diversity Committee, Research Integrity Working Group and a range of staff networks.

The Australian Department of Foreign Affairs and Trade (DFAT) supported a Gender Equality, Disability and Social Inclusion (GEDSI) analysis of the Indo-Pacific Initiative.

Engaged with PATH on best practice on how to use their Equity in Programming Benchmarks. The Equity in Programming Benchmarks are used to ensure equity in health, community priorities, respectful partnerships and inclusive innovation are embedded in projects and proposals. The benchmarks include self-assessments, examples and resources which IVCC hopes to use to assess equity within the New Nets Project; and other projects going forward.

After an open tender process, IVCC awarded direct research contracts to two facilities to provide field trial services. This approach will help strengthen and sustain the capacity for malaria vector control research in sub-Saharan Africa.

Stanford Medicine | Global Center for Gender Equality

Through training delivered by the Global Center for Gender Equality, at Stanford University, and supported by The Bill & Melinda Gates Foundation, IVCC developed best practice for the integration in vector control product development.

African research facility survey to understand the breakdown of categories such as gender, age, and disability across our active trial site projects, with a view to advance ED&I through our research partnerships.

IVCC is working toward improving procurement processes to embed ED&I, with a potential contractor's approach to equity, diversity and inclusion evaluated during the tender process.

# IVCC's External Scientific Advisory Committee

**Mission**

## The External Scientific Advisory Committee (ESAC), first established in 2006, is an independent group of scientists and academics who provide expert specialist technical assessment of IVCC's partner's evolving portfolio of vector control interventions.

Specifically, ESAC provide scientific advice on commercially oriented insecticide-based products, for public health use and on new product classes in vector control. ESAC is tasked with:

- Providing scientific advice on new project submissions.
- Giving advice on the project design and on project continuance, termination and extension decisions.
- Providing scientific, independent reviews on all data submitted by the projects.
- Ensuring that the projects meet agreed timelines and milestones.
- Providing scientific advice on non-project issues like publications.

Mathias Monday
**Director of Business Development and Strategy,**
IVCC

**Expertise and recruitment**

The IVCC supported ESAC is composed of about 20 experts covering a broad range of expertise, including entomology, epidemiology, chemistry, toxicology, modelling, regulatory and textile manufacturing. IVCC is continuously adapting the scope of expertise of ESAC to match the advancement of our portfolio.

In 2022, IVCC revised its ESAC recruitment process from a targeted approach to an open call for service. Job descriptions, outlining the desired skills, are now publicly available on our website. The primary objectives are to ensure we have the appropriate expertise to match the breadth of IVCC's portfolio and a candidate pool to enhance diversity and address gender across ESAC membership. During 2022/2023, IVCC had three rounds of recruitment to secure expertise across insecticide-treated net (ITN) development, entomology, and epidemiology. The response was exceptional, with experts applying from all continents.

During the course of 2022 and 2023, IVCC appointed to ESAC: Egon Weinmüller, former Head of BASF's Global Public Health Unit, and Samwell Okello, Senior Medical Entomologist and Head of Vector Control Unit at Vector Health International-Africa Technical Research Centre to support ITN development, and to support entomology, Dr Anne Wilson, an infectious disease epidemiologist based at the Liverpool School of Tropical Medicine (LSTM), and Ulrike Fillinger, a consultant with over 20 years of experience managing projects related to the control and elimination of arthropod-borne diseases.

> **“ IVCC revised its ESAC recruitment process from a targeted approach to an open call for service.**

**Organisation**

ESAC has two chairs: Dr. Jane Bonds and Professor Matt Thomas. Jane is a consultant expert in the control of pests and diseases, while Matt is a Professor and Director at the University of Florida, specialising in ecology and control of insects and diseases. Their role is to facilitate discussion to ensure all viewpoints are thoroughly considered before presenting recommendations to IVCC.

ESAC carries out two full reviews per year (usually in May and November). Short webinars are also held between these reviews to help ESAC members keep up to date with project progress.

Each full review typically last three to four days. Ahead of these reviews, each project team submits a status report of their product development project. ESAC is subdivided into expert subgroups tasked with analysing these reports and raising comments and questions. These points are subsequently deliberated with the respective project teams and the wider ESAC, enabling the clarification of specific matters and the identification of issues requiring attention by the project teams.

The path towards the World Health Organization (WHO) prequalification of a novel vector control intervention is extremely challenging. Not only is it expensive and time-consuming, but it also comes with significant risk of failure because of the complexity of the science behind each product innovation. By leveraging the skills and expertise of the ESAC through the development process, industry partners and other innovators are able to ensure that the challenges and hurdles can be identified early and, where possible, overcome. This expert advice has supported the prequalification of key vector control tools which have helped save many thousands of lives. IVCC remain enormously grateful for the critical role played by the ESAC team, without which the portfolio of public health vector control interventions available today would not be so diverse, comprehensive and impactful.

# Product development

## The past 12 months have seen a significant maturing of the IVCC portfolio.

The impact of IVCC's long held strategic aim to bring new active ingredients (AIs) to the insecticide-treated net (ITN) market has been confirmed with the evidence and policy endorsement of BASF's Interceptor® G2.

This has increased our focus on bringing other AIs into this market and expanding our manufacturer partnerships beyond the AI developers to include a range of ITN manufacturers using AIs from the agrochemical majors.

At the same time the evolution of the indoor residual spraying (IRS) marketplace, enabled by the NGenIRS project, has brought three (and soon to be four) chemical classes into use in rotation so the need for further product development in this area has diminished.


Dr Tom McLean
**Senior Advisor, Access and Strategy,**
IVCC

Danielle Brennan
**Senior Project Manager,**
IVCC


### TENEBENAL™ for insecticide-treated nets (ITNs)

In parallel with the successful PQ listing of VECTRON™ T500 as an IRS product, IVCC and Mitsui Chemicals and Crop Life Solutions (MCCLS) have been working with ITN manufacturers to develop ITNs using its active ingredient TENEBENAL™. A particularly useful outcome of IVCC's participation in the New Nets Project has been the insight this has provided into the global funder and country decision making mechanisms and the constraints that budget limitations place on willingness to pay a premium for increased efficacy. Modelling of the potential cost of making TENEBENAL™ coated or incorporated ITNs indicated that either technology could be commercially viable at appropriate volumes and technical analysis of the physical chemical properties suggested that both incorporation and coating formulations were possible.

### VECTRON™ T500

2023 saw the WHO Prequalification vector control assessment team complete their evaluation of VECTRON™ T500, with the product achieving a prequalification listing in March 2023. Following this milestone, the WHO Global Malaria Program (GMP) held a technical consultation to assess the comparative efficacy of vector control products and made the decision to expand their existing recommendations for IRS to include VECTRON™ T500. With VECTRON™ T500 having a novel mode of action from existing vector control products, prequalification listing and inclusion in WHO guidelines represent an important step in insecticide resistance management. Moving into the market uptake phase, IVCC looks forward to seeing this product being adopted by malaria prevention programmes across sub-Saharan Africa.

### Attractive Targeted Sugar Baits (ATSB®)

In 2021 three large epidemiology field trials were initiated as part of the ATSB® project, with the trial in Zambia recently concluding. The trials in Mali and Kenya are ongoing with results expected in Q2 2024. A full evaluation of the public health value of ATSB® as a malaria intervention will be carried out when the data from all three trials are available.

The team is planning a programme of additional studies to validate the methods used thus far and to better understand the drivers of ATSB® performance.

### Interceptor® G2

In March 2023 WHO issued guidance strongly recommending the adoption of BASF's Interceptor® G2 dual AI ITN for use in areas of pyrethroid insecticide resistance. This product is the outcome of a long partnership between IVCC and BASF on both the technical and market access development of the product. The unequivocal evidence of the increased efficacy of BASF's Interceptor® G2 created by the New Nets Project (NNP), coupled with enthusiastic adoption by our country partners enabled by the market intervention, demonstrates the importance of long-term partnerships between IVCC and manufacturers and countries to drive both the technical and market access development of innovative products.

However, there is a significant risk that widespread use of chlorfenapyr, the second AI in the dual AI net, will generate resistance to that AI. This has increased our focus on new modes of action for ITNs to support this new class.

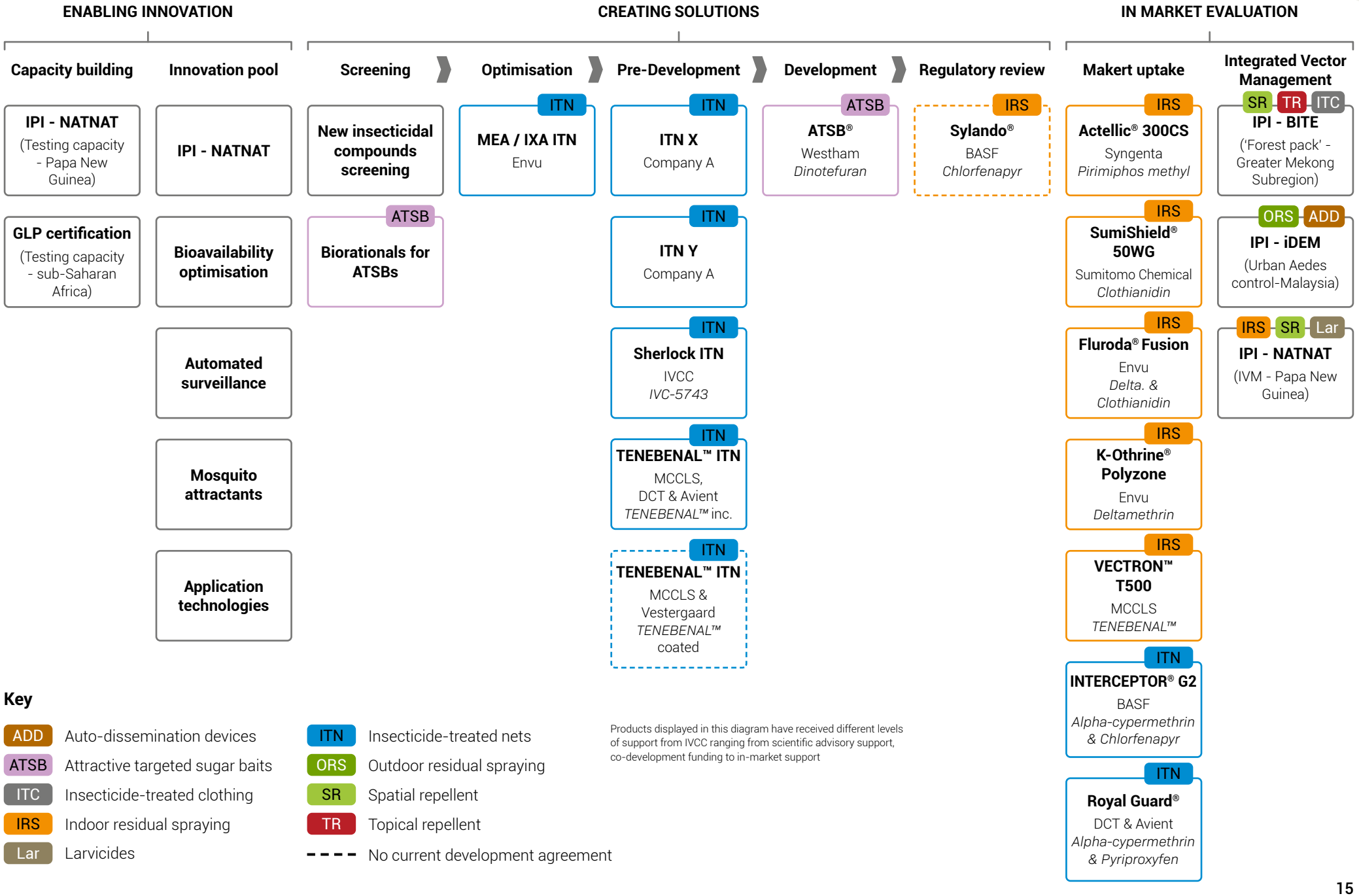
### ITN manufacturing partner search

Throughout 2023, IVCC has been searching for an ITN manufacturing partner to develop an ITN product using one of the novel AIs in our portfolio. As part of the tender process, we have gained a strong understanding of the technical and access capabilities of ITN manufacturers, as well as an understanding of the level of interest there is in the vector control community to continue developing lifesaving products with new modes of action. The applications we have received are unsurprisingly high calibre, and we are looking forward to announcing the successful bidder later in the year.

### The longer-term plan for ITNs

While it is great to see some of the novel AIs in IVCC's portfolio progress through ITN development projects, it is important for us to keep our pipeline open; continuously screening for insecticides, repurposed or novel, that could be used for vector control. IVCC has two novel insecticides in early development and several repurposed insecticides that are currently being assessed for use in ITNs. Ensuring novel modes of action are available in future for use in ITNs is essential if malaria prevention programmes are going to combat insecticide resistance.

# IVCC portfolio




## Key

- ADD — Auto-dissemination devices
- ATSB — Attractive targeted sugar baits
- ITC — Insecticide-treated clothing
- IRS — Indoor residual spraying
- Lar — Larvicides
- ITN — Insecticide-treated nets
- ORS — Outdoor residual spraying
- SR — Spatial repellent
- TR — Topical repellent
- - - - — No current development agreement

Products displayed in this diagram have received different levels of support from IVCC ranging from scientific advisory support, co-development funding to in-market support

# Impact of climate change on vector-borne diseases

## Climate change is having a dramatic impact on vector-borne disease transmission, demanding new policies, tools and approaches.

The effects are shown in the gradual extension of transmission range and seasonality of malaria and dengue, but most acutely in invasive species such as *Anopheles stephensi* in Africa and climate-driven humanitarian emergencies as we've recently witnessed in Pakistan and Mozambique. According to the WHO, Pakistan saw at least a four-fold increase in the reported number of malaria cases after the floods, from 400,000 cases nationwide in 2021 to more than 1.6 million cases in 2022 in the 60 districts supported by the Global Fund (meaning there were very likely many more).

Dr Mike McDonald
**Consultant,**
IVCC

These climate-driven population displacements are a tragic add on to conflict-driven displacements totalling now more than 110 million at increased risk for vector-borne diseases, malaria across Africa and parts of Asia, leishmaniasis in Syria, Turkey and Iraq, and dengue in Yemen and Bangladesh. While some displaced families are in camps or settlements where standard indoor residual spraying (IRS) and insecticide-treated nets (ITNs) can be deployed, many others are mobile, in makeshift shelters and situations where these tools are not practical.

IVCC recognises the need for innovative tools to reach these most vulnerable families beyond the reach of ITNs and traditional IRS for fixed structures. We are working to fast-track development and deployment, learning by doing for emerging vector control tools, including spatial emanators and outdoor transmission tools, especially Attractive Targeted Sugar Baits (ATSB®).

The Indo-Pacific Initiative (IPI) work in Thailand and Cambodia, funded by the Australian Government, has demonstrated the impact of etofenprox-treated materials, topical repellents and especially spatial emanators, both in controlled semi-field trials and for people working and sleeping out in temporary shelters in the Cambodia forests. The transfluthrin-based passive emanator was shown in the semi-field systems to have a community impact beyond just "repellency", impacting the vector's feeding cycle, survivorship and fecundity. In the field, the passive emanator hung in a temporary shelter – a tarpaulin stretched over a ridge pole – was the major contributor to a 95% reduction in vector contact. Follow-on implementation research is helping to develop strategies for deployment across the Greater Mekong Subregion and complements passive emanator work conducted against *Anopheles* in Africa, *Aedes* in Sri Lanka, and leishmania vectors among displaced persons in Syria.

Spatial emanators represent the third IVCC strategic pillar, including anticipating the potential for resistance and to define optimal use cases and deployment strategies. The anticipated approval by the WHO will open the door for rapid expansion to humanitarian emergencies as well as the development of alternative non-pyrethroid active ingredients.

The IPI in Thailand and Cambodia also included trials of etofenprox-treated clothing, technically a big improvement over traditional permethrin treatment with lower dermal absorption and greater wash resistance. While not a core IVCC strategic activity, the data and partnerships developed are helping to open the door for a new class of treated materials with great potential for commercial applications as well as treated materials for deployment in humanitarian emergencies.

Image credit: Dr Siriman Samaké, Malaria Research and Training Centre, USTTB, Mali

Third, IVCC is engaged with partners who are trialling extension of IRS to temporary shelters for displaced persons. Swathes of tenting materials treated with different IRS products in South Sudan and Nigeria are being analysed for persistence by the IVCC supported Liverpool Insect Testing Establishment (LITE) facility at the Liverpool School of Tropical Medicine (LSTM). This, along with information from partners with practical large-scale applications in Yemen and Pakistan, could open a large and important expanded use case for IRS products and help reduce transmission risk for these populations.

IVCC is not alone in these efforts, but partners closely with emergency relief agencies such as the MENTOR Initiative, and in global strategies with WHO, the United Nations High Commissioner for Refugees (UNHCR) and the RBM Partnership to End Malaria working groups.

Finally, climate change, along with urbanisation and global trade, impacts invasive vector species including *Aedes* in Europe and *An. Stephensi* in Africa. The south Asian, urban malaria vector *An. Stephensi* has invaded Africa through Djibouti, the Sudan and Ethiopia – where it was implicated in a major, dry season urban outbreak in Dire Dawa. Strategically, IVCC participated in a larger partnership led by WHO and the RBM Partnership to End Malaria to develop a global vector control response, and participates in both the surveillance and control research committees. It is anticipated that IVCC's investments in ATSB® development will have especially important applications in the hot, dry, arid environments with few alternative nectar sources where *An. Stephensi* thrives. ATSB®s and other potential interventions under IVCC's fourth strategic pillar for "Outdoor transmission tools" will improve adaptive vector control for the increasing threats of urban malaria from *An. stephensi* and other evolving African malaria vectors.

Climate change is upending our traditional approaches to vector control. IVCC is planning for the future. Spatial emanators, outdoor transmission tools, including ATSB®s, and potential extension of IRS have the potential to meet the challenges of our rapidly changing world.

> **"Climate change is upending our traditional approaches to vector control. IVCC is planning for the future.**

# Technical development

## Developing partnerships to develop new active ingredients and innovative approaches to prevent the transmission of insect-borne disease is core to IVCC's mission.

Bringing novel insecticides to the market remains a challenge; it is costly (up to $50m per compound) and can take more than twelve years. With a limited number of novel insecticides available, partnerships and collaborations are critical for delivering a vector control toolbox capable of achieving malaria elimination.

New insecticides have promise in several mosquito control products, including indoor residual spraying (IRS), Attractive Targeted Sugar Baits (ATSBs), insecticide-treated nets (ITNs) and spatial emanators. The modelling of resistance development, along with the analysis of the challenges of formulation and manufacturing, cost of goods, market dynamics and funding continue to guide our technical development strategy, especially when it comes to novel ingredients.


Derric Nimmo
**Director - Technical Development,**
IVCC


### Indoor residual spraying

**Goizper Group recently announced the commercial launch of the IK Smart Light to help make IRS delivery smarter.**

Traditional IRS delivery is logistically challenging, but new technology promises to improve the efficiency of this proven intervention. IVCC is excited to announce that, after roughly five years of working with the Goizper Group, the decision has been made to commercially launch the IK Smart Light.

This tool is an important step forward towards revolutionising the way IRS is delivered and has the potential to help make IRS delivery more accessible to a broader set of organisations and communities. The IK Smart Light provides immediate feedback to spray operators to help them deliver an accurate target dose of insecticide, enables programmes to train spray operators more efficiently, and collects data during use, allowing managers to monitor applications in real time.


Iñigo Garmendia
**Public Health Product Manager,**
Goziper Group


"...the Smart Light will surely be a game changer in IRS operations because it will help improve the quality delivery of spraying since strand operating procedures (SOPs) data captured and analysed daily will help correct deviations/errors observed after spraying..."

**N.Obu Adjartey,**
District Manager,
AngloGold Ashanti Malaria Control Ltd,
Ghana (AGAMal)

"The Smart Light will save cost on training, give real-time data, reduce training days, provide all data required for decision making, and improve operator's confidence."

**Emmanuel Christian Appiah,**
Obuasi District Manager,
AngloGold Ashanti Malaria Control Ltd,
Ghana (AGAMal)

## Spatial emanators

**IVCC to explore new active ingredients for use in passive spatial emanators.**

In partnership with IVCC, Dr Ingrid Chen from the University of California, San Francisco (UCSF) created a consortium to develop second-generation passive emanator prototypes with novel active ingredients (AIs). The project was funded in 2023 by the US Military's Deployed Warfighter Protection Program. The project leverages IVCC's access to over 4 million compounds already screened for insecticidal activity and two of IVCC's partner insecticide testing facilities: the Ifakara Health Institute (IHI) in Tanzania (see figure 1 on page 20) and the Liverpool Insect Testing Establishment (LITE).

The team also includes subject area expertise in volatile AI discovery through scientists at the US Department of Agriculture (USDA) and ISCA Technologies, and academic and industry partnerships with Brown University, S.C. Johnson & Son, Anovotek and Synergy Semiochemicals Corp. The project goal is to mitigate the selective pressure to develop insecticide resistance by developing new active ingredients with different modes of action to follow the rollout of first-generation passive emanators, protecting this product class by ensuring they remain efficacious to those in need of their protection from mosquito-borne diseases.

> **“ The project leverages IVCC's access to over 4 million compounds already screened for insecticidal activity and two of IVCC's partner insecticide testing facilities.**

Dr Ingrid Chen
**Associate Professor,**
University of California San Francisco

Image credit: Mgeni Tambw, Ifakara Health Institute (IHI), Tanzania

## Analytical and surface chemistry

Controlling malaria-transmitting *Anopheles* mosquitoes with pyrethroid insecticides is becoming increasingly challenging because of widespread resistance among vector populations. The development of new insecticides and insecticidal formulations is time-consuming and costly. However, a more active crystalline form of deltamethrin, prepared by heating the commercial crystalline form, was previously reported to be 12 times faster acting against susceptible North American *Anopheles* quadrimaculatus mosquitoes. In a 2023 publication, we show that heat-activated deltamethrin dispersed on commercially available dust can overcome various resistance mechanisms among five West African *Anopheles* strains and last for up to six months under laboratory conditions.

Since the publication of the research in 2023, the team have generated data showing the heat-activated dust could maintain efficacy against a highly resistant *Anopheles gambiae* strain (VK7) 19 months after heating (Figure 1). This shows that resistant mosquitoes can be killed with an insecticide to which they are resistant without altering the molecular composition of the insecticide and significantly enhancing the longevity of the product.

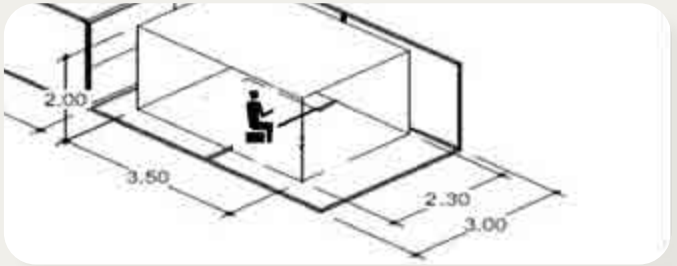
## Field research

In 2022, IVCC finalised the tender process for the provision of field research services to help IVCC to answer some key unanswered questions relating to the efficacy of malaria vector control products, especially ITNs. The African scientific research institutes that were given contracts for core funding of field research were Centre Suisse de Recherches Scientifiques (CSRS; Côte d'Ivoire) and the Vector Control Product Testing Unit (VCPTU) at the Ifakara Health Institute (IHI, Tanzania). The teams at IHI and CSRS support IVCC with scientific expertise on key unanswered questions, development and validation of assays and equipment, performing literature reviews, answering project-specific queries and a range of other activities. Several exciting trials and reviews were initiated in this research programme in the last year, which will aid IVCC in developing innovative vector control products in the coming years.

Dr Sarah Moore (IHI, Tanzania) said: "Working with IVCC is challenging, stimulating and fun. The whole team enjoy the interaction with the IVCC technical experts as we jointly solve knotty problems and develop ways to test new tools more efficiently. The IVCC team are approachable and support our scientists during the development of protocols and publications. Therefore, I see this partnership as beneficial for IHI because it is growing the capabilities, knowledge and confidence of our whole team as we engage in exciting science that will ultimately have global impact against vector-borne disease."

Views of the IACT

Views of the IACT




Experiment

Filter paper with active compound

IVCC highly values its strong partnerships with a network of African scientific research institutes. The collaboration with these facilities secures entomological expertise on product evaluations in malaria-endemic regions and allows the continued generation of high-quality data supporting IVCC's product development projects. Securing testing capacity with both established and novel partners is critical as the testing needs for IVCC projects will continue to grow in the coming years, especially for laboratory and semi-field studies on prototype ITN formulations. This results in the need for expanded field testing, which creates the opportunity to support further local institutions. In the past year, two successful studies were conducted in a new partnership with the National Institute for Medical Research (NIMR), based in Mwanza, Tanzania, and two joint publications are currently under development.

Dr Alphaxard Manjurano said: "We, as a malaria team at NIMR, are incredibly grateful for IVCC's ongoing support and commitment to our vision and mission of being a leading institute for the advancement of high quality health research and innovations in promoting health research that is responsive to the needs and wellbeing of Tanzanians. It has been a great opportunity to work in partnership with IVCC, as we have successfully completed both the Hybrid Net Project and the Indoor ATSB® Project. IVCC's support of these projects in both providing funds and intellectual skills has fuelled our success. The organisational skills and the unwavering commitment IVCC have provided to our partnership throughout the project are unbelievable. We are hopeful that our partnership will grow as we continue to collaborate on future projects on vector control efforts to fight against malaria and vector-borne diseases."

**“ IVCC's support of these projects in both providing funds and intellectual skills has fuelled our success.**

# Indo-Pacific Initiative

**Introduction**

## As we near the end of the initial Indo-Pacific Initiative (IPI) in December 2023, there is much to recognise in terms of what has been achieved by the partnerships.


Fred Yeomans
**Senior Project Manager,**
IVCC

Allison Tatarsky
**Director,**
UCSF,
Malaria Elimination Initiative,
Project BITE

Moses Laman
**Deputy Director,**
Papua New Guinea Institute
of Medical Research,
NATNAT


Beyond the project achievements Allison and Moses describe below, I want to draw attention to some other areas of wider impact.

Evidence developed on the efficacy of outdoor tools by Project Bite Interruption Toward Elimination (BITE) and Newly Adapted Tools Network Against vector-borne disease Transmission (NATNAT) has enhanced the evidence base for these new product categories. These tools have applications across the Indo-Pacific, Africa and the Americas, particularly in disease control, elimination and humanitarian settings.

The work has also further cemented collaborations between global institutions in various regions. New and expanded markets for novel vector control tools have been bolstered by the commercialisation of PIC Corp's Bite Barrier product in 2023, which was driven heavily by its strong performance in the Project BITE trials.

Discussions are also under way with manufacturers about increasing access to the insecticide treated clothing application used in the Project BITE trials to specific groups in the region and for use in humanitarian emergencies.

Stakeholder appetite in Papua New Guinea to reintroduce indoor residual spraying (IRS) following the NATNAT trials has the potential to contribute to the sustainability of this market globally. Additionally, the opening of the new laboratory in Papua New Guinea will not only benefit the testing of new tools within country, but across the Pacific region for years to come.

Looking ahead, there is still much to be done in the region to catalyse the uptake and effective use of new tools. This is especially important for the ongoing malaria elimination efforts in the Greater Mekong Subregion and the fight against rising cases in Papua New Guinea and its neighbours. Building on the evidence generation of IPI, we are now well poised to continue working with our partners, focusing on continued evaluation and market access of novel vector control tools.

**NATNAT**

The support from IVCC under IPI has allowed us to catalyse the evaluation of additional vector control tools in Papua New Guinea that could complement insecticide treated nets (ITNs) to accelerate malaria burden reduction. The NATNAT project has enabled Papa New Guinea Institute of Medical Research (PNGIMR) to strengthen our infrastructure and technical capability for vector control tools testing through the construction of a larger insectary, semi-field tunnel cage and experimental huts.

As we near the end of the programme, our key achievements have been as follows:

- Generating evidence on the durability, feasibility and acceptability of IRS in village settings.
- Completion of the PNGIMR Belna Natnat Centre, which is the first of its kind in the Western Pacific region, with an insectary for *Anopheline* and *Aedes* colony rearing and a 60m-long semi-field tunnel cage for product evaluations.
- Commencing laboratory trials of spatial repellents in the tunnel cage and laboratory trials studies of IRS products.

To support the uptake of new vector control tools, we have established a national vector control stakeholder network which brings together national, provincial, private sector, academic and NGO stakeholders working in vector control across Papua New Guinea. We have also partnered with the NMCP and Rotarians Against Malaria (RAM) to support the implementation of a programmatic pilot of IRS, led by the New Ireland Public Health Authority, which builds directly on the findings of the NATNAT IRS community trial.

We hope to continue to work with IVCC to expand the evaluation of and access to new vector control tools to inform policy, support implementation and ultimately contribute to disease burden reduction in Papua New Guinea and across the wider Pacific region.

## Project BITE (Bite Interruption Towards Elimination)

As Project BITE comes to the end of its first phase of funding, there is much progress to reflect on and many achievements to celebrate.

In Q1 2023, Project BITE successfully completed its final stage of research – an implementation feasibility study, which took the place of a previously planned randomised controlled trial. This implementation study, designed by the Project BITE team under the leadership of the University of California San Francisco, Malaria Elimination Initiative (USCF MEI), was conducted in Cambodia by Health Forefront Organization and evaluated the provision of forest packs containing a spatial repellent, topical repellent and insecticidal solutions for treating clothing, to nearly 6,000 malaria high-risk individuals by the Cambodia National Malaria Control Programme (NMCP) and the Malaria Consortium. The mixed methods evaluation found that, while there were logistical complexities surrounding the distribution of the tools, people who received and used the tools overwhelmingly reported liking them and finding them appropriate for their day-to-day life, particularly with the advantage of being able to use different tools in different spaces and times. The evaluation also included costing and willingness-to-pay studies, a population size estimate study, malaria prevalence surveys, serological investigations and qualitative studies with both end users and implementers.

Project BITE has pioneered an approach to evaluating novel vector control tools, from laboratory studies, to field-based studies, to the distribution of tools to populations in need of protection. While epidemiological evidence on the effectiveness of bite prevention tools individually and in combination as forest packs is important and necessary for their broad acceptance, new ways of gathering these data must be considered, as traditional randomised controlled trials become increasingly difficult to implement in elimination settings. IVCC, UCSF MEI and all Project BITE partners are enthusiastic about the future of these novel vector control tools and are optimistic about further opportunities to expand the evidence base on, and accelerate access to, these tools to catalyse progress towards malaria elimination in the Greater Mekong Subregion and beyond.

Image credit. Health Forefront Organization, Phnom Pehn, Cambodia

# New Nets Project

**Between 2018 and 2022, the New Nets Project (NNP), an IVCC-led consortium of partners, funded by Unitaid and The Global Fund, piloted the use of next generation nets, treated with a new dual insecticide combination, in areas of moderate to high malaria transmission throughout sub-Saharan Africa.**

By the project's end in 2022, the combined procurement of pyrethroid-chlorfenapyr nets by NNP, the Net Transition Initiative and US President's Malaria Initiative (PMI) averted an estimated 13 million malaria cases (and approximately 24,600 deaths), leading to $28.9m in financial savings to the health system.

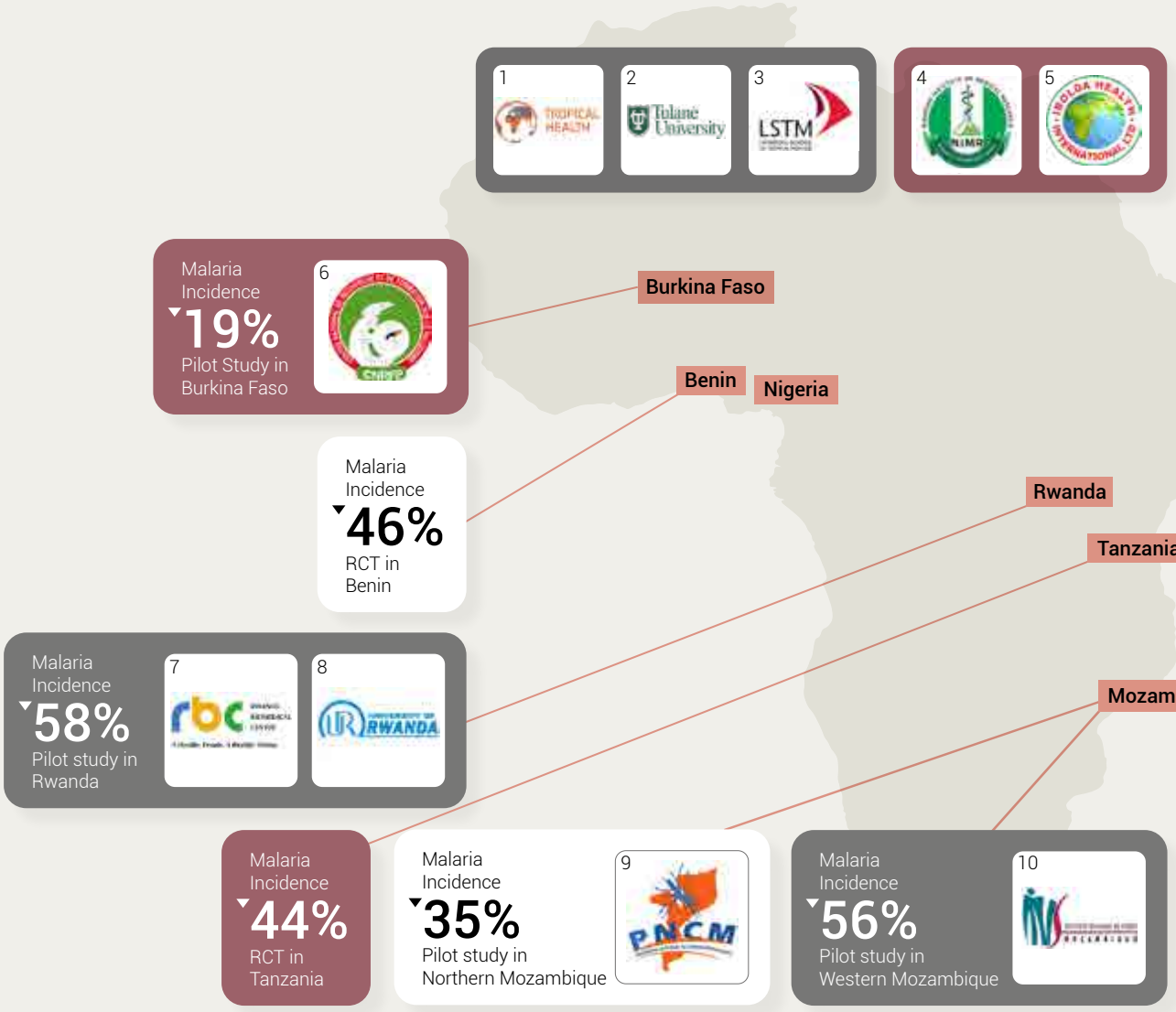
Through pilot and randomised control trials, the project established that pyrethroid-chlorfenapyr nets are 20-50% better at reducing clinical malaria cases than pyrethroid-only nets. This started with the first randomized controlled trial in Tanzania, funded UK aid, the UK Medical Research Council (MRC) and Wellcome.

A consortium of partners including The London School of Hygiene and Tropical Medicine (LSHTM) also conducted a randomized controlled trial of the new net types in Benin, to complement the Tanzania study. The Liverpool School of Tropical Medicine (LSTM) led on laboratory entomological testing and entomological correlates of efficacy. Population Services International (PSI) and The Alliance for Malaria Prevention led on net distribution and operational lessons learned.

PATH led the implementation of effectiveness pilots with country partners in Burkina Faso, Mozambique, Rwanda, and Nigeria, while Tulane University (based in New Orleans) led on cost-effectiveness work, and Imperial College London led on impact modelling.

The epidemiological evidence built through the NNP allowed the World Health Organization Global Malaria Program (WHO-GMP) to issue a strong recommendation for the deployment of pyrethroid-chlorfenapyr and a conditional recommendation for pyrethroid-pyriproxyfen insecticide-treated nets (ITNs) vs pyrethroid-only nets for prevention of malaria in adults and children in areas with pyrethroid resistance.

The catalytic market shaping work under NNP was another major success of the project. Enhanced by a volume guarantee, supported by MedAccess and the Bill & Melinda Gates Foundation, NNP increased supply and demand of dual-active ingredient nets, ensuring equitable and affordable access to novel vector control products.




## Logos

1. Tropical Health
2. Tulane University
3. Liverpool School of Tropical Medicine
4. Nigeria Institute of Medical Research (Nimr)
5. Ibolda International Health (Nigeria)
6. Centre National de Recherche et de Formation sur le Paludisme (CNRFP)
7. Rwanda Biomedical Center
8. University of Rwanda
9. Mozambique National Malaria Control Programme
10. Instituto Nacional de Saúde - Moçambique


Christen Fornadel
**Senior Technical Coordinator,**
IVCC

# US Congress passes Vector Expedited Review Voucher legislation

**Late last year, US President Biden signed the Pesticides Registration Improvement Act of 2022.** The Act includes the Environmental Protection Agency's (EPA) new Vector Expedited Review Voucher (VERV) programme. VERV rewards the registrant of a new insecticide, effective against insecticide-resistant mosquitoes, with a voucher for faster review of a second, unrelated product: for example, a new pesticide for agricultural use. Faster market entry of the second product has monetary value, which mitigates the investment costs to discover and develop a novel public health insecticide. The legislation directs EPA to launch the new programme by late December 2023. IVCC began working toward the VERV incentive in 2016.

VERV was modelled after the US Food and Drug Administration's (FDA) 15-year experience with the priority review voucher (PRV) program. A sponsor receiving FDA approval of a new treatment for selected neglected diseases, rare paediatric disorders or medical counter-measures, receives a voucher. The voucher can be exercised to receive priority review of a second treatment. Priority review is faster than standard review which has value due to faster market entry. FDA has awarded over 60 vouchers since PRV was launched in 2008. Vouchers can also be sold or exercised by the new owner.

PRV is an innovative policy response to the under-investment in new treatments for global diseases like malaria, Chagas disease, leishmaniasis, dengue and African sleeping sickness. Similarly, VERV is an innovative policy response to under-investment in public health use insecticides.


Jeffrey L. Moe

**Adjunct Professor (formerly Professor of the Practice in Global Health) Global Health Institute,**
**Duke University**


One comprehensive analysis (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) showed that malaria cases were reduced by 78% (2000–2015) or 663 million cases were averted, using insecticide-treated bed nets (ITNs) and indoor residual spraying (IRS). But as insecticide use increases, so does resistance selection. Even when new vector control tools are designed to reduce resistance pressure and are rotated with other insecticides, resistance development is often inevitable and insecticide efficacy declines. Resistance is highest among the pyrethroid class of insecticides because they have been widely used for nearly 20 years on ITNs. Newer ITNs combine pyrethroids with chlorfenapyr or pyriproxyfen to improve efficacy against pyrethroid-resistant mosquitoes and reduce the likelihood of resistance development. But, unless new insecticides are developed to work in rotation with these, rapid resistance development is highly likely.

For agrochemical companies, public health insecticides represent a very small market relative to crop protection. In addition, the procurement environment in malaria vector control is affected by uncertainty with mainly tender-based purchasing. New innovations with novel chemistry are likely to have a higher price point than older, off-patent products and thus it is a challenge for industry to generate a return on investment in this market environment.

An estimated 241 million people had malaria in 2020: 95% in Africa; 627,000 deaths occurred mostly among children under age 5. The 2021 WHO World Malaria Report notes, "nineteen countries (20%) had made progress in reducing malaria case incidence but by less than the expected target; twenty-seven countries (29%) had increased case incidence, and 14 countries (15%) had an increase of 40% or more in malaria case incidence in 2021 compared with 2015". After 15 years of year-on-year decline, progress against malaria has plateaued.

**The VERV authorising legislation directs EPA to award a voucher upon approval of a product which:**

- controls insecticide-resistant mosquitoes which are vectors of selected neglected diseases including malaria,
- uses a mechanism or mode of action that is different from insecticides already registered with EPA,
- and can be used in interventions such as (but not exclusively) insecticide treated nets and indoor residual spraying.

The legislation also allows the agency to make case-by-case considerations of previously approved products if they meet the VERV eligibility criteria and are submitted as repurposed public health use products.

In 2023, EPA has been developing a draft VERV guidance for industry. EPA observers forecast the agency will release the draft for public comment in the autumn of 2023 and release the final guidance on or before December 29, 2023.

VERV is authorised for 2022-2027 as part of the 5-year recurring cycle of Pesticide Registration Improvement Act (PRIA) re-authorisations. After the programme launch, ideally registrants will submit novel or re-purposed products for VERV consideration, and upon approval will receive a voucher. Experience with selling or exercising vouchers will transform VERV from long-awaited possibility to practice. The authorising legislation requires EPA to evaluate the programme in 2027, including possible changes to the eligibility criteria, and recommendations to continue/discontinue the programme for the next 5-year period. 2022 marks a 6-year legislative achievement for IVCC. And now, in 2023, the innovative programme is on track to open a window of opportunity for novel and re-purposed insecticides to receive the incentive and further motivate insecticide development in the fight against malaria.

# Good Laboratory Practice

**Since 2016, IVCC has supported eight vector control product testing facilities (four in West Africa, three in East Africa and one in the UK) towards Good Laboratory Practice (GLP) certification, in partnership with the Bill & Melinda Gates Foundation, the United States Agency for International Development (USAID) and UK Aid.**

Funds have been made available to these facilities for the GLP certification process, provision of GLP training through workshops (one in the UK and three in Africa), specialist training in quality assurance and data management systems (including training courses run by the UK Research Quality Association), and infrastructure improvements required for full GLP compliance.

Between 2016 and 2021, four of the eight facilities were granted GLP certification: the Kilimanjaro Christian Medical University College - Pan African Malaria Vector Research Consortium (KCMUCo-PAMVERC) facility in Tanzania (certified in 2017); the Centre de Recherche Entomologique de Cotono / the London School of Hygiene and Tropical Medicine (CREC/LSHTM) facility in Benin (certified in 2019); the Liverpool Insect Testing Establishment (LITE) facility, based within the Liverpool School of Tropical Medicine, (certified in 2020); and the Ifakara Health Institute, The Vector Control Product Testing Unit (IHI VCPTU) facility in Tanzania (certified in 2021). All four test facilities have been providing GLP laboratory and semi-field study services to IVCC's vector control product manufacturing partners.

Graham Small
**Senior Technical Manager,**
IVCC

Notably, the KCMUCo-PAMVERC and CREC/LSHTM test facilities conducted GLP laboratory and experimental hut studies on Mitsui Chemicals Crop & Life Solutions' (MCCLS) VECTRON™ T500 IRS product,[1,2] data from which were submitted by MCCLS to the World Health Organization (WHO) Prequalification Team for vector control products (WHO PQT/VCP) in support of its evaluation of this product. In addition, the Centre Suisse de Recherches Scientifiques (CSRS) facility generated GLP experimental hut study data[3] and CREC/LSHTM generated GLP laboratory and hut study data[4] on Vestergaard's new PermaNet® Dual deltamethrin-chlorfenapyr net which were used in WHO PQT/VCP's product evaluation. Both products were WHO prequalified during 2023 and have also received their WHO recommendation from the WHO Global Malaria Program (WHO-GMP).

Following delays to facility inspections by the South African National Accreditation System (SANAS) due to the COVID-19 pandemic, IVCC was very pleased to announce this year that three further African facilities had been granted GLP certification by SANAS: the Centre Suisse de Recherches Scientifiques en Côte d'Ivoire facility in Abidjan, Côte d'Ivoire (CSRS); the Vector Control Product Evaluation Centre at Insitut Pierre Richet in Bouaké, Côte d'Ivoire (VCPEC-IPR); and the National Institute for Medical Research (NIMR) Amani Research Centre in Muheza, Tanzania.

Professor Benjamin Koudou, CSRS Director of Research and Development, observed: "This tremendous achievement by the team will be important for the visibility of CSRS within Côte d'Ivoire and abroad. It will help further build the trust that companies, malaria control implementation programmes and other organisations have in our research. We anticipate that this will increase the demand at CSRS for conducting laboratory and field trials on products to control malaria and other vector-borne diseases."

Image credit: Graham Small, IVCC, UK

Dr William Kisinza, Chief Research Scientist and Test Facility Manager at the NIMR Amani Research Centre, also commented: "Obtaining our GLP certification has involved a lot of hard work by the team during the past seven years and we are very proud of this achievement. Our facility is the first public test facility in the East African region to achieve GLP certification for vector control product evaluations. We are grateful for the support and guidance provided by IVCC throughout this process. We now join a larger network of test facilities in Africa that can generate study data on vector control products of the highest quality. We look forward to working with companies to conduct high-quality GLP studies on the efficacy of novel vector control products in line with the Prequalification Unit Vector Control Product Assessment Team (PQT/VCP)."

IVCC would like to thank the Bill & Melinda Gates Foundation, USAID and UK Aid for their continued support to our network of African test facilities. We would also like to thank two key members of the GLP project team, Alex Wright and Jameel Bharmal, who spent many weeks visiting each facility to provide training, support the development and implementation of quality management systems, and guide them through the GLP certification process. The successful GLP certification of six of the seven African collaborating facilities to date is testament to all their hard work and dedication throughout this project.

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Image credit: Graham Small, IVCC, UK



IVCC 2023 Stakeholder Forum: 'Working in Partnership to Deliver Vector Control Solutions'

**October 2023**









# Finance Report 2022/23

## Financial governance

IVCC is a not-for-profit company limited by guarantee with charitable status. 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). The LSTM research management team accessed by IVCC has extensive knowledge of all major funders within the sector and the expertise to comply with all external funder audit requirements.

A finance and investment committee made up of senior employees and trustees external to the organisation gives governance oversight on all financial operations of IVCC and meets three times a year. A specialist taxation service is provided by external parties to give expert advice on both UK and overseas taxation ensuring IVCC is compliant.

All internal audit work is carried out by RSM Risk Assurance Services LLP. RSM's remit is to provide independent and objective assurance to add value and, where appropriate, to make recommendations to strengthen governance and control processes and identify opportunities for operational efficiencies, adopting a risk-based approach.

A competitive tender process was undertaken during the year, following which RSM was reappointed.

IVCC received an unqualified statutory audit report and no significant control issues were identified by the external auditor, Grant Thornton UK LLP.

## Value for money

Value for money is important to IVCC and its stakeholders.

Responsibility for the delivery of value for money is recognised 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 through the centralised procurement function.

The VfM Steering Group (VfM) is responsible for monitoring the VfM programme and for driving forward the strategy.

## Process improvement activities

As reported in the previous year, the LSTM group is undertaking a major finance systems replacement project. With the support of an enterprise resource planning consultancy, the group completed a successful tender process, following which TechnologyOne was awarded the contract. The project is well established, and the implementation team includes a dedicated Project Manager alongside secondees from the Finance departments. The new system is timetabled to go live in April 2024. The new finance system is expected to generate significant savings in the form of staff time, process automation and integration of systems, including forecasting processes.

Work has also begun on the specification for a new research management information system with contributions from departments across the group. This will greatly enhance all aspects of the research life cycle, including pre- and post-award management, contract management, research outputs, ethics and research governance.

Work continues on the review of professional service departments with the integration of the aims and actions developed with the organisational strategies for 2023–2028. This includes the alignment of capabilities and resources within teams. The appointment of a new Chief Operating Officer in early 2024 will spearhead the transformation plan.

## Procurement activity

LSTM published an invitation to tender for grant audits in August 2022, with a scope of work covering LSTM group funder audits, including the IVCC portfolio. LEES Accountants was awarded the engagement.

The External Scientific Advisory Committee (ESAC) advises IVCC leadership on specific areas of technical expertise in relation to the direction and strategy related to product development. Following a skills gap analysis, IVCC identified a need to recruit additional ESAC members. Recruitment was conducted through an open tender process.

Image credit: IVCC, UK

## Financial Performance

Income for the year of £33.4m was £15.2m lower than last year, with resources expended of £32.2m down by £15.5m giving a surplus of £1.1m before other recognised gains and losses.

| | 2023/23* | 2021/22 | 2020/21 | 2019/20 | 2018/19 |
|---|---|---|---|---|---|
| **Income** | £24.57m | £33.43m | £48.61m | £39.44m | £38.57 |
| **Expenditure** | £26.28m | £32.22 | £47.66m | £38.32m | £37.23m |
| **Net gain/(loss) on investments** | - | (£0.06m) | £0.94m | - | - |
| **Other recognised gains/(losses)** | - | - | - | £0.11m | £0.64m |
| **Surplus/Deficit** | (£1.71m) | £1.15m | £1.89m | £1.23m | £1.98m |

**Forecast.*

A total of £23.8m was spent on direct charitable project activities (2021/2: £40.96m) with a further £1.8m paid out on project activities undertaken in-house (2021/2: £2.2m). General support costs, including core administration support costs of £6.5m (2022: £4.2m) were also incurred in the year. In accordance with FRS 102, income and expenditure transactions which arise through forward foreign exchange contracts are restated from the forward rate to the year-end spot rate. This resulted in a further £1.4m being added to both income and expenditure for the year.

Income from charitable activities in 2022/23 was budgeted at £35.3m (2022/23 actual: £33.1m; 2021/22: £48.5m). Total income in 2022/23 of £33.4m represents a 6% shortfall against budget (£35.3m).

It is forecast that income from charitable activities will reduce from 2022/23 (actual: £33.1m) to £26.3m in 2023/24, representing a contraction of 20% against 2022/23. The reduction in the income forecast reflects the conclusion of the very successful New Nets Project (NNP) and the Indo-Pacific Initiative (IPI) and includes the latest assumptions in respect of the level of core grant renewals.

## Going concern

IVCC has a strong balance sheet including significant cash and investment holdings.

IVCC's last medium-term core grant with the Bill & Melinda Gates Foundation (the foundation) concluded in December 2022. Two bridge grants spanning the period October 2022 to August 2024 were awarded by the foundation.

The foundation award is set at a level that presumes a degree of match funding to maintain the portfolio at its current level. To ensure operational continuity at a critical and resource-intensive stage in the development of key projects, the 2024 annual budget was set on a deficit basis. The IVCC Board granted approval for the utilisation of up to £1.7m of IVCC reserves in the year 2023/24. IVCC has undertaken a scenario-based prioritisation assessment outlining the actions to be undertaken in the event that other sources of income fall below expectations.

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

The Board of Trustees and auditors therefore have a reasonable expectation that IVCC has adequate resources to continue in operation for the foreseeable future. Therefore, it continues to adopt the going concern basis in preparing the financial statements.

## Reserves Policy

Unrestricted reserves of £11m (2022: £9.9m) are used to finance activities currently out of scope with existing funders, but within the overall mission and objectives of the organisation. IVCC is planning to utilise up to £1.7m of its reserves to gap fund the development of key projects and the organisation is comfortable the level of reserves is more than sufficient to cover this.

IVCC aligns with the group policy of ensuring that unrestricted reserves represent a minimum of six months' pay expenditure. Resources are managed and committed within a framework of financial planning that ensures it has both sufficient reserves and liquid resources to fulfil its commitments.

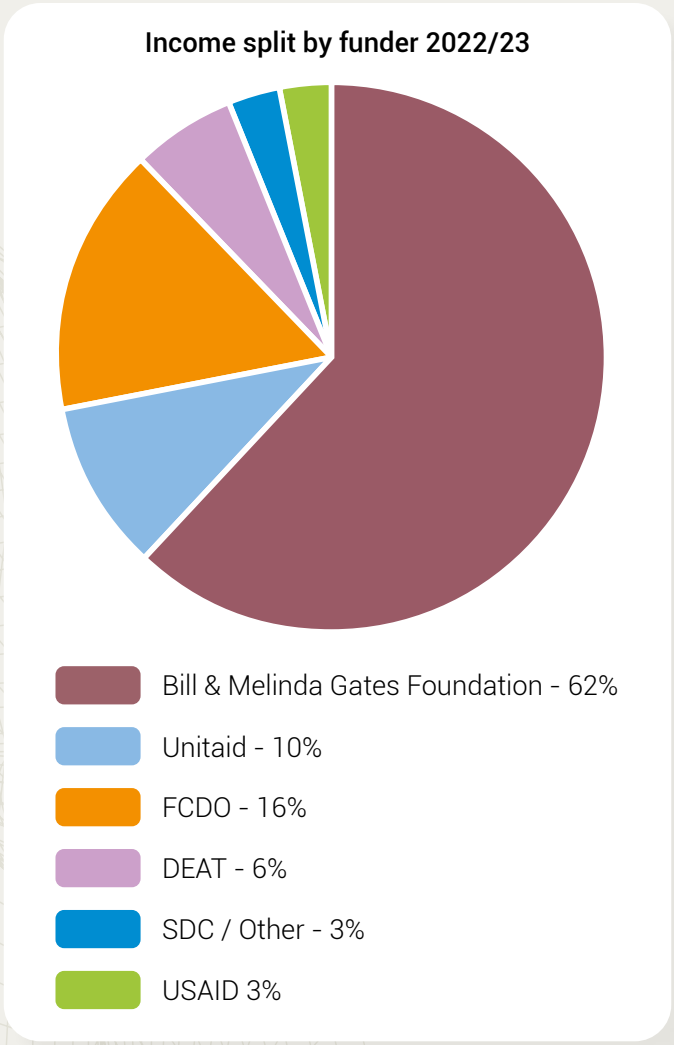
IVCC has a positive bank balance of £15.9m (2022/23: £19.5m), investments of £5m (2022/23: £12.9m) and no loans outstanding. Reductions in cash and investment holdings in the year are driven by funding constraints, coupled with a more dynamic mechanism of cash disbursement applied by the foundation to align funds advanced with IVCC's short-term cash flow requirements.

## Investments

IVCC continues to adopt a conservative investment strategy. Short-term surplus cash held is invested in high interest-bearing accounts as part of an overall cash pooling arrangement with the parent company to maximise potential returns and minimise risk. Medium- to longer-term cash is invested in low-risk company and government bonds.

The Finance and Investment Committee of LSTM acts as a review body for all finance- and investment-related activities. A member of the IVCC Board sits on the committee and reports between both organisations on any matters that should be brought to the board's attention for further discussion.

## Funding mix




## Financial governance

The foundation provided 62% of the charity's restricted income from charitable activities in 2022/23 (2021/22: 50%). Proportionate grant income by funder has been impacted by the NNP and the IPI being in their final phase, with both projects due to close by the end of calendar year 2023. Excluding income in the year from NNP and IPI, the foundation provided 74% of the charity's income in the year, compared with 76% in 2022.

Grant income from the foundation fell from £23.7m in 2021/22 to £20m in 2022/23, a reduction of 16%. This is driven by a lower rate of expenditure utilisation in respect of the foundation core grant, due to the securing of other sources of funding during the year.

The UK Foreign, Commonwealth and Development Office (FCDO) awarded IVCC £7.9m of core funding during the year. The memorandum of understanding remains active, with a current end date of March 2024.

During the year, IVCC's cooperative agreement with the United States Agency for International Development (USAID) concluded in line with the contractual end date of 31 December 2022.

Unitaid provided 10% of the charity's restricted income from charitable activities in 2022/23, a reduction of 19%, which is in line with timelines for the final phase of NNP which is at the closeout stage.

The Australian Government represents 6% of the charity's restricted income from charitable activities for 2022/23 (2021/22: 5%). The IPI project was subject to a no cost extension until 31 December 2023.

The 2023/24 budget assumes that 67% of income from charitable activities will be funded from active grants with the foundation, with unconfirmed grant renewal estimates accounting for 29% (£7.2m) of the total income target for the year. Since the 2023/24 budget was approved, grant renewals of £3.9m have been awarded, thereby reducing the unconfirmed grant renewal target from £7.2m to £3.3m.

Image credit: IVCC, UK

## Funding developments

The five-year predictive model of IVCC expenditure is in the process of being updated in conjunction with the ongoing strategic review of IVCC.

In 2023/24, USAID launched a Notice of Funding Opportunity. IVCC submitted a proposal and was awarded a new five-year cooperative agreement commencing 1 October 2023, associated with a budget ceiling of $10m (£8m), against which $0.5m (£0.4m) has been obligated to date, for the period to 31 December 2023.

The Australian Government launched a competitive call for proposals in 2023/24. IVCC responded with a proposal submission that, if successful, would enable IVCC to undertake follow-on activities under the IPI for a further five-year term.

In April 2023, Unitaid published a competitive call for proposals for a new market-shaping intervention, an Africa regional initiative aimed at building and refining effective delivery strategies for new vector control tools to catalyse adoption and address emerging threats (referred to as ARISE). IVCC assembled a consortium of partners and submitted a joint proposal in August 2023.

Image credit: Goodbye Malaria, South Africa

# The IVCC team

Strategy, Portfolio and Project Management | Technical Development | Access & Market Shaping | Communications & Operations

Justin McBeath
**CEO**

Mathias Mondy
**Director of Strategy, Portfolio and Project Management**

David Worrall
**Group Legal & IP Advisor**

Leo Smedley
**Finance Manager**

Terri-Lee Holmes
**Legal Officer**

John Hughes
**Finance Officer**

Larry Norton
**Senior Project Manager**

Fred Yeomans
**Senior Project Manager**

Danielle Brennan
**Senior Project Manager**

Marlize Coleman
**Project Manager**

Derric Nimmo
**Director of Technical Development**

Graham Small
**Senior Technical Manager**

Janneke Snetselaar
**Technical Manager**

Svetlana Ryazanskaya
**Technical Manager**

Jason Richardson
**Technical Manager**

Stephanie Herodotou
**Analytical Chemist**

David McGuire
**Director of Access & Market Shaping**

Tom McLean
**Senior Advisor, Access and Strategy**

Christen Fornadel
**Senior Technical Coordinator**

Ioana Ursu
**Senior Global Insight & Access Manager**

Andrew Saibu
**Africa Regional Coordinator**

Chris Larkin
**Director of Communications & Operations**

Laura Roberts
**Communications Manager**

Karen Johnson
**Senior Project and Business Administrator**

Sara McManus
**Project & Business Administrator**

Helen Fletcher
**Project & Business Administrator**

Gary Ward
**Project & Business Administrator**

## Consultants

Richard Adey
**Project Management**

Angi Harris
**Technical Strategy (ATSB)**

Vasanthan John Paul
**Registrations**

Jameel Bharmal
**Trials Manager East Africa**

Mike McDonald
**Technical & Partnering (DFAT)**

Julian Entwistle
**Technical (ATSB)**

Mark Latham
**Application Technology**

Jon Bastow
**Market Access (ATSB)**

Alan Ayers
**VERV**

# Funding partners

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

The Bill & Melinda Gates Foundation (the foundation) and IVCC are a long-standing partnership. The foundation 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. The foundation emphasises collaboration, innovation, risk taking and results, which fits precisely with IVCC's mission and achievements. The foundation 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 Foreign, Commonwealth and Development Office (FCDO), which is the UK government department with a mission to promote sustainable development and eliminate world poverty. FCDO 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. FCDO's partnership with IVCC has provided a substantial boost to the practical task of developing effective vector control approaches, such as insecticidal treated nets, that have substantially reduced child and maternal deaths and the overall incidence and death rate from malaria.

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.

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 has funded the IVCC NgenIRS and New Nets Programme (NNP) market intervention programmes to address factors hindering wide-scale use of new resistance breaking insecticides.

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.

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 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.

IVCC's work on global forecasts for malaria commodities is supported by the Clinton Health Access Initiative.

IVCC would also like to acknowledge additional NNP funding support provided by MedAccess.