



TOXICS-FREE SDGS: DOCUMENTING DDT SPRAYING, PRODUCTION, POLLUTION AND ALTERNATIVES IN UGANDA

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LIST OF ACRONYMS

Abt	Abt Associates Inc
EPA	Environmental Protection Agency
DDT	Dichloro-diphenyl-trichloroethane
CBD	Convention of Biological Diversity
COP	Conference of the Parties
CSOs	Civil Society Organizations
IPEN	International Pollutants Elimination Network
IRS	Indoor Residual Spraying
NAPE	National Association of Professional Environmentalists
NEMA	National Environment Management Authority
NMCP	National Malaria Control Programme
NDA	National Drug Authority
MDA	Mass Drug Administration
MOH	Ministry of Health
MSDS	Material Safety Data Sheet
PPE	Personal Protective Equipment
POPs	Persistent Organic Pollutants
PMI	Presidential Malaria Initiative
RRA	Rapid Risk Assessment
RTI	Research Triangle International
UPFM	Uganda Parliamentary Forum on Malaria
USA	United States of America
UNETMAC	Uganda Network on Toxic Free Malaria Control
UNHRO	Uganda National Health Research Organization
VCD	Vector Control Division
WHO	World Health Organization
WHOPES	World Health Organization Pesticide Evaluation Scheme

1. BACKGROUND OF THE PROJECT

Amidst staggering mortality and morbidity rates due to malaria in the African continent, about 14 African countries, namely: Botswana, Eritrea, Gambia, Madagascar, Mauritius, Morocco, Mozambique, Namibia, South Africa, Sudan, Swaziland (Eswatini), Uganda, Zambia and Zimbabwe, are using dichloro-diphenyl-trichloroethane (DDT) for malaria control, while a considerable number are contemplating using it. This is clearly indicated in the Malaria Journal published in October, 2017 on the “Global trends in the production and use of DDT for control of malaria and other vector-borne diseases.”

(<https://malariajournal.biomedcentral.com/articles/10.1186/s12936-017-2050-2>).

Considering the volume of medical literature that has been accumulated in the recent past, DDT use is in direct contravention of the rights of both the born and the unborn. Adverse effects of DDT not only increase the disease burden in resource-poor settings, but also violate various principles that govern human rights.

In 2004, the Stockholm Convention, an international agreement (treaty) on eliminating the production, distribution and use of persistent organic pollutants (POPs), including DDT, came into effect. The treaty made the use of DDT possible only in justified and exceptional cases to control the mosquitoes that transmit diseases, provided there were no effective and affordable alternatives available. The Convention limits DDT use to indoor residual spraying (IRS). However, confining the use of DDT effectively to indoor living areas is very difficult. The risk of severe economic impacts from spill-over effects and from misuse of DDT in agriculture is evident.

The Stockholm Convention on Persistent Organic Pollutants (POPs), under Decision SC-8/2, decided to evaluate the continued need for DDT for disease vector control at the 9th Conference of Parties (COP9), “on the basis of the available scientific, technical, environmental and economic information, including that provided by the DDT Expert Group, with the objective of accelerating the identification and development of locally appropriate, cost-effective and safe alternatives.”

It was therefore important to undertake this project in Uganda as it is one of the countries that have registered an acceptable purpose for DDT use. The project was conceived and financed by the International Pollutants Elimination Network (IPEN) and implemented by Uganda Network on Toxic Free Malaria Control (UNETMAC), an umbrella organization in Uganda registered in 2007 which co-ordinates, supports and builds capacity for its member organizations and individuals to engage in sustainable malaria control initiatives, sound chemicals management approaches and sustainable community development interventions.

The overall objective of the project was to reveal the ongoing proliferation of DDT pollution in manufacturing and use and cite important non-chemical alternatives to increase pressure for acting on this ongoing use in Uganda, while the primary objective of the project was to assess the current DDT production and/or use in Uganda.

Specifically, the project intended to -

- i) Conduct a review of the related literature on the production and or use of DDT in Uganda;
- ii) Conduct country specific Rapid Risk Assessment (RRA) of the DDT production, use and contaminated areas so as to know the level of the impact on humans, the environment and biodiversity;
- iii) Conduct an assessment of the potential or tried alternatives in the country; and
- iv) Conduct an assessment of the national political will to phase out DDT and use of other alternatives in the country.

2. INTRODUCTION

Over the past decades, the beneficial effects of indoor residual spraying (IRS) in malaria prevention have been reported in both high and low malaria endemic areas. Central to this IRS has been the application of insecticide to the inside of dwellings, walls and other surfaces that serve as resting places for malaria-infected mosquitoes.

For IRS to be implemented, a pesticide approved by the World Health Organization (WHO), under the World Health Organization Pesticide Evaluation Scheme (WHOPES), must be selected for use. WHOPES is the institution that analyses and recommends the pesticides that should be used in IRS based on their effectiveness, cost, and toxicity to human health and the environment.

To date, WHOPES has approved the use of pesticides within the following four classes of pesticides: Six (6) Pyrethroids (Alpha-cypermethrin WP & SC, Bifenthrin WP, Cyfluthrin WP, Deltamethrin WP, WG, Etofenprox WP, Lambda-cyhalothrin WP, CS), Two (2) Carbamates (Bendiocarb WP, Propoxur WP), Three (3) Organophosphates (Malathion WP, Fenitrothion WP, Pirimophos-methyl WP & EC and One (1) Organochlorine (Dichloro-diphenyl-trichloroethane -DDT WP).

The Stockholm Convention, which seeks to protect human health and the environment from persistent organic pollutants (POPs), provides a *sui generis* status for IRS using DDT largely on the basis of the African malaria tragedy.

In Uganda, DDT was introduced during the 1959-1964 joint Government of Uganda-WHO Malaria Eradication Pilot Project in the extreme area of Rwangaminyeto, Kihhi Sub County (presently, Kanungu district) in south western Uganda in Kigezi. The interventions focused on three annual rounds of IRS with DDT and Mass Drug

Administration (MDA) with single doses of chloroquine-pyrimethamine (Chloroquine 200 mg base and Pyrimethamine 16.5 mg) (CQ/P).

When DDT was completely banned in the late 1970s, its remaining stock in Uganda was used in the cotton and coffee plantations, and in some cases used to protect agricultural produce such as beans from bean weevils.



File Photo: DDT Container

The debate for the re-introduction of DDT began in early 2004 and its use for malaria disease vector control was conditionally approved by the National Environment Management Authority (NEMA) in November 2006. This raised a lot of opposition from a wide range of consumer advocates, opposition politicians, agriculturalists, health experts, and environmentalists.



File Photo taken by the New Vision during the launch of the 2008 DDT IRS in Oyam & Apac districts in Northern Uganda.

In 2008, the PMI, through Research Triangle International (RTI), piloted the use of DDT in Apac and Oyam Districts. While spraying DDT in these two districts, WHO guidelines were not observed. There was overwhelming evidence¹ that regulations regarding insecticide control were not followed, and that program implementation was flawed. Not enough was done in the months before spraying to educate the residents about the risks and benefits of DDT.

Sprayers were inadequately trained youths whose alleged behaviour included emptying unused DDT sachets into ant hills, intimidating or bribing residents to gain permission to spray, and spraying in homes without resident permission. Excessive concentrations of DDT were used and no containers were provided to households to manage the waste after the DDT was sprayed. Most of the spray operators were seen with no personal protective equipment (PPE)/gear and no tarpaulins or polythene sheets were provided to household owners to cover their household food and/or utensils. To make matters worse, after spraying, the house dust was swept outdoors.

On 30th June, 2008, a coalition of organic farmers, food exporters, and conservationists, organized by UNETMAC through M/s Tumusiime, Kabega & Co. Advocates and M/s Nile Law Chambers, filed a petition to stop IRS activities in Oyam and Apac in the high court of Uganda. Registered as **Miscellaneous Cause No. 149 of 2008**, a court injunction halting the spraying of DDT was granted in 2008. This injunction was, however, later lifted by the High Court when the lawyers refused to appear in court and did not inform the petitioners of their intention not to.

On realizing this, however, UNETMAC, through her new lawyers (M/s Niwagaba and Mwebesa Advocates), filed another case in the Constitutional Court on 2nd June, 2009, which was registered as **Constitutional Petition NO 14 of 2009**. This case was later on dismissed in 2014 by the Justices of the Constitutional Court who urged that it should have been filed in the High Court. UNETMAC opposed this ruling and petitioned the Supreme Court (Court of Appeal) in April 2014. Hearing of this case in the Court of Appeals was delivered in 2016 and the petition was dismissed on the grounds that it was filed in a wrong court².

Although the government of Uganda claims that it stopped using DDT in 2009 largely due to its resistance by the female anopheles gambiae and other mosquito species, information available in the corridors indicates that DDT is still being used secretly. The source reveals that the government used pyrethroids (deltamethrin, lambdacyhalothrin- commonly known in Uganda as ICON –alphacypermethrin -

¹Part of the evidence is revealed in the 2008 Court Case Ruling for Uganda Network on Toxic Free Malaria Control (UNETMAC), Lango Co-operative Union and five others Vs Republic of Uganda (**Miscellaneous Cause No. 149 of 2008**), as well as the 2008 Spray Performance Report for Apac and Oyam Districts, Uganda.

<https://www.pmi.gov/docs/default-source/default-document-library/implementing-partner-reports/spray-performance-report-for-apac-and-oyam-districts-uganda-march---may-2008.pdf?sfvrsn=4>.

²<https://ulii.org/ug/judgment/constitutional-court-uganda/2016/10>

commonly known as Fendona - an organophosphate called pirimiphosmethyl and a carbamate called bendiocarb) only until 2012.

Legislators in the 10th Parliament themselves vowed to oppose President Yoweri Museveni's proposal to reintroduce the spraying of DDT as one of the strategies to eliminate malaria in the country. President Museveni made the remark some time back as he flagged off a government initiative to fight malaria in Uganda under the Mass Action Against Malaria (MAAM) Programme. President Museveni was addressing health officials and legislators under the Uganda Parliamentary Forum on Malaria (UPFM). President Museveni said that the government may adopt spraying of DDT to combat the spread of malaria despite opposition by some politicians and civil groups. He accused the MPs against the use of DDT of ignorance and spreading lies among the public.

This project was undertaken in Uganda with particular emphasis in the 24 districts of Agago, Amuru, Apac, Gulu, Kitgum, Kole, Lamwo, Nwoya, Oyam, Pader, Alebtong, Amolatar, Budaka, Bugiri, Butaleja, Dokolo, Kaberamaido, Kibuku, Lira, Namutumba, Otuke, Pallisa, Serere, and Tororo located in the northern and eastern parts of the country where IRS activities have taken place and/or are taking place.

Important to note is the fact that, prior to the United States Presidential Malaria Initiative (PMI)-supported IRS activities in Uganda, the government of Uganda had not conducted any large-scale IRS campaigns since the 1960s. Since 2006, PMI has supported IRS programs in Uganda, starting with a large-scale campaign in the epidemic-prone southwestern highland district of Kabale.

In 2007, PMI targeted its support to high-risk sub counties of Kabale and extended support to the neighbouring district of Kanungu and four northern districts (Kitgum, Pader, Gulu, and Amuru), which included large populations of internally displaced persons (IDPs). PMI then scaled back support of IRS in Kabale and Kanungu and prioritized resources to the claimed highest transmission areas of northern Uganda (Kitgum, Pader, Apac, and Oyam), areas with the highest concentration of internally displaced peoples' camps and some of the highest rates of malaria transmission in the world. IRS was initially conducted with pyrethroids in the above districts except Apac and Oyam, which were sprayed with DDT in 2008.

The specific amount of DDT so far used in Uganda is not known because DDT is not registered for importation /use with Uganda's Agricultural Chemicals Board and Uganda Revenue Authority. It only comes into the country as classified cargo. As such, there is not any recorded data. Therefore, there is a need for a thorough investigation to establish the amount.

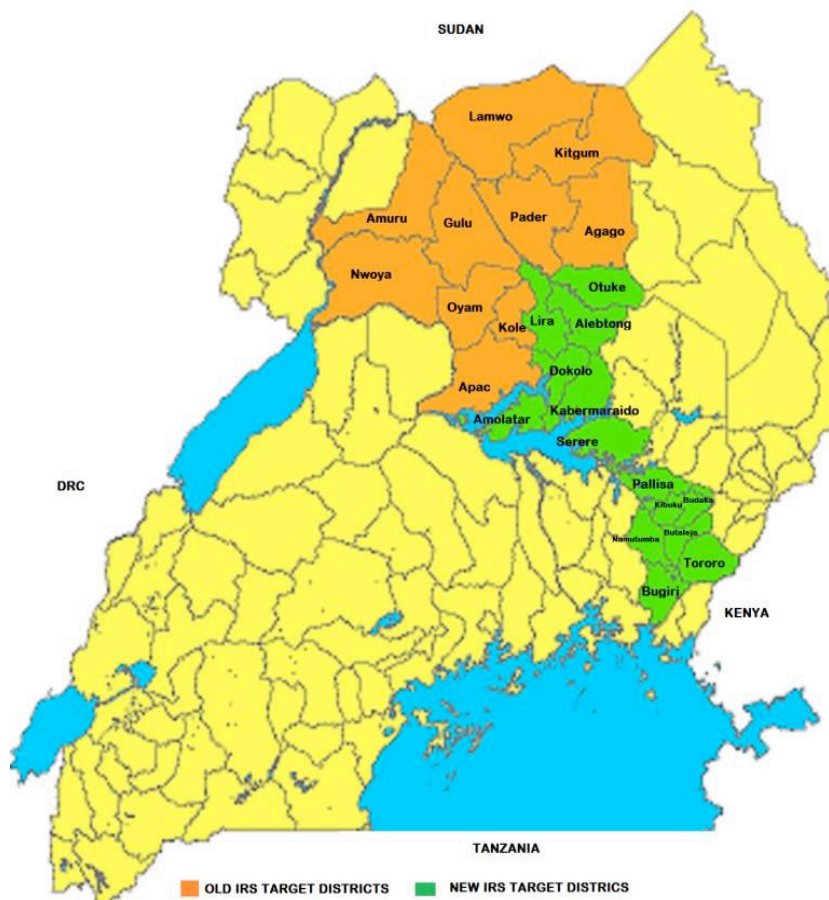
The only available data in Uganda - which is also not specific on DDT but a general inventory on obsolete pesticides - was done in 1999 by the Food and Agricultural Organization (FAO), which indicated that up to 214 tonnes of obsolete pesticide stocks (some of them POPs such as DDT) were available in the country.

Not even the country where Uganda imports its DDT from is documented. However, it is alleged that Uganda imports its DDT from South Africa. There are some US-based companies which are based in South Africa that have been helping Uganda in its procurement for DDT. One such company is called Africa Fighting Malaria (AFM).

In November 2009, Abt Associates Inc, a US-based company, began implementing the Uganda IRS project, and continuing the PMI-supported IRS in the northern districts of Uganda. Since then, PMI has concentrated its support for IRS in ten northern districts: Kitgum, Agago, Lamwo, Pader, Amuru, Nwoya, Gulu, Oyam, Kole, and Apac.

Since 2015 up to the present day, IRS activities have been and are also being implemented in the 14 districts of Alebtong, Amolatar, Budaka, Bugiri, Butaleja, Dokolo, Kaberamaido, Kibuku, Lira, Namutumba, Otuke, Pallisa, Serere, and Tororo.

The IRS activities in the nine (9) Eastern districts of Tororo, Lira, Butaleja, Namutumba, Kibuku, Budaka, Pallisa, Bugiri, and Serere are supported under the PMI, while the five (5) districts of Otuke, Alebtong, Dokolo, Kaberamaido, Amolatar are supported by the UK Department for International Development (DFID) whose support is expected to continue through 2022. Some other funding for the IRS activities in Uganda is obtained through the Global Fund for AIDS, Tuberculosis and Malaria (GFATM).



Map of Uganda showing the 24 districts where IRS activities have taken place and/or are taking place since 2009

3. SOURCES AND LEVELS OF POLLUTION, IMPORT/EXPORT, HUMAN EXPOSURE, POSSIBLE DAMAGES, STORAGE, WASTE AND RECOMMENDATIONS FROM PUBLIC INTEREST/NGO PERSPECTIVES

Uganda's environment and ecosystem could be adversely affected by the implementation of the IRS program if adequate and necessary mitigation measures and monitoring are not put into place. These critical ecosystems or activities include surface water bodies (lakes, river, marshlands and wetlands), air, soils, and economic and sustenance activities including agriculture, apiculture, and fisheries that might be adversely affected by the application of pesticides, especially DDT.

The Convention of Biological Diversity (CBD) ranks Uganda as one of the top ten countries in the world for biodiversity, particularly for mammalian diversity. Elephant, hippopotamus, buffalo, kob, topi, and a number of varieties of monkeys are all plentiful, while lions, giraffes, and rhinoceros also are available. At least 6 mammal species are found only in Uganda. The birds of Uganda include the crowned crane (the national emblem), bulbul, weaver, crow, shrike, heron, egret, ibis, guinea fowl, mouse bird, lourie, hornbill, pigeon, dove, bee-eater, hoopoe, darter, lily-trotter, marabou stork, kingfisher, fish eagle, and kite. There are relatively few varieties of fish, but the lakes and rivers contain plentiful stocks of tilapia, Nile perch, catfish, lungfish, elephant snout fish, and other species.

Through the way IRS activities are being implemented in northern and eastern Uganda, there is a high likelihood that the above diverse populations and ecological zones are already negatively affected. Mapping of settlements was not done and structures within 30 meters of sensitive habitats are not excluded from IRS. Larger buffers of at least 100 meters are not maintained for any pesticide storage or cleanup operations, and these facilities are located in some of the buffer zones of protected areas.

Some studies on DDT contamination in Uganda which have so far been done by foreign institutions have revealed high levels of DDT exposure. For instance, the one that was done on monkeys in Kibale National Park between 2014 and 2016 revealed monkeys having plagues of concave faces, missing nostrils, and cleft lips because of being exposed to chlorpyrifos and DDT, which is suspected to have come from 2008 DDT IRS in Oyam and Apac districts, which are in the neighborhoods of the Park^{3,4,5}.

In 2014, researchers with the National Museum of Natural History in Paris working in the northern part of Uganda's Kibale National Park, noticed something very wrong with the chimpanzees and baboons in the area: their noses were flattened, with nostrils that were abnormally small, or sometimes absent altogether. Their faces were concave in the middle. At the time, researchers estimated that around 10 percent of

³<https://www.iflscience.com/plants-and-animals/mutant-apes-discovered-in-uganda/>

⁴<https://www.theverge.com/2017/8/25/16197800/uganda-chlorpyrifos-pesticide-chemicals-farming-primate-deformity>

⁵<https://www.sciencedirect.com/science/article/pii/S004896971730949X?via=ihub#>

the chimpanzee population in that part of the park had these facial deformities, otherwise known as dysplasia. Two years later, that estimate jumped up to 25 percent.

Kibale National Park, known as the Sebitoli region, is a protected area about 300 square miles in size and one of the most biodiverse regions in Africa. With wet tropical forests in the north and woodlands and savannahs in the south, the park's range of ecosystems can play host to hundreds of different species of trees and birds.

There are more than a dozen different species of primates living in the park, ranging from the black-and-white colobus to the L'Hoest's monkey, and they've been studied for over 25 years. Some are observed daily. Until recently, primates with facial deformities were a rarity, spotted only twice before 2014. But by 2016, the same researchers with the National Museum of Natural History in Paris, working in Sebitoli had, calculated that 25 percent of the chimpanzees in that area had severe physical deformities, as did 17 percent of the baboons. It was a striking anomaly: just 9 miles away, primates were perfectly healthy.

Along with flat noses and abnormally small nostrils, a number of primates were also missing fingers. Some had patchy, light-colored fur. One female had a cleft lip and some baboons had extra openings near their nostrils. A few of the females appeared to have reproductive problems, not having produced any offspring well into adulthood and not displaying sexual activity or the genital swelling that indicates ovulation. All of the observed primates and their deformities were described in a recent study published in the *Science of the Total Environment*.⁶

The same researchers with the National Museum of Natural History in Paris wondered if the primates had succumbed to yaws – a tropical, bacterial infection that can result in similar facial deformities. But that disease typically comes with lesions that are apparent prior to the dysplasia, symptoms not observed on the chimpanzees and baboons in the area. So, they began to look for a cause outside of the forest.

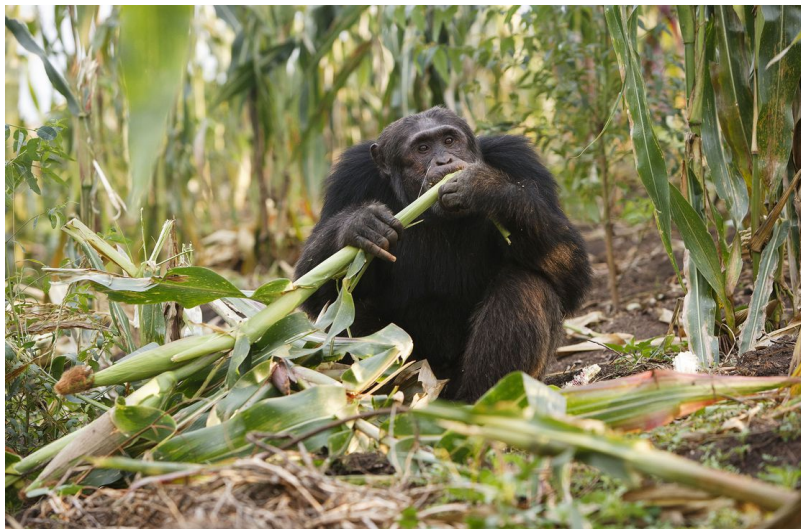


File Photo taken in 2014 in the village neighbouring Kibale National Park by the Researchers from the National Museum of Natural History in Paris

⁶<https://www.iflscience.com/plants-and-animals/mutant-apes-discovered-in-uganda/>
<https://www.theverge.com/2017/8/25/16197800/uganda-chlorpyrifos-pesticide-chemicals-farming-primate-deformity>

There searchers began to wonder if pesticides in the farmland that surrounds the Sebitoli area were a culprit. “That was one possibility,” says Colin Chapman, an author of the study and a professor in the Department of Anthropology at McGill University, “And it was a possibility we could look into.”

Because chimpanzees are protected, testing the primates themselves wasn’t an option. While primates can be observed and studied in the field, researchers aren’t allowed to physically interfere with them — to take a blood sample, for example — or remove them for observation elsewhere. They can’t even get close enough to touch them. So, researchers have to find ways to collect information around them. Here, the research team tested fresh maize seeds and stems as well as the soil from nearby farms. Soil samples from surrounding fields and river sediments were collected, too. The team also tested fish in and outside of the Sebitoli region for traces of pesticide.



File Photo taken in 2014 in Kibale National Park by Colin Chapman, a Professor in the Department of Anthropology at McGill University

Nearly every sample of fresh maize seeds and stems had levels of chlorpyrifos that were higher than authorized^{7, 8}.

Chlorpyrifos is an insecticide that’s recently been a subject of controversy in the US. Used since the 1960s, chlorpyrifos works on insects by overexciting their nervous system, eventually leading to death. At high enough doses, it has similar effects in humans. Researchers have spent decades telling the Environmental Protection Agency (EPA) that the chemical is dangerous and should be uniformly banned, citing evidence linking chlorpyrifos to neurodevelopmental problems in children, who are more vulnerable to the chemical than adults.

⁷<https://efsa.onlinelibrary.wiley.com/doi/full/10.2903/j.efsa.2017.4733>

⁸<https://www.theverge.com/2017/8/25/16197800/uganda-chlorpyrifos-pesticide-chemicals-farming-primate-deformity>

Information by the EPA^{9,10} show that EPA had accepted the findings about the chemical's dangerous impact and appeared to be on track to ban it, but in March 2019, EPA Administrator Scott Pruitt took a meeting with the largest US producer of chlorpyrifos, Dow Chemical, and has since denied the proposed ban.

Along with chlorpyrifos, the researchers also found DDT and its traces in and around the farms. Chlorpyrifos, a DDT byproduct, and another insecticide – imidacloprid – were also detected in the fish near the farms. Fish living deeper in the park didn't have any detectable levels of pesticides.

The researchers concluded that the pesticides used on farms were a likely culprit behind the facial dysplasia. The primates are affected by the same watershed that impacts the fish and in addition, primates in the area are known to sneak into neighboring farms to eat seeds and crops at night.

In 2003, Uganda had the world's 13th-largest land area under organic agriculture production and the most in Africa. By 2004, Uganda had around 185,000 ha of land under organic farming, covering more than 2 per cent of agricultural land, with 45,000 certified farmers. Had it not been for the negative impact of DDT IRS activities in Uganda, by 2017, more than 296,203 hectares of land would have been under organic agricultural production with more than 206,803 certified farmers.

Many of the organic farmers use their houses to store harvested produce. Once the DDT IRS activities occurred, organic exporters stopped purchasing produce grown in the IRS targeted areas, leaving thousands of farmers without an export market. Alastair Taylor, the AGRO ECO/Louis Bolk Institute Regional Manager, Eastern Africa, whose role was to help farmers adhere to standards required for organic certification commented thus -

"It wasn't the farmers' fault that they were sprayed, it was due to government policy... but now they need to develop new market opportunities. However, the economic losses for these farmers are considerable as there is a 20% premium for organic products at minimum. They also lost the strong marketing relationships with organic exporters that had been carefully initiated and solidified over years. They now need to learn how to negotiate new traders and new markets. The Ugandan slogan is 'Uganda: Gifted by Nature' and eco-tourism is a booming industry in this country. The government's consideration of DDT for widespread use is not holistic or cross-cutting thinking, when you think about Uganda's future".

Over 8 companies, including Shares Uganda Ltd, Gurunanah, SADCO, ESCO, Agri Exim, and Dunavant, which have been engaged in exporting agricultural products, have lost business and some of them have been made to pay heavily because of finding their products contaminated with DDT.

⁹<https://www.epa.gov/ingredients-used-pesticide-products/chlorpyrifos>

¹⁰<https://www.epa.gov/ingredients-used-pesticide-products/revised-human-health-risk-assessment-chlorpyrifos>

4. PROJECT OUTCOME

4.1 Activities conducted

The following activities were conducted:

- Reviewed literature on the production and/or use of DDT in Uganda;
- Conducted field visits and surveyed sample DDT sprayed communities in the four purposely-selected DDT-sprayed districts;
- Conducted area-specific Rapid Risk Assessments (RRAs) based on observation of contaminated sites, with a clear consideration of nearby water bodies, communities, farming & cropping systems, forests and other nearby social services (schools, open markets, play grounds, public transport stations, animal herding sites, etc.);
- Took pictures and documented every site visited and every impact observed. Written consent was obtained for the pictures with human faces which were taken, and are used in the report.
- Documented good practices of communities that replace DDT with alternatives;
- Conducted interviews with policy makers, especially politicians such as Members of Parliament (MPs) and district local leaders, as well as technocrats, especially officials from the Ministry of Health (MOH), the National Environment Management Authority (NEMA), academicians, members of civil society organizations (CSOs) and the media (among others) on the need to phase out DDT and use other alternatives in the country.

4.2 Outreach to Stakeholders: Stakeholders and sectors engaged and follow-up plan

The project team visited the purposely-selected districts of Gulu, Oyam, Lira and Tororo.



Photo taken by UNETMAC in March, 2019 during the visit of the Field Offices of the Uganda PMI Vectorlink Project by Abt Associates Inc in Tororo District

When UNETMAC team visited the offices of the Uganda PMI Vectorlink Project in Tororo district and asked for information, the team was advised to officially first seek permission from the Permanent Secretary in the Ministry of Health (MOH). UNETMAC made a formal request but has not yet received any feedback in more than two weeks. The team was further told by the local people that those who attempted to ask for information regarding this project have been arrested by the Resident District Commissioners and police.

The UNETMAC team met Mr. Muhanguzi Asaph, the Deputy Chief of Party at the Abt Associates Inc, and M/s Jeniffer Pilayo, the Tororo based Office Administrator, who informed the team that they are under strict instruction not to release any information regarding IRS activities unless authorized by the Ministry of Health.

After this hindrance, UNETMAC team cross-checked on the website of the Abt Associates Inc, which states that the number of people protected from malaria since 2009 by the Abt-led Uganda IRS activities is 6.8M people, a figure that seems to be exaggerated.

The UNETMAC team further engaged the different stakeholders and some issues as well as statements which were captured are briefly produced verbatim below: -

Okello Joseph, a younger farmer aged 26, said, “I also heard that this chemical kills people. We were also told that our produce would not get market and I didn’t want to lose my business.”

“Because they had noticed that we were adamant about this spraying program, they came after and told us that, those whose houses will be sprayed would get free medical services from all government hospitals. That’s why some of us accepted, unfortunately, this never came to pass,” said Adong Florence.

“When you lean on the wall after spraying, your skin gets cracks,” said Edac Yubentino from Adeke Village in Oyam district.

“When you are a resident of the sprayed house, you develop sores inside the mouth, especially in the evening,” said Otara George.

“The person /entity behind this program should stop immediately because our children are no longer going to school. We lost the market of our produce after the spraying and therefore we have no money for school fees,” said MzeeOgwengaAngello.

Other opinions obtained from people are:

“The government should instead invest the money spent on this activity and buy us mosquito nets. Why should they spray us with chemicals which have been banned in other countries? You can imagine, even mosquitoes did not die after the spraying.”



Photo by UNETMAC taken during the field visit

“The government should always be able to provide us with the market for our produce since people who used to buy them don’t want our produce after the spraying with this deadly chemical, DDT. “

“We shall try all means possible to continue fighting this program. The sprayers came and sprayed even my store against my will. I was forced to accept the spraying of my house and this made me lose the market of my produce.”

“After spraying, the cobweb fell down, after 5 hours, I let our chicken and duck to enter the house, they ate the cobweb, none of my chicken or duck survived.”

“The activity had tremendously affected negatively our business; our produce used to be sold highly but now it is sold cheaply. The high valued crops which used to be bought by some companies like Shares (U) Ltd., were totally refused.”

“What we need, are mosquito nets, nothing else, therefore advise this government now,” said an elder in his 60s.

“Unfortunately, because houses of my neighbours were sprayed, our market, including mine, was lost.”

“The night after spraying, there came many mosquitoes more than ever before.”

“Spraying caused much poverty to us because Shares Uganda Ltd and Agro Eco which used to pay us a lot of money for our produce left us completely; we just now survive on God’s mercy.”



Photo by UNETMAC taken during the field visit

“The sprayers would come covering their faces and every part of their bodies, in a scaring manner. To me, I noticed that the activity they were coming to implement may not be friendly...How comes Doctors and Nurses whom we find in hospitals don’t dress like that?”

“My children developed headache even up to now, they every time complain of headache which never used to be the case.”



Photo by UNETMAC taken during the field visit

“My children’s bodies started itching and they got flu immediately they entered the house, I was therefore forced to sleep at my neighbour whose house wasn’t sprayed.”

“We were not adequately involved in the development of the program, especially on matters to do with the sensitization of our people.”

“We received and are still receiving reports from farmers who have lost their businesses because buyers such as Lango Organic Farming Promotion Ltd which were buying stopped buying from them after the spraying.”

“As a leader, I would have also refused my house to be sprayed but just had to accept because if not, the government would look at me as a rebel and anti-government.”



Photo by UNETMAC taken during the field visit

In accordance with the WHO health and safety regulations, all persons working on IRS must be adequately protected against potential harm due to exposure from pesticides. All persons with potential direct contact or exposure to pesticides during handling, transportation, storage, use and cleaning of pesticides or pesticide contaminated materials must wear appropriate personal protective clothing in accordance with the safety instructions on the product label or material safety data sheet (MSDS). According to our investigation, this aspect was lacking in the sense that overalls, gloves, boots, face shields, and helmets were inadequate and inappropriate for the local climate.

During this study, UNETMAC staff members observed or were informed about the following things by community residents:

Although smoking is forbidden while on duty, some of the spray operators were found smoking while on duty. Eating and drinking during the day of applying pesticides should have been strictly regulated as it is strongly advised to feed spray operators a large meal in the morning before they conduct spray operations but this was not the case. Instead, spray operators were found eating mangoes as well drinking local brew while on duty.

Despite the fact that spray operators should wash off immediately with soap and plenty of water if the skin or clothing is contaminated with pesticide or if the pesticide gets into the eyes, this was not possible because there were no showers or water for this purpose. Spray operators were told to wash when they reach their homes. In addition, there were no designated wash areas for the overalls, boots and gloves and the people who werewashing these protective gears were not using industrial grade detergent and had no gloves and goggles.

Although pregnant women and nursing mothers are prohibited from handling pesticides in the course of IRS work, many pregnant women and nursing mothers were involved in handling pesticides during the IRS work in northern and eastern Uganda. These were recruited without subjecting them to pregnancy tests and yet it is advisable that countries using chemicals such as DDT exclude women as spray operators and instead use women in other capacities, such as mobilisers.

The pesticides were being transported to remote rural areas, over poor roads, and the vehicles which were hired for this purpose lacked sufficient seats and hand bars. In fact, one of the spray operators testified falling off the pickup truck which was transporting them, consequently damaging the spray pump he was holding and hence spilling the chemical.



File Photo taken during the transportation of the spray operators in Uganda during the 2008 DDT IRS in Oyam and Apac districts in Northern Uganda

In addition, UNETMAC team learned from the truck drivers who weretransporting the pesticides to the spraying field that they had not yet received any training from environmental compliance officers and, as such, did not have any certificate issued by such officers. The drivers therefore did not understand the toxicity of the pesticide and security issues and implications of the pesticide getting into the public's hands (such as contamination of environment and health hazards), handling an accident or emergency, the combustibility and combustion byproducts of pesticides, and/or handling vehicle contamination.

We observed that the vehicles that were transporting the pesticides were not equipped with fire extinguishers, spill kits, charged and functional cellular telephones, emergency procedures with phone numbers, or fully stocked first aid kits, as is a requirement for such vehicles. The drivers did not have protective personal equipment (PPE) and they were not provided with soap and water to wash after all the pesticide had been delivered. Instead, their vehicles were being washed at the normal washing bays, which were normally near the water courses. The UNETMAC team revealed that one of the pickup trucks carrying the IRS materials was found carrying food items such as bananas and cassava, and yet the IRS materials were not compartmentalized.

There was not enough public sensitization to enable household occupants to comply with home safety standards. For instance, many of them had not been educated about how to clear their homes of mats or rugs, furniture, cooking implements and all foodstuffs prior to spraying or how to move all furniture that cannot be moved from their homes to the center of the rooms and cover it with tarpaulins or polythene sheets. In fact, some people, including children, were seen entering their houses during spraying. There was no awareness about the IRS activities and the team could hardly see any Information, Education and Communication (IEC) materials in all the areas visited.

Although it is advisable for residents not to prepare food in close proximity to their houses during spraying, this was a common occurrence during the IRS activities in northern and eastern Uganda. Despite the fact that residents are supposed to have swept their floors free of residual pesticide and insects killed from the spraying and drop them in latrine pits, or, in lieu of a latrine pit, a hole that had been dug to bury the swept material, this was not being done, as most of the residents did not have pit latrines and had not been sensitized about it.

All public health facilities near the spray sites should be stocked with recommended medications for use in case of accidental poisoning or dermal or eye exposure; however, this was not the case in northern and eastern Uganda. Furthermore, the health officers, spray operators, supervisors, and drivers had not received any training on treatment for emergency cases of critical exposure and/or poisoning before the spraying occurred.

Although the IRS implementers are supposed to have consulted with the local authorities to determine factors such as flood zones, wells, soil types, etc. in order to locate storage facilities, this was not given much attention. Most of the pesticide storage facilities were located near schools, urban centres, water courses and residential homes. For instance, the central store in Tororo district was/is located almost in the middle of the town in an area where ground water is close to the surface.

The floors of the pesticide storage facilities lacked concrete surface to minimize absorption in case of spills. The storage facilities were not large enough to allow for proper accommodation of pesticides as well as storing empty containers and pesticide

waste. The pesticides were not shelved on wooden pallets but on the floor, which made them wet.

Despite the fact that pesticides are exclusively supposed to be applied to households' inner surfaces (walls and ceilings) in rooms that are used for sleeping, this was not the case in northern and eastern Uganda. Some spray operators were found spraying outside the shelters/huts and in the kitchen. Doors and windows of the huts were not closed during spraying and this might have caused the pesticide drift to the outside and into the environment.



File Photo taken by Abt Associates Inc during IRS operations in Uganda

Most of the IRS solid wastes were not collected, counted, labeled, or stored throughout the spray campaign in the district storehouses as it is required. In fact, some certain IRS wastes like empty sachets, gloves, etc. were found along the paths where the spray operators usually pass from the spraying fields.

The UNETMAC team were informed by the community that the use of DDT, especially in northern Uganda, now is largely associated with the Nodding Disease Syndrome and local people say that there are so many issues that link the two. The circumstances surrounding the current operations in Uganda seem to agree with the assertion by officials from the Ministry of Health as well as the employees of Abt Associates Inc that DDT is likely to be the one being used in the IRS program. However, it is now very difficult and risky to ask for information regarding IRS activities in Uganda, rendering it impossible to say with 100% certainty that DDT is being used unless a scientific, detailed investigation of DDT is done.

c) Communication with National or Local Authorities

Together with colleagues from the National Association of Professional Environmentalists (NAPE), UNETMAC team met a number of stakeholders and the brief views by some of them are here below: -

Meeting with Dr. Myers Lugemwa, the Deputy Programme Manager for the National Malaria Control Program (NMCP) in the Ministry of Health (MOH)



Photo by UNETMAC taken in March, 2019

Dr. Myers Lugemwa noted that malaria is a vector-borne disease caused by the infection of red blood cells by various one-celled parasites, of the protozoan genus *Plasmodium* (*P*), and which are transmitted by the female anopheles mosquito. Four major species of parasite transmit the disease to humans: *P. falciparum*, *P. vivax*, *P. ovale* and *P. malariae*. He noted that the most common and deadly parasite is *P. falciparum* and is the species found most frequently (90-98%) in Uganda. The most common malaria vector in Uganda is the *Anopheles gambiae s.l.*, while the *Anopheles funestus* is found mainly in high altitudes in Uganda or in permanent water bodies during short dry seasons. Both are late-night, indoor feeders.

He explained that in Uganda, malaria transmission is perennial, with 95% of the region exposed from moderate to high transmission. Population growth, massive deforestation, poor environmental management, cultivation of wetlands, brick making with open pits, road construction and agricultural activities such as rice growing, etc. have created an environment conducive to the spread of malaria.

Malaria is a leading cause of morbidity and mortality in Uganda, with an estimated average of 10.6 million malaria cases each year. It is responsible for 30-50% of all hospital outpatient visits, 35% of hospital admissions and 9-14% of all hospital deaths. About half of the hospital inpatient deaths in children under the age of five years are related to malaria and many people die in their homes. Malaria infection is responsible for 60% of miscarriages and abortions in the country and has also been associated with changes in the pathological course of other infections including HIV, Schistosomiasis and Intestinal Helminth.

He highlighted that in 1995, in order to control malaria, the government of Uganda established the Malaria Control Programme (MCP) in the Ministry of Health (MOH) to scale up malaria control interventions, including -case management in children, Intermittent Preventative Treatment during Pregnancy (IPT), Insecticide-Treated Nets (ITN) and Indoor Residual Spraying (IRS), among others. Indoor residual spraying (IRS) is done by applying liquid insecticides with long-lasting effects inside the upper wall surfaces of houses in order to kill mosquitoes or other insects that come to rest on indoor surfaces.

Dr. Myers noted that the National Malaria Control Program (NMCP) is charged with providing quality assured services for malaria prevention and treatment to all people in Uganda. The program guides malaria control efforts as outlined in the Uganda Malaria Reduction Strategic Plan 2014 - 2020 (UMRSP).

He stressed that the Uganda Malaria Reduction Strategic Plan (UMRSP) provides a common framework for all stakeholders to accelerate nationwide scale up of evidence-led malaria reduction interventions by the government, development partners, the private sector and all stakeholders. It stipulates the priority interventions, the strategic re-orientations and the investments required for achieving the goals and targets.

Dr. Myers noted that, currently, the government of Uganda intends to scale up and sustain IRS in at least 50 districts. He revealed that the NMCP aims at promoting district ownership and capacity to conduct IRS and that districts with the highest malaria transmission intensity (parasite prevalence >50%) will be identified and supported to implement IRS.

He stressed that the targeted districts are contiguous with areas where IRS has been previously implemented with impressive entomological and epidemiological results, enabling cost effective scale up in terms of IRS operational costs. He further revealed that vector resistance monitoring in the different eco-epidemiological zones will guide the choice of insecticides for IRS. In districts where IRS has substantially reduced transmission as demonstrated by epidemiological and entomological monitoring, such districts are being weaned off and further protection maintained by LLINs. IRS will then be extended to the neighbouring districts according to a phased scale up plan.

When probed to tell us the chemical being used in northern and eastern Uganda, he also advised us to write officially to the Permanent Secretary in the Ministry of Health and he was noncommittal on whether they are using DDT or not.

However, Dr. Myers categorically stated that the National Malaria Control Programme (NMCP) does not have any clear strategy for implementing vector control interventions and neither does it have any plans for Integrated Pest Management (IPM) and Integrated Vector Management (IVM).

Meeting with Dr. Wasswa John, the Head for the Chemistry Department at Makerere University

Dr. Wasswa John revealed that the Chemistry Department at Makerere University has attempted to undertake many studies on DDT, but they have been let down by the Uganda National Council on Science and Technology (UNCST), which has always refused and/or tactfully delayed certification of their research proposals.

He noted that the few studies they have gone ahead with (without the approval from UNCST) reveal higher levels of DDT. Regarding whether they are involved in the

ongoing IRS activities in northern and eastern Uganda, Dr. Wasswa noted that they are not involved at all^{11, 12, 13, 14}.



Photo by UNETMAC taken in March, 2019

Meeting with Dr. Tom O. Okurut, the Executive Director for the National Environment Management Authority (NEMA)



Photo by UNETMAC taken in March, 2019

¹¹<https://www.researchgate.net/publication/24365217> DDT and metabolites in fish from Lake Edward Uganda

¹²http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S0256-95742010000200020

¹³<https://www.researchgate.net/publication/287344274> 111-Trichloro-22-bisphenyl-chlorophenylethane DDT and its derivatives in marketed *Clarius werner* caught from Ugandas major urban wetlands

¹⁴<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5744723/>

Dr. Okurut noted that it is very important for all governments- not just that of Uganda - to realize that malaria is an environmental problem that needs concerted efforts of all stakeholders to deal with it.

He noted that NEMA is not involved in the ongoing IRS activities in northern and eastern Uganda and neither is NEMA aware of the chemicals being used.

Dr. Okurut further noted that no Environmental Impact Assessment (EIA) has been done and neither is there any Environmental Mitigation and Monitoring Plan (EMMP). According to the regulations, EIA and EMMP are mandatory and NEMA is supposed to demand these requirements.

Meeting with Mr. Jan Alex Fokkens, the Operations Manager for the Netherlands-based private company called Shares Uganda Ltd

Mr. Alex Fokkens noted that Shares Uganda Ltd is engaged in the organic farming business in northern Uganda and was affected by the 2008 DDT spraying and IRS operations to the extent that they had to shift their operations to West Nile, where IRS activities have not commenced.

Mr. Fokkens believes that there is no such thing as “controlled” indoor spraying and so DDT effluents at some point end up in the environment and the food chain, and therefore negatively impacts on Uganda's export markets. He revealed that the stigma that is attached to Uganda export products affects all export sectors (flower, fish, oil seeds, coffee, tea, fruits, rice, dairy products, beef products, cotton, organic products, honey, etc).



Photo by UNETMAC taken in March, 2019

Mr. Fokkens noted that spraying is done inside the walls of the grass thatched houses/kraals/shelters. The problem with that is that these shelters, in addition to being places where people live, are also used as food stores/granaries.

He thus concluded by saying that it is therefore a challenge doing organic farming as their harvested products are chemically contaminated during spraying and also during storage. Their buyers have therefore refused to buy as there is a greater risk of residual contamination. Additionally, after spraying, the dust swept from indoors is just dumped into the environment and with chemicals such as DDT, environmental contamination is then obvious.

Meeting with Mr. Nsubuga Emmanuel, the Assistant Commissioner Directorate of the Government Analytical Laboratory (DGAL) in the Ministry of Internal Affairs.

Mr. Nsubuga Emmanuel noted that, as DGAL, they have not commissioned any studies on DDT and IRS activities in Uganda generally.

When asked about DGAL's capacity to analyze DDT, Mr. Nsubuga noted that they have no capacity at the moment but that they are trying to lobby for the necessary equipment and that, where the need arises in the current circumstances, they can only collaborate with some private laboratories (which he was also not sure are competent enough to analyze DDT).



Photo by UNETMAC taken in March, 2019

Meeting with the Officer in charge of the Directorate of Product Safety at the National Drug Authority (NDA)

Meeting with this officer - who refused to reveal his name and share his contacts - UNETMAC team was told that the National Drug Authority (NDA) was established in 1993 by the National Drug Policy and Authority Statute, which in 2000 became the National Drug Policy and Authority (NDP/A) Act, Cap. 206 of the Laws of Uganda (2000 Edition).

The officer noted that the Act established a National Drug Policy and National Drug Authority to ensure the availability, at all times, of essential, efficacious and cost-

effective drugs to the entire population of Uganda as a means of providing satisfactory healthcare and safeguarding the appropriate use of drugs.

When asked about regulating the use of DDT by NDA, the officer noted that, in 2008, Uganda imported large quantities of AVI-DDT, 75%W/V, DDT WETTABLE POWDER, PHA014 from a foreign company called AVIMAR PTY LTD, 18 ASCHENBERG STREET CHAMDOR KRUGE.

He noted that in 2008 the NDA had developed guidelines on the use of DDT; however, after consultations, they were advised that the use of DDT did not fall under NDA mandate. As such, NDA left this role entirely to be handled by the National Malaria Control Programme (NMCP).

Meeting with the Vector Control Division (VCD), Ministry of Health (MOH)

UNETMAC's team was briefed that the Vector Control Division (VCD) was created in the early 1920s to control malaria and malaria vectors, especially in urban areas where there were non-immune colonial officers and imported Asian labourers.

The team was further educated that available records show that VCD performed these functions competently, unraveling the malaria endemicity country-wide, and as a result, the VCD mandate was expanded to cover control and research on other vector borne diseases including Lymphatic Filariasis, Schistosomiasis, Onchocerciasis, human trypanosomiasis (sleeping sickness), plague, tick and louse borne typhi and Leishmaniasis.

The team was told that control of pests of public health importance (rats/fleas, bedbugs, cockroaches) also formed part of the VCD mandate and therefore, the expanded mandate demanded an expansion of both scientific and technical cadres. Thus medical biologists (entomologists, parasitologists, ecotoxicologists and epidemiologists), medical officers and technicians (Vector Control Officers) were recruited.

The officer revealed to the team that at first, VCD were headed by a Senior Medical Entomologist, answerable to the Director of Medical Services. The Division was semi-autonomous, with its own vote. Today, the Division is Headed by an ACHS/VC, assisted by a Principal Entomologist who overseas most of the technical issues. The Division has personnel in the form of Vector Control Officers in more than 69 districts, where they work as district local government employees under the District Health Office (DHO) and in Health Sub-districts.

And that from its inception, VCD relied entirely on the Ministry of Health for all financial support. However, since the mid 1990s, the Division started receiving support for research, disease control and capacity building from several collaborating institutions and international agencies, including the Danish Bilharziasis Laboratory (DBL), London School of Hygiene and Tropical Medicine, Cambridge University, African Development Bank (through HSSP), European Union, Imperial College (UK),

Hamamatsu University in Japan, WHO (Afro), WHO (Geneva), DFID (UK), USAID/RTI, Carter Center Global 2000 River Blindness Programme, and the African Programme for Onchocerciasis Control (APOC), to mention but a few. As part of south-to-south collaboration, VCD collaborates very closely with several institutions in Kenya, Tanzania, Southern Sudan, Rwanda and Uganda.

The officer noted that the most common malaria vectors in Uganda are *Anopheles gambiaes.l.* and *Anophelesfunestus*. *Anopheles gambiaes.l.* is the dominant species in most places, while *Anophelesfunestus* is generally found at sites having permanent water bodies with emergent vegetation. *Anopheles funestus* are the more predominant malaria mosquito in northern Uganda (Apac, Lira) during dry months while *Anopheles gambiae* can be found at both sites during the rainy season.

Like *Anophelesgambiae*, *Anophelesfunestus* mosquitoes are strongly endophagic and are commonly collected indoors, resting on walls during early morning hours, making ITNs and IRS viable vector control strategies. Recently, *Anophelesarabiensis* have been found in northern, eastern, and south central Uganda, having been identified from *Anophelesgambiaes.l.* samples.

A species identification survey conducted in eastern Uganda (Tororo) showed a shift from predominantly *Anophelesgambiae* to *Anophelesarabiensis* after the start of IRS in 2015. *Anopheles arabiensis* tends to bite earlier in the evening, feeds more willingly on domestic animals, and has a greater propensity to feed outdoors than does *Anopheles gambiae*, but remains an effective malaria vector. Sampling from Apac District (in the previous northern IRS zone) indicates that *Anopheles arabiensis* may have replaced *Anophelesgambiae* as the predominant malaria mosquito in this district.

The officer revealed that as VCD, they are more interested in building the capacity for larval source management, especially in urban malaria control. He noted that larval source management (LSM) should be adopted as a complimentary strategy if the country wants to reduce malaria. He revealed that VCD is partnering with the National Malaria Control Programme (NMCP) and National Chemotherapeutic and Research Laboratory in supporting the conduct of baseline, and follow entomological and vector bionomic studies, training of health workers and Village Health Teams (VHTs) on larval source management techniques, mapping of potential sources for larval source management (breeding areas), larval source management acceptability studies and Behaviour Communication Change (BCC) for larviciding.

The officer noted that, resistance management and vector surveillance are fundamental in implementing a cost effective and efficient IRS program. He revealed that as VCD, they would have loved to assist the NMCP, partners and districts with knowledge and skills to implement an informed and evidence-led IRS program in order to achieve maximum impact, in addition to conducting nation-wide vector and parasite prevalence mapping. He noted, however, that VCD is not actively involved by the NMCP.

VCD would, for example, wish to conduct baseline and post-IRS entomological surveys/entomological studies to establish vector susceptibility to WHOPES-approved insecticides, and develop and implement an insecticide resistance management plan. In one project where they were engaged that was sponsored by USAID, VCD helped the Ministry of Health in the establishment of some sentinel surveillance sites for vector surveillance and an insectarium.

Meeting with Dr. Peter Ndemere, the Executive Secretary, Ugandan National Council of Science and Technology (UNCST)

The UNETMAC team met with Dr. Peter Ndemere, the Executive Secretary, Ugandan National Council of Science and Technology (UNCST), who briefed the team that the UNCST is a Government of Uganda Agency, established by CAP 209, under the Ministry of Finance Planning and Economic Development. He noted that UNCST is mandated to facilitate and coordinate the development and implementation of policies and strategies for integrating Science and Technology (S&T) into the national development process.

Dr. Ndemere further noted that it is a legal requirement for all persons and organisations carrying out systematic investigations of any form in Uganda to seek authorisation from the government and that UNCST is mandated to register and issue research permits. This is done to ease research coordination and oversight, ensure integrity and compliance with the set rules and regulations, and to protect the environment and humans as research participants.

When asked why UNCST has been blocking the efforts by researchers intending to undertake studies on DDT use in Uganda, Dr. Ndemere noted that those researchers may have failed to fulfil the authorization requirements. He revealed that all persons intending to carry out research in Uganda are required to register their research protocols with the UNCST, and obtain UNCST approval of the protocol. Research protocols submitted to UNCST for registration and approval should be well written and fully developed.

Dr. Ndemere went on to say that draft research protocols can NOT be accepted for registration and a research protocol must, at the minimum, have a title, names of the investigators and their institutions of affiliation, objective, methodology, significance/justification for the study, ethical considerations, workplan, budget and references. In addition, it is recommended for a research protocol to have a version and date. Data collection instruments, such as questionnaires, case report forms and informed consent forms must be attached to the protocol. Research protocols received and registered by UNCST are either reviewed internally or externally by Specialized/Research Ethics Committees (RECs), Task Forces (or Ad hoc Technical Committees) and Peer Reviewers.

Meeting with Dr. Sam Okware of the Uganda National Health Research Organisation (UNHRO)

On meeting with Dr. Sam Okware, the UNETMAC team was briefed that the Uganda National Health Research Organisation (UNHRO) is Uganda's umbrella organisation for health research coordination established in 2011 under the Uganda National Health Research Organization Act, 2011.

Dr. Okware noted that, among others, UNHRO is composed of the Uganda Virus Research Institute (UVRI), Uganda Cancer Institute (UCI), National Chemotherapeutic Research Institute and the Tropical Diseases Research Institute and UNHRO's role is to coordinate, promote and provide guidance for health research and development in Uganda.

When asked about whether UNHRO has done any research studies on DDT use in Uganda, Dr. Okware noted that UNHRO has not yet done any studies on DDT use in Uganda BUT that, they would welcome any partner willing to undertake such studies.

Dr. Okware noted that, as UNHRO, they are aware that malaria is known to be endemic throughout the country, probably with 95% of the population at risk. He observed that Uganda has the third highest number of *Plasmodium falciparum* infections in sub-Saharan Africa, and some of the highest reported malaria transmission rates in the world. There is stable, perennial malaria transmission in 90–95% of the country. In the rest of the country, particularly in the highland areas, there is low and unstable transmission with potential for epidemics.

Quoting the 2016 data from Uganda's Health Management Information System (HMIS), Dr. Okware noted that malaria accounts for 20% to 34% of outpatient visits and 25% to 37% of hospital admissions. Of all the reported malaria cases in 2016, an average of 60% was laboratory confirmed, with the highest rate at 90% in May.

Meeting with Prof. Charles Kwesiga, the Executive Director, Uganda Industrial Research Institute (UIRI)

The UNETMAC team was briefed by Prof. Charles Kwesiga that the Uganda Industrial Research Institute (UIRI) is a parastatal company, wholly owned by the government of Uganda, whose primary objective is to carry out scientific and industrial research, develop competitive technical services, and improve the capacity and competence of indigenous entrepreneurs to embark on sustainable industrial production, to produce high quality marketable products, for the benefit of Uganda's citizens.

Prof. Kwesiga further noted that UIRI was established by an Act of Parliament in 2002, which was assented to and signed into law by the President of Uganda on 30th July 2003 and that it now falls under the Uganda Ministry of Trade, Industry and Cooperation (MTIC).

Prof. Kwesiga noted that, as UIRI, they have not yet conducted any studies on the impact of DDT use in Uganda. He noted that UIRI strongly recommends the use of DDT alternatives and that he knows this has been done in other parts of the world. For example, Prof. Kwesiga quoted to the UNETMAC team the authors of the book

Malaria Vector Control without DDT: Sustainable Alternatives, which clearly elucidates several mosquito control measures that are applicable to individual and community levels. Prof. Kwesiga noted that the authors of the book classify several mosquito control measures under five headings, namely: *reduction of human mosquito contact, destruction of adult mosquitoes, and destruction of larvae, source reduction and social participation*, and that the authors provided basic approaches that can be used to fight this disease without necessarily using DDT.

More interestingly, Prof. Kwesiga also noted that in Uganda, malaria was at one time in 2002 almost eliminated in some parts of Kampala city and Jinja through a community-based environmental management program. Prof. Kwesiga revealed that a detailed assessment of vector breeding sites was undertaken at two sites in Kampala (Kitebi & Kikulu) and two in Jinja (Police Barracks & Loco Estate). Action plans in 2003 were specific to the ecology and social make-up in each site. In Kampala, the interventions included filling puddles, introducing larvivorous fish and improving drainage. In Jinja, the plans focused on building and repairing drainage channels and soak-pits. Collections of adult mosquitoes from sentinel houses suggested that there was a reduction in malaria transmission (a drop in the number of adult mosquitoes collected). Most important, the interventions were associated with reductions in malaria prevalence of 11% in the Police Barracks and 36% in Kitebi, providing evidence of the potential benefits of environmental management for reducing malaria transmission in these urban settings.

Prof. Kwesiga therefore notes that even in situations where indoor spraying is considered, less harmful pyrethroids should be used instead of DDT, and that more research in this area is also needed.

Meeting with Mr Chris Nugent, the Kansai Plascon (U) Ltd Managing Director

Being aware of recent Kansai Plascon (U) Ltd release of the anti-mosquito repellent paint^{15, 16} onto the Ugandan market, the UNETMAC team met with Mr. Chris Nugent, the Company's Managing Director.

Mr. Nugent noted that Kansai Plascon (U) Ltd is subsidiary of Kansai Plascon Africa, which is also a subsidiary of the Japanese-based Kansai Paint Company. The Company bought all the Sadolin Paints Company interests in Uganda, Kenya, Tanzania, and Zanzibar.

Mr. Nugent revealed to the UNETMAC team that the Company has invested more than \$10m (Shs36.7b) in the production of anti-mosquito repellent paint with a target to sell 60,000 litres across Uganda within every three months. There are both water-based and oil-based paints; however, no one has tested them for lead content nor is aware of the chemical content and possible human health effects over its lifetime.

¹⁵<https://www.256businessnews.com/kansai-introduces-anti-mosquito-paint-for-uganda/>

¹⁶<https://theinsider.ug/index.php/2019/03/19/newly-introduced-anti-mosquito-paint-demand-excites-manufacturers-plascon/>

Mr. Nugent noted that Uganda is the second country in Africa alongside Morocco to get the new paint and that, in Uganda, the Company is selling the four litres of the anti-mosquito repellent paint at Shs80,000.00, which is a bit unaffordable for most Ugandans.

He revealed that the Company launched its 'Hold my Hand' campaign, which aims at highlighting the plight of young children, the most vulnerable malaria victims. They plan to make partnerships with other concerned stakeholders to ensure that they cause an impact as far as preventing malaria is concerned.

Mr. Nugent further revealed that the anti-mosquito repellent paint is a modification of the acrylic emulsion paint powered by a new mosquito "knock down" technology and that, the "knock down" technology works by disrupting a mosquito's nervous system on contact, reducing its ability to remain on painted walls or fly too far away, resulting in it being knocked down. The knock down effect lasts for up to two years, offering lasting protection from malaria and other mosquito borne diseases.



File Photo taken by the Kansai Plascom (U) Ltd

When asked about whether the paint could be containing DDT, Mr. Nugent simply said that their paint is safe and that it has been approved by the Ministry of Health; Ministry of Internal Affairs; the National Environment Management Authority (NEMA) and the National Health Research Organization (UNHRO). He concluded by saying that an insecticide paint could be the solution to Africa's longstanding malaria problem.

5. PROJECT DELIVERABLES

The project deliverables include the following:

- Reviewed literature on the production and or use of DDT in Uganda

- Surveys and field visits to the DDT sprayed communities in the four purposively selected districts;
- Documentation on the magnitude of DDT production and/or use in Uganda;
- Documentation of the rapid risk assessment (RRA) of DDT on exposed humans, animals, wildlife, birds, pollinators (including honey bees), aquatic vertebrates and invertebrates in soil and water in the project area;
- Documentation of the alternatives to DDT that the national government is testing or considering to test, those used by neighboring countries, indigenous knowledge for mosquito control, cultural and community-based practices used nationally as good practices; and
- Documentation of the face-to-face interviews with the Stockholm Convention focal point, policy makers and development partners and the political will to replace DDT with alternatives.

NOTE: The project team engaged the media (both print & electronic) to disseminate the project results and project briefs and reports prepared for dissemination. Two radio talk shows were held and 200 copies of the DDT-malaria fact sheets were printed and disseminated. The resources were not enough to print more copies nor to engage the media more regularly.

6. RESOURCES

- i) <https://mobile.monitor.co.ug/News/Butebo-man-burns-own-house-in-protest-against-anti-malaria-spray/2466686-5047156-format-xhtml-ytnr94z/index.html>
- ii) <http://tndnewsug.com/health-ministry-districts-clash-over-indoor-residual-spraying/>
- iii) <https://newz.ug/government-undertakes-indoor-spraying-in-10-malaria-epidemic-districts/>
- iv) <https://ugandaradionetwork.com/story/govt-resumes-indoor-residual-spraying-in-north-eastern-uganda>
- v) <https://mobile.monitor.co.ug/News/US-Malaria-Initiative-Shs108-billion-nets-Uganda/2466686-4187484-format-xhtml-15jx24dz/index.html>
- vi) <https://businessfocus.co.ug/plascon-introduces-mosquito-repellent-paint-product/>
- vii) <https://www.monitor.co.ug/Business/Commodities/Firm-seeks-VAT-exemption-anti-mosquito-paint-Plascon/688610-4970006-7clxkez/index.html>
- viii) <https://kampalapost.com/content/business/anti-mosquito-paint-be-launched-uganda>
- ix) <http://erepository.uonbi.ac.ke/handle/11295/21756>
- x) Uganda malaria quarterly bulletin issue 10: April–June 2015
- xi) <http://www.health.go.ug/sites/default/files/Ugand%20Malaria%20Bulletin%20Issue%2010.pdf>. Accessed 12 Nov 2016

- xii) <https://www.pmi.gov/docs/default-source/default-document-library/malaria-operational-plans/fy-2018/fy-2018-uganda-malaria-operational-plan.pdf?sfvrsn=11>
- xiii) <https://www.ubos.org/onlinefiles/uploads/ubos/pdf%20documents/Uganda DHS 2016 KIR.pdf>
- xiv) <https://malariajournal.biomedcentral.com/articles/10.1186/s12936-017-2163-7#Bib1>
- xv) <http://www.comminit.com/malaria-africa/content/communication-toolkit-indoor-residual-spraying-irs-campaigns>
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