



Innovation, education, communication and health promotion towards malaria elimination

Christiaan de Jager

4 February 2020

Make today matter



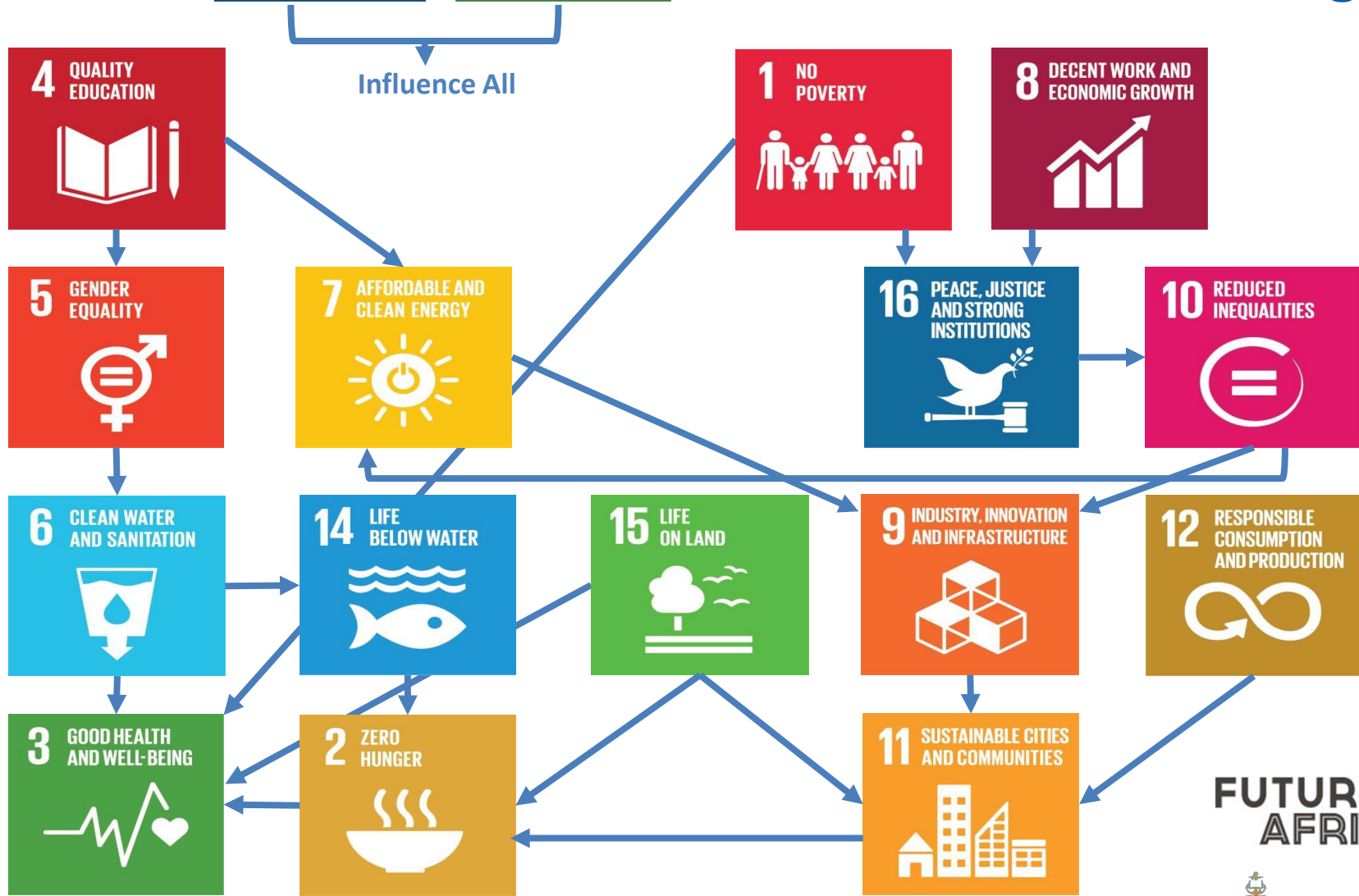


Outline

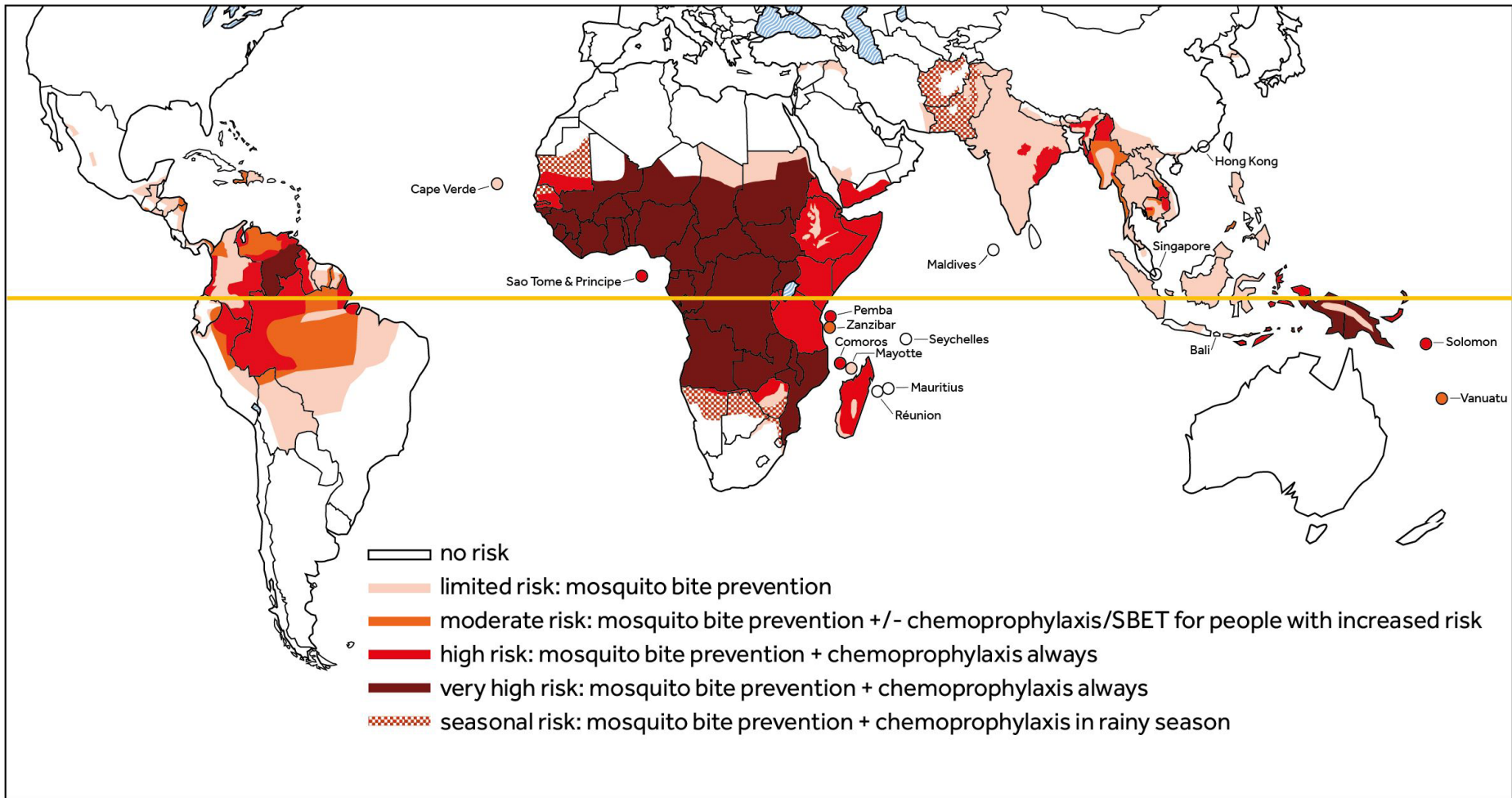
- Malaria elimination - SDGs
- Current status of Malaria
 - Global
 - South Africa
- Transdisciplinary research by the UP ISMC
- UP ISMC contributions as vehicle to address the SDGs
 - Innovation
 - Education
 - Communication
 - Health promotion



Interlinking SDGs towards health and well-being



Global Malaria (2019)



*WHO 2019, World Malaria Report 2018
Adapted from Inst. Trop. Med.*

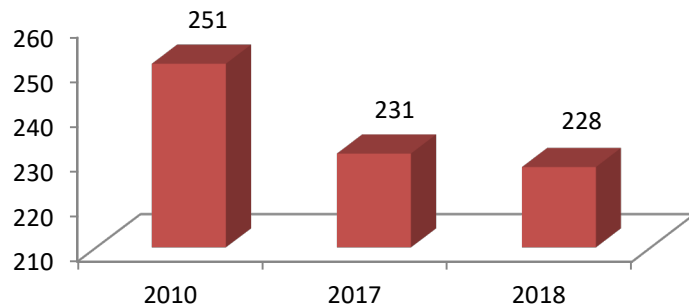


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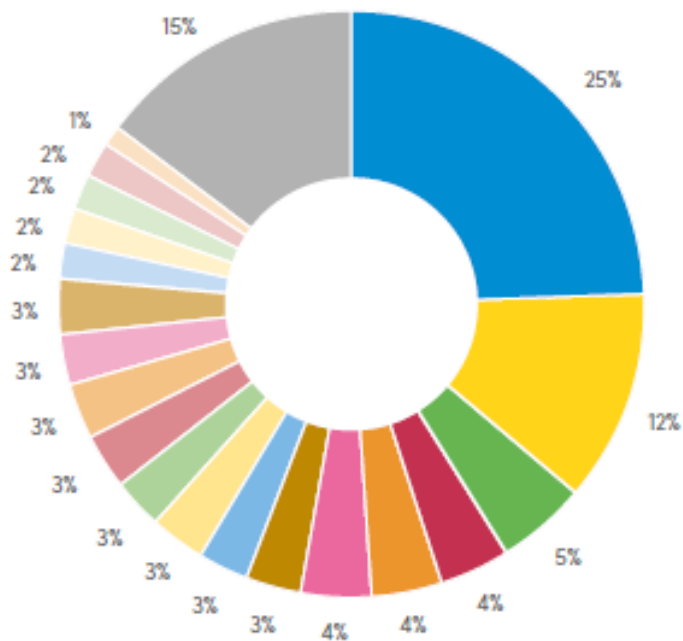
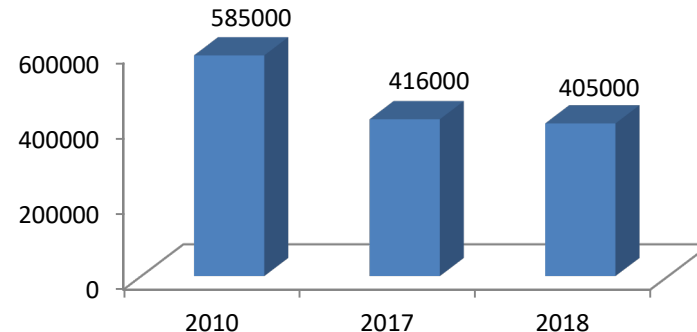
Global Cases & Deaths (2018)



Global cases (millions)



Global deaths

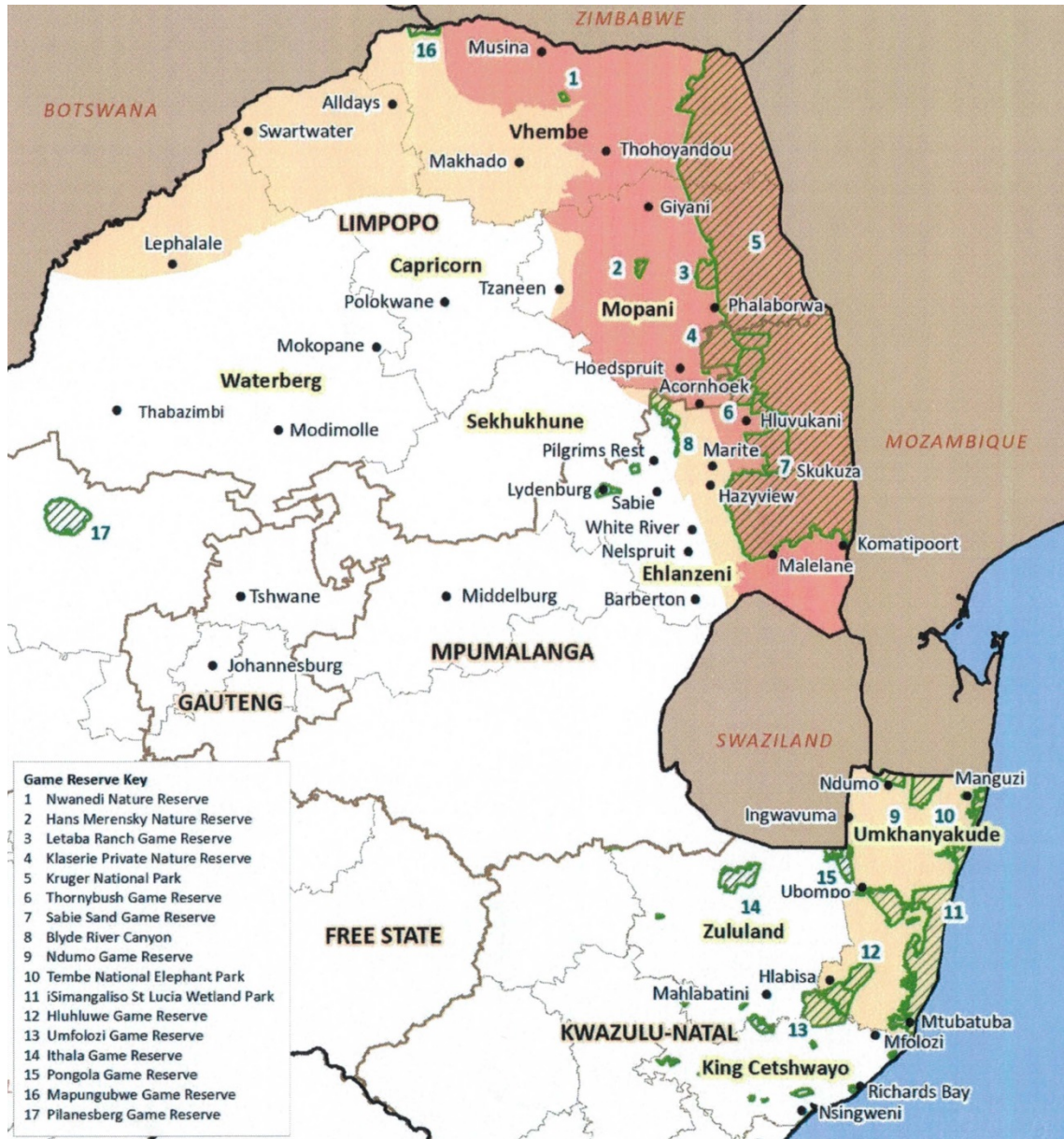


- Nigeria
- Democratic Republic of the Congo
- Uganda
- Mozambique
- Côte d'Ivoire
- Niger
- Burkina Faso
- Mali
- Angola
- United Republic of Tanzania
- India
- Ghana
- Cameroon
- Rwanda
- Benin
- Malawi
- Kenya
- Guinea
- Burundi
- Others

WHO 2019,
World Malaria Report 2018



Southern Africa Malaria (2018)



SOUTH AFRICAN MALARIA RISK MAP November 2018

FINAL TECHNICAL DRAFT, AWAITING APPROVAL

To significantly reduce your risk, take precautionary measures against mosquito bites throughout the year in ALL RISK areas
Where malaria chemoprophylaxis is indicated, mefloquine or atovaquone-proguanil or doxycycline should be used

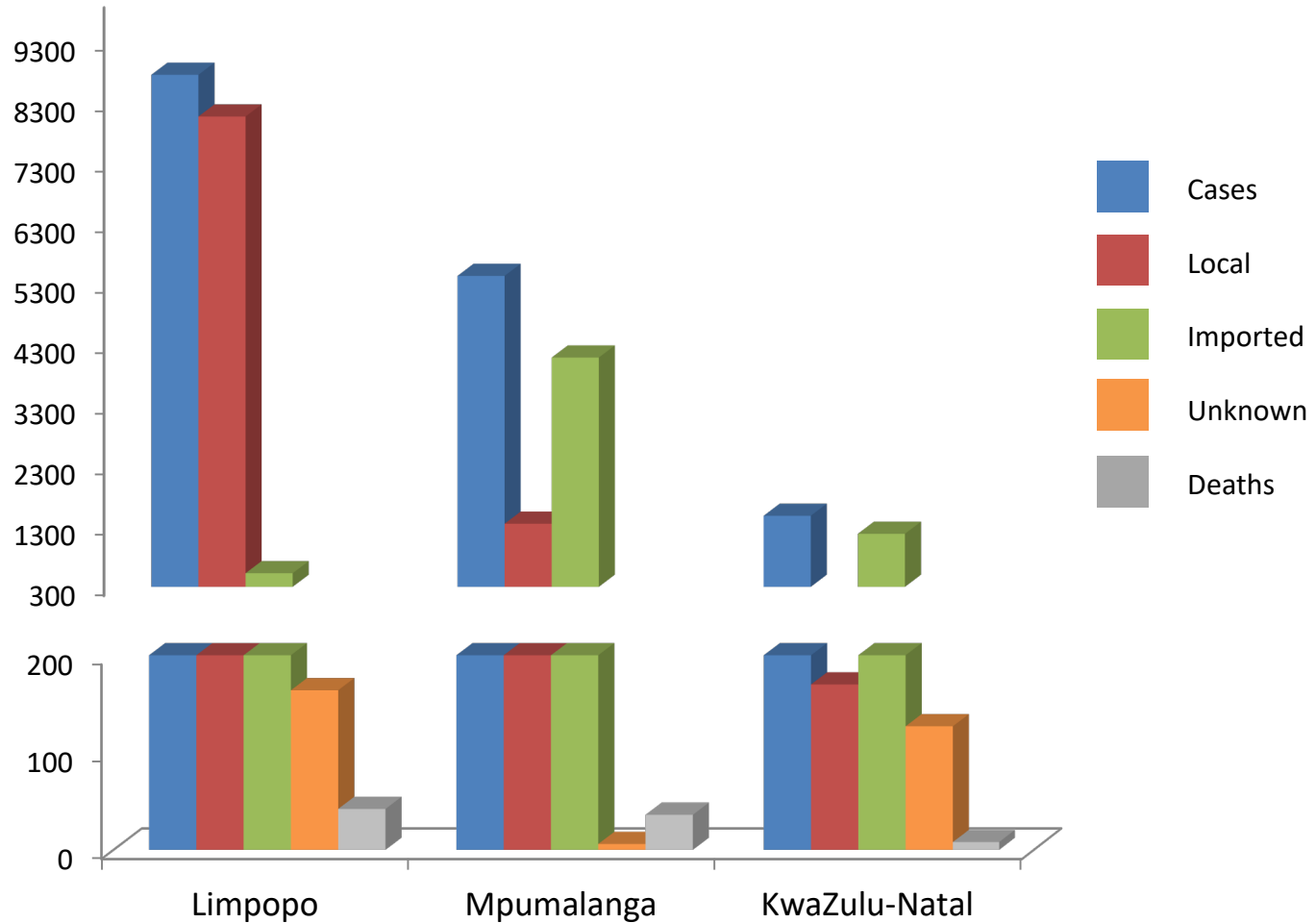
- Low Risk**
Only non-drug measures to prevent mosquito bites are recommended from September to May
- Moderate Risk**
Antimalarial drugs are recommended from September to May for all travellers
- Malaria risk does exist in neighbouring countries** For further information, please consult the WHO travel health guidelines at <http://www.who.int/ith/en/>



Map produced by the Health GIS Centre, South African Medical Research Council
Data Sources: Malaria Control Programmes of KwaZulu-Natal, Limpopo and Mpumalanga, Malaria Information System, South African Medical Research Council, Statistics South Africa, Municipal Demarcation Board



South Africa Cases & Deaths (2018)



SA NDoH, unpubl.

UP ISMC: Strategic Framework



VISION

To become a nationally and internationally known multidisciplinary research centre making a substantial contribution towards the creation of a malaria-free Africa

BY

Employing sustainable & environmentally safe malaria control technologies

Establishing integrated vector management strategies

Ensuring effective malaria case management

Promoting health education in affected populations

GOAL 1:

Follow an INTEGRATED, TRANS-DISCIPLINARY APPROACH in generating new knowledge pertaining to safe malaria control in Africa through fundamental and applied research

SO 1: Promote research into safe and effective malaria control strategies

SO 2: Engage communities, promote awareness and conduct research that reflects issues and needs of vulnerable communities related to safe and sustainable malaria control

SO 3: Develop and implement valid decision making tools for malaria management

GOAL 2:

SUPPORT AND PROMOTE RESEARCH COLLABORATION within the UP and with relevant partners regionally, nationally and internationally

SO 4: Advise policy makers on sustainable options of effective malaria control

SO 5: Promote networks with relevant partners regionally, nationally and internationally

GOAL 3:

SUPPORT ACADEMIC EXCELLENCE AND HUMAN CAPITAL DEVELOPMENT in order to build a critical mass of people performing cutting edge malaria research

SO 6: Develop human capital through education and training as well as leading-edge research

SO 7: Provide a platform for large scale project funding and capacity development



SUSTAINABLE MALARIA CONTROL



HUMAN HEALTH

Case management
Public health
Environmental health

In vivo / ex vivo infection analyses
Functional genomics
Bioinformatics
Toxicology

Integrated Vector Management
Environmental management
Mathematical modelling
Early warning systems
Remote sensing
Climate change
Toxicology

GIS
Education
Surveillance
Epidemiology
Health promotion
Health economics
Clinical & field trials
Community engagement
Animal modelling



PARASITE CONTROL

Parasite biology
Anti-malarial discovery & development
Transmission blocking strategies
Parasite surveillance (epidemiology)
Related malaria-like infections

Chemical & plant control
Transmission blocking



VECTOR CONTROL

Biting behaviour
Physical methods of control
Monitoring & Evaluation
Resistance testing
Semiachemistry
Bionomics

External collaborators & funders
(Nationally & Internationally)

Local communities must be considered and be involved, to some extent, in research and operations

HEALTH IN THE SDG ERA



UP ISMC as vehicle to address the SDGs towards malaria elimination





1 NO POVERTY



Sustained investment in health and malaria unlocks the potential of human capital to generate growth.

A 10% reduction in malaria has been associated with a 0.3% rise in annual GDP.

At household level, reducing malaria protects household income from lost earnings and the costs of seeking care.





2 ZERO HUNGER



People who suffer less from malaria **can work their fields** more consistently, resulting in better harvests and **improved food security**.

Well-nourished people, especially children, are better able to **fight** malaria.

- Dietary and food intake questionnaires
- Food intake questionnaires:
 - Determine daily food intake
 - Determine adequate nutrient intake





WHO Member States have endorsed the bold vision of a world free of malaria, and set the ambitious new target of reducing the global malaria burden by 90% by **2030**.

Preventing malaria in pregnancy reduces maternal mortality and gives newborns a far healthier start in life.

University of Pretoria Institute for Sustainable Malaria Control

"It is now widely recognized that any attempt at malaria eradication must be a long-term commitment that involves multiple interventions, disciplines, strategies and organizations."
— Anthony Fauci

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INSTITUTE FOR SUSTAINABLE MALARIA CONTROL

ARE YOU AWARE ABOUT MALARIA?

Welcome to the UP Institute for Sustainable Malaria Control

The University of Pretoria Institute for Sustainable Malaria Control (UP ISMC) is a fully integrated, multi- and trans-disciplinary, interfaculty initiative. The aim of the Institute is to coordinate and promote collaborative research on safer and sustainable malaria control and management, and generate new knowledge and support new activities pertaining to safe malaria control in Africa. This includes research on malaria education and health promotion. The UP ISMC is working closely with the National Department of Health and the Provinces to achieve the government's malaria elimination goals.

- Home
- Recently updated | 2018
- About us
- Research
- Research academic members
- Namaacha CoE
- ReSMaCA Programme

GLOBAL TECHNICAL STRATEGY FOR MALARIA 2016–2030

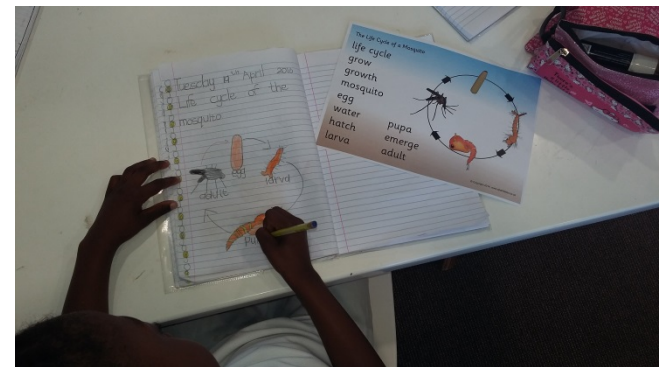
WORLD MALARIA REPORT 2019



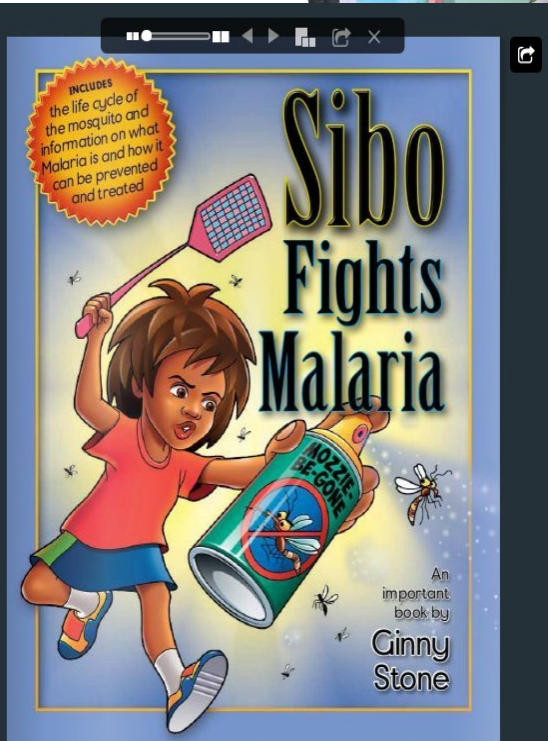
Reducing malaria enables children to **attend school regularly and learn more effectively.**

This significantly improves their school performance, and later wage-earning capacity.

- **Reducing malaria enables children to attend school regularly and learn more effectively.**



Educate and promote health through books



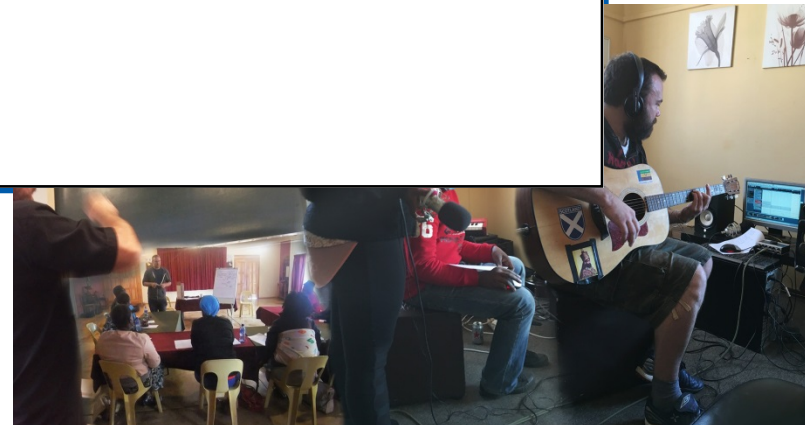
SIBO



Educate and promote health through drama



Educate and promote health through music and singing





THE A,B,C,D OF MALARIA PREVENTION



A

AWARENESS

Be **AWARE** of the risk and symptoms



B

BITE PREVENTION

Avoid being **BITTEN** by mosquitoes (from dusk till dawn)



C

CHEMOPROPHYLAXIS

Take **CHEMOPROPHYLAXIS** (antimalarial medication) if prescribed



D

DIAGNOSIS

Early **DIAGNOSIS** and Rapid Treatment

Infographics for easier 'malaria' communication

MILD/MODERATE

SYMPTOMS

SEVERE

DO NOT IGNORE SYMPTOMS. GO STRAIGHT TO A DOCTOR



FEVER

SWEATING

HEADACHE

MUSCLE ACHES

FATIGUE

SHAKING

VOMITING

DIARRHOEA

FATAL IF NOT TREATED

EARLY DIAGNOSIS and RAPID TREATMENT prevent deaths

*Adapted from International SOS,
2016*



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Freeing **women and school-age girls** from the burden of caring for family members when they fall sick from malaria, increases their likelihood of completing school, entering and remaining in the workforce.

Empowering women as citizen scientists





Cleaning trash from waterways such as streams and surrounding areas, **clean water and sanitation** leads to decreased **mosquito breeding** and a reduction in the rate of malaria transmission.

It also improves water quality, generating further health benefits.



Mpofu et al. *Malar J* (2016) 15:586
DOI 10.1186/s12936-016-1642-6

Malaria Journal

RESEARCH

Open Access



Field effectiveness of microbial larvicides on mosquito larvae in malaria areas of Botswana and Zimbabwe

Mulamuli Mpofu¹, Piet Becker¹, Kaka Mudambo² and Christiaan de Jager^{1*}



Insecticidal health impact



Environmental Chemical Pollution and Health (ECPH) research unit

- To provide a platform for more effectively addressing issues related to endocrine disrupting chemicals (EDCs), that could assist and advise government on possible measures to manage exposure to potentially harmful EDCs and toxic waste/pollution management in general.





7 AFFORDABLE AND CLEAN ENERGY



In resource-constrained malaria endemic areas, access to sustainable energy will improve access to **electrical lighting and cooling**, enabling people to spend **more time indoors** where vector control can be better employed.

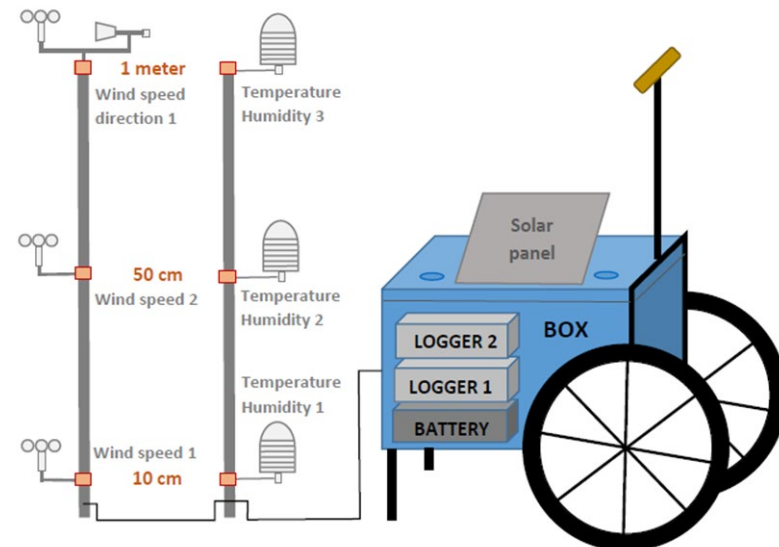


Innovation for research purposes

Malaria Micro-climate Module - Garimunia



South African Weather Service





8 DECENT WORK AND ECONOMIC GROWTH



Reducing malaria creates healthier, more **productive workforces** which can help to attract trade and commerce.

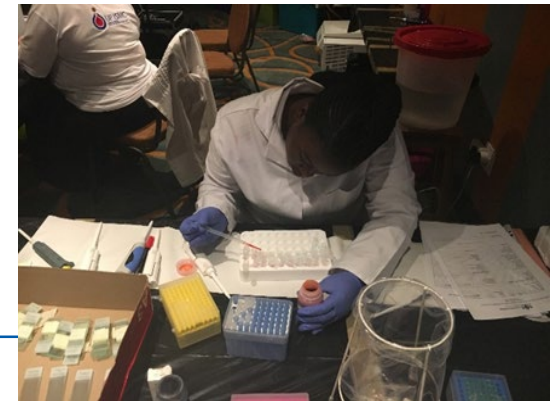
When combined with pro-poor policies, these factors **drive job creation**, inclusive growth and shared prosperity.

Enterprises that invest in their workers reduce the cost of doing business, increase their competitiveness and enhance their reputation.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



Healthy, happy people
Job creation
Jobs = health and positive economic growth





9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



Major construction and development projects must not introduce or increase malaria transmission. **Well-planned infrastructure and improved housing** help reduce exposure to mosquitoes and facilitates greater access to health and malaria services.



11 SUSTAINABLE CITIES AND COMMUNITIES

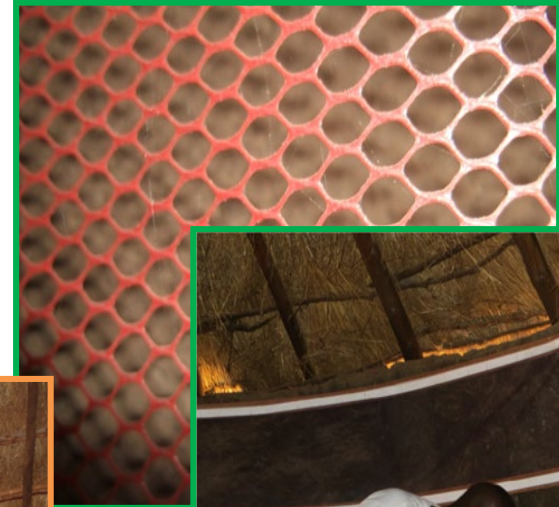




Innovation ~ Safer alternatives



Past



Future?



Current



New collection and lure techniques

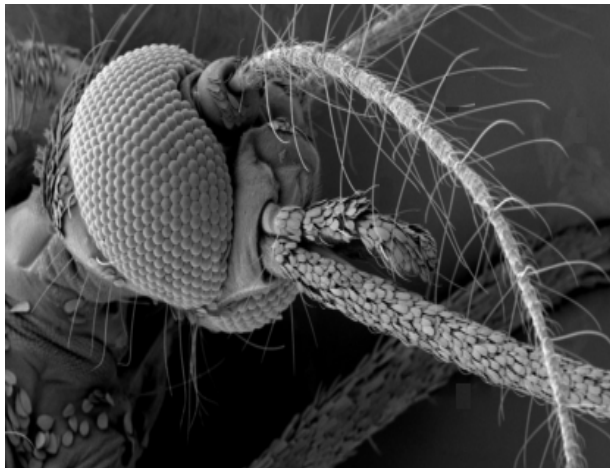
For monitoring and surveillance, vector control, and insecticide resistance research



Solar-powered traps

Developed by private sector entrepreneurs & UP ISMC testing in field

Semiochemical studies



Human landing catch (LC) vs Cattle LC collection



Novel & innovative vector control methods



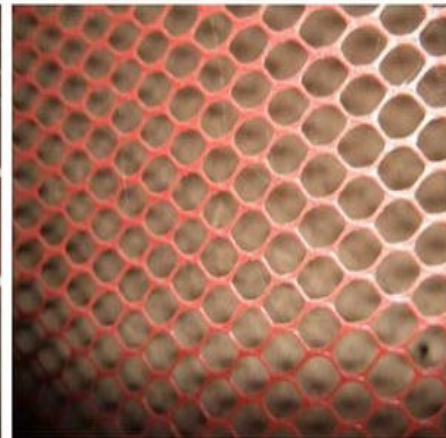
Pseudo-azeotrope repellents



Protective clothing products



Wall linings as alternatives to IRS



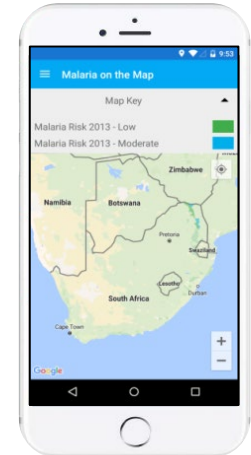
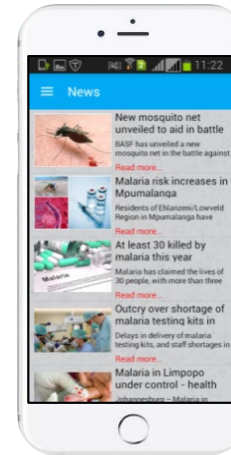
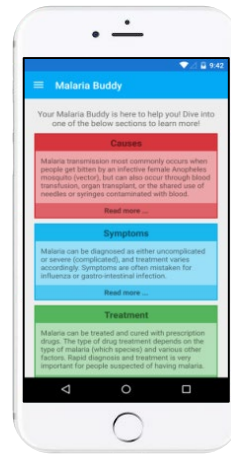
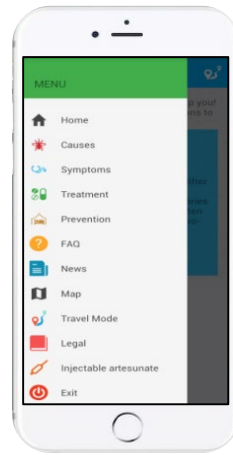


Smart devices to 'communicate' malaria

'Malaria Buddy' app

- Mainly to inform tourists about malaria and indicate when entering a malaria area
- Some health practitioner information
- Scope for future malaria awareness (outbreak notices, updates on latest malaria control methods) in rural areas

Free to download





A targeted response to malaria actively improves health of the **poorest**, enabling **vulnerable families** to break the vicious cycle of **disease and poverty**, and helping to make sure that no one is left behind.



Albert Luthuli
CENTRE FOR RESPONSIBLE LEADERSHIP



Investing in malaria reduction contributes to the **creation of more cohesive, inclusive societies**.



**Centre for
Human Rights**
UNIVERSITY OF PRETORIA



Given that **climate change** is predicted to increase the range and intensity of malaria transmission, plans to mitigate the effects of climate change are likely to include an increased commitment to controlling and eliminating malaria.



Geospatial Health 2019; volume 14:676

Predicting malaria cases using remotely sensed environmental variables in Nkomazi, South Africa

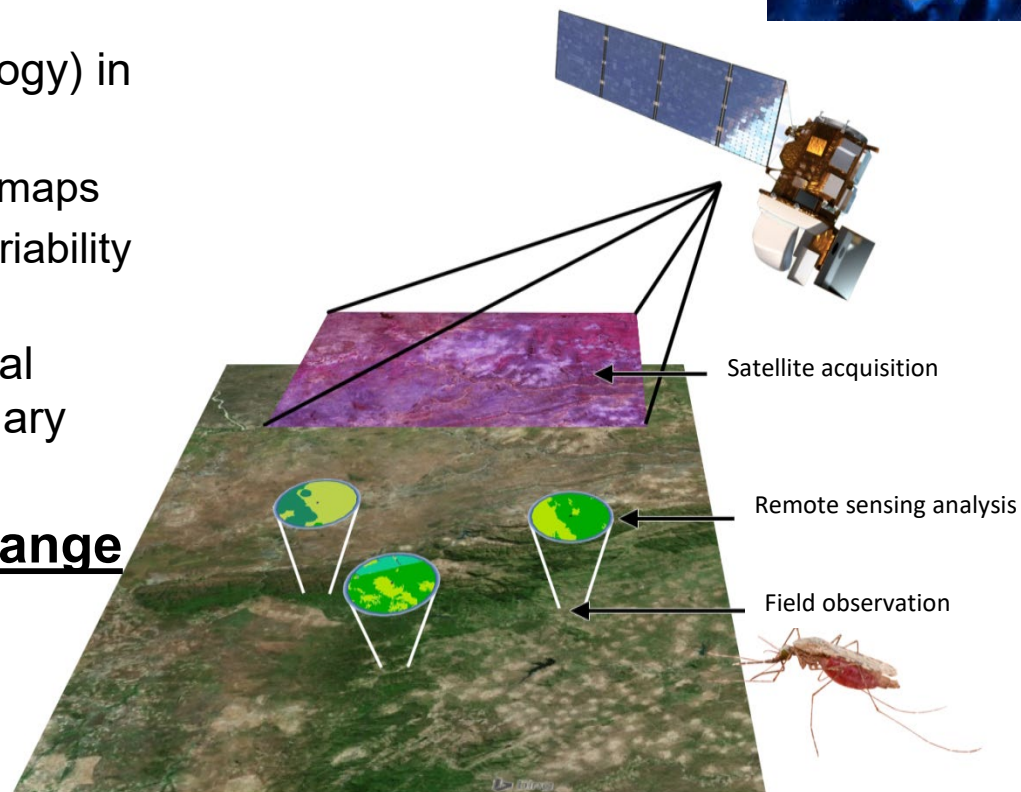
Abiodun Morakinyo Adeola,^{1,2} Joel Ondego Botai,^{1,3,4} Jane Mukarugwiza Olwoch,^{3,5}
Hannes C.J. de W. Rautenbach,^{1,2,6} Omolola Mayowa Adisa,³ Christiaan de Jager,²
Christina M. Botai,¹ Mabuza Aaron⁷

ReSMaCA Programme



Remote Sensing for Malaria Control in Africa

- UP ISMC initiative
- Use remote sensing (satellite technology) in malaria control
 - Expansion of predictive malaria-risk maps
 - Investigate the impacts of climate variability and other factors on malaria
- South African, French, French National Space Agency (CNES) and other tertiary and research institutions involved
- All malaria aspects incl. **climate change challenges**



www.malaria.up.ac.za



17 PARTNERSHIPS FOR THE GOALS



The many **multi-sectorial partnerships** in place to reduce and eliminate malaria have a positive collateral effect



Sustainable malaria control:

Follows an **integrated and transdisciplinary** approach for effective development of malaria control methods and strategies.

- Existing research platforms include:
 - [UP Institute for Sustainable Malaria Control \(UP ISMC\)](#) – 9 Fac & GIBS
 - [SARChI Chair in Sustainable Malaria Control](#) - NAS
 - [CoP in Malaria Elimination](#) - With SARChIs in Maths, Wits and UCT
 - [MRC Collaborating Centre for Malaria Research](#) – MRC, NDH
 - [Goodbye Malaria Centre of Excellence for Mozambique](#) – Moz Gov
 - [NICD China](#)



Transdisciplinary Approach Postgraduate forum





Summary

- An integrated approach is needed towards malaria elimination
- Malaria education, awareness and health promotion should include the affected communities
- Local communities and travellers should be targeted to also address issues related to cross-border movement
- Research and/or control programme methods allow for people to:
 - make informed decisions about their personal well-being and
 - they can assist in the fight against malaria

Global issues

Such as **health, environment, food security, energy, social stability** and **sustainability** should be solved together through a concentrated research offering/solution.

Can contribute to the attainment of the **Sustainable Development Goals** but also leave a research wealth of wisdom to be transmitted to the next generation through **education and training**.



Thank You



UP End Malaria



UP ISMC



@UPEndMalaria



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www.malaria.up.ac.za
Malaria Buddy app