Join the **WWARN** community

To ensure that all malaria patients receive safe and effective treatment

WORLDWIDE ANTIMALARIAL RESISTANCE NETWORK

WWARN

wwarn.org

“Tackling the threat of resistance will help ensure that patients receive the best possible antimalarial treatment and support the campaign to eradicate malaria.”

Prof Francine Ntoumi, Chair and Executive Director of the Congolese Foundation for Medical Research, Republic of the Congo

THE CHALLENGE OF DRUG RESISTANCE

Despite recent progress in reducing mortality rates, malaria remains a major public health problem. As resistance to artemisinin combination therapies (ACTs) – the recommended treatment against malaria – continues to emerge and spread, maintaining the efficacy of existing drugs is vital.

Drivers of antimalarial resistance are:

- Poor quality antimalarial medicines
- Use of monotherapies instead of recommended ACTs
- Patients not completing the full course of treatment
- Under-dosing of vulnerable patients such as children and pregnant women.

ABOUT WWARN

The public health community needs comprehensive, reliable and timely information to slow the emergence of antimalarial resistance and maintain the efficacy of antimalarial treatments. The **WorldWide Antimalarial Resistance Network (WWARN)** is a collaborative platform for researchers to assess the evolution, epidemiology and public health impact of drug resistance.

A relatively small increase in malaria drug efficacy could have a major impact by stopping millions of cases of recurrent malaria each year.

WWARN promotes antimalarial drug efficacy by providing policy makers with the evidence needed to plan effective strategies to contain resistance and ensure the most effective use of current and new drugs in the fight to eradicate malaria.

WWARN brings together experts from multiple research disciplines from across the world, and provides new tools, services and training to assure the quality of antimalarial efficacy testing.

WWARN is part of the **Infectious Diseases Data Observatory (IDDO)**, a global forum for data sharing and collaboration across the research and clinical management communities.

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“Preserving the efficacy of antimalarials in all endemic areas requires that we work together to share knowledge and resources.”

Associate Professor Mallika Imwong, Faculty of Tropical Medicine, Mahidol University, Bangkok, Thailand

OUR WORK

WWARN collaborates with research groups to:

- Provide reliable evidence of antimalarial drug efficacy
- Support quality-assured data collection and drug efficacy assessment of existing antimalarials and those in development
- Overcome the challenges of identifying and analysing early signs of antimalarial resistance
- Integrate data from multiple sources, building a comprehensive picture of resistance drivers and strategies to slow their effects
- Improve access to existing malaria data through an externally managed Data Access Committee
- Develop antimalarial pregnancy treatment and prevention research evidence to support policy-makers, public health practitioners and communities
- Adapt the WWARN data management model to emerging infections and neglected tropical diseases through IDDO (iddo.org).

“WWARN has gathered more than 135,000 individual patient records, equivalent to 80 per cent of all artemisinin combination therapy (ACT) clinical trial data available; we’d like to develop this to include prospective data for new trials.”

Prof Philippe Guérin, Director of IDDO

SUPPORTING MALARIA RESEARCHERS

Free, easy-access online tools and services to help researchers contribute to the campaign against resistance

External Quality Assurance

Proficiency testing and reference standard programmes help assess the ability of a laboratory to carry out analyses, resolve problems and improve results

Parasite Clearance Estimator (PCE)

Provides an accurate and consistent method of parasite clearance rate estimation, the metric for parasite susceptibility to artemisinins

Protocols & Procedures

Support protocol design and the collection, analysis, interpretation and dissemination of high quality data e.g. microscopy guidelines for malaria researchers

IVART Online

Removes subjectivity from IC_{50} calculations used to measure the ***in vitro*** drug susceptibility of malaria parasites

Literature Review Library

A comprehensive reference resource to support development of clinical study programmes

Explorer

Presents summary data from clinical trials stored in the WWARN Data Centre

Molecular Surveyors

Summarise the prevalence of molecular markers associated with resistance by location and time

Vivax Surveyor

Summarises published reports of *Plasmodium vivax* antimalarial clinical trials by location and time

Antimalarial Quality Surveyor

Summarises published reports of antimalarial medicine quality by location and time

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HOW WWARN RESEARCH IS HELPING TO IMPROVE TREATMENT OUTCOMES

WWARN initiated a series of pooled analyses of individual patients' data to assess the patient and parasite-related factors associated with clinical failure following treatment with the four main ACTs:

- **artemether-lumefantrine (AL)**
- **artesunate-amodiaquine (ASAQ)**
- **dihydroartemisinin-piperaquine (DP)**
- **artesunate-mefloquine (AM)**

Although most of these treatments are working well in most regions, our findings highlight many ways to optimise the efficacy of ACTs, especially in vulnerable sub-populations. These include:

- Small children treated with DP were receiving a lower amount of the drug than expected, and these children were much more likely to fail treatment. This evidence supported changes to the World Health Organization's *Guidelines for the treatment of malaria* (3rd Edition 2015).
- Malnourished children treated with AL are at a higher risk of treatment failure than those who are well-nourished.
- Providing the artemisinin and amodiaquine as a single pill is more effective than treating people with two separate pills.
- Patients infected with parasites that carry particular mutations in *pfcrt* and *pfmdr1* are at higher risk of treatment failure after AL.

"In Latin America, WWARN has helped raise awareness of vivax malaria, collating available data about this more neglected species, more prevalent in South America."

Dr Marcus Lacerda, Centro de Pesquisas Leônidas e Maria Deane (FIOCRUZ), Manaus, Brazil

PLATFORM FOR PARTNERSHIP

Since its creation in 2009, more than 260 institutions have worked in collaboration with WWARN. The network provides an opportunity for researchers to share their experience and knowledge, and receive increased visibility for their research.

Study Groups

WWARN invites scientists to contribute their clinical efficacy data and form a study group to collaborate with other data contributors to answer a scientific question. The data platform converts individual patient or parasite data into a standardised format. Datasets are combined and analysed to answer that question.

Data sharing

WWARN's unique informatics infrastructure simplifies data sharing, allowing collaborators around the globe to integrate data from different antimalarial studies and disciplines. Combining data across countries and time is the only effective way to track the emergence and spread of antimalarial resistance. This highlights areas where information is fragmented, inaccessible, of poor quality or even missing.

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GET INVOLVED

- Use the wide range of free tools and services
- Share your study and collaborate with colleagues
- Access data or join a study group to propose and answer key questions
- Download our publications
- Contact WWARN to connect with colleagues in your region
- Sign up for the WWARN e-newsletter: info@wwarn.org

wwarn.org

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IDDO
INFECTIOUS DISEASES DATA OBSERVATORY

We are grateful to all our donors and partners whose support makes this important research work possible.

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