Global funding trends for malaria research in sub-Saharan Africa: a systematic analysis

Michael G Head, Sian Goss, Yann Gelister, Victor Alegana, Rebecca J Brown, Stuart C Clarke, Joseph R A Fitchett, Rifat Atun, J Anthony G Scott, Marie-Louise Newell, Sabu S Padmadas, Andrew J Tatem

Summary

Background **Total domestic and international funding for malaria is inadequate to achieve WHO global targets in burden reduction by 2030. We describe the trends of investments in malaria-related research in sub-Saharan Africa and compare investment with national disease burden to identify areas of funding strength and potentially neglected populations. We also considered funding for malaria control.**

Methods **Research funding data related to malaria for 1997–2013 were sourced from existing datasets, from 13 major public and philanthropic global health funders, and from funding databases. Investments (reported in US$) were considered by geographical area and compared with data on parasite prevalence and populations at risk in sub-Saharan Africa. 45 sub-Saharan African countries were ranked by amount of research funding received.**

Findings **We found 333 research awards totalling US$814·4 million. Public health research covered $308·1 million (37·8%) and clinical trials covered $275·2 million (33·8%). Tanzania ($107·8 million [13·2%]), Uganda ($97·9 million [12·0%]), and Kenya ($92·9 million [11·4%]) received the highest sum of research investment and the most research awards. Malawi, Tanzania, and Uganda remained highly ranked after adjusting for national gross domestic product. Countries with a reasonably high malaria burden that received little research investment or funding for malaria control included Central African Republic (ranked 40th) and Sierra Leone (ranked 35th). Congo (Brazzaville) and Guinea had reasonably high malaria mortality, yet Congo (Brazzaville) ranked 38th and Guinea ranked 25th, thus receiving little investment.**

Interpretation **Some countries receive reasonably large investments in malaria-related research (Tanzania, Kenya, Uganda), whereas others receive little or no investments (Sierra Leone, Central African Republic). Research investments are typically highest in countries where funding for malaria control is also high. Investment strategies should consider more equitable research and operational investments across countries to include currently neglected and susceptible populations.**

Funding **Royal Society of Tropical Medicine and Hygiene and Bill & Melinda Gates Foundation.**

Introduction

The current total domestic and international investments in malaria are considered grossly inadequate to meet the annual global target for investment of US$6 billion.[1] The 2015 Global Burden of Disease study estimated that there were 731000 malaria-associated deaths (a decline of about 37% since 2005, along with a decline in age-standardised mortality of 43%)[2] and 296 million positive cases (a decline of about 30% since 2005) in 2015,[3] with a high prevalence in sub-Saharan Africa.[4] To address this burden, malaria is the focus of large and well funded programmes from influential global health actors such as The Global Fund[5] and the Bill & Melinda Gates Foundation, both of which have targeted malaria for elimination.[6]

An estimated US$8·9 billion was disbursed globally for malaria control and elimination programmes between 2006 and 2010, with most of this funding targeted to Africa.[7] As well as provision of finance from The Global Fund, substantial investment came from other actors, such as the World Bank and the President's Malaria Initiative. As investment specifically focused on malaria control increases, the burden of malaria decreases,[8] with interventions estimated to have averted 663 million clinical cases of malaria globally since 2000. Insecticide-treated nets, the most widespread intervention, were responsible for 68% of the averted cases.[9] However, a substantial burden still remains, requiring efficient allocation of scarce financial resources to address gaps in implementation and research.

The ten largest global health research funders, which include the US National Institutes of Health, the European Commission, the Wellcome Trust, and the Bill & Melinda Gates Foundation, collectively invest about $37·1 billion into research each year,[10] and malaria is a research priority or part of a wider focus (eg, global health) for these organisations. Investments cover the full pipeline of research, from preclinical science, to clinical trial phases and product development, and on to implementation and operational research. However, few multi-funder analyses of the focus of these awards exist.

Lancet Glob Health 2017

Published Online
June 28, 2017
http://dx.doi.org/10.1016/S2214-109X(17)30245-0

See Online/Comment
http://dx.doi.org/10.1016/S2214-109X(17)30252-8

Global Health Research Institute and Faculty of Medicine (M G Head PhD, S Goss MSc, Y Gelister MSc, R J Brown PhD, S C Clarke FFPH, Prof M-L Newell PhD), **WorldPop, Department of Geography and Environment** (S Goss, V Alegana PhD, Prof A J Tatem PhD), **and Department of Social Statistics and Demography and Centre for Global Health, Population, Poverty and Policy** (Prof S S Padmadas PhD), **University of Southampton, Southampton, UK; Southampton NIHR Respiratory Biomedical Research Unit, Southampton General Hospital, Southampton, UK** (S C Clarke); **Harvard TH Chan School of Public Health, Harvard University, Boston, MA, USA** (J R Fitchett MBBS, Prof R Atun FRCP); **Department of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, UK** (Prof J A G Scott PhD); **and Flowminder Foundation, Stockholm, Sweden** (Prof A J Tatem)

Correspondence to:
Dr Michael G Head, Global Health Research Institute and Faculty of Medicine, University of Southampton, Southampton SO16 6YD, UK
m.head@soton.ac.uk

Research in context

Evidence before this study

In July and August, 2016, we searched PubMed and the grey literature (via internet search engines and stakeholder websites, such as WHO) using the search terms "research investments", "research funding", "malaria investments", "malaria funding", and "malaria Africa" for articles written only in English. One author (MGH) also searched a personal Mendeley literature database that is built for the purpose of informing the Research Investments in Global Health (ResIn) study. Previous investment analyses include the study by Pigott and colleagues, ResIn publications, and the Policy Cures annual reports on product development research in infectious diseases.

Added value of this study

To the best of our knowledge, this is the first study to systematically describe the geography of public and philanthropic research funding for malaria in sub-Saharan Africa. The study combined and then re-analysed open data sources from numerous key global health investors, and categorised the awards via the classification system developed by the ResIn study. This strategy allowed us to provide a comprehensive overview of the investment landscape, with actionable data that can help inform equitable decisions around resource allocation.

Implications of all the available evidence

The findings show that much of the available resources are directed towards key global health hubs in sub-Saharan Africa—for example, Tanzania, Uganda, and Kenya. However, several countries, such as Chad and Central African Republic, receive little or no research and operational funding despite having high malaria-associated burdens and mortality. These countries have neglected populations, and the global health community should reconsider strategies around resource allocation to reduce inequality and improve equity.

The Research Investments in Global Health study (ResIn) has analysed funding trends in infectious disease research awarded to UK institutions[11,12] and has identified Africa as being the focus of much of the UK global health research portfolio.[13] Here, we aimed to systematically analyse investments in research related to malaria from leading international donors, in particular when the focus of the project was in sub-Saharan Africa. We also aimed to locate the site of the research at the national level, describe the geography of investment trends, and compare investments with the local prevalence of malaria caused by *Plasmodium falciparum* and malaria burden, as measured by the sizes of at-risk populations.

See Online for appendix

For more on **UberResearch** see http://www.uberresearch.com/dimensions-for-funders

Methods

Search strategy and selection criteria

The process of collating and categorising infection-related research awards to UK institutions for this systematic analysis has been described in detail elsewhere.[11–13] Briefly, we extracted award data for studies of infectious diseases from funder's websites or requested award data directly from the funder. We also searched funding databases, such as the National Research Register, owned by the UK Department of Health, and clinicaltrials.gov, for infection-related awards. Each award was individually scrutinised and categorised under a number of diseases, disease areas (eg, global health, antimicrobial resistance), and by type of science (eg, phase 1–3 clinical trials, public health research). Award types included project grants, programme grants, fellowships, and pump-priming (development grants) or pilot projects that had a clear research component to the project.

We focused specifically on awards relating to malaria research in sub-Saharan Africa. We used the UK portfolio already collated by the ResIn study[12] and further considered 28 leading funders of global health research (see appendix 1 for the full list of funders that were assessed, including those that did not have data that met the inclusion criteria). We used existing knowledge and data from the ResIn study, author knowledge, and healthresearchfunders.org to identify key funders who were likely to have provided research investment for malaria. Much of the newly collected data were sourced from the Dimensions for Funders database, UberResearch. When searching online databases for awards related to malaria, we used the search terms "malaria", "plasmodium", and "anopheles". From the retrieved awards, we reviewed the title and abstract to ascertain whether the project had a focus in the 45 sub-Saharan African nations for which data were available. When information about the project was insufficient, we searched databases (including the UK Research Councils' Gateway to Research database, PubMed, and Europe PMC) for publications related to the original award and for information about the award on institutional or study-specific websites. We included awards for which the commitment to fund was dated between 1997 and 2013 (inclusive). The UK Department for International Development and the Bill & Melinda Gates Foundation fund both research and implementation activity; here, we only included the research projects. Using the malaria awards from the preexisting ResIn UK dataset as an example, we included awards of greater than $150 000 (the 10th percentile in the UK dataset). Awards solely related to preclinical science were excluded because they were unlikely to have a specific geographical focus; all other types of science along the research pipeline (from phase 1 studies through to public health and implementation research) were included.