To review approaches to burden estimation and make recommendations to MPAC on:

1. **Approaches WHO should use to:**
   a) estimate the number of malaria cases and deaths in order to prioritize countries for resource allocation
   b) understand trends over time to assess impact of global strategies
   c) prioritize malaria in comparison with other health conditions

2. **Approaches endemic countries should use to:**
   a) estimate the number of malaria cases and deaths nationally and sub-nationally
   b) understand which populations are most affected
   c) improve the quality of input data for malaria burden estimation
MBE-ERG: Membership

- Salim Abdulla (Tanzania)
- John Aponte (Spain)
- Zulfiqar Bhutta (Pakistan)
- Peter Byass (UK)
- Azra Ghani (UK)
- Brian Greenwood (UK)
- Patrick Kachur (CDC-US)
- Aswan Kumar (India)
- SETH Owusu-Agyei (Ghana)
- Ana Carolina Santelli (Brazil)
- Peter Smith (UK)
- Richard Steketee (PATH)
- Jane Thomason (HMN)
- Nicholas White (Thailand)

MPAC Members
MBE-ERG: Timetable

Meeting 1: (June 27-28, 2012):
Initial review of estimation methods, identify issues, and determine key questions

Meeting 2: (First quarter 2013):
Individuals representing major groups involved in malaria burden estimation will present their approaches to the ERG and answer questions on their methods

Meeting 3: (June/July 2013)
Review evidence gathered and formulate recommendations to MPAC that address questions posed.
MBE-ERG first meeting progress: Use of burden estimates

1. Global advocacy for malaria control;
2. Global reporting to targets, such as for Millennium Development goals (MDGs);
3. Global burden of disease analysis and the prioritization of malaria in relation to other conditions;
4. Prioritization of countries for resource allocation (e.g. Global Fund) – it was noted to be problematic for prioritization when different burden estimates were derived for a country.
5. Some countries made little use of the WHO estimates and used their own data, others used WHO data for Global Fund applications.
6. WHO follows a country consultative process for clearing estimates by country that takes several months. By the time this is complete new global and regional estimates are prepared. Consequently, country level estimates for the previous year are out of date and global and country level estimates have not been released together.
MBE-ERG first meeting summary:
Review of recently published estimates

- All estimation methods are quite crude and problematic, all with weaknesses and strengths and high levels of uncertainty
- Methods using real current data attractive but challenging where malaria burden is greatest
- Possibility of a hybrid approach to be explored; certain components of each approach could be improved
- Presenting uncertainty is a challenge and there is much focus on a single number (especially for deaths)
- In the short to medium term, whatever estimation method is used is likely to be subject to considerable uncertainty. ERG aim is to suggest way forward in the short-term and explore longer-term approaches, possibly involving collection of new data.
MBE-ERG first meeting summary:
Review of recent case estimates

- MAP: risk-based approach for countries with stable malaria, fixed incidence for unstable areas, national reporting for selected countries. parasite prevalence (PfP) surveys (1985-2008) converted to malaria incidence using modelled relationship from survey data.
  - PfP surveys used may be old and not representative - biased in time and place.
  - All-age clinical incidence is modeled from malaria incidence surveys matched by time and place to age-standardized PfP surveys - large uncertainty range in the prevalence to incidence conversion. May also result in underestimate of clinical incidence because cases in longitudinal surveillance offered treatment.

- WHO: case-based approach (adjusted for estimated under-reporting) for countries with reliable reporting and risk-based (MARA map) in high transmission countries, with adjustment for ITN use.
  - Treatment-seeking and health facility reporting rates could be overestimated in estimates outside of Africa.
  - For Africa better alternatives to the MARA map probably exist. All-age clinical incidence may also be underestimated because cases in longitudinal surveillance offered treatment.
MBE-ERG first meeting summary:
Review of recent death estimates

- IHME: used modeling approach based on vital registration and verbal autopsy data
  - difficulty in following the description of methods put forth in the paper.
  - ratio of adult to child malaria deaths is not consistent with clinical experience or in other studies and calls into question the validity of the results.
  - higher number of deaths among African adults is likely driven by use of VA data, which may overestimate adult deaths due to over diagnosis of malaria.

- WHO: uses malaria estimated case count and CFR of 0.3% outside Africa and Risk map and age-specific mortality rates according to transmission level and urban or rural – adjusted for ITN use.
  - other data may be available to refine the fixed CFR applied to adjusted case reports for countries outside Africa and for the mortality rate by level of transmission for countries in Africa.
  - India has embarked on a study to estimate malaria deaths using a modified WHO approach with alternate values for CFR.
MBE-ERG first meeting summary: Discussions on way forward

1. Inviting other groups producing burden estimates (MAP, IHME, Swiss Tropical) to meet as per Terms of Reference for the ERG, with specific questions to be addressed:
   
a) What are the main assumptions in your model?
b) What are your estimates most sensitive to in terms of assumptions or absence of data?
c) What data/information that could be collected relatively easily/would be most useful in improving your model?
d) How could your modeling methods be integrated with other modeling methods to produce (better) consistent estimates?
e) How good is your method at measuring trends in addition to absolute numbers?
f) How willing are you to share your basic data with other groups?
2. Preparatory work by selected group members. Detailed review of a particular method focusing on strengths and weaknesses of particular models.
   - age distribution of malaria deaths
   - case fatality rates
   - converting prevalence to incidence
   and suggesting specific studies to be done and groups that would be engaged.

3. Group members would seek to outline new approaches to estimating absolute numbers and/or trends – especially methods that would involve collecting data at national or sub-national levels (liaising with national malaria control programme staff and others as necessary to assess data availability).