

The Open Health Concept for Meningococcal Meningitis¹

Open Health can help protect vulnerable populations by providing early warning of disease outbreaks - resulting in timely, planned responses that prevent major epidemics, such as meningococcal meningitis

Meningococcal Meningitis – The Problem

Meningococcal meningitis is one of the most feared epidemic diseases because of its rapid onset, high fatality rates and long term disabilities, such as brain-damage and deafness, affecting many survivors. The risk of meningitis epidemics is ever present in the dry, dusty climate of sub Saharan Africa. In 2008, a ten-year vaccination programme will begin in this ‘Meningitis Belt’ to protect the 350 million people at risk from epidemics. With around 50-60 million doses of the new vaccine produced each year, decisions on prioritization will continue over the next decade.

The success of the programme should be evident by 2010 with the immunization of children and young adults in hyper-epidemic areas significantly reducing the number of cases. At the same time, enhanced surveillance tools and a better understanding of the disease will help public health workers from the WHO, national centres and districts to respond to meningitis risks that evolve with changing health, social, demographic and environmental conditions.

¹ A contribution of the WHO *Open Health*, Public Health Information System, to the Meningitis Environmental Risk Information Technologies (MERIT) project. MERIT is a collaborative effort of the WHO and members of the environmental, public health and epidemiological communities. It aims to combine environmental information with knowledge of epidemic meningitis to increase the effectiveness of prevention and response control strategies.

These operational tools will enable early identification of potential epidemics and the opportunity to respond quickly and effectively to prevent widespread infection.



Map of Africa, depicting in light shading the region referred to as the ‘Meningitis Belt’

Enabling a Proactive Public Health Response

Current meningitis control strategies in Africa, based on reactive vaccination campaigns in districts which have passed a pre-determined epidemic threshold, have not been fully satisfactory in reducing the burden of the disease. A more proactive approach is being developed which will put *Open Health* at the heart of the decision-making process.

Once implemented, *Open Health* will enable Ministries of Health, the WHO and volunteer organizations to assess the various factors that affect the transmission of meningitis and respond early to a potential meningitis outbreak – before the number of cases reaches epidemic proportions.

An early response strategy may include: dispatching staff to clinics in the high risk areas; starting education campaigns for villagers in remote locations to increase awareness of the symptoms of the disease and urging them to seek early medical help; and making the new conjugate vaccine available to carry out immunization in the areas likely to be worst affected. Proactive combination of

early warning, preparedness and response will help avert full blown epidemics.



Patient receiving treatment

This kind of intervention is possible because of the availability of an effective vaccine, the availability of medical staff, and the ability to identify meningitis risk early enough for a timely response. The latter is possible because of *Open Health*, the new tool developed by WHO, which enables real-time disease tracking and monitoring; and the real-time assessment of control strategies based on the integration and analysis of epidemiological, biological, social, economic, demographic and environmental risk factors (see Table).

Increased knowledge of these risk factors empowers medical officers to monitor the current situation, provide early warning of future risks, and determine the consequences of particular intervention strategies including assessment of the operation risks that may impact effective treatment of the disease, such as access to health care facilities. This approach will rationally determine the populations most at risk and identify those that that can be treated.

Open Health can also be used to assess the impact of climate change on health risk. Anticipating changes in the geographical distribution and intensity of meningitis risk up to five years ahead would allow sufficient time to increase national and district level awareness, adjust immunization programs and

where needed raise the funding to produce and deploy additional vaccines.

Many factors influence meningococcal meningitis outbreaks. These can be assessed through *Open Health* to design and implement effective control strategies

Demographic	Migration of populations increases the risk of the disease spreading over large distances
Economic	Poor economic conditions can delay or prevent distribution of vaccines to at-risk populations, prevent access to early treatment, and create barriers to education and awareness of the disease
Environmental	Hot, dry and dusty conditions are believed to irritate the protective lining of the nose and throat, making invasion of the meningococcal bacterial into the bloodstream easier. Analyses and forecasts of weather, climate and sand and dust storms are therefore of particular interest in the development of early warning and assessment systems
Epidemiological	The vulnerability of a population to a meningitis epidemic is influenced by their immune status, the arrival of new strains of the bacteria, carriage rates and other disease factors
Social	Crowded living conditions, such as in households and at markets, tend to increase the rate of transmission of infection through coughing and sneezing

Open Health

Open Health works at every level. In districts, surveillance improves by filling the gaps and reducing the overlaps between existing systems, providing health information managers with a single system. Critical data on real time evolution of disease is entered quickly and easily allowing rapid identification of health risks when combined with national and global routine health information, environmental and demographic data. Open Health eases the inclusion of these external data, improving risk analysis and identification, and increasing the effectiveness of subsequent health interventions. The factors responsible for meningitis risk can be calculated within modules embedded within *Open Health* using its own internal data archive and data acquisition portal. By enabling all of the medical

personnel, district health information managers, district medical officers, national health information managers, and WHO disease surveillance teams to see and share the same information, rapid response is possible.

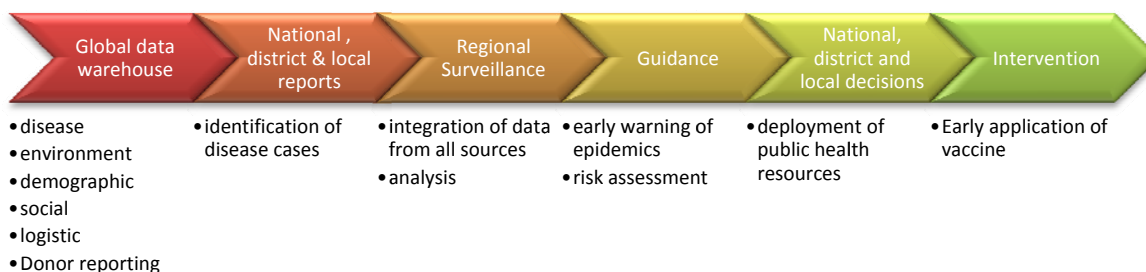
What is needed? Financing is needed to tailor *Open Health* to the needs of the public health community dealing with meningitis epidemics. *Open Health* has passed the prototype stage and is ready for full scale implementation. The meningitis work plan requires the development and integration of specific modules within the *Open Health* system to create an operational decision support tool for health workers in the African meningitis belt. Timed to coincide with the implementation of the meningitis vaccine, a comprehensive surveillance system will reinforce the immunization programme by helping prioritize the deployment of the vaccine. *Open Health's* analytical tools will be used to identify potential outbreaks enabling an early response to reduce infection rates

on the requirements of the various users involved in the identification of and response to meningitis in Africa. Users include national, district and local health information managers and medical officers responsible for identification and treatment of meningitis cases; epidemiologists and medical staff at regional centres responsible for data integration, surveillance and early warning of risks; and staff at global centres responsible for the maintenance of the underlying data system.

Work package I – Create a data entry tool for rapid reporting of meningitis cases and set up of stand-alone systems at key clinics throughout African Meningitis Belt countries.

Work Package II – Complete the integration of district and national surveillance data with biological, demographic, social, economic, environment and logistical data.

Work Package III – Integration, testing and



Data and information flows through *Open Health*

and avert widespread epidemics. This is also an opportunity to reconcile current realities of operational decision support to a standards-based approach to public health interventions.

The *Open Health* Work Plan for Meningitis:

Open Health is based on off-the-shelf and license free components and standards. The programme will provide deployable applications targeted to the meningitis community. A deployable system for meningitis surveillance and response will take 12 months at a cost of €1.5M. The work plan focuses

evaluation of a meningitis decision support tool within *Open Health* for use at regional surveillance centres. Once the evaluation is completed the assessment tool will be accessible to all of the collaborating partner organizations, ministries of health and district and local health officers for operational use.

Work Package IV – Extend the *Open Health* data warehouse (archive) to include all relevant environmental data, especially those needed to determine current and past climate conditions in the region of the Meningitis Belt. These will be the basis for the routine estimate of meningitis risk. These data will be particularly useful in testing the

effectiveness of the vaccine programme and assessing the consequences of various interventions.

Project Outcomes

The following project outcomes will be used as a basis for validation and verification of the effectiveness of the program:

- The development and ongoing availability of meningitis risk assessments, including current and future scenarios based on projected changes in disease, social, demographic, environmental, economic, logistical and other factors to guide operational responses.

- The implementation of an early warning system for meningitis epidemics.
- Improved impact assessment methodology for prevention efforts.
- Improved deployment of vaccines to populations most at risk by combining health and environmental information in an “early warning system” using *Open Health*.
- Improved evaluation of the efficacy of the new conjugate vaccine for meningococcal meningitis used to control epidemics.
- Increased numbers of public health practitioners capable of effectively using *Open Health* in decision making.
- Path finding example of the use of *Open Health* for public health interventions that is applicable to the control of other diseases.

Contacts

For the **World Health Organization *Open Health***:

Dr. Kathryn O’Neill
Public Health Mapping and GIS
International Health Regulations Coordination
CDS/EPR/IHR/GIS
World Health Organization
20, Avenue Appia
1211 Geneva 27
Switzerland

Tel. +41 22 791 3836
Fax +41 22 791 4878
Email: oneillk@who.int
www.who.int

For the **Health and Climate Foundation**

Dr David Rogers
Health and Climate Foundation
Champ Courtet
Marchissy 1261
Switzerland

Tel. +41 22 368 21 03
Fax +41 22 368 21 04
Email: drogers@hc-foundation.org
www.hc-foundation.org