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New Joint Centre for Infectious Diseases Research underpins world leading research efforts to develop new tools and technologies to assist in National and International Disease Control efforts

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Despite the increasing importance of non-communicable diseases worldwide, infectious diseases remain a constant threat to health and well-being internationally. Insect borne diseases such as malaria still account for a large proportion of under 5 year old child mortality, while dengue continues to extend its geographical range and poses a major threat of epidemics in high density urban populations. Other insect borne diseases such as Chikungunya and West Nile can periodically become a major public health problem. Transmission of these diseases can increase rapidly through human population movements, such as cross-border migration from more highly endemic areas, major events, such as the Haj, changes in sensitivity to infection, through viral sweeps of new serotypes, drug or insecticide resistance, or seasonal changes in insect population densities. Robust national health systems need to be able to rapidly collate accurate data from many sites on disease transmission, entomological indices and parasite and insect susceptibility to treatment and control interventions. This data needs to be readily available at regional and national level to underpin rational responses.

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Decisions, once made, need to be coupled to effective logistics to ensure that the control measures and treatment regimes can be quickly implemented and their effectiveness monitored. National health systems can be streamlined by using high throughput state of the art technologies to monitor relevant parameters, comprehensive database analysis, GIS and query tools to analyse and visualise the information, and high speed internet connections to ensure that the data is available in real time at National, Regional, District and Municipal or village level.

The Kingdom of Saudi Arabia (KSA) is taking the lead in developing these integrated systems in a joint venture with the Bill and Melinda Gates Foundation funded Innovative Vector Control Consortium and the Liverpool School of Tropical Medicine. The programme is supported by the Ministry of Health in Saudi Arabia and was launched at a high profile event at The Royal Society in London in April 2011. This international collaboration will rapidly increase Research and Development capacity in KSA at a new Joint Research Centre in Jazan, KSA, due to be completed in 2014. The initial research programme covers a range of projects ranging from Decision Support Systems for malaria and dengue, which will operate seamlessly in English or

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Arabic, to new diagnostics to evaluate the efficacy and longevity of insecticide based interventions. Operational research projects will then establish how best these can be incorporated into the Health Systems and Health Services of KSA. The programme will subsequently be expanded into other infectious diseases, such as TB, and will serve as a model for other infectious disease control programmes in the World Health Organisation EMRO region.

This initiative is timely. For example, the Global Initiative for malaria eradication launched by the Bill and Melinda Gates Foundation in 2007, and supported by the WHO and other normative bodies faces a number of obvious challenges. These include the recent selection and detection of resistance to the first line treatment, Artemisinin Combination Therapy drugs, massive increases in pyrethroid resistance in the *Anopheles gambiae* complex of mosquitoes, and the difficulty and cost of case detection and treatment when countries are in the elimination phase of malaria control and are experiencing very low levels of disease transmission and need to avoid re-introduction of the parasite into the local mosquito vector population. Malaria in Saudi Arabia is effectively a border issue, and although the malaria in the Arabian peninsula is on the fringes of its transmission range the local vector *Anopheles arabiensis*, a member of the *A. gambiae* complex is a very efficient vector. Pyrethroid resistance in the *A. gambiae* complex is now seen as a major threat to elimination or sustained control of malaria and the WHO are developing an umbrella programme with support from international donors to try and tackle this issue. Pyrethroid insecticide resistance in this vector in Zanzibar is already compromising the long term effective control programme in operation on this island, and the resistance status of the vector on

the Arabian Peninsula will need to be closely monitored.

Effective surveillance and case detection are essential in Saudi Arabia due to the continuous threat of renewal of transmission from neighbouring Yemen. Establishing a system for dealing with this in a timely and cost effective manner will act as a model system for other border malaria settings internationally as countries within a region act at different speeds to reduce and eventually eliminate malaria from within their borders.

Saudi Arabia is also a unique setting from which to undertake operational research into dengue control. The disease is already endemic within the country, but the large influx of human populations into at risk urban settings during the Haj lends itself to the development of a rapid detection and response system for the containment of transmission of this disease.

In setting up these systems the data generated will be anchored to GIS systems which incorporate primary to quaternary health centre data and allow transmission data to be displayed at different levels of granularity from household to regional level. Such a system, that is readily compatible with all common national health information systems, also provides a potential platform for accessible visual display of a raft of relevant data across the spectrum of infectious and non-communicable diseases. The new initiative in Saudi Arabia that is embedded in the Ministry of Health but which brings together international leaders in infectious diseases research with cutting edge facilities and carefully structured capacity development should provide an exciting new model for the rapid development of more effective systems for improvement of health not just in Saudi Arabia but in the broader international community.

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