

# Laboratory Systems: Overview



Laboratory  
systems  
strategy  
group  
LATH-LSTM



## Strengthening capacity to improve access to reliable laboratory services

Health related MDGs will not be achieved in poor countries without accessible and reliable laboratory services. The diagnosis of tuberculosis requires microscopic examination of sputum smears. HIV status needs to be confirmed by a laboratory test before treatment, and response monitored with CD4 counts. Since the introduction of combination therapy, the overdiagnosis rates of malaria associated with presumptive clinical diagnosis cannot be justified. Laboratory confirmation by microscopy or rapid test is cost-effective for adults and older children in high transmission areas and also probably in children under 5 years old. Anaemia affects over half of all pregnant women and children in poor countries. Accurate haemoglobin measurement, not conjunctival pallor, is the best way to confirm all but the most severe cases. Adequate supplies of safe, accurately matched blood are essential to prevent deaths from severe anaemia.

Despite overwhelming evidence that laboratory services are absolutely critical for achieving the MDGs, they remain one of the most neglected components of health systems. The reasons why laboratories have been so neglected range from failure to engage laboratory staff in key decisions, to a limited focus on technology rather than on effective management systems. Marginalisation and chronic neglect of laboratory services means that results are inaccurate or unknown. Consequently patients are mismanaged, drugs are wasted and surveillance data is unreliable. Until poor countries develop laboratory services they can rely on, they will continue to be dependent on externally funded and therefore unsustainable, laboratory technology to monitor disease burden and the impact of disease control programmes. Solutions for rejuvenating laboratory services cannot be imposed from outside – they must be home-grown.

LATH and LSTM have been working in partnership with Ministries of Health, Non Governmental Organisations and academic institutions in many poor African countries to deliver solutions for priority problems in laboratory services. Although the following case studies illustrate a range of different approaches adopted by LATH/LSTM they have in common some fundamental principles which are critical if the solutions are to be workable and durable.

### Principles

1. Laboratory staff at all levels must be engaged in identifying problems and finding solutions
2. Look beyond individual tests and target improvement towards systems (e.g. supplies, management)
3. Simultaneous top-down and bottom-up approaches are essential, not optional, and must involve current and future key decision makers

# case studies

## MALARIA

**Problem:** There is no system for checking or improving the quality of essential tests performed by district hospitals such as malaria microscopy.

**Solution/evidence:** Through a collaborative programme between LATH/LSTM and the Ministry of Health, 20 regional laboratory supervisors in Ghana were supported to implement locally-tailored mechanisms for measuring and improving test performance in all 205 district hospitals. The supervisors updated the skills of 93% of the 693 laboratory staff, 74% of whom were assistants, and produced improvements in test quality (e.g. 11% in accuracy of malaria microscopy in 6 months). We have successfully employed the Ghana model in other African countries.

## HIV

**Problem:** Many countries in the eastern and southern African region lack the necessary capacity in laboratory management skills for the successful implementation of preventive, care and support programmes for HIV interventions.

**Solution/evidence:** AMREF have developed and delivered a new East African regional training programme for laboratory technicians to support antiretroviral treatment. LATH/LSTM provide an external monitoring and evaluation service for the course. This type of external validation, which could be applied to a range of courses, ensures international quality programmes and strengthens educational capacity.

## TUBERCULOSIS

**Problem:** Robust supervision systems for TB microscopy services are often lacking due to human resource shortages and lack of laboratory representation in TB control programmes.

**Solution/evidence:** In Jigawa and Kano states in Nigeria we have facilitated the establishment of intra-state external quality assurance systems to improve the accuracy of TB microscopy and equipped technicians with supervisory skills so that the QA processes can be maintained. Information management tools were incorporated into the system so that accurate laboratory data could be used to inform decision making processes.

## BLOOD TRANSFUSION

**Problem:** Although global policies recommend that blood for transfusion should come from voluntary donors, 80% of blood in sub-Saharan Africa still comes from family replacement donors.

**Solution/evidence:** Our study in a district hospital in Malawi showed that the full economic cost of a unit of blood from replacement donors was \$16.28 per unit. Blood collected from voluntary donors through centralised systems cost over \$55/unit (excluding capital costs); much of the cost is due to better quality systems and costs of recruiting voluntary donors. Decision-makers need such evidence to help them make decisions about feasibility and cost-effectiveness of blood transfusion policies.

## ANAEMIA

**Problem:** Clinical diagnosis of anaemia is unreliable. Could the Haemoglobin Colour Scale be used to detect anaemia where there is no laboratory?

**Solution/evidence:** Our systematic review of the evidence commissioned by WHO indicated that the Haemoglobin Colour Scale probably was better than clinical diagnosis but that this needed confirming with 'real life' studies. As a result several studies are now underway to evaluate the Scale under field conditions including a multi-national study in pregnant women managed by WHO's Department of Reproductive Health.

## LABORATORY MANAGEMENT

**Problem:** Official estimates of human resource requirements in Malawian medical laboratories indicates a need for 100 BSc and 30 MSc level biomedical scientists to provide a reliable quality service and meet the challenge of scaling up antiretroviral therapy. Currently Malawi has only a handful of externally trained BSc and MSc graduates.

**Solution/evidence:** LATH/LSTM has helped the College of Medicine in Malawi to develop its own, partly work-based, BSc to train district laboratory managers. The production of 'home grown' graduates is known to reduce 'brain drain'; the work-based component and input into the curriculum by the Ministry of Health, ensure that graduates skills are tailored for the Malawian context.