



PROJECT FINAL REPORT

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Final Publishable Summary Report

1. Executive Summary

Evidence used to guide blood transfusion practices in Africa has almost exclusively been generated by wealthy countries in Europe and North America and is often not appropriate for low-income countries. Locally-generated evidence which meets the needs of blood transfusion practice in sub-Saharan Africa (SSA) is scarce as there is very little indigenous research capacity. The aim of this project was to increase research capacity in transfusion services in SSA to do research by coordinating and supporting training and networks for blood transfusion research. The project coordinated links between transfusion services and academic institutions in Ghana, Zimbabwe, the Netherlands, Denmark and the UK to teach research skills to transfusion service professionals and to promote transfusion research as an exciting topic with high public health impact. The project engaged key stakeholders in all aspects of the programme in order to generate evidence that is useful for transfusion service practitioners and policy makers.

The project was split into 5 work packages comprising a PhD programme (4 students from Ghana and Zimbabwe); research skills courses for 44 professionals already working in the transfusion service; bursaries for 46 clinical and science undergraduate and Masters students to undertake research on a transfusion-related topic; project coordination and communication/research uptake. Together these activities, which provided research skills training at undergraduate, professionals and doctoral level – created a vibrant and dynamic transfusion research community in Africa, within and beyond the transfusion services.

In addition to the research training, mechanisms were established in the blood services in Ghana and Zimbabwe to review the research findings and to provide advice and action uptake to influence transfusion policy and practice. Many research findings were presented by the project participants, including research trainees at national and international conferences and in academic and non-academic publications. A key achievement of the project was an updated list of priority transfusion research topics for SSA which was produced by participants including researchers, blood service practitioners and policy makers at a workshop in [Pretoria, South Africa in February 2015](#).

2. Summary Description of Project Context and Objectives

Context of the project

The project addressed a specific need identified by the blood transfusion services in sub-Saharan Africa (SSA) to increase their own capacity to do research which meets local health priorities. This project aimed to build sustainable capacity for health research in Africa by coordinating and supporting training and networks for blood transfusion research. The project coordinated links between transfusion services and academic institutions in SSA and Europe to teach research skills to transfusion service professionals and to promote transfusion research as an exciting topic with high public health impact. The project engaged key stakeholders in all aspects of the programme in order to generate evidence that is useful for transfusion service practitioners and policy makers.

Justification for the project

Evidence used to guide blood transfusion practices in Africa has almost exclusively been generated by wealthy countries in Europe and North America and is often not appropriate for low-income countries. Locally-generated evidence which meets the needs of blood transfusion practice in SSA is scarce and where it does exist, it is very weak. At a workshop in Mombasa, Kenya in 2008, transfusion service stakeholders from across Africa identified and prioritised the research they needed to generate appropriate evidence.¹ A disturbing conclusion of the workshop was that the African transfusion services had very little indigenous research capacity at any level and lacked research strategies. They were therefore not able to begin to generate the much-needed evidence.

At the 2008 Mombasa workshop the African transfusion service stakeholders devised strategies to address this major gap in research capacity. These strategies included: teaching transfusion service staff research skills; establishing links with local academic institutions for research mentoring; generating research abstracts for transfusion meetings; and encouraging more interest in transfusion research by hosting projects for students from local universities. Our project supported the transfusion services in Africa to implement these strategies by coordinating multidisciplinary inputs (i.e. researchers, educators, transfusion prescribers and users, managers, policy makers) using expertise from Africa and the EU.

This 4 year project aimed to build transfusion-related research skills in Africa and to begin to generate research that can be used to guide improvements in the service. The project built research skills at under-graduate, post-graduate, professional and doctoral levels. This was achieved through taught courses and competitive project and research enhancement grants, combined with advocacy for using and disseminating transfusion research. Within their blood transfusion centres, the national transfusion services already had personnel and material to support research. Through this project, new collaborations with their local academic institutions brought much-needed academic rigour and research expertise. Close engagement of transfusion service managers and policy makers in all stages of the research ensured that the research met

¹ <http://www.afsbt.org/index.php?page=53>

local needs, that research capacity building processes were sustainable, and that results were used to influence policy and practice.

Project goal, objectives and principles

Goal: To strengthen the capacity of blood transfusion services in Africa to sustainably conduct research that is useful for policy and practice.

Objectives

1. to coordinate programmes to train African transfusion service professionals to do research which meets the needs of the service and the local population
2. to coordinate research opportunities within Africa's transfusion services for external undergraduate, Masters and PhD students
3. to support transfusion policy makers, service managers and researchers to work together to identify research needs, develop research strategies and use research to inform policy and practice
4. to strengthen the research systems, infrastructure and networks within and between transfusion services and academic institutions in Africa, the EU and beyond

These objectives were achieved by:

- coordinating the provision of formal, practical training for transfusion services professionals in research skills
- coordinating a programme of research scholarships in transfusion-related topics for undergraduate and Master's students (clinical and science) from local universities
- supporting enhancements to enable a small number of PhD students to undertake transfusion research
- engaging multi-disciplinary stakeholders in determining research priorities and strategies, in making awards to students and in using research results
- disseminating the research programmes and outputs through presentations, publications and other media, and through our partners' extensive networks in Africa, Europe and beyond
- rigorously monitoring our research capacity building schemes and seeking further funding to maintain the components which proved to be successful

Approach to building transfusion research capacity

The coordination actions undertaken by this project to enhance transfusion research capacity in SSA predominantly involved south-south partnerships with the northern partners acting in a support role as research facilitators and mentors. The project was split into **5 work packages**. One (WP1) dealt with overall project coordination (especially between African and EU partners) and management, three (WP2, 3, 4) focused on supporting development of research skills and one (WP5) coordinated activities between African partners, with a focus on dissemination, strategic planning (including infrastructure) and uptake of research.

Ultimately, but beyond the lifetime of this project, one of our key aims was to develop world class African transfusion research leaders. To create an environment that spawns research leaders,

Africa's transfusion services must build up a critical mass of individuals both within and outside the transfusion services who understand research and how it can be used to improve the service. We have extensive experience of research capacity building in Africa and we are aware that to build research capacity in any organisation it is essential to simultaneously strengthen all the levels at which research is conducted. Therefore in this project we coordinated the development of transfusion-related research skills using a range of approaches from introductory courses for transfusion professionals to supporting PhD students.

The project supported a small number of individuals in Africa selected through open competition to undertake advanced transfusion research training at PhD level (WP2 '**PhD Enhancements**'). The purpose of supporting PhD students was to develop potential transfusion research leaders in Africa and through their networks of supervisors and colleagues, help to raise the profile of transfusion research. To complement the PhD programme we supported two additional schemes both aimed at creating a vibrant and dynamic transfusion research community in Africa within and beyond the transfusion services.

One scheme provided introductory research skills courses for professionals already working in the transfusion service (WP3 '**In-service Research Skills**'). In our experience such courses are very effective at not only building an awareness of research and basic research skills among staff², but they also drive the development of research systems (e.g. dedicated research budgets, research management units, research strategies) within the institution.³

The other scheme provided opportunities for clinical and science undergraduates and Masters students enrolled at local universities to undertake research on a transfusion-related topic. (WP4 '**Transfusion research scholarships**'). In addition to broadening the range of available student research projects to include transfusion topics, this scheme brought university staff into close contact with the activities of the transfusion services and facilitated the development of future research collaborations between the transfusion services and academic institutions.

Each of these research training schemes was coordinated by a named African partner although both African transfusion service partners hosted students enrolled on each scheme. The African Society for Blood Transfusion (AfSBT) played a key role in coordinating and extracting lessons from the African transfusion service partners' activities (WP5). Involvement of policy makers and practitioners in defining and using research, and in research generation is hard to achieve and therefore often neglected in capacity building projects. However for our project it was critical to have such engagement in order to make a significant and sustainable health impact in Africa. Working closely with the EU partners, the AfSBT (WP5) had prime responsibility for engaging local

² Bates I, Ansong D, Bedu-Addo G, Agbenyega T, Akoto AY, Nsiah-Asare A, Karikari Evaluation of a learner-designed course for teaching health research skills in Ghana *BMC Medical Education* 2007, 7:18

³ Bates I, Akoto AY, Ansong D, Karikari P, Bedu-Addo G, Critchley J, Agbenyega T, Nsiah-Asare A. Evaluating Health Research Capacity Building: An Evidence-Based Tool *PLoS Medicine / Public Library of Science*. 3(8):e299, 2006

and international stakeholders in the project and in disseminating and promoting the use of the research outputs and capacity building processes.

Prior to the start the research training schemes, the partners undertook visits to each other's sites to learn about their existing research capacity and to help the partners identify gaps and research topic priorities (part of WP1). At the start of the project there was an initial workshop where each of the partners produced detailed workplans, and the transfusion service partners finalised their institutional strategies and decisions on agreed research priorities. The priority research topics took into account, but were not limited to, the research priorities already identified at the pan-African transfusion research meeting in Mombasa in 2008. The site visits and workshop provided an orientation for all partners to ensure that they were aware of the situation in each other's institutions and this promoted coordination and enhanced the effectiveness of the project.

Effective dissemination of lessons and outputs from this project were important for improving Africa's transfusion services and for convincing agencies to support blood transfusion research in Africa in the longer term. Lessons and outputs were therefore shared not only with other researchers but with an extensive range of other individuals, networks and organisations including research funders, decision-makers, WHO, media, developing country governments, NGOS and civil society organisations.

Sustainability is 'the capacity to endure' and it depends on how well programmes become institutionalised in organisations.⁴ Sustainability of health programmes has been defined as 'the long term ability of an organisational system to mobilise and allocate sufficient and appropriate resources (manpower, technology, information and finance) for activities that meet individual or public health needs and demands.'⁵

In order to sustainably build research capacity, our project not only developed the research skills of individuals, but also supported integration of research into the mainstream activities of transfusion organisations. This was achieved by developing the ability of transfusion service stakeholders to identify, finance and utilise research. Within the timescale of this project we knew we would not be able to create completely sustainable transfusion research programmes. However, we were able to demonstrate some progress in indicators that are known to be positive predictors of sustainability. These indicators involve people, organisations, communities and systems⁶. Examples of such indicators that we used in the programme included: the degree to which integration of the 'in-service research skills programme' into the annual plans and budgets of the transfusion services had been achieved; acquisition of external funding for transfusion research and evidence that the research has influenced policy and/or practice.

⁴ Gruen R et al. Sustainability science: an integrated approach for health-programme planning. [Volume 372, Issue 9649](#), 1 November 2008-7 November 2008, Pages 1579-1589

⁵ Olsen IT. Sustainability of health care: a framework for analysis. *Health Policy Plan* 1998; 13: 287-95.

⁶ Bailie RS, Si D, O'Donoghue L, Dowden M. Indigenous health: effective and sustainable health services through continuous quality improvement. *Med J Aust* 2007; 186: 525-27. Swerissen H, Crisp BR. The sustainability of health promotion interventions for different levels of social organization. *Health Promot Int* 2004; 19: 123-30.

3. A Description of the Main S&T Results/Foregrounds

Work Package Number 2 - PhD Programme

Principal Investigator of Work Package: David Mvere

Objectives (all completed)

- To coordinate and monitor the awarding of a range of enhancements and incentives, including linkages with EU institutions, that will attract African PhD/MPhil students to do research on a transfusion topic which meets the needs of the service and the local population.
- To strengthen the research systems, infrastructure and networks within and between transfusion services and academic institutions in Africa, the EU and beyond.
- To support transfusion policy makers, service managers and researchers to work together to identify research needs and develop research strategies.

Summary of achievements for objectives and details for each task

Develop criteria and set up a selection panel for fair selection of students

The advertisement of the PhD positions was placed on the T-REC and AfSBT internet websites and also posted on notice boards at local Universities in April 2011. A total of six applicants were shortlisted for interview at the School of Public health in Accra, Ghana by the Project Management Group in July 2011. In advance of the interview, each candidate was asked to prepare a ten minute presentation on a chosen research area. Each student spent one hour with the panel firstly giving their presentation and then undertaking a formal interview. Applicants were also given an additional hour prior to the interview to write a short abstract using a recent blood transfusion article and to write a five minute presentation explaining how they hoped their career would develop and where they expected to be in five years.

The successful applicants were Tonderai Mapako and Nyashadzaishe Mafirakureva from Zimbabwe and Francis Sarkodie and Lucy Asamoah-Akuoko from Ghana.

Contribute to stakeholder workshop to determine priority research topics

Research priorities were originally identified at a workshop involving blood transfusion stakeholders from across Africa in Mombasa, Kenya in 2008. They were discussed and developed at the T-REC launch meeting in July 2011 and are detailed in deliverable report number 1.2. The selected PhD students and their supervisors in the African and European universities worked with other T-REC PIs to develop the specific PhD topics that were based on the priority areas identified. The topics selected were as follows:-

- Tonderai Mapako – Risk modelling in blood safety
- Francis Sarkodie – Syphilis testing and its cross reactions in Ghana
- Lucy Asamoah-Akuoko – Strategies to encourage repeat blood donations among first time voluntary and replacement donors in Ghana
- Nyashadzaishe Mafirakureva – Cost effectiveness and safety of blood transfusion

At a workshop in Pretoria in February 2015 which involved researchers, transfusion services directors and policy makers from across Africa and beyond, the 2008 research priority list was updated. The revised priority list is available on the [T-REC website](#) and will be used to guide research activities and to target funding.

Engage local university in planning PhD/MPhil enhancements scheme

Zimbabwe

A third-party agreement was signed by the University of Zimbabwe, College of Health Sciences and National Blood Service Zimbabwe to provide tutors to support students undertaking research activities associated with the T-REC project. Students are working with supervisors at the local University and with the University of Groningen in the Netherlands.

Ghana

A third party agreement between the University of Ghana School of Public Health and Ghana National Blood Transfusion was set up, however there were ongoing delays with the registration of the PhD students in Ghana and the agreement ceased on the 31st June 2013. The Ghana students subsequently registered at the University of Liverpool and LSTM, UCPH and local supervisors from Ghana provided supervision, resources and academic support to the PhD students.

Develop detailed workplan for work package including quarterly monitoring

Each of the four PhD students developed a work plan for their PhDs and these were reviewed by their supervisors and the research coordinator. Progress has been reported quarterly to the programme coordinator at LSTM.

Appoint research coordinator

Mr Mvere was the research coordinator of the PhD programme for both Ghana and Zimbabwe. Supervisors from local and European universities were allocated to provide support.

Identify African and EU supervisors for students in consultation with PMG and plan timing of supervisory visits to Africa/EU

- Two work supervisors and two local supervisors from University of Zimbabwe supported two supervisors from the University of Groningen.
- Two local supervisors from Ghana supported the PhD students with assistance from supervisors at the University of Copenhagen and LSTM.
- All four PhD students met with their European supervisors in Johannesburg in February 2015 to review progress and discuss future research plans.
- Tonderai visited the Netherlands for a PhD internship from Jan-March 2014 and met both supervisors.

Provide general induction for students and develop a tailored plan for their enhancement activities

- Ghana students visited Copenhagen University from September 2012 to November 2012.
- One PhD student Tonderai Mapako attended internship in the Netherlands, at the University Groningen from the beginning of January to March 2014.

- Each PhD student prepared the life cycle of their projects including budgets and this was shared by supervisors.

Agree package and timing of enhancements (e.g. meetings, seminars, workshops and study visits) with students, partners and universities

Ghana students

All 4 PhD students attended training courses, study visits with supervisors and workshops as part of their PhDs.

Establish systems for reporting students' progress (or adapt, if necessary institutions' own systems)

- Zimbabwean PhD students adopted the University of Zimbabwe reporting system and they provided monthly progress reports about their supervisory meetings including Skype meetings with supervisors from the University of Groningen.
- Ghanaian students adopted the University of Liverpool PhD reporting system which requires on-line reporting of progress and supervisory meetings.
- T-REC considered and adopted the process of using Personal Development Action Plans (PDP) that have been developed through the Malaria Capacity Development Consortium for their PhD students based in African universities. These PDPs assist PhD students in planning their PhD students and their post-doc careers and guidance has been received from Dr Hazel McCullough of London School of Hygiene and Tropical Medicine.
- The Ghana PhD supervisor Henrik Ullum visited Ghana in January 2013 to develop work plans with the students.
- LSTM PI and Deputy PI visited Zimbabwe in February and June 2013 respectively to hold face to face meetings with PhD students on their progress.
- LSTM PI and the Educational developer visited Ghana in November 2013 to hold face to face meetings with the PHD students on their progress
- NBSZ Medical Director Dr. Jean C. Emmanuel took over from Dr. M. E. Chitiyo as work-based PhD advisor

Produce bi-annual summary progress reports

The progress reports on PhD students were presented during the annual meetings each year and progress was reviewed regularly with the supervisors in line with their universities' requirements

Contribute to research dissemination and networking

International

Tonderai Mapako, Nyashadzaishe Mafirakureva and Lucy Asamoah-Akuoko (delegate) gave oral and poster presentations at *AABB Annual Meeting, Philadelphia, USA, October 2014*

Nyashadzaishe Mafirakureva gave an oral presentation at the *Health Economics and Epidemiology Research Office, University of Witwatersrand, South Africa, 28th August-6th September 2014*

Lucy Asamoah-Akuoko gave an oral presentation at the *European Conference on Donor Health Management, The Hague, Netherlands, August 2014.*

Lucy Asamoah-Akuoko, Tonderai Mapako, Francis Sarkodie and Nyashadzaishe Mafirakureva gave an oral presentation at the *7th International Congress of the AfSBT in Victoria Falls, Zimbabwe, 30th July-2nd August 2014*

Lucy Asamoah-Akuoko gave a poster presentation at the *Liverpool School of Tropical Medicine, Postgraduate Research Student Conference, Monday 14th April 2014.*

Tonderai Mapako gave an oral presentation at the *University of Groningen, The Netherlands, Departmental Brainstorming session, 21 March 2014.*

Tonderai Mapako gave an oral presentation at the *AABB Annual Meeting & CTTXPO 2013, Denver, Colorado, USA 12th-15th October 2013*

Lucy Asamoah-Akuoko, Tonderai Mapako, Francis Sarkodie and Nyashadzaishe Mafirakureva gave a poster presentation at the *23rd International Congress of the ISBT Netherlands 2-6 June 2013.*

Francis Sarkodie and Lucy Asamoah-Akuoko gave an oral presentation at the *Rigshospitalet, University of Copenhagen Staff Meeting 6 November 2012.*

Francis Sarkodie and Lucy Asamoah-Akuoko gave an oral presentation at the *National Congress of the Danish Blood Donor Association 3 November 2012.*

Nyashadzaishe Mafirakureva gave an oral presentation at the *Pharmaceutical Society of Zimbabwe Annual Conference, Victoria Falls, Zimbabwe 11th-14th October 2012.*

Tonderai Mapako gave a poster presentation at the *32nd International Congress of the ISBT Mexico 7-12 July 2012.*

Lucy Asamoah-Akuoko, Francis Sarkodie and Nyashadzaishe Mafirakureva gave an oral and poster presentation at the *6th International Congress of the AfSBT Mauritius 4-7 June 2012.*

Nyashadzaishe Mafirakureva and Tonderai Mapako gave an oral and poster presentation at the *6th International Congress of the AfSBT Mauritius 4-7 June 2012 – T-REC Parallel session.*

National

Lucy Asamoah-Akuoko gave an oral presentation at the *Continuous Professional Development for Clinical Staff, Greater Accra Region of Ghana, August 2014.*

Tonderai Mapako gave an oral presentation at the *ZINQAQ Annual Scientific Conference (ZASCO) 2013, Crown Plaza, Harare, Zimbabwe (Invited presenter) 9-10 July 2013*

Lucy Asamoah-Akuoko gave an oral presentation at the *Continuous Professional Development for Clinical Staff, Greater Accra Region of Ghana, November 2013*

Tonderai Mapako gave an oral presentation at the *ZINQAQ NBSZ NAT Consensus workshop, Zimbabwe, 18 September 2012*

Nyashadzaishwe Mafirakureva gave an oral presentation at the *Training workshop for doctors & laboratory scientists on standards for transfusion appropriate use of blood & blood products Mandel Training Centre, Harare: 13th & 14th September 2012*

Lucy Asamoah-Akuoko gave an oral presentation at the *Faculty defence of PhD protocol, University of Ghana*

Francis Sarkodie gave an oral presentation at the *Faculty defence of PhD protocol, University of Ghana*

Publications

- Mafirakureva, N., S. Khoza, D. A. Mvere, M. E. Chitiyo, M. J. Postma and M. Van Hulst (2014). Incidence and pattern of 12 years of reported transfusion adverse events in Zimbabwe: a retrospective analysis. *Blood Transfus* 2014;**12**: 362-7.
- Mafirakureva, N., Nyoni, H., Chikwereti, R., Khoza, S., Mvere, D. A., Emmanuel, J. C., Postma, M. J. & Van Hulst, M. The average unit production cost of blood in Zimbabwe from a provider's perspective. In: Abstract Presentations from the AABB Annual Meeting Philadelphia, PA, October 25-28, 2014. *Transfusion* 2014;**54**: 15A-268A.
- Mafirakureva, N., Khoza, S., van Hulst, M., Postma, M. J. & Mvere, D. A. The evaluation of blood donor deferral causes in Zimbabwe. In: Abstracts of the 23rd Regional Congress of the International Society of Blood Transfusion, Amsterdam, The Netherlands, June 2-5, 2013. *Vox Sanguinis* 2013;**105**: 65-299.
- Mapako, Tonderai, David A Mvere, McLeod E Chitiyo, Simbarashe Rusakaniko, Maarten J Postma, and Marinus van Hulst. "Human Immunodeficiency Virus Prevalence, Incidence, and Residual Transmission Risk in First-Time and Repeat Blood Donations in Zimbabwe: Implications on Blood Safety." *Transfusion* 53, no. 10 Pt 2 (October 2013): 2413–21.
- Mapako, Tonderai, Simbarashe Rusakaniko, Maarten J Postma, Janet Dzungare, Stellah Ngwende, John Mandisarisa, Ponesai Nyika, et al. "Changes in HIV Prevalance among Men and Women between the 2005-6 and 2010-11 Zimbabwe Demographic and Health Surveys." DHS Working Papers No. 111 (Zimbabwe Working Papers No. 12), Rockville, Maryland, USA: ICF International, August 2014
- Mapako, Tonderai, Mart P. Janssen, Peter van den Burg, Martin Smid, David A Mvere, Jean C. Emmanuel, Maarten J Postma, Simbarashe Rusakaniko, Henny Bakker Certe Groningen, and Marinus van Hulst. "Comparison of Blood Services and Clinical Transfusion Practices in Zimbabwe and The Netherlands: What Are the Key Lessons?" *Africa Sanguine* Vol. 17.2, December 2014.

Work Package Number 2: Summary of important results

- The Zimbabwe students have each had three papers published as part of the requirements of a Dutch PhD.
- All the PhD students have attended courses relevant to their PhDs and are involved with the supervision of bursary and DPDM students
- The students are helping to form collaborative links between the blood services and the local Universities that did not exist before the project

Work Package Number 3 - Diploma in Project Design Management (DPDM)

Principal Investigator of Work Package: Justina Ansah

Objectives (all completed)

- to coordinate programmes to train African transfusion service professionals to do research which meets the needs of the service and the local population.
- to support transfusion policy makers, service managers and researchers to work together to identify research needs, develop research strategies and use research to inform policy.
- to strengthen the research systems, infrastructure and networks within and between transfusion services and academic institutions in Africa, the EU and beyond.

Summary of achievements for objectives and details for each task

Contribute to stakeholder workshop to determine priority research topics

Research priorities were identified in the launch meeting in July 2011. The selection of research topics within these priority areas was determined by direct communication with PIs, DPDM supervisors and students. A list of research titles was collated by the administration office in Ghana to allow monitoring of research topics and to avoid duplication.

Develop detailed workplan for work package including quarterly monitoring

Detailed workplans for year 1 (2011/12) and year 2 (2012/13) were developed and followed. The introduction of the DPDM course in Harare was originally scheduled for year 2, but in response to significant interest in the course this timeline was brought forward to year 1. Workplans were monitored and reviewed quarterly by all the coordinators and a workpackage report was submitted to the coordinator for review on a quarterly basis. Due to the success of the DPDM in Harare, NBSZ are exploring the possibility of continuing the course possibly in collaboration with a local university.

Appoint research coordinator

Research Coordinators were nominated at the onset of the programme for all the three training centres.

- Dr. Daniel Ansong - Coordinator for Kumasi (DPDM lead coordinator)
- Dr. Edward Asumanu - Coordinator for Accra
- Professor E. Gomo - Coordinator for Harare

Liaise with KATH, Ghana and LSTM to extend DPDM course to Ghana Blood Transfusion Service staff (year 1) and then to other African partners

This was successfully achieved and staff from the blood transfusion services in Ghana and Zimbabwe have attended the DPDM course in three centres (Accra, Kumasi and Harare). Communication links were established between KATH, LSTM and Harare via email and Skype. DPDM was extended from Kumasi to Accra with the main secretariat at the 37 Military Hospital. The course started in Accra in September, 2011 and subsequently in Harare in January, 2012. The DPDM lead coordinator (Daniel Ansong) and the educational developer from LSTM (Sue Purnell) were in attendance to support the first workshops at these two new sites.

A presentation of the DPDM course was made at the AfSBT meeting in June 2012 and a number of representatives from other African countries expressed an interest in the course. As there was no provision within T-REC to extend this beyond Ghana and Zimbabwe, these representatives will need to secure funding to enable this to occur. The LSTM educational developer Anthony Cegielka presented the DPDM package at the 7th AfSBT congress in Victoria Falls in July 2014

Set up selection panel for course participants, and ensure a transparent and fair selection process

A panel for the selection of T-REC DPDM candidates was constituted before the beginning of DPDM-Accra in September each year. The team included:-

Ghana

- Dr. Justina K. Ansah - (PI)
- Dr. Shirley Owusu-Ofori-(deputy PI)
- Dr. Daniel Ansong - (DPDM coordinator)
- Dr. Edward Asumanu - (Coordinator-Accra)

Zimbabwe

- Professor Exnavia Gomo - (Coordinator- Harare)
- Mr. Rhadi Chikwereti- (Harare)
- Mr. Collins Mitala - (Harare)
- Mr. Blessing Mukwada-(Harare)
- Dr. N.E. Kureva-(Harare)
- Mr. Liveson Mbiri-(Harare)
- Mr. Biran Mangwende-(Harare)

Manage funds for DPDM students and honoraria for tutors

The funds for DPDM students as well as honoraria for tutors were managed by the administrative staff at GBTS and NBSZ. Tutors were paid based on contact hours with DPDM students during training sessions. The number of hours were recorded by signed attendance/time sheets endorsed by the coordinators. DPDM students prepared budgets for their project work which were then discussed and agreed by the course coordinators. The students then produced receipts for the costs at the end of the course.

Establish annual review of course quality in each institution using published criteria and make recommendations for improvements

The DPDM supervisor and student handbooks were reviewed annually by the course academic board in collaboration with the LSTM Educational Developer to improve the quality of the course content.

A publication writing workshop was introduced to support students to publish their DPDM research findings and the first workshop was held in Kumasi, 14-16th September 2012.

Coordinate lesson-learning from DPDM about building transfusion service research skills across all partners

DPDM coordinators worked with LSTM PIs to develop an evaluation tool for this purpose. Data about progress and lessons was collated and shared with all partners and also presented at national and international meetings.

Collate information about research project outputs for annual reports, dissemination and policy/practice influence

Two batches of T-REC students from Harare graduated in May 2014. The second and the third batch from Ghana are expected to graduate just after the close of the project and present their results in Kumasi in September 2015 to an audience of clinicians, senior academic staff, the head of blood transfusion and the hospital's Chief Executive.

Some DPDM students presented their outputs at the 7th AfSBT International Congress in Victoria Falls, Zimbabwe and one student has published an article in Transfusion Today.

Information about the outputs of student projects was collated by the DPDM coordinators and discussed by the Research Committees set up in both Ghana and Zimbabwe to review whether the outputs could influence policy/practice.

Work with local partners to promote sustainability of DPDM

DPDM is well established at Kumasi and has progressed well at 37 Military Hospital, Accra, where it is handled by senior local doctors trained as facilitators and supervisors. The Accra centre is now largely autonomous, although grades and supporting documentation are processed in Kumasi and some Kumasi staff act as supervisors where subject expertise is required. The course is clearly sustainable in the long term at both centres in Ghana. Dr Kerina Duri's contract as Course Coordinator in Harare expired towards the end of the project. Prof Exnavia Gomo took over responsibility for the course in Harare and negotiations are underway to incorporate the DPDM within a Master's programme at the University of Zimbabwe.

Familiarisation with new LSTM quality assurance documentation was improved in order to allow local staff to present grades and supporting documentation directly to the external examiner and LSTM examination boards should the T-REC partners decide to continue under the LSTM award scheme now T-REC funding has ended. Discussions are underway with LSTM's Director of International Educational Initiatives to establish the most suitable form of collaborative agreement to encourage sustainability and allow flexibility in the local context.

Assist host country to organise annual meetings

AfSBT organised travel logistics for consortium members to attend the 7th AfSBT congress in Victoria Falls in July/August 2014.

AfSBT and LSTM worked together to organise the final T-REC workshop and management committee meeting in Johannesburg in February 2015.

Contribute to research dissemination and networking

A number of students participated at the 7th AfSBT Congress in Zimbabwe in July/August 2014, where they either made oral presentations or submitted a poster. At the end of the T-REC project

a number of DPDM students were drafting submissions to the journal *Africa Sanguine* with support from their local supervisors.

An outline and description of the DPDM programme has been published in the journal *Africa Sanguine* 16 (4).

Work Package Number 3: Summary of important results

- A total of 44 students were enrolled on the T-REC DPDM course with 35 having graduated and 9 expected to graduate later in 2015. This exceeds the deliverable number of 42, with the additional two students being sponsored by the Ghana Blood Transfusion Service.
- A total of 7 DPDM students gave oral and poster presentations at an International Conference (July/August 2014 AfSBT 7th International Congress).
- Recruitment and training of new facilitators, markers and supervisors was successful.
- Autonomy in centres newly implementing DPDM (Accra and Harare) due to T-REC funding.
- Development of local DPDM administrative capability (such as the use of online registration, submission and recording of grades) to allow sustainability after T-REC funding.

Work Package Number 4 - Transfusion research scholarships

Principal Investigator of Work Package: David Mvere

Objectives (all completed)

- to coordinate research opportunities within Africa's transfusion services for external undergraduate and postgraduate students which meets the needs of the service and the local population.
- to support transfusion policy makers, service managers and researchers to work together to identify research needs, develop research strategies and use research to inform policy
- to strengthen the research systems, infrastructure and networks within and between transfusion services and academic institutions in Africa, the EU and beyond.

Summary of achievements for objectives and details for each task

Appoint research coordinator

The Deputy PIs for Zimbabwe and Ghana were the research coordinators for student bursaries

Engage local university in planning student scholarship scheme

Ghana: Over the duration of T-REC a total of 30 students have enrolled onto the programme and 29 reports have been received with one student deferred from 2014 to 2015. A total of 90% of applicants were degree holders, and 10% were Masters Students and 1/3 of all students were medical students. Accra and Kumasi are now experienced with this scheme and PhD students have been assisting bursary students with literature reviews and technical support.

Zimbabwe: Some initial problems were experienced in liaising with students due to the timing of the academic calendar and the amount of finance available was perceived as a problem. A total of 16 applications were received and 16 projects were completed. The students were drawn from different faculties including Pharmacy, Social Sciences, Accounting, Laboratory Sciences and Information technology

Develop selection process for students' scholarships and select students

Ghana: Year 1 - 2011

Adverts were posted in two local newspapers in October 2011 and a total of twelve applications were received from four Universities. The PI and deputy PI vetted the applications and chose 6 students who were in their final year of their research in a sciences or medical field. These students graduated in 2012.

Ghana Year 2 - 2012

Adverts were posted in two local newspapers in September 2012. A total of fourteen (14) applications were received and ten (10) were selected.

Ghana: Year 3- 2013

Advertisements for year three bursaries were placed on T-REC website and sent by courier to all the public universities in Ghana. A total of fourteen (14) applications were received and all the applicants were awarded the bursaries.

Zimbabwe: Year 1- 2011

National Blood Service Zimbabwe did not advertise the bursary programme in the year one because it was too late for the 2011/2012 academic year.

Zimbabwe: Year 2- 2012

Zimbabwe posted adverts in 3 National newspapers in September 2012 with the deadline of the same month. A total of Seven (7) applications were received by the Deputy PI and four candidates were selected.

Zimbabwe: Year 3 - 2013

Due to low uptake of the bursaries, Zimbabwe adopted a continuous enrolment of bursaries for Universities and tertiary institutions. Two (2) students were awarded scholarship from Connect Institute of Systematic Counselling. A further ten (10) students were awarded bursaries from the University of Zimbabwe on a continuous basis.

The total number of bursaries awarded was 30 for GBTS (year 1 = 6, year 2 = 10 year 3 = 14) and 16 for NBSZ (year 2 = 4, year 3 = 12)

Manage scholarship funds

A budget of 260 Euros per student was managed by the management offices in Ghana and Zimbabwe. Students were required to provide receipts for items purchased and were reimbursed on completion of their project.

Collate reports about research outputs produced by scholarship students

Completed reports were collated as students finished their projects.

Collate information about research project outputs for annual reports, dissemination and policy/practice influence

Reports produced by the bursary and DPDM students were reviewed by the Research Committees in Ghana and Zimbabwe. The two committees discussed the potential impact for change in policy and practice at institutional, regional and national level and advised on further action needed (e.g. more research, change in practice etc).

Work Package Number 4: Summary of important results

A total of 46 undergraduate and graduate students within Ghana and Zimbabwe conducted research projects related to blood transfusion. This had not happened prior to the T-REC project and has the following positive outputs:

- Links were created between the blood transfusion services in Ghana and Zimbabwe and Universities within the countries
- Research outputs were generated that have the potential to influence policy/practice
- Awareness of the blood transfusion service as a potential career for postgraduate research has increased

Work Package Number 5 - Research use, dissemination and sustainability

Principal Investigator of Work Package: David Mvere

Objectives (all completed)

- to support transfusion policy makers, service managers and researchers to work together to identify research needs, develop research strategies and use research to inform policy
- to strengthen the research systems, infrastructure and networks within and between transfusion services and academic institutions in Africa, the EU and beyond

Summary of achievements for objectives and details for each task

Coordinate initial site visits and workshop

Ghana National Blood Transfusion Service coordinated the opening ceremony for T-REC project in Accra Ghana on the 5th of July 2012. The ceremony was officially opened by Dr. Ahmed Zacharia who was nominated as their representative by the Ministry of Health in Accra Ghana. The opening ceremony was attended by health professionals from Ghana in addition to members of the T-REC consortium. There was also a management committee meeting on the 6th July and a visit to the Ghana blood transfusion service on the same day.

A launch meeting in Zimbabwe was held on the 5th October 2011 and was attended by various stakeholders from academia including the UZ College of Health Sciences, the Medical Research Council of Zimbabwe, the Biomedical Research and Training Institute and the Research Council of Zimbabwe, members of the Medical Scientific Committee which is a subcommittee of the NBSZ National Committee, the NBSZ management team and the T-REC project team. The event was attended by the Permanent Secretary in the Ministry of Health and Child Welfare; Brigadier General (Dr) Gerald Gwinji who officially opened the T-REC programme in Zimbabwe. A site visit to the National Blood Transfusion Service Zimbabwe was conducted on the same day.

Develop detailed workplan for work package including quarterly monitoring

The Project Management Group prepared a detailed workplan for each workpackage during the launch meeting in Accra. Each institution also received a budget allocation statement which had been extracted from the overall project budget by the T-REC project manager (Susan Jones). This budget was broken down into individual activities allowing each partner to understand the funding available for each activity and also the internal reporting required periodically as follows:

NBSZ and GBTS – quarterly financial and work package reporting

UCPH and RUG – six months financial reporting

Each report contained a summary of progress towards objectives and the details of each task, significant results and deviations.

Identify opportunities for exchange of personnel (south-south and north-south) to support research capacity building

The DPDM supervisors from KATH Ghana alongside educational developers from LSTM have trained their counterparts in Accra, Ghana and Harare, Zimbabwe to enable the continuance of the DPDM programme (i.e. south-south and north-south collaboration and exchange). The PhD students will continue to work with local and European supervisors and will carry out further study

visits in Europe and Africa (i.e. south-north collaboration and exchange) in both the completion and defence of their PhD theses.

GBTS has further strengthened its links with a network of media health journalists through Bernard Appiah (separately funded project – Wellcome Trust), who has written articles (available via Sci Dev Net) regarding GBTS services and T-REC. The main purpose of these articles is to highlight the excellent work being conducted by blood transfusion services and to continue the engagement with the general public in the improvement in services and to increase the availability of safe blood.

Dissemination of outputs from T-REC

Since the start of T-REC, communication and dissemination about the programme has been undertaken through a variety of channels. The website has been maintained and updated on a continuous basis; it communicates T-REC's core business, and disseminates all of the main articles and stories emerging from work in Ghana, Zimbabwe and internationally. T-REC progress has also been documented in the form of over 20 short 'vox pop' films hosted on YouTube. These highlight and communicate the need for research in blood services, and the experiences people have had participating in T-REC activities such as the PhDs, DPDM and bursaries. Accessible and open-access articles have been published in non-academic journals such as Transfusion Today, Africa Health and SciDev.Net; and media articles have been published in national newspapers (both print and online) in Ghana and Zimbabwe. Almost twenty academic papers have been published or are in preparation for being published relating to individual T-REC PhD studies and to research capacity strengthening in blood services; journals include the Lancet, Transfusion, Africa Sanguine and Vox Sanguinis. A T-REC series of five Policy Briefs and six Impact Briefs have been produced or are in the process of being produced, drawing on both academic evidence and the personal testimonies of those involved in T-REC to promote the uptake of research evidence and enhance research capacity strengthening. Results of an in-depth review of the research capacity of NBSZ undertaken through T-REC, were presented at a national meeting of blood services managers, researchers and policy makers in Harare in February 2015,

A report from the T-REC blood transfusion workshop, held in Pretoria, has also been produced and disseminated to everyone who attended. This report highlights the initial aims of T-REC and also identifies research priorities for blood services in sub Saharan Africa moving forward.

Websites & Social Media

Website	Start Date	Description
www.t-rec.eu	Apr-11	Website dedicated to disseminating project outputs and activities
www.facebook.com	Jan-12	Social media network used for disseminating outputs and advertising courses and bursaries
www.youtube.com	Jul-11	T-REC You Tube channel show casing a series of interviews with T-REC staff and students - 19 student / staff films
Community Research and Development Information Service of the European Commission http://cordis.europa.eu/project/rcn/98388_en.html	Nov-12	TREC publishable periodic report
	Jun-13	TREC Project Brief
		TREC Project explanation

Journals

Authors	Journal	Title	Published	DOI
A. Dunn	Africa Health	Improving blood transfusion services in Africa: the launch of T-REC	Sep 2011	Vol 33, No 6
I Bates, A Dunn	Transfusion Today	National Blood Service Zimbabwe Launches the T-Rec Project. An EU Funded Research Programme	Dec 2011	Issue 89, p28
I Bates, A Dunn, T Seddon	The Bulletin of the Royal College of Pathologists	Building the research capacity of blood transfusion services in Africa	Jan 2012	Issue 157, p28-29
S Owusu-Ofori	Transfusion Today	Goals and achievements of the Kumasi Blood Centre, Ghana	Sep 2012	Issue 92, p12-13
I Bates, A Dunn	Transfusion Today	International quality research project Ghana - Zimbabwe	Mar 2013	Issue 94 p4-11
Mapako T, Mvere DA, Chitiyo ME, Rupsakaniko S, Postma MJ, van Hulst M.	Transfusion	Human immunodeficiency virus prevalence, incidence, and residual transmission risk in first-time and repeat blood donations in Zimbabwe: implications on blood safety.	Epub 2013 Jun 23	10.1111/trf.12311
E. N. Osei, A. T. Odoi, S. Owusu-Ofori & J.-P. Allain	Transfusion Medicine	Appropriateness of blood product transfusion in the Obstetrics and Gynaecology (O&G) department of a tertiary hospital in West Africa	Online 15 th May 2013	doi: 10.1111/tme.12028
B Appiah, I Bates, S Owusu-Ofori, A Dunn	The Lancet	Culturally relevant communication interventions to promote voluntary blood donations in Ghana: an observational, interview-based study.	Oct-13	doi:10.1016/S0140-6736(13)62169-8

Authors	Journal	Title	Published	DOI
N Mafirakreva, S Khoza, D.A. Mvere, M.E. Chitiyo, M.J. Postma, M Hulst	Blood Transfusion	Incidence and pattern of 12 years of reported transfusion adverse events in Zimbabwe: a retrospective analysis	Jan-14	Online
T Mapako, S Rusakaniko, M.J. Postma, J Dzangare, S Ngwende, J Mandisarisa, P Nyika, D.A. Mvere, O Mugurungi, M Tshimanga, M Hulst	Demographic and Health Surveys. DHS Working Papers No. 111 (Zimbabwe Working Papers No. 12).	Changes in HIV Prevalence among Men and Women between the 2005-06 and 2010-11 Zimbabwe Demographic and Health Surveys	2014	http://dhsprogram.com/pubs/pdf/WP111/WP111.pdf
N Mafirakureva, H Nyoni, R Chikwereti, S Khoza, D.A. Mvere, JC Emmanuel, M Postma, M Hulst.	Transfusion	The average unit production cost of blood in Zimbabwe from a provider's perspective.	Oct-14	2014;54: 15A-268A
A Dunn, D Ansong, D Mvere, J Ansah, S Owusu-Ofori, E Gomo, I Bates	Africa Sanguine	T-REC: Strengthening capacity for blood transfusion research in Ghana and Zimbabwe	Dec-14	Vol 16, No 22
N Mafirakureva, S Khoza, M Hulst, M Postma, D.A. Mvere.	Vox Sanguinis	The evaluation of blood donor deferral causes in Zimbabwe.		2013;105: 65-299.

Media

Agency	Title	Link	Date
Daily Graphic, Ghana	J.Ansah discussing the Ghanaian National Transfusion Bill	http://graphic.com.gh/news/general-news/41426-speed-up-passage-of-national-blood-transfusion-bill.html	Apr-15
LSTM website - news item	TREC hold final meeting in South Africa	http://www.lstmed.ac.uk/about-lstm/news-and-media/latest-news/t-rec-holds-final-meeting-in-south-africa/	Feb-15
Sci Dev Net	Project aims to build African health research capacity	http://www.scidev.net/sub-saharan-africa/r-d/news/project-aims-to-build-african-health-research-capacity.html	Feb-15
Sci Dev Net	Sustaining R&D capacity in blood transfusion services	http://www.scidev.net/sub-saharan-africa/sustainability/scidev-net-at-large/blood-transfusion-services.html	Feb-15

Agency	Title	Link	Date
Podcast LSTM	Professor Imelda Bates discussing Blood and capacity building in Liverpool School of Tropical Medicine	http://www.t-rec.eu/highlights/index.htm	Jun-14
Health Nest Ghana	New program to help build capacity in Health research	http://ghanahealthnest.com/2014/03/08/new-program-help-build-capacity-health-research/	Mar-14
Daily Graphic, Ghana	President Mills was not brought to hospital in van	Newspaper cutting	Sep-13
Voice of America: Health Chat	Radio Interview: I Bates	Recording available at LSTM	Aug-13
LSTM website - news item	TREC Annual meeting 2013	http://www.lstmed.ac.uk/about-lstm/news-and-media/latest-news/2013/jan-june/t-recs-annual-meeting-2013/	Jun-13
LSTM website - news item	TREC Student wins outstanding female doctor award	http://www.lstmed.ac.uk/about-lstm/news-and-media/latest-news/2013/jan-june/t-rec-phd-student-wins-ghanas-outstanding-female-doctor-award/	Jun-13
Opportunities for Youth, Zimbabwe	TREC bursaries in Zimbabwe	http://www.opportunitiesforyouth.org/2012/09/19/postgraduate-mscmphilmed-research-bursaries-national-blood-services-zimbabwe/	Sep-12
Texas A&M Health Centre	Appiah to Research Blood Transfusion in Ghana and Zimbabwe	https://news.tamhsc.edu/?post=appiah-to-research-blood-transfusion-in-ghana-and-zimbabwe	Aug-12
Health Canal	T-REC: Building research capacity for blood transfusion services in Africa	http://www.healthcanal.com/public-health-safety/21766--REC-Building-research-capacity-for-blood-transfusion-services-Africa.html	Oct-11
LSTM	T-REC: Building research capacity for blood transfusion services in Africa: Press release	http://www.lstmed.ac.uk/about-lstm/news-and-media/press-releases/2011/t-rec-building-research/	Oct-11
Health Competence	T-REC - Building research capacity of blood transfusion services in Africa	http://www.healthcompetence.eu/converis/publicweb/project/2991;jsessionid=1c004a11195b30f4a79f9ef10f55?show=Person	

Presentations and conferences at National and International meetings

Poster/Oral	Programme	Author	Meeting name & Venue	Title
Oral	PhD	Dr Shirley Owusi-Ofori	7th International Congress of the AfSBT in Victoria Falls, Zimbabwe	A Review of a Hospital Transfusion Committee in Kumasi, Ghana; Fourteen years of dedicated service
Oral	PhD	Dr Oliver Hassell	7th International Congress of the AfSBT in Victoria Falls, Zimbabwe	How much blood is needed? The estimation of blood requirements in low and middle-income countries
Oral	PhD	Dr Lucy Asamoah-Akuoko	7th International Congress of the AfSBT in Victoria Falls, Zimbabwe	Blood donation in southern Ghana: perceptions, motivators and deterrents
Oral	PhD	Dr Oliver Hassell	7th International Congress of the AfSBT in Victoria Falls, Zimbabwe	Paediatric transfusion in Africa: which children need blood
Oral	PhD	Tonderai Mapako	7th International Congress of the AfSBT in Victoria Falls, Zimbabwe	Monitoring and evaluation of healthcare programmes
Oral	PhD	Francis Sarkodie	7th International Congress of the AfSBT in Victoria Falls, Zimbabwe	A new screening strategy for syphilis at KATH in Kumasi, Ghana
Oral	PhD	Tonderai Mapako	7th International Congress of the AfSBT in Victoria Falls, Zimbabwe	Residual risk estimates of viral transfusion transmissible infections in Zimbabwe
Oral		Dr Emmanuel Dei	7th International Congress of the AfSBT in Victoria Falls, Zimbabwe	Application of information technology by blood banking and transfusion facilities in greater Accra region
Oral	PhD	Nyasha Mafirakureva	7th International Congress of the AfSBT in Victoria Falls, Zimbabwe	Blood component use in Zimbabwean hospitals: preliminary findings
Oral	PhD	Dr Veena Sharma	7th International Congress of the AfSBT in Victoria Falls, Zimbabwe	A policy review of national blood transfusion policies in Africa
Oral		Dr Oliver Hassell	7th International Congress of the AfSBT in Victoria Falls, Zimbabwe	Computer modelling of the blood supply in low and middle income countries using Discrete-event simulation - a pilot study
Oral	DPDM	Imelda Bates Daniel Ansong	American Society of Tropical Medicine and Hygiene (ASTMH), Atlanta, November 2012	Strengthening research capacity within a Ghanaian teaching hospital: ten year prospective
Oral	DPDM	Daniel Ansong	Health System Research Conference, Beijing, 31 st Oct-3 rd Nov 2013	Strengthening an institutional health research system: a prospective ten year study using an evidence-based framework for monitoring progress
Poster & Oral	PhD	Tonderai Mapako	6 th International Congress of the AfSBT Mauritius 4-7 June 2012	Risk modelling of blood safety

Poster/Oral	Programme	Author	Meeting name & Venue	Title
Poster & Oral	PhD	Nyasha Mafirakureva	6 th International Congress of the AfsBT Mauritius 4-7 June 2012	Suspected transfusion reactions In Zimbabwe: an analysis of 1999 - 2011 Reports
Poster	PhD	Francis Sarkodie	6 th International Congress of the AfsBT Mauritius 4-7 June 2012	Syphilis testing and cross reactions for syphilis in Ghanaian blood donors; development of a rational syphilis testing strategy
Poster	PhD	Lucy Asamoah-Akuoko	6 th International Congress of the AfsBT Mauritius 4-7 June 2012	Evolving strategies to encourage repeat blood donations in first time voluntary and replacement blood donors in Ghana
Oral	PhD	Nyasha Mafirakureva	6 th International Congress of the AfsBT Mauritius 4-7 June 2012 – T-REC Parallel session	Cost-effectiveness and safety of blood transfusion in Zimbabwe Proposed work plan
Oral	PhD	Tonderai Mapako	32 nd International Congress of the ISBT Mexico 7-12 July 2012	HIV prevalence in first-time and repeat blood donations in Zimbabwe, impact on blood safety
Oral	PhD	Tonderai Mapako	NBSZ NAT Consensus workshop, Zimbabwe, 18 September 2012	Trends in transfusion transmissible infections (ttis) in blood donations in Zimbabwe
Poster	PhD	Tonderai Mapako	33 rd International Congress of the ISBT Netherlands 2-6 June 2013	Inter-donation intervals of seroconvertors and impact on blood safety in Zimbabwe
Poster	PhD	Nyasha Mafirakureva	33 rd International Congress of the ISBT Netherlands 2-6 June 2013	The evaluation of blood donor deferral causes in Zimbabwe.
Poster	PhD	Francis Sarkodie	33 rd International Congress of the ISBT Netherlands 2-6 June 2013	Syphilis testing and its cross reactions in Ghanaian blood donors
Poster	PhD	Lucy Asamoah-Akuoko	33 rd International Congress of the ISBT Netherlands 2-6 June 2013	Evolving strategies to encourage repeat blood donations in first time voluntary and replacement blood donors in Ghana
Oral	PHD	Nyasha Mafirakureva	Training workshop for doctors & laboratory scientists on standards for transfusion appropriate use of blood & blood products Mandel Training Centre, Harare: 13 th & 14 th September 2012.	Do adverse transfusion events occur in Zimbabwean hospitals & how can we document these reactions?
Oral	PhD	Francis Sarkodie	National Congress of the Danish Blood Donor Association 3 November 2012	Syphilis testing and cross reactions for syphilis in Ghanaian blood donors; development of a rational syphilis testing strategy
Oral	PhD	Lucy Asamoah-	National Congress of the Danish Blood	Safe blood donation in Ghana

Poster/Oral	Programme	Author	Meeting name & Venue	Title
		Akuoko	Donor Association 3 November 2012	
Oral	PhD	Francis Sarkodie	Rigshospitalet, University of Copenhagen Staff Meeting 6 November 2012	Syphilis testing and cross reactions for syphilis in Ghanaian blood donors; development of a rational syphilis testing strategy
Oral	PhD	Lucy Asamoah- PhD Akuoko	Rigshospitalet, University of Copenhagen Staff Meeting 6 November 2012	Evolving appropriate strategies to encourage repeat donations among first time voluntary and replacement donors in Ghana
Poster	DPDM	Eric Ntifu	1st Annual General Scientific meeting of the Ghana Society of Haematology(GhaSH) Conference Hall Ghana Medical Association (GMA) House at Korle-bu	A study to investigate the demand and supply of blood and blood components at the Obstetrics and Gynaecology directorate of Komfo Anokye Teaching Hospital (KATH).
Poster	DPDM	Emmanuel. N Dei	1st Annual General Scientific meeting of the Ghana Society of Haematology(GhaSH) Conference Hall Ghana Medical Association (GMA) House at Korle-bu	A survey on the application of information technology by blood banking and transfusion facilities in the Greater Accra region of Ghana
Poster	DPDM	Felix Appertey	1st Annual General Scientific meeting of the Ghana Society of Haematology(GhaSH) Conference Hall Ghana Medical Association (GMA) House at Korle-bu	Factors that motivate voluntary blood donors in selected second cycle institutions and some churches in the Damgbé West district of the Greater Accra region of Ghana
Poster	DPDM	Samuel K. Nodzi	1st Annual General Scientific meeting of the Ghana Society of Haematology(GhaSH) Conference Hall Ghana Medical Association (GMA) House at Korle-bu	Evaluation of the Hepatitis B rapid test strip used in screening blood donors at the Ridge Hospital
Poster (E-Catalogue)	PhD	Lucy Asamoah- Akuoko	Liverpool School of Tropical Medicine, Postgraduate Research Student Conference, Monday 14th April 2014.	Blood donation in southern Ghana: perceptions, motivators and deterrents
Oral	PhD	Tonderai Mapako	University of Groningen, The Netherlands, Departmental Brainstorming session, 21 March 2014	Transfusion transmission risk of infections: impact of using different models

Identify potential sources of funds to sustain project, assist in proposal writing and coordinate partners/students applications to external agencies for funding - ongoing

T-REC has directly contributed to the realisation of three recent funding awards detailed below.

Funder	Name	Title	Amount
LSTM Research Development Fund	Imelda Bates, Veena Sharma	Improving blood transfusion services in Kumasi, Ghana through policy	£5,700.00
Wellcome Trust	Imelda Bates, Bernard Appiah	Ethical concerns for health professionals, media and the public in promoting adequate and safe blood transfusion services in Africa: a case study of Ghana and Zimbabwe	£5,000.00
British Society for Haematology	Imelda Bates, Veena Sharma	The strengths and weaknesses of blood transfusion services in Kumasi, Ghana.	£5,000.00

Identify relevant research meetings; support partners and students on all schemes to submit abstracts and papers for publication/presentation

At the AfSBT 7th Congress, 13 oral presentations were conducted by T-REC PhD students and DPDM students, 6 abstracts from T-REC DPDM students were included in the congress programme.

At this time there are 8 papers in development and both T-REC partners and students are looking for appropriate platforms, both nationally and internationally, to present at.

Assist LSTM and the host country to organise annual meetings

The Africa Society for Blood Transfusion organised the 2014 annual meeting which was held during the AfSBT 7th Congress in Victoria Falls, Zimbabwe. AfSBT arranged accommodation and travel for all African and EU consortium members as well as securing meeting spaces for the annual meeting, a parallel session and an exhibition stand.

LSTM worked in partnership with AfSBT in the organisation of the T-REC Blood Transfusion workshop held in Pretoria, South Africa (February 2015). This workshop was attended by 35 people from around the world, including USA, Europe and Africa, from a variety of professional backgrounds including policy makers and medical professionals. LSTM and AfSBT arranged the accommodation and travel arrangements for all delegates and organised the workshop and conference venues. During this workshop the final T-REC management meeting was held and attended by all African and EU consortium members.

Significant results

- Production and dissemination of the Zimbabwean Research Capacity Review (March 2015)
- Production and dissemination of the report from the T-REC Blood transfusion workshop (February 2015)
- T-REC Blood transfusion workshop held in Pretoria, South Africa (February 2015).
- Final T-REC meeting held during blood transfusion workshop in Pretoria, South Africa (February 2015)
- Annual meeting and T-REC parallel session in Zimbabwe during the 7th AfSBT Congress (July 2014).
- Ongoing dissemination of T-REC information through the website

Work Package Number 1 - Management and coordination

Principal Investigator of Work Package: Imelda Bates

Objectives (all completed)

- To recruit project staff through a transparent process in line with institutional, national and international policies and legislation
- To set up an efficient office and systems for effective management of the project and for reporting to the Commission Services
- To coordinate all project activities between partners, sub-contractors, stakeholders and external agencies.

Summary of progress towards objectives and details for each task

Staff recruited; functional team and office

The project was co-ordinated at LSTM and functional team an office has been set up. Management and co-ordination personnel were provided at all the partner institutions. Signed contracts were set up for all partners and third party organisations.

List of research priorities for each African partner

Research priorities for each partner were developed at the launch meeting in Accra on the 5-6th of July 2011. Workplans for each of the workpackages were also developed.

Conduct site visits of GBTS and NBSZ

A site visit of the Ghana Blood Transfusion Service in Accra was conducted on the 7th July 2011 and a visit of the National Blood Centre Zimbabwe (Harare) was conducted on the 4th October 2011. The reports of these visits are attached to this report.

Finance and reporting training for partners

At the launch meeting in Ghana training on EU reporting and finance was conducted by Susan Jones. This training included an explanation of the budgets, the need to complete timesheets and how to complete transaction templates designed by the LSTM management office. .

Website

The T-REC website (www.t-rec.eu) was launched in the first month of the project and has been improved, redesigned and updated. It now contains information on the project, the partners, the PhD students and their research topics, the DPDM courses and student bursaries. Further details can be found in the report for deliverable 1.1.

Project planning and status

Workpackage 1

Both deliverables within this workpackage were completed in period 1 and deliverables reports were submitted. Management of the consortium activities has continued throughout the duration of the project.

Workpackage 2

A total of four PhD students were selected in July 2011, two from Zimbabwe and two from Ghana. The students started working with their supervisors on the plans for their PhD programme and the two Zimbabwean students were registered at the University of Zimbabwe in January 2012. However, there was an ongoing delay in the registration of the Ghanaian students at the University of Ghana and a decision was made in early 2013 to register the students at the University of Liverpool. Although every effort was made to complete the projects within the timeframe of T-REC, the theses will be completed after the scheduled end of T-REC.

The deliverable within this workpackage of two successful independent grant applications has been achieved and the deliverable report has been submitted.

Workpackage 3

Ghana

The initial plan for DPDM students in Ghana was for 6 students in year 1, 9 in year 2 and 9 in year 3 making a total of 24 students. To date 17 students have graduated and the 9 year 3 students are expected to graduate in September 2015. The additional two students we sponsored by GBTS as added value to the T-REC project.

Zimbabwe

The initial plan for DPDM students in Zimbabwe was for 9 students in year 2 and 9 in year 3 making a total of 18 students. Transfer of the DPDM course to Harare was brought forward to year 1 and all 18 students have completed the DPDM course.

The deliverable of local tutors teaching >30% of the DPDM course was achieved on schedule and a deliverable report has been completed and submitted.

Workpackage 4

The grant agreement specified a total of 42 students to complete the bursary programme. To date 46 students have been enrolled and 45 have submitted final reports with the final student deferred until later in 2015.

The deliverable of 6 research outputs presented at national meetings has been exceeded and a deliverable report has been submitted.

Workpackage 5

AfSBT is actively working with the consortium partners and the Communications Officer at LSTM to disseminate the outputs of the T-REC project. This work is ongoing and the deliverable of 10 topics produced in diverse media for non-academic audiences has been exceeded and a deliverable report has been submitted.

Significant results

The partners worked well together throughout the project and meet face-to-face on an annual basis with a group teleconference in between the annual meetings. Cooperation between the European and African partners with respect to the PhD programme is continuing to work well and Ghana and Zimbabwe successfully worked together to transfer the DPDM course from Ghana to Harare where it is now running independently.

4. Potential Impact

The overall goal of this project is to strengthen the capacity of blood transfusion services in Africa to sustainably conduct research that is useful for policy and practice. Achieving our objectives will result in the impacts listed in the following table.

Impact	Steps needed to bring about impact	Assumption/external factors affecting impact
Effective programme coordination centre at LSTM	<ul style="list-style-type: none"> • Complete contractual formalities • Identify office space, procure office equipment and set up office systems • Develop detailed workplan for including progress indicators and quarterly monitoring schedule • Liaise with EU Commission Services and LSTM administrative staff (including finance and human resources) to ensure reporting mechanisms and requirements are understood and complied with by all those involved in the project 	<ul style="list-style-type: none"> • No major contractual problems
<p>All partners will have in-depth understanding of each other's institutions and learn transferable lessons.</p> <p>National transfusion services formulate their own research strategies and implementation plans</p>	<ul style="list-style-type: none"> • Agree schedule for representatives of all partners to have site visits to African transfusion services • Hold initial workshop with stakeholders to determine research priorities and strategy • Ensure that transfusion service partners build review of research strategies and progress into their annual plans • Produce report outlining similarities, differences and key challenges for each institution produced and circulated 	<ul style="list-style-type: none"> • Local conditions conducive to productive visits • Partners able to influence annual transfusion service plans to enhance research activities
Research and teaching skills of individuals at all levels within and beyond the transfusion service will be	<p>PhD/MPhil scheme</p> <ul style="list-style-type: none"> • High quality students enrolled on PhD/MPhil enhancements programme • High quality supervision provided through collaborations between EU and African research supervisors • Close monitoring of students' progress so problems can be identified early and addressed and 	<ul style="list-style-type: none"> • PhD supervisors remain in post for the duration of the project and have adequate time to provide high quality supervision • Local tutors are committed to taking

<p>enhanced.</p> <p>Students supported by the project will be successful in obtaining independent research funding</p>	<p>to ensure they complete on time</p> <p>In-service training scheme</p> <ul style="list-style-type: none"> • DPDM course is extended to students from Ghana transfusion service and then to other African partners • Students conduct research that meets local research needs and complete the programme • Educational skills of local tutors enhanced (e.g. facilitation, self-directed learning) by mentorship from SP and practical experience of running DPDM <p>Student scholarship scheme</p> <ul style="list-style-type: none"> • Scholarships are well advertised in local academic institutions and high quality students are attracted and selected • Local supervisors appointed to oversee students' transfusion projects; support provided by EU partners • Student projects will be marked by individuals within and outside the transfusion services thereby increasing understanding of transfusion research beyond the transfusion services • Scholarships will be competitive and increasingly sought after as their increasingly high quality will make them more prestigious <p>Enhanced skills for EU and African partners</p> <ul style="list-style-type: none"> • Through collaborations EU partners will gain experience of research in transfusion topics and African partners will gain experience of teaching and supervising research • Supervisors and partners will support students to write proposals for research funding 	<p>over the DPDM course</p> <ul style="list-style-type: none"> • Students undertaking DPDM course remain in post for duration of course • Projects in transfusion topics will be attractive for students from local academic institutions • Research funding opportunities for transfusion topics available to project graduates • Project graduates successfully compete for research funds
<p>Expansion of research activity will drive strengthening of research infrastructure and systems within transfusion services</p>	<ul style="list-style-type: none"> • Transfusion services will appoint a research coordinator to act as the focal person for all research activities and to advocate for research to be included in annual plans and budgets • Transfusion services will have year-round involvement with students at all levels (from in-service professionals to PhD) undertaking research on transfusion topics • Results from projects will be collated by research coordinator who will promote utilisation of research results by the transfusion services and beyond • Transfusion service partners will organise regular research meetings and presentations and seek external research funding to promote sustainability 	<ul style="list-style-type: none"> • High level commitment within transfusion services to integrate and strengthen research

Transfusion research recognised by academic community as an exciting and under-researched area	<ul style="list-style-type: none"> • Research outputs from all three schemes which are suitable for publication/presentation are identified by supervisors • Supervisors and all partners help students to identify suitable journals/meetings (appropriate for their level of research) and support them to prepare publications/presentations • Whole project presented at international meetings annually (e.g Global Forum for Health Research, International Society for Blood Transfusion) 	<ul style="list-style-type: none"> • Transfusion research in Africa is perceived to be an important topic by journals and meeting organisers
<p>Research results in policy/practice changes.</p> <p>Research dissemination generates international interest in African blood transfusion services and attracts investment in the service</p>	<ul style="list-style-type: none"> • Project website set up for internal communication for project partners and for external information about project and dissemination of research activities and outputs • Research dissemination topics produced in diverse media for non-academic audiences • Specific messages about components of transfusion policies produced for highly targeted audiences • Profile of transfusion research raised among local Ministries of Health and external funders of health services and research (e.g. EU, BMGF, governmental agencies) through presentations at relevant stakeholders and programme meetings (e.g. Safe Motherhood, child health, malaria, HIV) 	<ul style="list-style-type: none"> • Policy makers and service managers have the will, and are able, to incorporate research outputs into policy and practice

Spreading excellence, exploiting results, disseminating knowledge

Our strategy for spreading excellence, exploiting results and disseminating knowledge will focus on active participation by all stakeholders in building the capacity of African transfusion services to generate and utilise evidence. Our communication processes are designed to enable the stakeholders to voice their needs and have their voices heard and, in the longer term, to promote investment in sustainable transfusion research capacity in Africa.

We will use five key approaches to effectively communicating about our project:

Strengthening networks

We developed links between researchers, practitioners and policy makers to raise awareness of our project so that they can use outputs to inform transfusion policies and practices. Our extensive existing contacts and the new ones that were developed through this project will

provide opportunities for networking and joint reflection into processes of building research capacity, and generating and using evidence.

Promoting dialogue, reflection and learning

We set up forums and workshops with a range of stakeholders to discuss research capacity building and to enable practitioners to frame research in their own context and make use of what is relevant. This neglected area of “putting research to use” will also highlight research gaps and priorities for the future.

Repackaging research findings

We developed accessible policy and practice briefs to help raise awareness of enhanced research capacity, ongoing research, highlight key research outputs, and signpost people where to go to find out more.

Building an accessible evidence base

Promoting a culture of applying research evidence relies on facilitating access to existing knowledge. We have created an information and resource centre to enhance access to existing research and to support, signpost, adapt and repackage materials for local audiences.

Measuring change

Tracking the impact of research capacity building and research outputs through networks is a challenge that we are addressing by conducting network mapping and assessing how research has influenced changes in practice and policy. We are also in the process of setting up a research network with ISBT to detail research and researchers in the blood transfusion field and to promote further collaboration.

Our programme supported regular scientific meetings in each of our African partner institutions where progress reports about the research programmes has been presented, specific projects were showcased and research findings disseminated. These meetings currently involve not just researchers but also local transfusion practitioners, managers and policy makers. Each of the partner transfusion services already have their own public relations and communications units. Because blood transfusion services deal not only with health professionals but with a wide variety of audiences such as the general public and media, these units have well-established links to agencies outside the service including non-governmental and civil society organisations. These units therefore provide effective communication channels that can also be used to disseminate lessons and results from this project.

The African transfusion services have a wide range of stakeholders including high level policy makers, government departments, front line health workers, counsellors, civil society organisations, NGOs, academic institutions, research institutions and community workers. A list of these stakeholders has been drafted and various ways of packaging our project outputs will be designed for these different audiences. Examples of the types of ‘packaging’ that we could use to make sure our outputs are accessible to those who can use them most effectively are: online resources, hard copy publications with interactive dissemination,

regular newsletters (with optional regional and local language editions), discussion groups, email lists, theatre groups and peer-to-peer education.

The research mentors in the EU partner institutions have strong track records of publishing and presenting research outputs in meetings and journals and part of their role will be to support African researchers to present and publish their research results. We have particularly encouraged publication in national and regional journals and in open access journals. In addition to these traditional research outlets we have also disseminated through websites, social media and publications for the non-research audience.

Networking is an important component of our dissemination strategy because linking people together will help them to share their knowledge and to make sense of the complex issues in transfusion practice. Coordination of dissemination activities to a broad international audience requires specialist skills has been coordinated by our communications officer Alison Dunn. She specialises in participatory techniques and in collaboration with African partners, has worked towards empowering transfusion service stakeholders to directly engage in our project. Through our website, site visits, supervisory visits, regular meetings, and the 'bridging' activities of AfSBT and LSTM we have created vibrant learning networks between and beyond our partners so that they can share experiences and adapt approaches to different contexts as a result of the learning within networks.

Management of intellectual property

As this is a coordination and support project intellectual property issues have not been a significant problem. We have and will continue to generate two types of knowledge: teaching materials (for the DPDM) and research project outputs. Academic and teaching communities have well recognised mechanisms for dealing with the intellectual property issues concerning these types of knowledge. Teaching materials belong to the institution providing the teaching and research outputs generally belong to those who designed and conducted the research. Any research conducted within this project will be subject to the international, national and institutional recommendations governing publication, ethical approval processes and public presentation of research.

5. Contact details

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The T-REC website continues to promote the work of the project. PhD and DPDM student films are available (http://www.t-rec.eu/phd_programmes/index.htm) and will be updated when new films are made available. The T-REC website also provides access to highlights from the project from the last five years including reports, policy briefs, podcasts and news articles.

T-REC Consortium Beneficiaries

Beneficiary Number	Beneficiary name	PI	Beneficiary short name	Country	Project entry date	Project exit date
1. (Coordinator)	Liverpool School of Tropical Medicine	Prof Imelda Bates	LSTM	UK	Month 1	Month 48
2.	Ministry of Health	Dr Justina Ansah	GBTS	Ghana	Month 1	Month 48
3.	National Blood Service Zimbabwe Association	Dr M E Chitiyo	NBSZ	Zimbabwe	Month 1	Month 48
4.	Rijksuniversiteit Groningen	Prof Maarten Postma	RUG	Netherlands	Month 1	Month 48
5.	Københavns Universitet	Prof Ib Christian Bygbjerg	UCPH	Denmark	Month 1	Month 48
6.	Africa Society of Blood Transfusion	Mr David Mvere	AfSBT	South Africa	Month 10	Month 48



Management Committee at the final T-REC meeting on the 26th February 2015

Left to right: Radhi Chikwereti - NBSZ, Tony Cegielka – LSTM, Daniel Ansong – GBTS, Rene van Hulst – RUG, Imelda Bates – LSTM, Henrik Ullum UCPH, Shirley Owusu-Ofori, GBTS, David Mvere – AfsBT/NBSZ, Oliver Hassall - LSTM