Compilation of Medical Research Council (MRC) Submissions
to
Department of Science & Technology (DST) publication

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SADC Epidemiology Network on Drug Use (SENDU)

The SADC Epidemiology Network on Drug Use (SENDU) came into being in the year 2000 as a 5-year programme to provide a composite picture of substance use and its related consequences for the SADC region. A substance abuse surveillance system was established in and managed by each of the member states. These systems were based on a national drug monitoring system established by the Alcohol & Drug Abuse Research Unit (ADARU) of the MRC in 1996.

The focus of these country systems was to collect and analyse data relating to substance abuse from specialized treatment centres and psychiatric hospitals; mortuaries, and hospital emergency rooms. Police sources also provided data on drug arrests, seizures and prices. Some countries added other sources such as prison records.

Report back meetings attended by representatives of the country systems were held on a 6-monthly basis. The country reports presented at these meetings were synthesized into a 6-monthly regional report which was widely distributed (see http://www.sahealthinfo.org/admodule/sendu.htm) and served to improve the quality of data collected through the revised UN Annual Reports Questionnaire. Table 1 shows the negative effect of substance abuse in the SADC region as reported at the 6th SENDU Regional Report Back meeting held in November 2004.

Table 1: Composite assessment of the use of various substances per SADC country and negative effect on health and social systems (January to June 2004) based on treatment demand (Tx-D) and law enforcement (Law-E) indicators

<table>
<thead>
<tr>
<th>Country</th>
<th>Cannabis</th>
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<th>Heroin</th>
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<tr>
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<tr>
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<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
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<tr>
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<td>+++</td>
<td>-</td>
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<td>+++</td>
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<td>N/A</td>
<td>N/A</td>
<td>+</td>
</tr>
</tbody>
</table>

- substance either not used or not showing up substantially on indicators; + some evidence of use of drug and/or dealing in the country; ++ law enforcement and/or treatment demand indicators suggest moderate use of and/or dealing in substance; +++ substantial use and/or negative consequences indicated (e.g. arrests for dealing); # from country presentation by Mr Justin Ntambwa.

From: Ms Pam Cerff, MRC Alcohol & Drug Abuse Research Unit (ADARU)
Anxiety and Stress Disorders

Of all the diseases known to ravage Africa, perhaps those that have been paid the least attention proportionate to their associated disability are the psychiatric disorders.

It is now known that 5 of the 10 most disabling disorders worldwide are neuropsychiatric conditions. In South Africa, these account for the largest portion of the national burden of disease, after HIV/AIDS.

The MRC Anxiety and Stress Disorders Research Unit and the Cross-University Brain-Behaviour Initiative have a particular interest in the high rates of exposure to trauma on the African continent. There is also acute awareness of the negative impact of HIV/AIDS on psychological status.

The Unit has conducted several studies on these issues in collaboration with African countries:

- with a group in Kenya to assess rates of trauma in high school students
- with a colleague in Nigeria to assess psychiatric disorders in HIV/AIDS patients
- as part of an international consortium that is comparing psychiatric disorders in South Africa, the United States, and Nigeria, with several manuscripts currently being prepared for publication

From: Dr Soraya Seedat, MRC Anxiety & Stress Disorders Research Unit

**Practihc** (*Pragmatic Randomized Controlled Trials in HealthCare*) was a European Union-funded converted action which provided open-access tools, training and mentoring to researchers, in developing countries, who were interested in designing and conducting pragmatic randomized controlled trials of healthcare interventions. **Practihc** was a collaboration of leading trialists from eleven countries including South Africa, Zimbabwe and Mozambique. The collaboration’s aim was to improve health systems by increasing capacity to evaluate healthcare delivery systems, health policy, public health and clinical choices and to identify the most effective options.

The initiative for this project came from Dr Merrick Zwarenstein of the Health Systems Research Unit of the Medical Research Council (MRC) in 2001. The project ran from December 2001 until May 2005. The main success was the compilation of an open source tool for protocol development called the Trial Protocol Tool (TPT) which can be downloaded from the website. This tool formed the basis of 5 training workshops which were held in Southern Africa and which provided training to over 200 trialists from the three hosting countries as well as from the rest of Africa. The initial workshop in Cape Town 2001 was co-funded by the Department of Science & Technology (DST).

Another deliverable was the research on health policy, specifically the implementation of the treatment of eclampsia in pregnant women, by means of magnesium sulphate, in the health systems of South Africa, Zimbabwe and Mozambique. The results of this work from the Southern African researchers were published in the special edition on Health in Africa of the British Medical Journal in October 2005. The work done by the researchers from Africa on pragmatic randomized controlled trials in Practihc received international recognition. The trialists from this collaboration have been successful in securing new funding for a new project called SUPPORT (Supporting Policy Relevant Reviews and Trials) and the MRC will be one of the coordinating institutions. This project will run from 2006 to 2008.

**South African Collaborators:** Dr Merrick Zwarenstein, Prof Jimmy Volmink, Dr Carl Lombard, Prof George Swingler, Dr Simon Levin

**Zimbabwe Collaborators:** Prof Godfrey Woelk, Dr S Chirenda

**Mozambique Collaborators:** Dr Julie Cliff, Dr E Sevene

*From: Dr Carl Lombard, MRC Biostatistics Unit*
Injury Prevention and Safety Promotion in Africa

The co-host to the Medical Research Council’s Crime, Violence and Injury Lead Programme (CVI LP), the University of South Africa (UNISA) Institute for Social & Health Sciences (ISHS), is a designated WHO Collaborating Center and is affiliated to the global Safe Communities movement. In this capacity the ISHS is responsible for the support of other WHO Safe Communities projects across Africa and has strong ties with the Injury Prevention Initiative for Africa (IPIFA). The ISHS is a steering committee member of IPIFA and as such is jointly responsible for annual training initiatives that take place under IPIFA auspices, notably an Injury Surveillance and Trauma Team Training Course. The ISHS is also responsible for co-coordinating, on a bi-annual basis, a regional Safety Promotion conference. In 2005 the conference was held in Portside, Egypt. This was the fourth of its kind that has been hosted by the ISHS.

In edition, the CVI LP supports the designation (based on a set of eight safety criteria) of Safe Community Demonstration Projects. In April 2006 CVI LP, along with the ISHS, will support the designations of Nomzamo and Broadlands Park in the Western Cape as the second successful application for a WHO Safe Community status in Africa.

Furthermore, the CVI LP is the host of the African Journal for Safety Promotion. The journal’s coverage is the entire African continent and it has a circulation of 400 copies per edition. The editorial Board consists of members from across the continent and two editions are produced annually.

Finally, the CVI LP is a partner to the 8th World Conference on Injury Prevention and Safety Promotion, to be held in Durban. This is the first time that this World Conference will be held in Africa and as such is a highlight for the CVI LP and its partners.

From: Dr Sandra Marais, MRC Crime, Violence and Injury Lead Programme
What is the key to the exceptional long-distance performances of the Kenyan and Ethiopian runners?

The answer to this question is being sought by collaborative research between the UCT/MRC Research Unit for Exercise Science and Sports Medicine (ESSM), the University of Glasgow and the University of Nairobi.

Professor Tim Noakes, Director of the Unit, has been appointed Visiting Professor to the University of Glasgow's Institute of Biomedical and Life Sciences Unit within the Faculty of Biomedical and Life Sciences. Together with Dr Yannis Pitsiladis at Glasgow and the University of Nairobi, they are studying Kenyan and Ethiopian runners, in training and competition, to determine the genetic and biological factors that could explain their amazing performances.

The performance of these runners is one of the most important exercise phenomena in the world, and this research attempts to understand their dominance of long-distance running, and the underlying biological factors.

From: Ms Yvonne Blomkamp, MRC Exercise Science & Sports Medicine Research Unit
Lead Poisoning in African Children

MRC research conducted over the past decade has shown that in certain areas unacceptably high proportions of South African children have elevated blood lead levels. The studies pointed to lead in petrol and paint as being amongst the most significant sources of childhood exposure to lead. The research findings catalyzed and supported efforts to remove lead from these media. Since January 2006, leaded petrol is no longer sold in South Africa, and a legislative process is now also underway to limit the use of lead in paint manufactured in the country.

To examine the risk of lead exposure amongst children in Gaborone, the MRC has joined forces with the University of Botswana to conduct a study in April 2006 of the distribution of blood lead levels in pre-school children from Gaborone. Through this partnership, information and education materials to raise awareness of lead hazards will also be shared.
Urban Housing and Health

Housing is one of the most powerful determinants of public health. With rapid urbanization currently underway in many parts of Africa, urban housing quality and the implications for public health, have become a major research focus for the South African MRC. In 2005 a long-term study of living conditions and health status was initiated in Johannesburg, in five low-cost sentinel sites:

- A high-rise, inner city suburb;
- A “standard” inner city suburb;
- An apartheid-era township;
- A relatively new low-cost housing development;
- Informal settlements on the urban fringe.

Preliminary analyses point to fascinating findings on variations across the five sites in relation to population migration patterns and mobility, levels of crime and violence and food security, and point to the need for targeted interventions in key settings.

Discussions are now underway between representatives of the MRC and the African Population and Health Research Centre to share experiences of research approaches, methodologies and findings in relation to similar studies being undertaken in Blantyre, Accra, Nairobi and possibly Kampala.

From: Angela Mathee (words and photographs), MRC Health & Development Research Group
Assessing child exposure to lead in Gaborone, Botswana

Lead is a ubiquitous metal that has been associated with a number of adverse health effects including anaemia, kidney damage, severe stomach aches, muscle weakness and brain damage. Even low levels of exposure can lead to impaired mental and physical development. Sources of lead include petrol, paint, batteries, candles, coal, crystal glass, cell phones, computers, television sets, ammunition, cabling, protective clothing, pottery, fishing weights and tobacco. There are currently high levels of concern over the continued use of leaded petrol and lead contained in paint used in homes in this country. However, there is currently no data on children’s exposure to lead in Botswana to inform decision-making. In response to this, the aim of this study is to determine children’s exposure to lead in Gaborone, Botswana. The study, due to begin in April 2006, will collect data on blood lead concentrations from approximately 300 children (aged between 1-6 years old) as well as soil, water and paint in children’s living environments. Key partners include The Medical Research Council of South Africa, the University of Botswana and the Botswana Department of Health.

From: Angela Mathee and Brendon Barnes, MRC Health and Development Research Group
Exploring how research findings are taken up in health care policy and practice in three Southern African countries

How to better use research findings to inform policy making is a question often considered by researchers, research funders and decision makers. For many of the health problems contributing to the burden of disease in low- and middle-income countries, research has identified effective and affordable interventions. Often, however, these interventions are not implemented or are discarded in favour of unproven interventions – an ineffective use of scarce health care resources.

Despite the importance of this problem, little research has explored how research findings are taken up in health care policy and practice in low and middle-income countries. The Health Systems Research Unit of the Medical Research Council of South Africa, together with collaborators at the University of Zimbabwe and Eduardo Mondlane University in Mozambique, recently undertook a study to describe policy makers’ and researchers’ views regarding the barriers and facilitators to using research evidence in policy making. The study focused on policy making in two important areas: maternal health and malaria control.

By comparing data collected in Mozambique, South Africa and Zimbabwe, the research team have been able to identify common barriers and facilitators to research uptake across these settings. This will be helpful in designing strategies to promote the use of research findings in health policy making. A series of collaborators’ workshops provided opportunities for research methods training and the sharing of ideas and expertise. In this way, the project has contributed to building research capacity in the region. Findings from the project will be published in 2006.

Collaborators: (1) University of Zimbabwe: Prof. Godfrey Woelk (Principal Investigator), Sheila Matinhure. (2) Eduardo Mondlane University, Mozambique: Prof. Julie Cliff, Dr. Alda Mariano, Dr. Esperanca Sevene, Benedita Fernandes [National Institute of Health] (3) Medical Research Council of South Africa: Dr. Simon Lewin, Karen Daniels.

Funders: Alliance for Health Policy and Systems Research, German Technical Development, European Union (the Practhc [Pragmatic Randomised Trials in Health Care] project), Medical Research Council of South Africa
Project collaborators, Harare, 2004

From: Dr Simon Lewin, MRC Health Systems Research Unit
Addressing the HIV Pandemic and women’s empowerment in Africa through research on novel biotechnology products

The HIV pandemic in Africa is increasingly focused on new and rapid increase of infections among young women of reproductive age. Women’s vulnerability to HIV infection in a patriarchal society is largely due to their economic and social dependence on their male partners, biological reasons, and violence and abuse. Condoms, the only known method for HIV Prevention, are dependent on the use and acceptability by the male partner. Many women are not in a position to negotiate condom use for every sexual act. Many women are aware of their partner’s infidelity but lack the power to insist on condom use.

HIV Prevention scientists worldwide and in Africa are researching biotechnological products that can be used by women to protect themselves and their partner from HIV acquisition. These products, known as microbicides, are being tested in many countries in Sub-Saharan Africa including the SADAC region.

Microbicides are designed to be inserted in the vagina prior to sexual intercourse. In the event that the women cannot negotiate condom use, it is hoped that the products will prevent HIV acquisition. Microbicides are currently tested in a gel form. The products are in the final stage of testing, thus a proof of concept is expected in less than 5 years.
This unique partnership, with multiple International donors in the United States of America and United Kingdom, places the African region at the forefront of microbicide research. These partnerships allow for huge efforts on HIV prevention education, safe sex behavior counseling and Voluntary Counseling and Testing among many urban and rural communities in the region. South Africa alone, through the Medical Research Council’s HIV Prevention Research Unit, is testing 5 of the 6 products in advanced clinical trials. It is estimated that the first set of results will be announced in late 2008.

The Unit, headed by Professor Gita Ramjee, is the only centre in the world conducting multiple trials of this nature. Through this initiative, hundreds and thousands of men, women and adolescents are educated on HIV prevention, treatment and care in the greater Durban region. The Unit, through its extensive collaborative research, works with scientists in Zimbabwe, Zambia, Malawi, Tanzania, Uganda, Nigeria, Benin, Burkina Faso and others in Asia, USA and Europe.

This extensive collaboration with African scientists provides the Unit with an opportunity to build clinical trial capacity in the African region by providing onsite training on clinical trial procedures and implementation. In addition, the collaboration provides a platform for African scientists to share common challenges and solutions in implementing their research. It is without doubt that, irrespective of where in the African region the research is based, there are common issues that can be addressed collectively.

It is envisaged that if an efficacious product is found, South Africa, through the Department of Science and Technology, will take the lead in not only developing the technology for mass production but also providing a base for development of “home grown” microbicides in the future.

From: Dr Gita Ramjee, MRC HIV Prevention Research Unit
1) Evaluation of African Medicinal Plants as possible drugs for Malaria

A collaborative research project between Botswana, South Africa and Zimbabwe. A NEPAD, SADC African Research Cooperation

This project is intended to strengthen the link between phytochemistry and reliable bioassays, to enable the development of natural-product based leads into antimalarials. The Indigenous Knowledge Systems (IKS) for Health at the South African Medical Research Council (MRC) in Cape Town has sent semi-purified active extracts and lead compounds to collaborators at the Chemistry Department of the University of Botswana for isolation, chemical characterization and structural elucidation. Purified compounds derived from plants used for treatment of fever have been sent from Botswana to the IKS for pharmacological evaluation. Three of the compounds have shown antiplasmodial activities (IC$_{50}$) against chloroquine–sensitive strains of *P. falciparum*.

Also, compounds illustrated below have been sent to the Department of Physiology and Biochemistry at the University of Zimbabwe in Harare where their effects on an isolated parasite target in *P. falciparum* enzyme glutathione transferase (GST) have been investigated. Four of the compounds affected the activity of the enzyme. GSTs play an important role in the acquisition of resistance to many chemotherapeutic drugs.

Chemical structures of the candidates active against *P. falciparum*. These compounds have been isolated from a Southern African medicinal plant.
Phytochemistry is a well-established area of research in Gaborone. Facilities are well equipped and research collaboration with Cameroonian scientists generates additional compounds for testing. The source of DAA8.3 and JB42C is a local plant indigenous to Southern Africa. Attempts are also being made to grow the plant in experimental gardens in Botswana and South Africa.

Capability exists in two laboratories, the Department of Physiology, University of Zimbabwe and the IKS, to perform screening tests using a battery of *P. falciparum* strains that are both sensitive and resistant to chloroquine and/or mefloquine. The research on the effects of the selected compounds on an isolated parasite target in *P. falciparum* GST is carried out in the Department of Biochemistry, University of Zimbabwe.

The IKS will further utilize the expertise of its partners in systems biology to determine drug targets, and use proteomics and genomics to try to unravel the mechanism of action of these lead metabolites and compounds. Together with its partners, the IKS will use Metabolimics to predict possible drug interaction and toxicity of these lead compounds.

The consortium has applied for funding through the NEPAD and SADC calls for proposals to take this research forward. The consortium aims to strengthen existing capacities in partner institutions via training and development of students and scientists in the region.

2) **African Traditional Medicinal Plants as agents in the fight against Malaria**


The use of medicinal plants in traditional medicine in Africa is probably the oldest example of an indigenous knowledge system of health. There is a renewed interest in validating these traditional claims of cures for diseases that mostly have an impact on the peoples of this continent. These diseases are chronic conditions such as Malaria, Tuberculosis, Diabetes, Hypertension and HIV/AIDS.

Water and methanol extracts of the bark of a medicinal plant reverse parasite resistance to chloroquine by a 7-fold factor. The active fraction is a high molecular weight fraction with a molecular weight greater than 10 000 Daltons containing a mixture of tannins and polyphenolic compounds. The active protein fraction contained high levels of serine, glycine, glutamic acid and aspartate amino acids. When the fraction was cleaved and hydrolyzed with Proteinase K, the activity of the extracts to reverse the resistance of the parasite to chloroquine was destroyed. This clearly indicated that the proteins were responsible for the activity of reversing the parasite resistance to chloroquine.

These findings have the potential to be used in other infectious disease conditions such as Cancer, Tuberculosis and HIV and AIDS where the causative agents are known to be resistant to the available drugs. The second importance of these
findings is that the active fraction is a protein and there would be very low likelihood for resistance development and potential toxic effects as seen in resistance-reversing agents such as Verapamil, which have never found their way into practical use because of their toxicities.

The following departments are collaborating in this project

<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>Department</th>
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<tr>
<td>South Africa</td>
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<td>IKS Lead Programme</td>
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3) Contribution as an Expert in Traditional Medicines Research for WHO Africa Region and African Union (AU)

The Indigenous Knowledge Systems for Health (IKS) Lead Programme at the South African Medical Research Council contributes significantly in the African continent as expert for the World Health Organisation (WHO), through its Regional Economic Community on matters of traditional medicines and Indigenous Knowledge Systems.

The Lead Programme further participates in African Union (AU) consultative meetings, which includes participation in the African Ministers of Health Meetings and the AU meetings on matters relating to research, drug development and traditional medicines.

The Lead Programme also plays a vital role in the regional initiatives on research and technology development. It is a member of a task team, composed of numerous African countries, on research and development of traditional medicines against chronic diseases such as HIV and AIDS, Malaria, Sickle Cell Anaemia, Hypertension, Tuberculosis, etc.

The programme has research collaborations with countries such as Botswana, Nigeria, Kenya, Uganda, Madagascar, and Democratic Republic of Congo (DRC) on projects including Malaria and HIV and AIDS and is proposing a new project with Kenya to look at Bird Flu and the role that traditional medicines can play in the fight against this possible threat. This project is based on the numerous traditional uses of plants for animal epidemics, such as “Phamokate” which is a disease of chickens that results in an acute condition where chickens just fall and die in large numbers. This disease is well known amongst villagers and there are traditional interventions which have been used very successfully to stop the spread of the disease from household to household, and also to save the chickens from this sudden death.

From: Dr Motlalepula Matsabisa, MRC Indigenous Knowledge Research Unit
The Africa Programme for Health Innovation “APHI”

Contribution to DST’s African Research and Technology Cooperation Report: 2003-2005

The MRC Innovation Centre has partnered with the Centre for the Management of Innovation in Health Research and Development (MIHR) in the United Kingdom (UK) to build capacity in Intellectual Property (IP) management and technology transfer in East Africa, through the Africa Programme for Health Innovation (APHI). This initiative, which was funded initially by the UK Department for International Development (DFID) and the Rockefeller Foundation, has been underway since January 2005 and has involved the development of a network of contacts in Uganda, Tanzania, Kenya, and Ethiopia. A needs assessment has been conducted in these countries. The APHI team visited the region 4 times between February and May 2005 and delivered needs assessment workshops in Uganda (Makerere University Medical School), Tanzania (Tanzania Commission for Science and Technology - COSTECH), and Kenya (International Livestock Research Institute - ILRI and the Kenya Medical Research Institute - KEMRI). A workshop was also convened in Nairobi (ILRI) in April to coordinate the efforts of other regional initiatives with APHI.

A regional needs assessment and technology transfer and IP management training workshop was held from the 18th-20th May 2005 in Dar es Salaam, Tanzania, with representatives from all four countries. This was followed by further training workshops for senior scientists, institutional managers and IP/technology transfer managers in Kenya and Uganda in January/February 2006 and assistance with IP policy development.

The initiative will continue through a consortium (APHI Consortium), which is currently being established with MIHR, the MRC and various stakeholders in East Africa from scientific research institutions, the private sector, relevant government ministries and quasi-governmental bodies that are committed to capacity development and innovation in the health sciences. The APHI Consortium will develop and deliver programmes that address the needs of individual institutions and the region as a whole, and are complementary to the work of other capacity development initiatives. The Consortium will be administered through a Coordination Secretariat or liaison office in East Africa. Representatives from participating institutions/organizations will form an APHI Advisory Committee to mobilize resources, sustain momentum and enter newer domains of activity. The APHI Consortium secretariat, which will be established in 2006, will essentially be a service provider to fulfill ongoing functions related to IP and technology transfer management in the related institutes, and follow-up services to the training courses provided by the APHI and others.

From: Dr Michelle Mulder, MRC Innovation Centre
African Collaboration By The Malaria Research Lead Programme

The Malaria Research Lead Programme (MRLP) has had good collaboration with scientists working in many African countries. The research conducted by the malaria programme occurs on a regional and a continent-wide scale. The Mapping Malaria Risk in Africa (MARA) project collected data from all over Africa in order to develop a comprehensive database that could be used for determining malaria risk in different parts of Africa.

One potential barrier to success of combination therapy, is the degree to which geographically dispersed parasite populations share or exchange genetic material. Within the ambit of MARA, a collaborative project with the London School of Hygiene and Tropical Medicine is mapping the spatial distribution of the genetic determinants of drug resistance on the African continent. Without adequate spatio-temporal understanding of geneflow among African parasite populations, it will be impossible to design optimally effective strategies for management and containment of resistance in the future.

Capacity for monitoring insecticide resistance was very scarce in the region. The MRLP and the Liverpool School of Tropical Medicine and other partners thus set out to train scientists from seven Southern African Development Community (SADC) countries, to enable them to conduct insecticide resistance surveys in their countries. Developing such skills has resulted in policy change in many of these countries owing to the detection of high levels of insecticide resistance.

More specifically, malaria control interventions were put into place in the copper-belt region of Zambia. This was a region experiencing high intensity malaria transmission and the MRLP developed and implemented an effective control strategy for the region based on Indoor Residual Spraying (IRS). This programme was very successful and was used as a model for extending malaria control into the rest of Zambia.

The MRLP has also been responsible for implementing an IRS-based control intervention on the island of Malabo off the coast of Equatorial Guinea. Recently the MRLP and other collaborators were awarded a Global Fund grant for extending the work done on the island to mainland Equatorial Guinea.

The successful implementation of an IRS strategy in Mozambique to control malaria as part of the Lubombo Spatial Development Initiative (LSDI) saw dramatic reduction in the prevalence of the disease from 90% in some areas to less than 5%. The successes achieved in Mozambique have been recognised internationally and two Global Fund grants were made to this project, one in 2003 and a second in 2006.

From: Dr Rajendra Maharaj, MRC Malaria Research Lead Programme
Innovative Digital Mammography System

The National Institutes of Health in the USA have awarded a competitive grant to a consortium consisting of two South African partners -- the MRC/UCT Medical Imaging Research Unit and Lodox Systems (Pty) Ltd – to develop an innovative digital mammography system for detecting breast cancer lesions.

The principal investigator of the grant is Kit Vaughan, Hyman Goldberg Professor of Biomedical Engineering and Director of the Unit. The University of Gezira in the Sudan has sent one of its lecturers, Mr Khalid Hussein, to pursue his PhD degree in biomedical engineering at the University of Cape Town. Mr Hussein, who is affiliated with his university’s Institute of Nuclear Medicine, Molecular Biology and Oncology and is supervised by Dr Tania Douglas, a senior researcher in the Medical Imaging Research Unit, is working on computer modelling and system optimisation of the digital mammography system. His research will thus contribute to the development of a diagnostic tool that will have widespread application, not only in Africa but around the world.

From: Prof Christopher L (Kit) Vaughan, MRC Medical Imaging Research Unit
Tapeworm cysts in the brain are a major cause of epilepsy and other complications in several African countries

This problem is so serious that countries in eastern and southern Africa have formed a working group to discuss and co-ordinate prevention and control measures. In South Africa the prevalence of brain cysts, as illustrated below, is exceptionally high in some districts in the Eastern Cape (e.g. Alfred Nzo and Oliver Tambo districts).

The illustration on the left shows numerous cysts of the pork tapeworm (Taenia solium) in part of a human brain at post mortem (photo by courtesy of Dr T. Nash). The girl on the right has severe headache because there are cysts in her brain.

People become infected by cysts and intestinal tapeworms in different ways. Cysts develop after swallowing tapeworm eggs on food prepared by a person who is passing eggs in faeces, or by direct physical contact with a carrier who has eggs on hands, lips or elsewhere on the body. In contrast, eating undercooked or raw pork containing viable cysts leads to infection by an intestinal tapeworm. Prevention and control must therefore include regular treatment of people living in communities where infection by tapeworm is common, as well as measures to ensure there are no cysts in pork. Free-ranging pigs perpetuate the cycle by scavenging human faeces when there is not toilets. Cysts develop in pigs when scavenged human faeces contain tapeworm eggs. An educational poster showing how to break the cycle of infection has been developed (see below).

In South Africa, cysticercosis and infection by tapeworms are serious health problems, especially in the Eastern Cape province. A diagnostic survey by researchers at the Medical Research Council and collaborators was completed in 2005. Results showed that approximately 10% of 400 volunteers from the Alfred Nzo and Oliver Tambo districts had cyst antigens circulating in their blood. Veterinarians have ascertained that in pigs at 21 villages in these areas, tapeworm cysts were present in the tongue muscles of between 28% and 52% of those that were examined. Other SADC and NEPAD countries are also affected and the Cysticercosis Working Group for Eastern and Southern Africa (CWGESGA) has been formed by Angola, Burundi, Kenya, Madagascar, Mozambique, Rwanda, South Africa, Tanzania, Uganda, Zambia and Zimbabwe.
Vitamin A for Africa Initiative (VITAA)

Researchers from the Nutritional Intervention Research Unit (NIRU) in collaboration with the Agricultural Research Council (ARC-Roodeplaat), are part of VITAA, which promotes the production and consumption of the orange-fleshed sweet potato in seven Sub-Saharan countries, namely Ethiopia, Ghana, Kenya, Mozambique, South Africa, Tanzania and Uganda. The orange-fleshed sweet potato is rich in a provitamin A carotenoid called beta-carotene and, therefore, has the potential to control vitamin A deficiency in children. A study done by NIRU indeed showed that the vitamin A status in terms of liver stores of primary school children improved after they consumed ½ cup of boiled and mashed orange-fleshed sweet potatoes for 53 school days. The orange-fleshed sweet potato is promoted in several small-scale farmer systems and household production projects throughout the seven VITAA partner countries. Methods that retain the maximum amount of beta-carotene after harvesting, storage, processing, cooking and drying are continuously being studied.

Beta-carotene-rich orange-fleshed sweet potato is an excellent source of provitamin A and can be promoted as a viable long-term food-based strategy for controlling vitamin A deficiency.

From: Dr Mieke Faber, MRC Nutritional Intervention Research Unit
Assisting African countries in their national iodine surveys

One of the dietary micronutrients, iodine, is essential for the production of the thyroid hormones and for normal brain development and functioning. Ministries of Health over the world are therefore obliged to ensure an adequate supply of salt fortified with iodine to their populations to prevent and control the grave consequences of iodine deficiency. The most important indicator of iodine status in a population is the concentration of iodine in the urine, usually collected from school aged children or adult women.

Since 2003 NIRU has assisted 3 African countries (Sierra Leone, Uganda and Mozambique) in the assessment of the iodine status of their populations. Urine samples collected during national surveys were analysed for iodine concentration in the iodine laboratory of NIRU. The results of the iodine survey in Sierra Leone showed a marked improvement in iodine status compared to an earlier national survey. However, the people in three of the nine geographical districts in the country were still iodine deficient because of the inability of their local salt producers to fortify salt successfully with iodine. People living in the remaining 6 districts used mainly imported salt which was adequately iodised.

In Uganda, the high concentration of iodine in salt was reflected in the excessively high iodine status of the people living in the four regions of the country. The urinary iodine data produced in the NIRU iodine laboratory was very useful for health planners and decision makers in Uganda for correcting the situation in order to prevent potential health consequences of over-iodisation of salt.

In a huge population survey in Mozambique, 10 000 urine samples were collected from school aged children and analysed in the NIRU laboratory. The results of this survey showed that the population of Mozambique is still iodine deficient at the national level despite efforts to mobilise the many small salt producers towards producing salt that is adequately iodised. Health authorities in Mozambique therefore have a challenge in strengthening their national salt iodisation programme to provide adequate amounts of iodine to the whole Mozambican population.

Overall, these examples of technological collaboration with other African countries illustrate the regional role that the MRC plays in the health care of African populations.

Iodine nutrition evaluation in Lesotho

Because of the mild to severe iodine deficiency observed in Lesotho since 1960, mandatory iodisation of salt for human and animal consumption was introduced in Lesotho in 2000 as a long term public health strategy. NIRU closely collaborated with researchers in Lesotho in the assessment of the urinary iodine status of school children and women of child bearing age. In each of 31 clusters, 30 women and 30 primary school children were randomly selected to provide urine samples for urinary iodine analysis in the iodine laboratory at NIRU. The iodine status of both women and children was slightly more than adequate, except for marginal iodine deficiency in children living in the mountainous area of the country. These results indicate that iodine deficiency has been eliminated as a public health problem in Lesotho.
Furthermore, it also indicates the need for future monitoring to ensure that the iodine status of women in the lowland areas of the country does not increase excessively.

The results of the Lesotho national iodine study were also written up as a PhD thesis under the supervision of a NIRU scientist.

From: Dr Pieter Jooste, MRC Nutritional Intervention Research Unit

ECSA Laboratory Training Workshop: Analysis of Fortified Foods

A laboratory training workshop on the analysis of fortified foods was held at Nutritional Intervention Research Unit (NIRU) from 16 - 25 May 2005. Fourteen analysts from institutions in Malawi, Kenya, Zambia and Tanzania attended the workshop. It was organised by NIRU’s De Wet Marais, who is the regional coordinator for the Eastern, Central and Southern African (ECSA) laboratory network.

The workshop was sponsored by MOST, the USAID Micronutrient Program. The outcomes of the workshop are better quality control and improved capacity in the region for the monitoring of food fortification programmes.

From: Mr Christian de Wet Marais, MRC Nutritional Intervention Research Unit
MRC Oesophageal Cancer Research Group, Collaboration within Africa

The MRC/UCT Oesophageal Cancer Research Group has an active collaboration with researchers at the University of Khartoum in Sudan. This strategic collaboration is crucial to investigating the genetic susceptibility to oesophageal cancer in different regions of Africa where the disease has a high prevalence. This study focuses on the analysis of genetic variations and defects in genes that are involved in the detoxification of pro-carcinogens derived from alcohol, tobacco, toxins and a range of environmental carcinogens. Defective removal of such pro-carcinogens is believed to play an important role in the process of transformation of normal cells into tumour cells. In this collaboration, Ms Hanan Babiker El Tahir, a lecturer at the University of Khartoum, has been given leave of absence to complete her PhD. She is jointly supervised by the Director of the MRC/UCT Oesophageal Cancer Research Group and will be completing her PhD at the end of 2006.

From: Prof M Iqbal Parker, MRC Oesophageal Cancer Research Group

PROMEC – IITA Nigeria Project

The PROMEC Unit is currently involved in a collaborative International Sorghum / Millet (INTSORMIL) Collaborative Research Programme on the natural occurrence of the carcinogenic mycotoxins, fumonisins and the Fusarium species associated with sorghum, maize and millet grain intended for human consumption in Africa. This is being done in collaboration with Dr R Bandyopadhyay of the International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria. Results indicate that all the maize and most of the sorghum and pearl millet samples, although at lower levels in the latter two grains, were naturally contaminated with fumonisins (Figure 1). Isolates from this study will be used to further determine the toxin profiles of toxigenic Fusaria isolated from the samples collected in Nigeria, comparatively on maize, sorghum and millet cultures. The strains are being characterized molecularly by Prof John Leslie of Kansas State University, USA.

From: Prof Wally Marasas, MRC PROMEC Unit

Grain samples of Fusarium infected maize (left), sorghum (middle) and millet (right) naturally contaminated with fumonisins.
Reviews for Africa Programme

The interest in evidence-based healthcare and research synthesis has grown considerably in recent years. Systematic reviews are the backbone of evidence-based practice and the product of research synthesis. They involve systematic and explicit methods to identify, select, critically appraise, and analyse relevant research around a clearly formulated question.

The South African Cochrane Centre, in collaboration with the Cochrane Infectious Diseases and HIV/AIDS Review Groups, has initiated the Reviews for Africa Programme (RAP). RAP is supported by a grant from the Nuffield Commonwealth Programme, through The Nuffield Foundation. It is a capacity building initiative that builds on existing collaboration and models for training and mentorship, to develop a cadre of people in the science of research synthesis with the view to promote evidence-based health care policy and practice in the African region.

The first four week protocol development course held in September 2005 consisted of a mixture of didactic and practical sessions, and participants had dedicated time to work on their protocols. Five months after Phase 1, two protocols have been published and three are in press.

- Emmanuel Effa, Nigeria: Azithromycin for treating uncomplicated typhoid fever
- Stephen Gichuhi, Kenya: Interventions for squamous cell carcinoma of the conjunctiva in HIV-infected individuals
- Chukwuemeka Nwachukwu, Nigeria: Antimotility agents for chronic diarrhoea in people with HIV/AIDS
- Oyinlola Oduyebo, Nigeria: The effects of antimicrobial therapy on bacterial vaginosis in non-pregnant women
- Ekong Udoh, Nigeria: Rectal artemisinin derivatives for treating *Plasmodium falciparum* malaria

RAP is highly successful in achieving its goals of supporting people from African countries and can be used as a model for future training efforts to support people from developing countries. The next intake of participants will be in 2006. For information on the course please visit [http://www.mrc.ac.za/cochrane/rap/htm](http://www.mrc.ac.za/cochrane/rap/htm)
Chukwuemeka Nwachukwu, Ekong Udo, Oyinlola Oduyebo, Emmanuel Effa and Stephen Gichuhi at the September 2005 course

Stephen Gichuhi and Emmanuel Effa playing the Evidence base Reproductive Health Care board game during the September 2005 course

From: Dr Taryn Young, SA Cochrane Centre
HIV/AIDS Mentoring Programme

The HIV/AIDS Mentoring Programme is a collaborative project between the South African Cochrane Centre (SACC) and the Cochrane HIV/AIDS Review Group (CRG), University of California, San Francisco. It was established in 2000 when the CRG recognized that many of their published reviews had a treatment focus of little relevance to developing countries where anti-retroviral treatments were often not available at that time. The Programme aims to increase the capacity of researchers within the sub-Saharan region to produce HIV/AIDS reviews relevant to developing countries. Novice authors working on HIV-related Cochrane Reviews are linked with a more experienced author (mentor) who can provide guidance and methodological expertise throughout the review process.

The Programme has grown considerably in the past five years with 20 authors receiving mentorship: 15 from South Africa, two from Kenya, one from Nigeria, one from Cameroon and one from Uganda. Four mentors are from the United Kingdom, one from Australia, one from Cameroon, one from Canada and four from South Africa.

To date four reviews have been published in The Cochrane Library; and 14 are in progress, with ten protocols already published and one in the peer review process. In total 15 authors have received training at the two HIV/AIDS review progress schools held in 2003 and 2005.

This initiative is successful in accomplishing its objectives, particularly in supporting novice authors and by increasing the number of HIV/AIDS reviews relevant to the region. It is currently expanding to include a South Asian HIV/AIDS Mentoring Programme, and can be used as a model by other CRGs to increase participation by developing country authors. The programme will be formally evaluated by an external evaluator during 2006.

For more information on the programme please visit http://www.mrc.ac.za/cochrane/hivmentoring.htm
Facilitators and participants at the HIV/AIDS Progress School held in January 2005

Lize van der Merwe, HIV/AIDS statisticians for African authors assisting Muki Shey, Cochrane author from Cameroon

From: Dr Nandi Siegfried/Ms Joy Oliver, South African Cochrane Centre
Co-operating for ethically sound and fully participative AIDS vaccine trials in Africa

The South African AIDS Vaccine Initiative (SAAVI) aims to develop an affordable, effective and locally relevant AIDS vaccine for southern Africa. Its specific mandate is to find a vaccine that works against the strains of HIV that circulate in southern Africa whatever form that vaccine takes. It is likely that a vaccine that is successful in South Africa will also work in our neighbouring countries. Many of the vaccines currently in clinical trials are being tested simultaneously in a number of African countries and early planning is under way to ensure that promising South African-developed test vaccines will also be tested elsewhere on the continent.

However, AIDS vaccine development is not only about the nitty gritty of the complicated science and biotechnology, it is also about people. Ensuring that communities are fully and equally involved in vaccine development and that vaccine R&D is carried out in an ethically sound fashion is perhaps the most important element of SAAVI’s work. And in this regard the initiative (specifically its Masikhulisane Community Involvement Programme) has collaborated extensively with other African-based groups to tease out the unique issues around true community involvement and ethical participation.

The HIV Vaccine Ethics Group (HAVEG), based at the University of KwaZulu-Natal and funded by SAAVI, is the secretariat of the Ethics, Law and Human Rights Working Group of the World Health Organisation’s African AIDS Vaccine Programme (AAVP). The AAVP was formed at a meeting in South Africa in 2002 to bring together scientists and community representatives to promote and facilitate AIDS vaccine research in Africa through capacity building and regional and international collaboration. SAAVI has worked with the AAVP since its inception. The Ethics, Law and Human Rights Working Group has researched the capacity of research ethics committees to review vaccine protocols in selected African countries; has reported to UNAIDS on the ethical-legal framework in these countries; and, provides training to increase capacity in ethics review for AIDS vaccine trials.

In 2005 SAAVI also hosted the strategic planning meeting for the Community Involvement Working Group of the AAVP. This brought together representatives from seven African countries. The aim was for Africans to set their own goals and, despite country differences, to tease out a common purpose with regard to the often complicated process of facilitating true community involvement.

SAAVI continues to be an international leader in promoting adolescent involvement in AIDS vaccine R&D. There are compelling scientific reasons for testing vaccines in adolescents and it is also vital that we end up with a vaccine that can be licensed for use in adolescents which means that testing must occur in this group at some stage in the development process. SAAVI has done extensive work in this area both in formulating high-level, well-researched dialogue and opinions on the topic and in actively involving adolescents in educational processes around vaccine development and in community advisory groups, and this year has participated in an AAVP technical consultation in Botswana aimed at addressing the challenges around the participation of adolescents in vaccine trials.
Co-operation with individual countries is also a feature of SAAVI’s work. Most recently the Masikhulisane programme hosted a visit by Lillian Kasirye, the community outreach specialist from the Makerere University Walter Reed Project, a major clinical trial site in Uganda. This visit was aimed at sharing practical experiences of community involvement activities including community workshops, training materials and experiences in working with an important stakeholder in vaccine development – the media. Although each African country and community is unique with specific needs and problems relating to AIDS vaccine development, there is no doubt that sharing experiences and products between countries is of great value.

Africa carries the burden of the HIV/AIDS epidemic and has the greatest urgency to find a successful vaccine. Co-operation at all possible levels and in all the areas of vaccine R&D is therefore an imperative. This article only highlights some ways in which continental collaboration is being facilitated for this crucial goal.

From: Ms Michelle Galloway, South African AIDS Vaccine Initiative (SAAVI)
Telemedicine Workstation for Africa

The Telemedicine Lead Programme together with the University of Stellenbosch (SUN), through the Innovation Fund, have developed a Telemedicine Workstation to assist with the delivery of health care to rural and underserved areas in South Africa and Southern African Developing Countries.

The development team has successfully developed a workstation that is simple and user friendly yet efficient enough to deliver specialist medical care. It has addressed all the gaps in the market and health sector. The workstation has been tested in a clinic and the feedback from the user was that the system ensures, “working smarter not harder”. There is a collaboration with the Ministry of health of Zambia and the hospital in Lusaka to test the workstation in their clinics.

However, this project goes beyond just developing and selling a product. It includes ensuring that there is a medical and technical service available. The medical service includes a panel of specialists available to attend to the telemedicine cases. Often high tech equipment is available in Africa but the technical support is not readily available. The development team of this workstation addressed this issue by ensuring that there is a remote maintenance and support service in place.

From Dr Moretlo Molefi, MRC Telemedicine Lead Programme

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