

EUROPEAN COMMISSION

Safe blood in developing countries

The lessons from Uganda

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Cover photo shows child in Kiwoko Hospital, Uganda
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Quotation

‘The blood donor [in Africa] is a member of a society with a constant exposure to many infections and with an economy that makes the gift of blood a most generous gesture. It must be regarded as very scarce.’

– *from an EC report on safe blood in Uganda*

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Foreword
by the Uganda Minister of Health

The government of Uganda has fully supported the rehabilitation of the Uganda Blood Transfusion Service since it began in 1987, with help from the European Union and the European Commission. This government support has taken many forms, so that the initial rebuilding of the central blood bank in Nakasero, Kampala, and the later extension of its activities into a full national blood transfusion service serving all our 90 or so hospitals, has been a successful partnership between aid donor and recipient government.

Safe blood is particularly important for Uganda because of the high rate of HIV infection that has unfortunately afflicted our people. Safe blood that has been properly screened and tested has prevented many HIV infections and AIDS deaths, and has formed a major element of our national AIDS campaign. Many individual Ugandans have contributed to the success of the Uganda Blood Transfusion service, most notably its skilled director and staff. But I am sure they would agree with me in saying that the real heroes are the thousands of men and women who have over the last decade donated their blood, voluntarily and without fee, so that others may have life.

The Uganda Blood Transfusion Service is notable both as a contribution to AIDS prevention, and as a major component of health reform, and as a foreign aid project that took local roots and flourished.

So I am pleased that this book records how and why it was done, and what benefits we have achieved, so that others can learn from our experience.



Dr J.G.S. Makumbi
Minister of Health, Uganda

Foreword
by Commissioner Professor Pinheiro

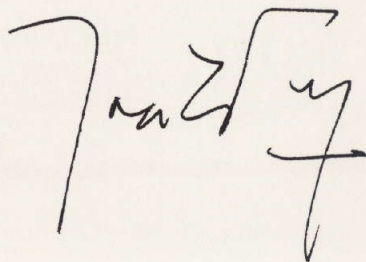
HIV is one of the major social issues of the end of this century. Despite a major effort of the developing countries, supported by the international community over the last 9 years, the epidemic continues to spread rapidly, especially in the developing world.

Already in 1987 the European Union launched a support programme to limit the spread of the epidemic and mitigate its social impact. Interventions developed at both Community and bilateral levels since then make the Europe of the 15 the most important donor in the field of HIV/AIDS actions today. In order to mobilize the highest political support and to improve the efficiency of our technical and financial support, coordination between all members of the Community is being improved and the council of Ministers adopted an important resolution on HIV/AIDS actions in the developing world. This resolution defines the European strategies and principles for the next 5 years.

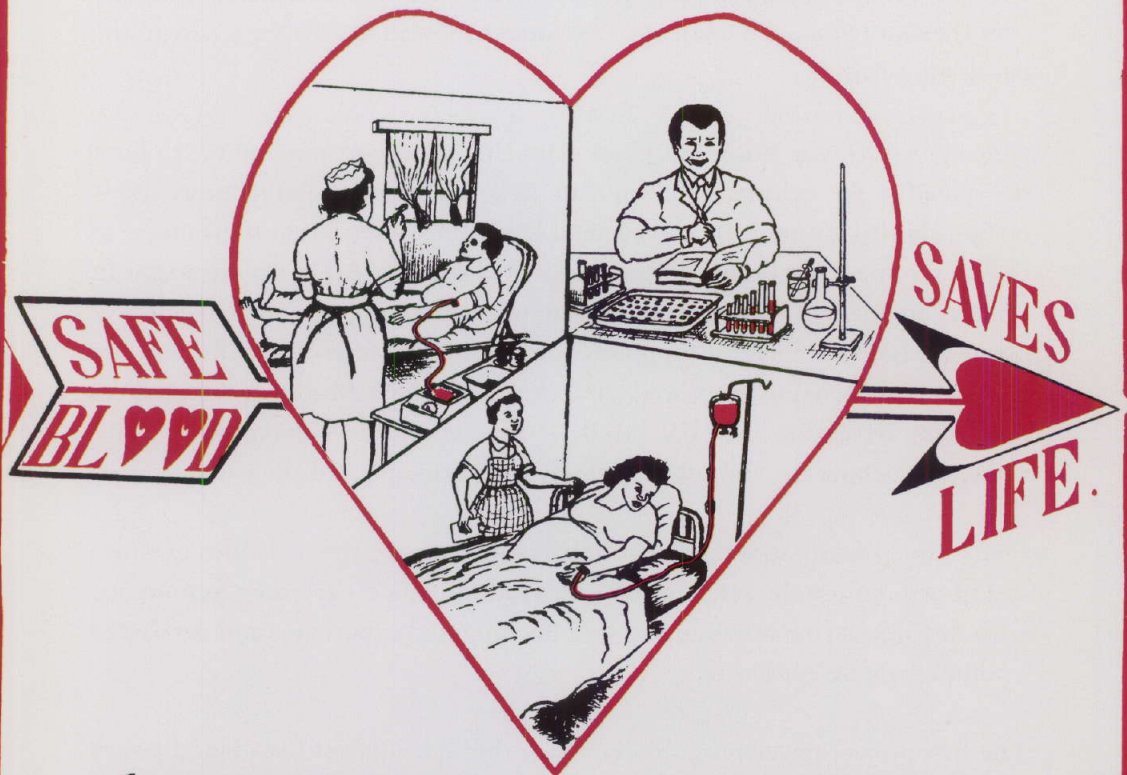
One of the priority strategies in countries where the epidemic is already widespread is to ensure the safety of blood donations. Since 1987 the Community, with its partners, has accumulated well documented experience and developed a comprehensive approach.

The first project developing this approach through support for a blood policy at national level, ensuring the safety of blood transfusion throughout the country by now, was started in 1987 in Uganda. This book reports on the work undertaken and it is our hope that this crucial experience will be worthwhile for other people in ministries and donor agencies, and be an encouragement to individuals.

Commissioner Professor Pinheiro



BLOOD DONORS SAVE AND SERVE.



“PLEASE, GIVE **BLOOD**
TO SAVE **LIFE**.”

Bank With:

NAKASERO OR
**BLOOD
BANK.**

ANY OTHER REGIONAL
BLOOD CENTRE;

- GULU. -MBARARA.
- MBALE. -FORT PORTAL.
- ARUA.

What the Blood Transfusion Service has done for Kabarole Hospital

— communication from Mrs Ruth Isingoma, matron, Kabarole Hospital

‘It is a wonderful experience to see a patient walk from hospital, especially after she or he has spent some days lying hopelessly in bed. The Blood Transfusion Service has greatly contributed to such encounters in Kabarole hospital. Many patients, patients’ relatives and friends have been observed expressing words of gratitude to the hospital staff as well as praising God for the availability of the same.

‘Individual patients, the hospital staff and the public as a whole have all shared the benefits of blood transfusion. Patients include those that need emergency blood transfusion as has been in cases of road traffic accidents, ante-partum haemorrhage, post-partum haemorrhage, plus emergency operations.

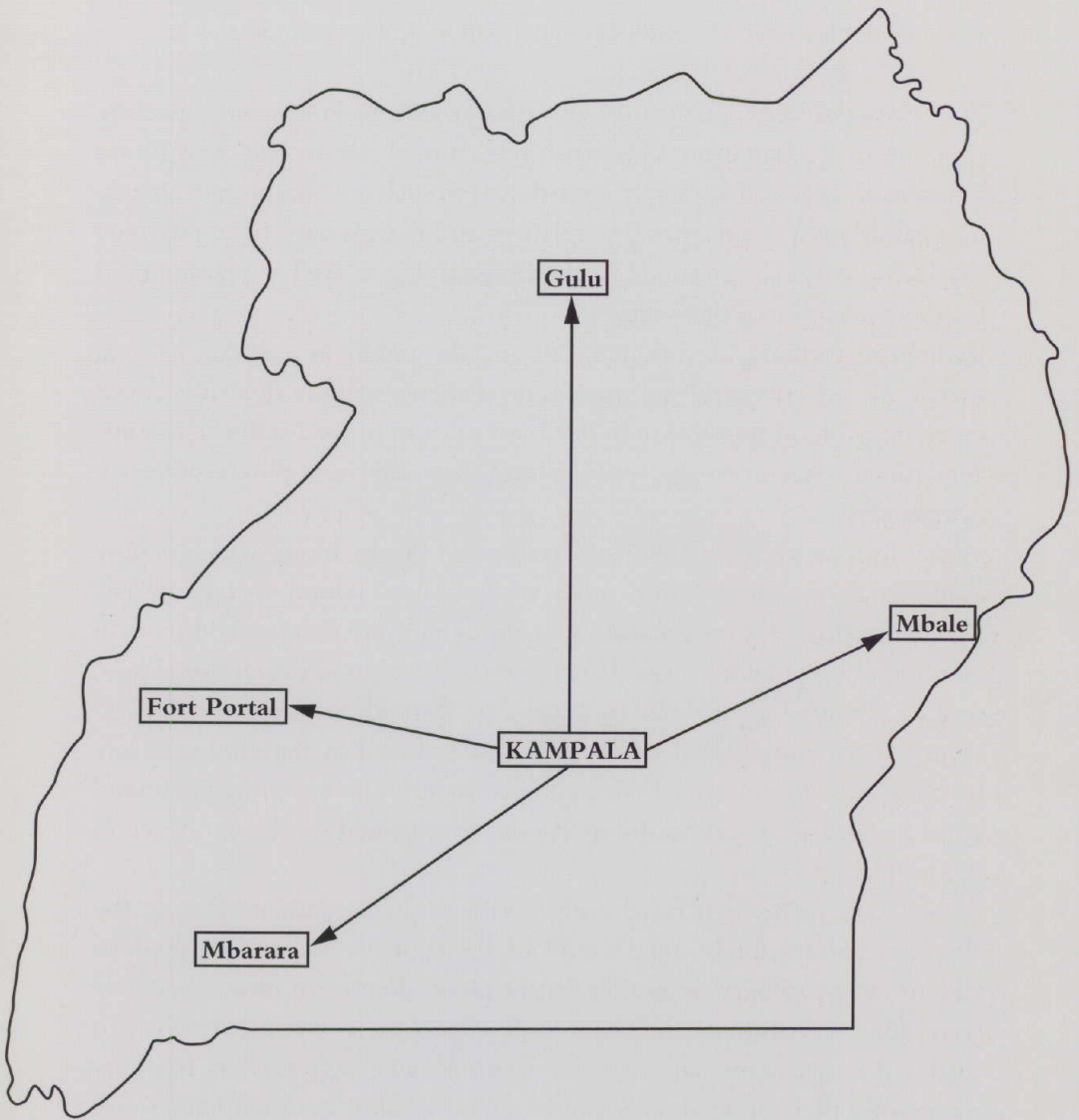
‘Many lives of such patients have been saved by the blood which is now available all the time. Some other patients need blood therapeutically. Severe anaemia due to pregnancy, acute or chronic diseases common in either adults or children have been combated by blood transfusion. Those that are admitted for planned operations go through theatre successfully.

‘The AIDS scourge need not be left unmentioned as transfusion of safe blood is one of the hospital’s main achievements. This has brought about a good hospital-public relationship. People have gained more confidence in the hospital.

‘Some years past, when faced with a crisis of saving patients’ lives in the absence of blood, the hospital would ask the patients’ relatives or friends to take the responsibility of getting urgent blood donors. In most cases, they were not successful as it involved high costs. That is when patients with road traffic accidents, ante-partum haemorrhage, post-partum haemorrhage and others in need of urgent blood transfusion lost their lives. Today the same task is no longer given to the patients or friends, since the blood bank does that effectively.

‘Since it has achieved such an advantageous goal, the hospital prays for the persistence of the service.’

UGANDA'S BLOOD TRANSFUSION CENTRES



Some facts about Uganda

Uganda straddles the Equator, and at about 236,000 square kilometres is about the same size as Great Britain or the state of Oregon, USA. Uganda is bordered by Kenya, Sudan, Zaire, Rwanda and Tanzania. Most of the country is high, at over 1,000 metres in altitude, and almost 25 per cent of the country's surface is water, thanks to several large lakes, the largest being Lake Victoria, Africa's biggest lake, source of the Nile, and shared between Uganda, Tanzania and Kenya. The country is mostly very fertile, with agriculture making up around 60 per cent of GDP and coffee, tea and tobacco being main exports. Some figures for Uganda are:

Population	about 17 million
Population growth rate	about 2.8 per cent a year
Fertility rate	7.2 children/ woman
Maternal mortality rate	550 per 100,000 births
Life expectancy (1993)	less than 50 years
Malnutrition of under-5s	45 per cent
Population per doctor	24,700
Population per nurse	8,900
Gross National Product (GNP) per head	about \$170
Health share of GNP	2 per cent
Education share of GNP	15 per cent
Defence share of GNP	26 per cent
Top 5 causes of morbidity, 1992	
– Malaria	19 per cent
– Diarrhoea	9 per cent
– Measles	7 per cent
– Pneumonia	6 per cent
– Anaemia	6 per cent

Section One

**INTRODUCTION
AND SUMMARY**



Safe blood and HIV/AIDS: the Uganda achievement

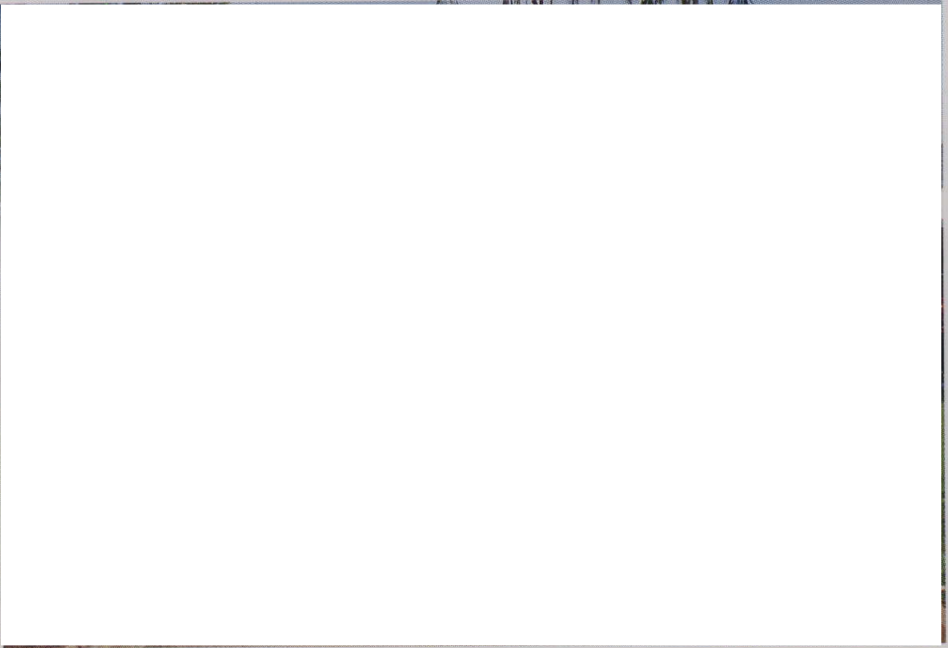
'The history of control of HIV transmission through blood and blood products is filled with conflict and drama, and illustrates with stark clarity the gap in HIV prevention between rich and poor countries... HIV transmission through blood is still a tragic – and preventable – reality in many developing countries.'

This quotation from the study entitled *AIDS in the World*, published in 1992 by the Global AIDS Policy Coalition based at Harvard University, USA, says it all. The prime task of this book is to show that in one developing country at least, Uganda, the goal of safe blood has been achieved, and that it can be done elsewhere, using similar methods and drawing on the lessons learnt in Uganda. The days of saying fatalistically 'it can't be done' are over. Uganda demonstrates that the goal of an uncontaminated supply of blood to hospitals, once set, can be achieved.

As elsewhere, it was the HIV epidemic that pointed up the need for a safe, or safer, blood supply. But safe blood has far wider uses than control of HIV. It is, or should be, an integral part of a nation's total health care system, helping to save lives under threat from any direction. So the principles and lessons drawn from Uganda are not just about HIV/AIDS, important as that is, but also about the quality of health care generally. For that reason, they are of wide interest to anyone with a responsibility (medical, financial, administrative) for health care and the saving of lives.

The cry for 'safe blood' is a highly emotional one, since the mere idea of contaminated blood strikes at the very heart of a person's sense of good health and well-being. For many people, blood is central to the notion of life itself. In any industrialised country today, if any part of the blood supply is found to have been 'dirty', that is, contaminated by the HIV virus or other infections, there are loud demands for the punishment of those who have allowed dirty blood to get into public use.

Today, thankfully, in almost any industrialised country, if you go into hospital for an operation involving a blood transfusion, you take it for granted that the blood used will be clean blood. You do not even think about it. This relaxed



The Nakasero blood bank, Kampala

confidence in the blood supply was not achieved without trauma and upheaval, and a cost in human lives. But since about 1985, the blood supply has been, broadly speaking, safe. For example, since that date, only 18 cases of HIV/AIDS caused by blood transfusion have been recorded in the USA.

In the developing world, the picture is quite different. Some 5 to 10 per cent of HIV infections (some say, more) are still due to transfusions of HIV-contaminated blood, and all too often, in poor countries strapped for cash and with tiny health budgets, these statistics are dismissed with a shrug as an unavoidable fact of life (or death). But they show, as clearly as any other measurement of health, the continuing gap between richer and poorer nations.

The vast majority of all blood donations – about 90 million a year – are made in and for the industrialised countries but virtually all the untested blood donations are given in poorer countries.

The most serious characteristic of HIV infection by blood transfusion is that it is almost 100 per cent effective in each case. It can be considered a condemnation to death against which there is no appeal. By contrast, in developing countries, sexual intercourse may cause many more HIV infections overall: but as a transmitter of HIV each act of sexual intercourse has an efficiency of one per cent or less. This is the paradox. Sex causes far more HIV infections than

transfusions of contaminated blood, but each individual sex act is at least a gamble: contaminated blood transfusions cause fewer HIV infections, but each transfusion with infected blood almost certainly leads to death.

So the safety of the blood supply is a clear responsibility for governments and public health services, in developing as well as developed countries. Furthermore, if the supply of blood is unsafe, doctors are faced with a cruel ethical dilemma, whether or not to give blood that might save a life – or might kill. It also creates a high risk for individual patients who are in need of blood or blood products, at a time when they are in no position to make a choice or protect themselves or their families. The choice of whether to transfuse blood or not, lies with the doctor. Thus the medical profession cannot duck the responsibility.

But this is only one of the many difficult decisions and choices to be made when planning a health system in a country like Uganda. In a place where the majority of people do not have access to safe water, where life expectancy is low and infant mortality is high, and where health expenditure is small, what is the justification for making safe blood a priority intervention in the health sector? The answer is this. Because the intervention has a proven effect, on health in general and on disease control, at a given cost, and is feasible, it is a typical public health responsibility. If a proper blood transfusion service is not organised, blood transfusions are given anyway, but badly, and can do more harm than good. Of all the routes of HIV infection, transfusion of infected blood is at the same time the most efficient, and the most amenable to prevention by known technologies and systems.

On systems, Uganda is now in the middle of a large-scale reform of its health sector, to decentralise it, organise it better, and make it more cost-effective. This puts more emphasis on the primary role of health centres and the district. But some services, such as the policy making and organisation of both blood supplies and drug supplies, benefit from being coordinated and monitored at a more central level, for reasons of efficiency and scale. The health reform movement in developing countries is only gradually taking these points into account, and can benefit from well-documented exercises such as the Uganda safe blood programme so as to make better informed choices about essential health interventions.

The tragedy of the haemophiliacs

Blood transfusion as we know it today began during World War Two, when so-called 'battlefield medicine' mastered the use of blood and products derived from blood. Since then, blood and blood products have become a major international industry, with the USA for example accounting for 60 per cent of the world trade in blood plasma. Blood products include cells in the blood, platelets, plasma, and products derived from the plasma itself, one of which, factor VIII, is important for haemophiliacs and came to have its own tragic place in the history of safe blood.

It was in 1982 that the US Centers for Disease Control first reported cases of AIDS among people with haemophilia. Indeed, the recognition, as early as 1983, that HIV could be carried by blood transfusion sprang from this association with haemophiliacs, and it was the haemophiliacs that were to pay a heavy price for this discovery.

Haemophilia is a hereditary bleeding disorder, and occurs almost everywhere in the world. It affects 20 out of every 100,000 males born. By the early 1970s, blood clotting concentrates became a standard way of treating haemophiliacs, improving and prolonging their lives. Many, in the USA at least, took 40 to 60 blood infusions a year. But some of this blood was HIV-contaminated, in the years before the presence of the virus was recognised.

As a terrible consequence, AIDS is now the leading cause of death among haemophiliacs. From having one chronic and sometimes lethal disorder, they have, unknowingly, been inflicted with another, almost always lethal disease. About 50 per cent of all people with this hereditary blood clotting disorder in the USA have HIV.

There have been numerous court cases in the USA, in an effort to pin down the blame. Most of the law suits brought by haemophiliacs or their survivors against US drug companies have failed. But one litigant who contracted HIV in 1984 has won around half a million US dollars in a case brought against the American Association of Blood Banks, and a fund of around US\$ 150 million is being set up by the industry to compensate HIV-infected haemophiliacs – possibly 6,000 of them.

In the UK, after a political row, a similar compensation fund was set up for

haemophiliacs. In France, the former director of the French national blood transfusion service was sent to prison for four years, and the service's former head of research and development was sent to prison for two years, for allegedly allowing HIV-contaminated blood to go into distribution in the mid-1980s.

There was a serious scandal in Germany over supply of contaminated blood, allegedly as late as 1993, leading to officials of a blood products company being put on trial on charges of fraud and causing bodily harm. In both France and Germany, where over 40 per cent of haemophiliacs have the HIV virus, there have been attempts to determine the responsibilities of senior politicians, serving or former, in the blood scandals. There have been enquiries in Switzerland and in Canada, where it has led to proposals for a drastic reorganisation of the blood service.

The point of rehearsing these often sad facts is that safe blood did not come easily even to the richer countries of Europe and the Americas. It came only after scandal, recrimination, punishments, deaths of the innocent, and widespread political pressure. How much more difficult and painstaking must it be to establish a safe blood supply in countries with far fewer resources and skilled people?

Infections carried by blood

There are several infections, not just HIV, that can be transmitted through blood and blood products. These include:

- HIV, both HIV-1 and HIV-2
- Hepatitis, Hepatitis B, Hepatitis C, and Hepatitis delta
- Human T- cell leukaemia virus (HTLV), types one and two
- Syphilis
- Malaria
- Chaga's disease.

In short, blood *can* be very dangerous.

The unique features of Africa

AIDS in the World also says that:

‘The key concept in modern transfusion medicine is the *integrated blood transfusion service*. The integrated system seeks to ensure a timely supply of adequate amounts of safe blood and blood products, where needed and at an affordable cost... The global reality is stark: while the integrated system is a reality in industrialised countries (albeit with residual problems) the people of the developing world rarely receive the full benefits – and often suffer the risks – of blood transfusion.’

This book shows how one African country, Uganda, did achieve an integrated blood transfusion service. But it also shows how, in doing so, Uganda had to face up to some of the special characteristics of health and the blood supply in Africa. What are those special characteristics?

First, much of the health infrastructure on the continent has been destroyed by civil war and civil strife (as it had been in Uganda)

Second, some regions of Africa have a high rate of HIV infection (and of other infections) in the general population, leading to a basic probability that the blood supply will also be heavily contaminated, unless stringent precautions are taken

Third, blood is frequently and routinely given by doctors in Africa in cases where sometimes blood transfusion could be replaced by other measures

Fourth, African economies are generally too poor to import ‘safe’ blood supplies or blood products from abroad

Fifth, African health budgets are generally tiny when expressed in terms of health expenditure per head of population, so a full-scale safe blood service is often considered quite beyond their means

Sixth, the occasions when blood is given differ quite radically in Africa, compared to, say, Europe or the USA. There, it is typically a case of high trauma, say, major surgery, a motor accident or an industrial injury. In Africa, it is more likely to be a mother in childbirth, or a child suffering acute anaemia as a result of malaria. Such a child, tragically, runs the risk of swapping malaria-related anaemia for the deadly HIV infection. Overall, a much greater percentage of blood in Africa goes to women and children than in industrialised countries

Seventh, Africa (like many parts of Asia) has professional paid blood donors, who make their living out of giving their blood, often as a result of extreme poverty. These people and their behaviour are hard to keep track of, and they tend to have abnormally high rates of HIV infection

Eighth, most donations of blood are given at the level of the individual hospital, that is, blood transfusion is hospital-based. So it is hard to enforce consistent standards over many scattered sites, and personnel skilled and trained in blood transfusion are thinly spread

Ninth, in the absence of a national or regional safe blood policy and blood transfusion service, much blood donation and transfusion is done 'on the hoof', with relatives of the sick or injured person giving their blood to the doctor to use there and then. This means that there may be no time or facilities to test the blood for HIV or anything else, and the well-meaning attempt to restore a sick or injured person may end in an even worse outcome.

The effect of all this is that you cannot (even if you have the money) just take a blood transfusion service from an industrialised country, where none of these characteristics apply, and plonk it down unaltered and unmodified in an African (or other developing) country. Nor can you just assume (as some donors have done) that simply financing a supply of blood bags and HIV test kits to hospitals will be enough to solve the problem. Nor is a purely medical approach enough. It is much more complex than that.

The study entitled *AIDS in Africa*, published in 1994 in New York, remarks that: 'Even more frustrating from the public health point of view is the realisation that the experiences and strategies of developed countries for preventing bloodborne HIV transmission are not useful in Africa. If the American blood donor screening programme were implemented in Zaire, for example, almost all Zairian donors would be ineligible to give blood.'

So the choice of standards has to be realistic in the light of African conditions. The choice of blood donors has to be adjusted to the rate and age profile of HIV infection in Africa, and the infections to be screened against have to be chosen in the light of the epidemiology – the main diseases prevalent – in Africa. For example, in Zimbabwe, about 10 per cent of the adult population carries the Hepatitis B virus, about the same rate as the HIV virus. The prevalence of malaria and malaria-induced anaemia, poses special problems for Africa. This study of how Uganda developed a national safe blood programme shows how the idea of an integrated blood transfusion service was both adopted from industrialised countries and adapted to the specific circumstances of Africa.

There are of course other EC-supported projects to develop blood transfusion services in Africa. Angola, Benin, Cameroon, Congo, Cote d'Ivoire, Guinea

Conakry, Lesotho, Madagascar, Rwanda, Zambia and Zimbabwe are cases in point. These examples are discussed in more detail later (see page 145). But the case of Uganda is unusual because

- a) Uganda had a shattered infrastructure
- b) from the ruins, a national blood transfusion service has emerged
- c) with quantified results and costs
- d) it was the first and is now the longest-lasting EC safe blood intervention in Africa.

The Global Blood Safety Initiative

In 1988, a year or so after the European Commission began its safe blood project in Uganda, the Global Blood Safety Initiative (GBSI) was launched. Its aim was an ambitious one, no less than to set universally applicable standards for the collection and use of blood. The GBSI (recently replaced by the WHO Blood Safety Unit, with a different mandate) was a collaboration between the World Health Organisation, the Global Programme on AIDS, the League of Red Cross and Red Crescent Societies, the UNDP (United Nations Development Programme) and the International Society of Blood Transfusion. A meeting of representatives from these organisations and from the World Federation of Haemophilia, the EC, and other bi- and multilateral agencies and NGOs was held in May 1988, at which it was agreed to launch the GBSI.

The practical purpose of the GBSI was to support the setting-up of integrated blood transfusion services in all countries, services which could provide adequate, safe, accessible, affordable and appropriately used supplies of blood. The key words here are 'integrated', 'safe', 'accessible', 'affordable', and 'appropriately used'. These concepts drew upon the principles already established by the EC for achieving safe blood, such as voluntary blood donation, systematic screening for all relevant infections, and rational use of blood to reduce unnecessary blood transfusions. The EC has made a point of operating at both technical level and, through such efforts as collaboration with the GBSI, at worldwide policy level.

The GBSI believed that safe blood would only be guaranteed in the con-

text of a sustained world-wide co-operative effort – an effort which, sadly, has yet to come to full fruition. Although HIV/AIDS triggered this new and urgent concern for the safety of the world's blood supplies, it quickly embraced a broader objective of reducing morbidity and mortality both from failure to transfuse and from the many complications of transfusion, including transmission of HIV and also other infectious agents, depending for example on the region.

The GBSI worked out and published clear and comprehensive guidelines for operating blood transfusion services, with particular attention to:

- recruitment of blood donors
- HIV-testing of blood donated
- training of blood transfusion staff
- appropriate use of blood.

The main principles guiding the GBSI were that:

1. development of integrated blood transfusion services should occur within the broader context of national health plans as well as within the context of national plans for AIDS prevention and control.
2. a country's supply of safe blood and blood products should be sufficient to meet patients' needs.
3. steps should be taken to encourage appropriate clinical use of blood.
4. safety of blood supply depends on careful selection of blood donors, and voluntary non-remunerated donors best fulfil the criteria for 'safe donors'.
5. to ensure quantity and safety, blood transfusion services need to be regulated and co-ordinated, a task for which governments bear the ultimate responsibility.

Therefore the GBSI tried to persuade both governments and donors that blood transfusion should be a component of all AIDS programmes, with a separate budget even if it could not be a separate unit, with adequate government support and funding. Realistically, it recognised that most developing countries would need financial aid from international donors to achieve a safe blood supply. Such was the case in Uganda, where the European Commission had already stepped in as the major support agency. The GBSI and the Uganda blood transfusion project interacted. The GBSI drew on the Uganda experience in formulating its policies and guidelines. The managers of the Uganda project were able to use the principles laid down by the GBSI to demonstrate to government and other officials that

their objectives and ambitions were in accordance with the best practices laid down by the World Health Organisation. Also, the GBSI funded a short-term consultant, Judith Goddard, to help develop transfusion services in the districts of Uganda, so helping a truly national service to come about. After Dr John Watson-Williams had completed his task as EC technical assistant for the rehabilitation of the UBTS, Miss Goddard joined the main Nakasero blood bank in Kampala as technical assistant.

The Uganda Blood Transfusion Service: a portrait

Today, less than a decade after being resurrected from the wreckage left by 15 years of alternating civil war and neglect, the Uganda Blood Transfusion Service (UBTS) is supplying almost all the hospitals in Uganda – over 90 of them – with almost all the supplies they need of safe, screened blood that is free of the HIV virus and of hepatitis. The exceptions are mainly where and when continuing security problems in the north of the country make direct supplies too dangerous to deliver. Even then, there are fall-back local arrangements for blood screening.

In so doing, the UBTS has saved countless lives, not only among those who have been taken to hospital and need a blood transfusion, but also among those who, as potential blood donors, have received AIDS education, and among those who have sought a blood test so as to know their HIV status and avoid passing on the infection to others, for example, when about to marry and have children (see page 53).

The UBTS and its central laboratory at the Nakasero Blood Bank in Kampala and its four regional blood banks in Gulu, Mbale, Mbarara and Fort Portal, have therefore become an object lesson to other developing countries, many of whom do not have a comprehensive safe blood policy or programme, about what can be achieved and how it can be achieved.

The UBTS has also become an object lesson to funding agencies about how a social sector aid project can be carried out – and a potential test case for their commitment to better health in the world. The European Commission in Brussels was the first and remains the main technical and financial supporter of the Uganda safe blood project (American, French and Canadian donors then added contributions), and has committed over ECU 7 million to it. In return,

the project played a pivotal role in the development of the EC's own world-wide commitment to the global programme on HIV/AIDS (see page XXX). In the context of Uganda's own HIV/AIDS campaign, the safe blood programme has a significance far wider than the simple narrow-focus screening of blood for hospitals, vital though that is. The diverse collection of activities that go to make up a fully-fledged safe blood programme in an African context make it one of the most efficient, measurable, and cost-effective mass interventions yet devised against the HIV epidemic.

There are signs, tentative but hopeful, that at long last the HIV epidemic in Uganda may be stabilising or even declining (see page 49). A recent evaluation of the UBTS suggests that the blood transfusion service may have been preventing 5,400 new HIV infections a year, as against 18,800 prevented by other means e.g. changes in sexual behaviour (see page 92). Whether or not this is exact, the UBTS has played a part in Uganda's campaign against HIV/AIDS that is far more significant and demanding than would be the case these days in, say, a European country.

Thanks to its rehabilitation, the UBTS and its 100 or more staff are now supplying nearly 40,000 units of blood a year to Ugandan hospitals, enough for today's needs. Given that even in cold storage blood only lasts for about 35 days, it has to keep up a continuous (but not excessive) supply of new blood. In the future, its level of activity will respond to the evolution of Uganda's medical services (see page 98). The UBTS is also contributing to medical research on AIDS transmission (see page 101).

The wider contribution of the UBTS

But the simple statistic of the number of blood units hides the real dimensions of the contribution that the UBTS has made to helping the people of Uganda to control and live with the epidemic that has brought tragedy to so many of them. It has contributed in three substantial ways:

1. by preventing the many thousands of HIV infections that might have been caused by use of HIV-contaminated blood in hospitals, both immediate infections and (at least as important) subsequent infections by the infected (see page 97)
2. by enabling many thousands of Ugandans, not in hospital but coming to the AIDS Information Centres in Kampala and elsewhere, to know their HIV status accurately, and so make informed decisions about their lives, partners, habits

and responsibilities (see page 53)

3. by educating many thousands of people, particularly among the young in schools, colleges and churches, about the HIV epidemic and its patterns of spread, during the UBTS's campaigns to recruit reliable blood donors (see page 113).

For these reasons, the Uganda Blood Transfusion service has been one of the major instruments of AIDS control in the country, rivalling if not exceeding in influence other, more publicised AIDS prevention strategies. If the evidence that the HIV epidemic is peaking is confirmed, the UBTS must take a due share of the credit.

The view from an up-country hospital

— communication from Dr. Richard Montgomery, medical superintendent, Kiwoko Hospital

'As medical superintendent of this new 110 bed rural hospital, I have appreciated greatly the excellent and efficient facility of the UBTS. The hospital began as a clinic with one of the original priorities being to treat children with malaria, especially those needing transfusion. We now find we perform up to 100 transfusions in a month. It is professionally so rewarding to see a baby two days after his transfusion smiling and eating a piece of maize, knowing that when he was admitted he was hours away from death.

'How does one select stories from so many to illustrate the blessing of a safe transfusion to our patients? Mama Kyesu spent long hours recovering from a complicated hysterectomy but finally turned the corner after receiving some blood. Joyce was badly burnt in a grass fire and spent many weeks with us having grafts and dressings. Her total deafness perhaps meant she couldn't hear shouted warnings to avoid the flames. Blood was a most necessary factor in her recovery. The 7 year old boy whose blood would not clot as it leaked continuously from his gums needed more than one transfusion to allow his body to overcome the crisis and build up stronger platelets. And there are countless others.'

The matter of costs

Measurement of the cost is a part of the project. Previously, near to nothing was known or published, in Uganda as elsewhere, about costs. Now the UBTS managers and funders know how much it costs them to supply a unit of blood, and how that cost has been reduced over the years, from over ECU 50 per unit of blood to about ECU 26 (see page 91). They know how much blood they supply, and to whom: and how much blood they test. They know the 'yield' – that is, the ratio of blood collected to blood used, the rate of wastage. They know the ins and outs of bulk purchasing, the price of testing equipment and its minimum technical specifications, the cost of salaries, and the running costs of vehicles. All this is due to the design and monitoring of the project.

Equally, the management knows that more needs to be done (see page 98). For example, blood donors need to be even better looked after and appreciated, partly through blood donor clubs; salaries need to be higher to retain trained staff; job security needs to be improved; not all hospitals are up to standard in storage and use of blood. The status of the UBTS needs to be regularised, perhaps by making it into an autonomous public entity with its own board of governors and own management. Greater collaboration is needed between the

blood transfusion personnel and the medical profession to improve the use of blood and lessen the need for blood products. There is still much to do.

The dynamics of the project

But the nine years or so that have elapsed since the project started are a short period compared to the digestion and implementation periods that characterise many aid projects in Africa. Perhaps because it has been carried out in phases, with the success of one phase triggering the next phase, the UBTS has been a comparatively fast-moving project with forceful dynamics behind it, in particular:

1. the support of the Uganda government and its ministry of health
2. the response of the Ugandan people to the urgent need for safe blood
3. the skills of the EC technical assistants who got the UBTS going again
4. the skills of the (Ugandan) director of the UBTS and his staff who keep it going
5. the financial and technical support of the European Commission.



A complex organisation

Nevertheless, the UBTS has been forced to develop a complex organisation to deal with its problem in Uganda. The main characteristics of this (explored in detail later in this volume) are:

1. recruitment of a core group of unpaid, volunteer, repeating blood donors; in other words, people who can be relied upon to give blood regularly that is HIV-free, to replace the old paid and high-risk blood donors (see page 113). This cuts down the wastage (contaminated blood has to be destroyed), the risks to hospital patients, and the costs. Before the Uganda project, many people believed that a voluntary system of blood donation was not possible in Africa.
2. systematic training of staff, so that public trust in the blood test results is high (see page 127).
3. a central co-ordinating organisation, so that minimum standards and quality control can be defined and enforced, and scarce skills can be best used (see page 121).
4. a complex web of transport arrangements, involving the UBTS's own road transport, public bus and taxi services, post office vans, and local air services, to overcome both poor local roads and security problems (see page 100).
5. development of other sources of income, in addition to the EC's external funding, so that the UBTS has some degree of financial independence and can look ahead to the day when the Uganda government will be expected to take a larger share of the financial responsibility (see page 107).
6. as mentioned, the extensive HIV education efforts that accompany the recruitment of blood donors.
7. the training of clinical staff in the appropriate use of blood, that is, to teach them when blood transfusion is really necessary, and when it is not.

The lessons learnt 'on the ground' during the rehabilitation of the UBTS made a large contribution to the more theoretical efforts of the Global Blood Safety Initiative (GBSI), set up by the World Health Organisation, the Red Cross and others, to define the needs, methods and standards for safe blood world-wide.

A view from Mulago Hospital, Kampala

— communication from Mrs Catherine Kisumba

'Rehabilitating Nakasero Blood Bank was to me the best thing that has been achieved in Uganda after the Liberation War of 1986. Prior to that the general method of collecting blood in Mulago Hospital was to either ask relatives of patients to donate blood or for the hospital staff to hurriedly recruit blood donors from public places like Kampala taxi park (at a fee). The blood was then sold to the patient or his relatives in the hospital.

'In most cases there was no time to screen this blood, neither was there any system of screening for HIV. We were all at risk in case of the possibility of getting involved in, say, a motor accident and having to be rushed to a hospital and given a blood transfusion.

'When Dr. Watson-Williams embarked on the job of rehabilitating Nakasero Blood Bank, the problems were numerous, and seemed insurmountable:

a) the building was rotten, and the formerly well trained staff had dispersed.

b) the public attitude towards donating blood had been negative. There was a general fear that giving blood would result in shortage of blood in the body and therefore would be harmful to one's health.

c) most people were afraid of being tested for AIDS in case they were infected, and were also afraid of being exposed and shunned by their friends should they be found to be HIV positive. Therefore the method of protecting the donors' identities was crucial.

'In spite of these problems plus other numerous logistic problems which are typical of the developing world, Nakasero Blood Bank was not only rehabilitated but also the systems that had been put in place by the time Dr. Watson-Williams left the country ensured continuity of providing safe blood to most hospitals in the country.'

Four questions about aid

Four questions are often asked about aid projects in developing countries, especially in Africa. The first is:

– who is going to do it?

the second is:

– where did the money go?

the third is:

– is this kind of activity applicable to other countries (so the value is multiplied)

the fourth is:

– is it sustainable, that is, how will it continue when and if the foreign aid money comes to an end?

In the case of Uganda's blood transfusion service (unlike many other aid projects, sadly) these questions can be answered. There were and are trained and dedicated people to do the work. You can see where the money went, just by going and looking at the buildings, equipment, people and blood supplies. Much has been learnt by other countries from the Uganda experience (although, sadly again, many still do not have any equivalent safe blood supply). The fourth question, about long-term sustainability, is discussed in detail in this volume (see page 107), and everyone knows that it will not be an easy question to answer. Safe blood can look expensive when compared to the total health budget of a poor country, especially a country forming part of what is regarded as the epicentre of the world AIDS epidemic.

The project has demonstrated that the people of Uganda have the human will and government commitment to develop an internationally acclaimed technical programme. But how far can the government and people of Uganda be expected to take over the full costs of it, and when? The UBTS seems destined to become a test, both of Uganda's long-term priorities in achieving better health, and of donors' long-term commitment to supporting this effort.

For this reason, if for no other, the achievements (and problems) of the UBTS will continue to be under scrutiny, both by the international community and, not least, by the Ugandan taxpayer. That is why this record of how it all came about and what was done, and why, is of wide interest, far outside Uganda and far outside the immediate circle of blood transfusion and medical experts.

The first visit for the EC

The EC, then in the process of launching its new HIV/AIDS programme, was asked to give support to Uganda. Dr Lieve Fransen, who already had extensive experience of public health planning in Africa, was hired as a consultant in April 1987 to identify where the EC could best provide support. She had just defended her PhD in Public Health at the University of Antwerp and was specialised in tropical medicine, epidemiology and genito-urinary medicine. She felt highly motivated to play a part in the mobilisation then taking place around HIV in developing countries, and especially in Uganda where the epidemic was spreading fast.

During a short visit to Uganda in that month she was able to discuss with all parties involved both the epidemic and the response to it. She received great support from the newly appointed EC Delegate to Uganda, Karl Harbo. She recognised that the epidemic was already of serious proportions, and that its consequences would be devastating. The opportunities to do something about it had to be both well chosen and quickly organised. She recommended that EC support to Uganda could best be used for a safe blood initiative, because:

1. the blood supply was totally unsafe and was used mainly for pregnant women and for children, whom she saw as the window of hope for the future. She also stressed the importance of the responsibility falling upon the government and the public health service to protect the population against unsafe blood, both for its own sake and for prevention of HIV
2. both for the EC and for the Uganda government, this initiative meant starting from nothing and needed technical assistance. But it also needed a long-term commitment and a comprehensive approach with high initial investment costs that other aid donors were not willing or able to undertake at that time
3. the presence of a consultant from another aid donor who was also interested in promoting safer blood through the Red Cross, meant that there was an EC member state which might also be involved, raising the possibility of a joint European Union effort.

During her mission to Uganda she studied the feasibility of such a project,

despite the lack of data on blood or its safety. She proposed to start with a first phase to provide safe blood for the Kampala/Entebbe area, and then expand in the spirit of 'doing while learning' because there were no previous models of how to do this kind of work and this kind of foreign aid.

To implement the project, the EC at first sought a European agency or European technical assistance to help Uganda's Ministry of Health to put into a place a detailed policy, strategy and plan. But after much deliberation the Commission decided to hire a technical assistant, in the person of Dr John Watson-Williams, as its manager-on-the-spot. An international tender was organised to provide equipment and supplies.

This was the beginning of the story that led the EC to develop a comprehensive policy and strategy for safe blood in developing countries, in the context of the larger EC HIV/AIDS programme which had just started.

Dr John Watson-Williams enters the scene

Late in 1986, shortly before the EC became involved, the acting President of the Uganda Red Cross Society, Edward Mungati, via the American Red Cross invited Dr. John Watson-Williams, a British haematologist (i.e. an expert on blood) who had also worked in America, to visit Uganda and advise the URCS about how to revive the blood transfusion programme which the Red Cross had previously carried out before civil strife made it impossible. The visit was made in April 1987, the same month that Dr Lieve Fransen was in Kampala on behalf of the EC, and Dr Watson-Williams made recommendations on much the same lines as Dr Fransen, but independently.

He suggested the construction of a blood bank in Kampala, a national volunteer donor programme, and a blood distribution system to deliver 30,000 units of blood a year. The American Red Cross Society agreed to designate Dr Watson-Williams as a volunteer delegate to the URCS, and the Carnegie Corporation of New York provided a \$25,000 grant for a feasibility study.

This study was carried out from September 1987 until May 1988. During that time Dr Watson-Williams worked at the New Mulago Hospital, Kampala, and at the Virus Research Institute in Entebbe. He was able to report that a volunteer blood bank programme would probably be successful. He was also able to evaluate different ways of HIV testing and blood typing, and to select those which would be most cost-effective in a national programme.

The director of the AIDS Control Programme, Dr Sam Okware, and the Ministry of Health gave encouragement and invited Dr Watson-Williams to assist in the planning for the EC-sponsored Nakasero Blood Bank project, so bringing together the two parties interested simultaneously in much the same contribution to restoring Uganda's health system. So it came about that in July 1988 Dr. Watson-Williams was chosen to be the EC's technical assistant for the project, starting in September 1988.

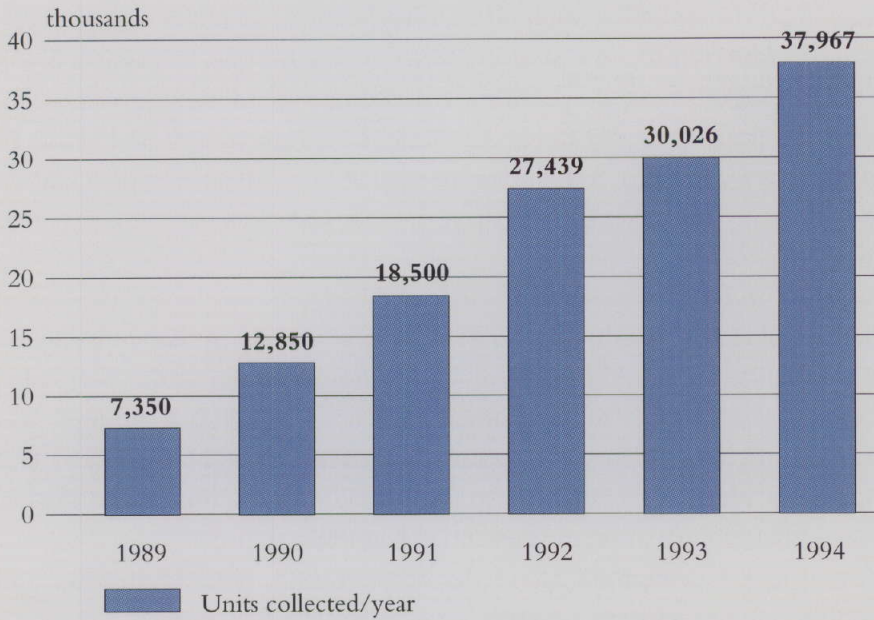
Dr Watson-Williams came to the Uganda project with strong ideas about how best to organise blood transfusion services in Africa. He had already spent time in Nigeria and elsewhere studying the problem, and had already

recognised that an efficient blood transfusion service in Africa is a quite different proposition to a transfusion service in, say, Europe. In Europe, blood is needed for emergency operations, for example for adults after a car crash, and the electricity supply can be relied on for refrigerating stored blood. In Africa, both the need and the circumstances are different, with children and maternity cases being the main recipients, and electricity supplies often unreliable.

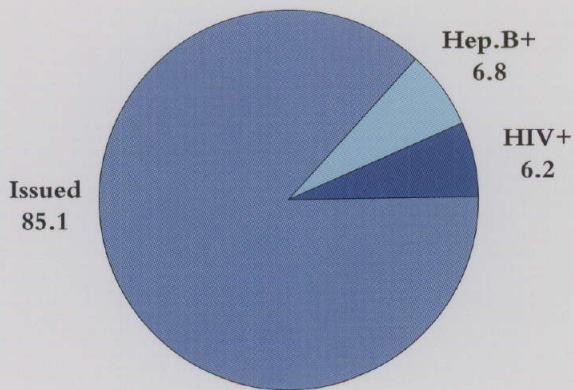
From his previous experience in Africa he had also concluded that one of the critical deficiencies in patient care was the scarcity of trained laboratory staff and the resulting low level of diagnostic testing at the peripheral hospitals where most of the patient care is given. If each hospital also expected the laboratory staff to recruit, screen and bleed blood donors, and to test the blood for markers of transmissible diseases, this would further reduce their ability to provide essential diagnostic testing.

However, if a centralised blood donor recruiting, blood collection and blood screening and testing service was available, the hospital technician would be provided with a constant and adequate supply of safe blood and would only need to perform compatibility testing for each transfusion. The benefits of this could then be maximised by the development of a high-level centre for training of blood transfusion staff, both for local programmes and for programmes in other developing countries, and a demonstration project could be set up that medical decision-makers from other countries could observe and learn from. So Uganda became, for Dr Watson-Williams, a chance to demonstrate that his theory would work in practice.

UBTS Blood Units Collected 1989-1994



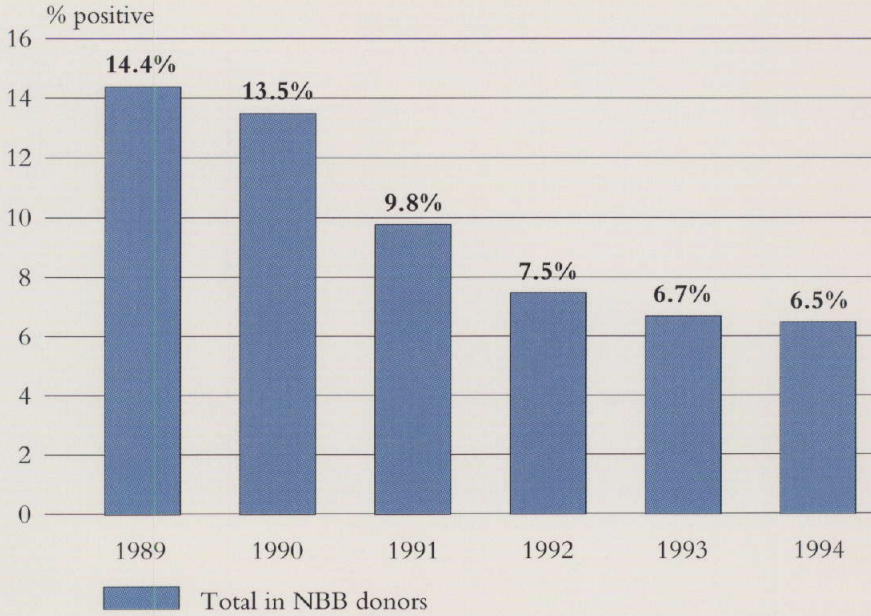
Blood units Processed - UBTS 1994 Anti-HIV+, Hepatitis+, Inadequate units



Volunteer and Relative Donors
0.2% positive HIV & HepB, 1.5% Not Issued

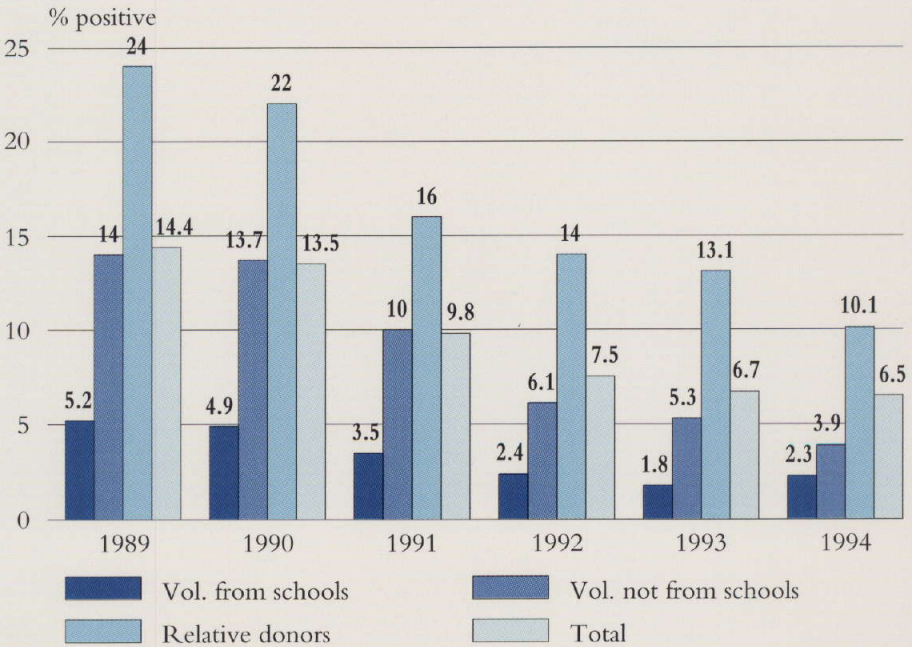
HIV Frequency of NBB Blood Donors

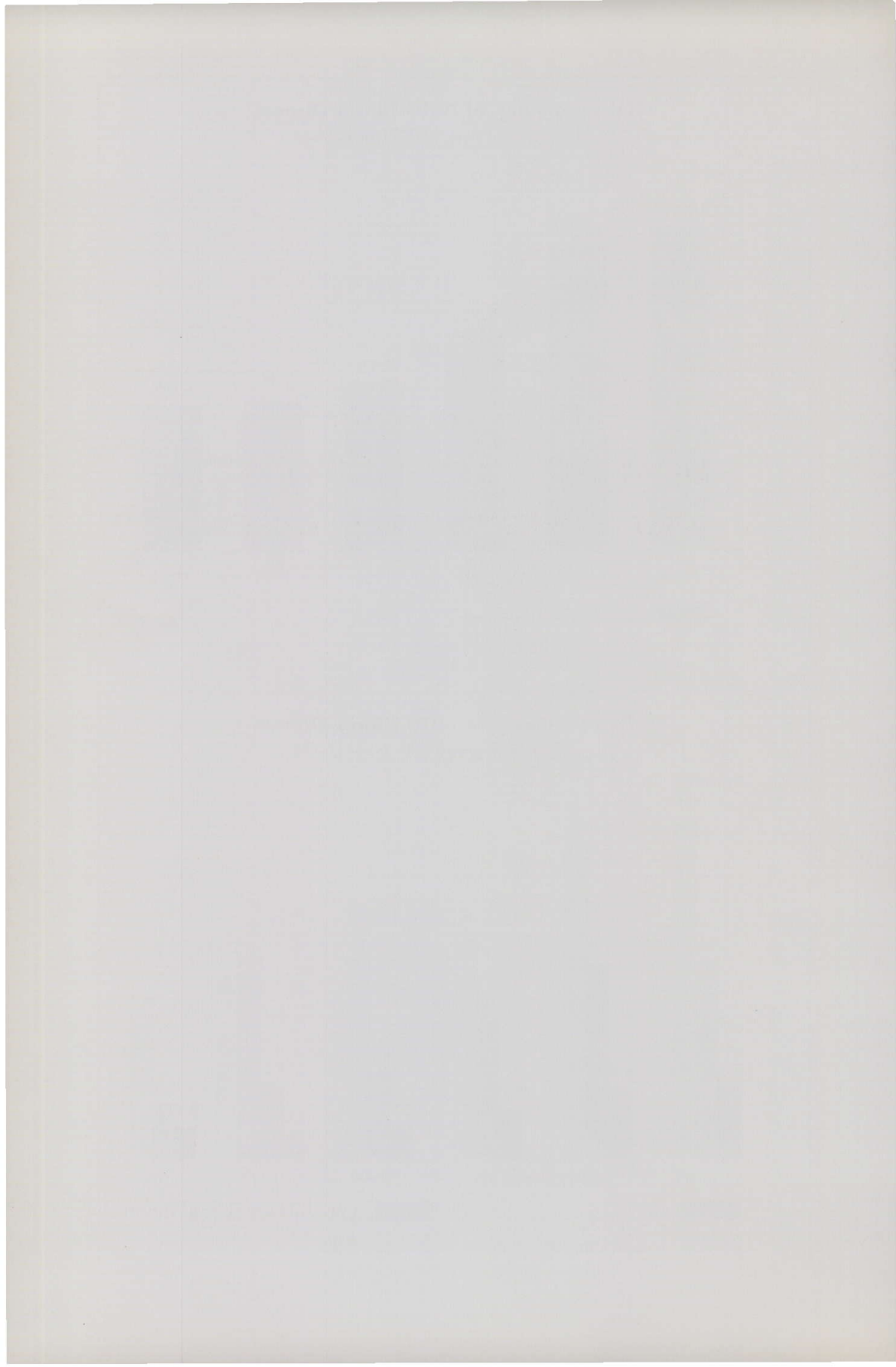
% positive for anti-HIV 1989-1994



HIV Frequency of NBB Blood Donors

% positive for anti-HIV 1989-1994





Section Two

**BACKGROUND:
UGANDA'S HISTORY, HEALTH,
AND THE HIV/AIDS EPIDEMIC**

Uganda's political and physical health: a brief history

A. The political background

'With a per capita income of under US\$ 170, Uganda today is one of the poorest countries in the world: indeed, it is a living testament of the havoc caused by the political turmoil and economic decline brought about by more than a decade of despotic rule.'

This is the verdict on Uganda that begins the World Bank survey of Uganda, entitled *Growing out of Poverty*, published in 1993. After being a British protectorate for 70 years, Uganda gained independence in 1962. At that time, the country had much going for it. It was one of the most vigorous and promising economies in sub-Saharan Africa. It had a good climate and fertile soil: it was self-sufficient in food, and its agriculture, along with textiles and copper, earned enough foreign exchange to pay for imports and still show a surplus. Savings stood at 15 per cent of GDP, enough to finance a reasonable level of investment, and the country had a good system of roads, railways and air transport. But in 1971 the first president, Dr Milton Obote, was overthrown by a military coup lead by General Idi Amin.

'The Amin regime radically reversed the economic and social progress attained since independence, and the ensuing civil strife resulted in tremendous loss of human life. It is estimated that as many as 500,000 Ugandans lost their lives during Amin's eight-year dictatorship and as many as one million more were internally displaced from their homes and farms,' says the World Bank.

Amin was eventually deposed, but this was not the end of Uganda's troubles. Dr Milton Obote resumed power in 1980, but according to the London-based *Independent* newspaper,

'The 1980 election, now widely regarded as fraudulent, resulted in the return of Milton Obote... [but] the country was plunged into a barbarous civil war which exceeded any atrocities committed during Idi Amin's rule.'

The toll taken by two long periods of civil strife was terrible. Skilled people left the country, Uganda's GDP declined by 25 per cent in the decade 1970 to 1980, exports by 60 per cent, and inflation rose to 70 per cent a year, under the pressure of heavy military spending and bank borrowing. In particular, government spending on education and health had by 1985 sunk to 27 per cent and 9 per cent of the levels of the 1970s.

This literal decimation of health expenditures was all the more disturbing because at independence Uganda's social indicators were as good as, or better than, most of Africa, with a good health service that had pioneered many low cost health and nutrition programmes. There was an organised network of vaccination centres, and an immunisation programme that reached 70 per cent of the population.

By early 1986, when the National Resistance Army (NRA) and its political wing, the National Resistance Movement (NRM) took power, the country was in dire straits. The NRA leader, Yoweri Museveni, was declared President and the NRA quickly took control of the country except for sporadic resistance in the North and East. But the infrastructure and the economy had been destroyed by the fifteen years of civil war and mismanagement. The roads were in disrepair (journeys of 80 km took over two hours), the railways were not working, telephone lines were destroyed, water mains and pumping stations were broken and the electrical supply was irregular, inconsistent and dangerous due to inadequate generation and overloaded transformers and distribution lines.

Government pay was six months or more in arrears and inadequate to provide the necessities of life. Government workers worked either a few hours a week or not at all. If they came to work there was nothing to do. To survive they had to spend as much time as possible growing food and working in what was left of the private economy.

The new government soon achieved the confidence of European and other Western governments. With emergency aid major roads were rebuilt and the utility services underwent a complete survey and essential repairs. Health care services were revived as far as possible, and health expenditures began to increase again. But the task of rebuilding the nation was immense.

B. The health of the nation

Over half of Uganda's 17 million population, even under peacetime conditions, still falls below a basic poverty line. Life expectancy, at 47 years for men

and 50 for women, is one of the lowest in the world. The country's crude death rate, at 20 per 1,000, is about twice the level of the average low-income country, for example, neighbouring Kenya. Over half of hospital deaths are children,

the main killers being malaria, pneumonia, diarrhoea and malnutrition. Nearly half the children under 5 years of age suffer from malnutrition. For adults, the main causes of death are AIDS, tuberculosis and malaria.

'The leading causes of death are all preventable, although with varying degrees of difficulty,'

comments the World Bank. One difficulty is the inadequate number of nurses and doctors – see the table on page 13. There are only around 90 hospitals for the whole country. Another problem is the health budget. Total health spending in Uganda, public and private added together, is about US\$ 6 per head of population, which is a half to a third of what sub-Saharan countries in general spend, and half of what is considered necessary to provide a basic essential health service in a low-income country.

Uganda's health problems are com-

Child receiving blood transfusion

pounded by a high fertility rate and so a high population growth rate (see table on page 13 again). But the toll this exacts on Uganda's mothers is high, with 550 maternal deaths per 100,000 live births, about twelve times the rate in developed countries. On top of all this came 'slim disease,' as Ugandans graphically describe the AIDS epidemic which hit the country.

C. Safe and unsafe blood in Uganda

It is important to realise that, like so much else in Ugandan life, the country had a distinguished history in blood transfusion before the time of troubles set in. The British Red Cross Society, Uganda branch, began a blood donor and blood bank programme as long ago as 1958. The Red Cross world-wide is a

major contributor to blood donation, providing a quarter to a third of the world's blood supply and about half of the US blood supply.

In 1958 the Ministry of Health opened a blood bank laboratory in a wooden hut at Old Mulago Hospital in Kampala. When the New Mulago hospital was opened in 1962, the European and Asian Hospital on Nakasero Hill in Kampala was closed and the Nakasero Blood Bank (NBB) opened in the building that had been the nurses' home. This blood bank developed rapidly to supply all the blood needed by the Kampala hospitals (Mulago, New Mulago, Nsambya, Mengo and Rubaga) and also provided blood, when possible, to other hospitals in Uganda.

By 1974 it was collecting and typing 14,000 units annually (4,000 from voluntary donors recruited by the Uganda Red Cross). The blood bank made its own collecting and giving sets and used resterilised bottles and resharpened needles. The laboratory underwent frequent enlargements and had to add two wooden buildings to accommodate offices and an antenatal screening programme. The space available amounted to a grand total of 320 square metres. The staff rapidly increased, reaching a peak of 120 in 1974. In 1972 Paul Senyonga, who had received specialised training in London, England, and Melbourne, Australia, became the chief technologist in charge. He is in fact still there in 1995. But the years 1976-1986 were years of great difficulty, as everywhere else in Uganda, and the Nakasero Blood Bank declined dramatically. Funding was inconsistent, inflation was drastic (the exchange rate rocketed from 7 Uganda Shillings to 16,000 to the US\$), yet the staff salaries remained the same at 2,000 Uganda Shillings for the unskilled rising up to 20,000 Uganda Shillings for the doctor in charge, per month. British aid and the German Red Cross assistance were diverted to other purposes; two mobile blood banks, lavishly fitted out, were supplied by the German Red Cross but never found their way to the NBB.

As stocks of supplies lasted and the staff could find transport, blood collection continued, but each year less and less was provided to the hospitals. The voluntary blood donors became fewer and fewer and hospitals were forced to provide their own blood needs. The mission hospitals, with the advantage of donated supplies, were more successful than the government hospitals in being able to keep up a supply of blood. Hospitals used many different donor recruiting methods but the most frequent was requiring obstetric and surgical patients to provide two blood donors before admission. During the early 1980s resterilisation of blood bottles became very difficult and hospitals began to use imported blood bags whenever they could be obtained.

Management of emergencies became extremely difficult because blood was never ready in the blood bank. If suddenly a severe haemorrhage occurred as a complication of labour or a child was brought in with severe anaemia and cardiac failure, blood would take anywhere from 6 to 12 hours to get, the time needed to solicit blood from relatives, most of whom would not have come with the patient, cross-match and issue it. By this time the patient would either have died or did not need the blood.

The effect of the HIV epidemic was not long in showing itself. By 1986, 9 per cent of all blood donated at the main Mulago teaching hospital in Kampala was positive for HIV. This seroprevalence had risen to 24 per cent in the same population by 1989. Testing blood for HIV-1 before transfusion did start in the main hospitals in Kampala in the last quarter of 1986. This testing was, however, still irregular and because of shortage of blood most emergency transfusions were carried out before the blood could be tested.

It also became apparent that the individuals who were donating blood at the time were not the most suitable. Relatives, when asked to donate blood for the patient, would often go out and find a paid donor to donate. Many donors were recruited, for a fee, by touts working at the hospital gates. These paid donors happened to be the sort of individuals most likely to be HIV positive. It is therefore most likely that before the Uganda Blood Transfusion Service (UBTS) became fully effective again, a lot of patients received HIV infected blood.

The mission hospitals, notably Nsambya, acquired facilities for Elisa tests and started testing blood donations for HIV in 1986, with emergency help from the EC. From 1987 blood donations collected at New Mulago hospital and at the NBB could be tested at the Institute of Public Health with kits donated by the WHO. But HIV testing was not available for the majority of hospitals in other towns in Uganda. Some hospitals in those towns were able to send blood samples to Nsambya hospital, the IPH at Mulago, or the Virus Research Institute at Entebbe. But even so the blood frequently had to be used before the test results were available.

Then in May 1987, the Uganda government with assistance from the World Health Organisation held a donors conference in Kampala to solicit funds for AIDS control. At this conference the EC pledged support for a phased safe blood programme, with a first phase objective of providing 10,000 units of safe blood for hospitals in the Kampala/Entebbe area. How the EC came to make this pioneering intervention, is described in Chapter Four.

AIDS in Uganda: a glimmer of hope?

'Uganda is experiencing an epidemic that rivals the worst ever experienced by any nation... any discussion of the health sector in Uganda in the 1990s is dominated by STDs and AIDS in particular. Although other health issues remain critical, they are dwarfed by the magnitude and immediacy of an estimated 1.5 million Ugandans being infected with HIV.'

That is the World Bank's summary of the AIDS situation in its 1994 project proposal for a loan of US\$ 73 million to Uganda to help control sexually transmitted diseases (STDs), including HIV/AIDS. Given that only a little over half the Ugandan population is over 15 years of age, the statistics mean that one in every six or seven adults is infected by HIV.

For some groups of people, the level of infection is worse. In Kampala, some 30 per cent of all pregnant women going to ante-natal clinics are infected, and in many parts of the country AIDS is the most common cause of adult admission to, and deaths in, hospital. During 1995 new evidence emerged that at long last the epidemic may be reaching some sort of plateau, or even declining. While still tentative, this evidence offers 'a glimmer of hope', and is discussed below.

Extent of AIDS in Uganda

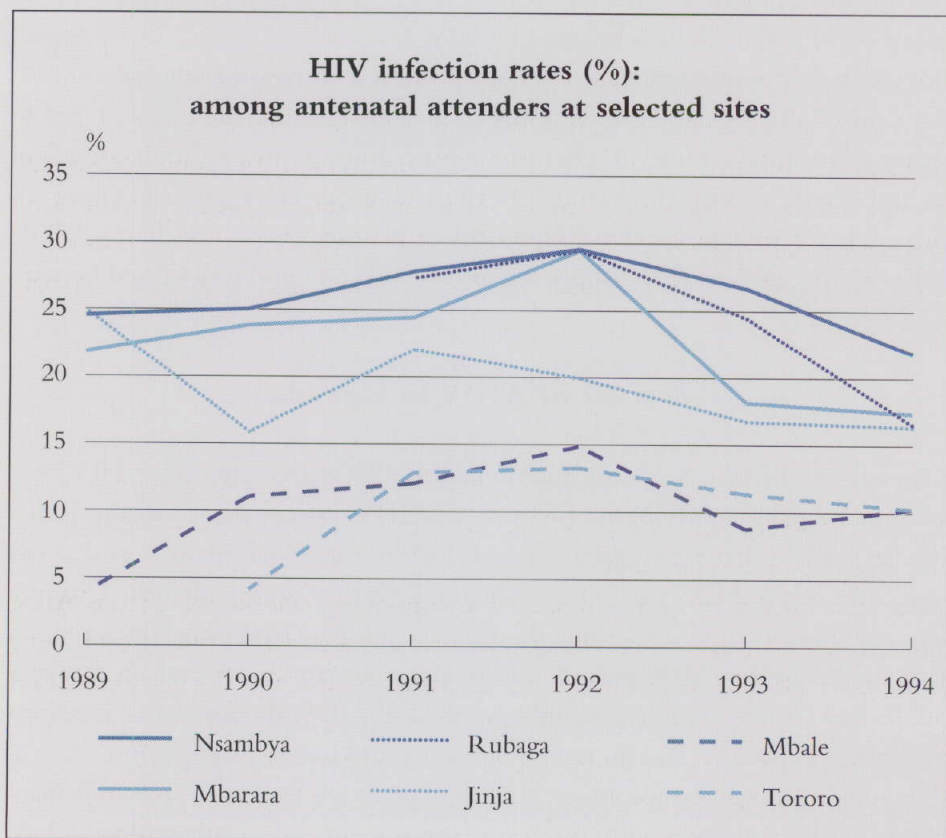
Cases of AIDS first began to appear in the 1980s, and soon after HIV tests became available in 1985, the first case of AIDS was confirmed in the Rakai district, part of that area bordering on Lake Victoria which many regard as the epicentre of the AIDS pandemic in Africa. Estimates suggest that the cumulative number of AIDS cases since then is over 300,000, and projections suggest that in the 1993 – 1998 period, due to past infection rates, perhaps 565,000 adults and 250,000 children could have died of AIDS (though actual numbers will never be known, due to under-reporting and under-diagnosis).

The most common symptoms of HIV in Uganda are weight loss, chronic diarrhoea, prolonged fever and cough, and (more and more) tuberculosis. Once

AIDS sets in, Ugandans survive for a far shorter time than in developed countries. Partly as a result of HIV/AIDS, tuberculosis has re-emerged (in Uganda as elsewhere in Africa) as a serious and growing public health problem.

Mobilising to deal with HIV/AIDS

What clearly distinguished Uganda from other African countries, where the existence of the HIV/AIDS epidemic was for some time denied or hushed up for fear of damage to the tourist trade, or out of pride and distaste, was that Uganda and its President swiftly and publicly acknowledged the presence and extent of HIV/AIDS, and invited outside help both in rebuilding the health system of the country, and in particular in mobilising efforts against HIV/AIDS. In 1987, the Uganda AIDS Control Programme (ACP) was set up within the Ministry of Health. Later, in 1991, an independent Uganda AIDS





The Nakasero computer records system

Commission was set up, with financial aid from the World Bank group, which had early on become involved in the rehabilitation of Uganda's health services. As an emergency response to the country's health problems, the IDA (International Development Association, part of the World Bank group) in 1988 launched the First Health Project, an ambitious programme to help restore health services in Uganda. The First Health Project encountered severe problems, principally over accountability for money spent, but it was a start. By 1990, external aid including aid from the EC accounted for almost half of Uganda's total health expenditure, against 20 per cent for the general run of sub-Saharan countries, and stood at about US\$ 2.8 per head of the population, thus emphasising both the low level of national health expenditure and the dependence on foreign help.

The First Health Project had several components, one of which was AIDS control. Within that, there was an element for blood transfusion, and along with the 1988 IDA loan there was a grant of about US\$ 600,000 from SIDA (the Swedish aid agency) for help with the rehabilitation of the blood transfusion service. Part of the money was spent on training, and about half of it was spent on buying Elisa readers, refrigerators and other equipment, including vehicles. These were distributed to 12 district blood transfusion units outside

Kampala. Later, these district facilities were put under the same administration as the Kampala blood bank, so contributing to today's national integrated blood transfusion service.

The evidence for 'a glimmer of hope'

Two studies issued in 1995 offer what one of them calls 'a glimmer of hope' that the rate of HIV may at last be stabilising or even decreasing in Uganda, although Ministry of Health officials are cautious about placing too much weight on this evidence, too soon.

In the first study, a group of scientists headed by epidemiologist Daan Mulder and funded by the UK's Medical Research Council have been studying rates of HIV infection among adults in a group of 15 rural villages, all near to each other, in the

Packing blood bags in a coolbox for distribution

Masaka district of south-west Uganda. Most of these adults are peasants who grow bananas as a subsistence crop and coffee for sale. Most are Roman Catholics, but one in four are Muslims. The study has been going on since 1990. The key finding in 1995 was that:

'During the 5-year period, the overall HIV-1 seroprevalence showed little change, from 8.2 per cent in 1990 to 7.6 per cent in 1994. In contrast, in males aged 20 to 24 years the prevalence decreased by 80 per cent, (from 11.8 per cent to 2.4 per cent); among females aged 13 to 19 and 20 to 24 years the decrease was 62 per cent and 34 per cent respectively. In males aged 13 to 19 years the incidence of HIV-1 infection also declined.'

What is the significance of this? The study suggests that:

'This is the first report of a decline in HIV-1 seroprevalence among young

adults in a general population in sub-Saharan Africa. The prevalence of HIV infection in this population was high and the intensity of intervention modest. It is too early to conclude that the epidemic in this population is in decline, but the results of this study give a glimmer of hope and should encourage the vigorous pursuit of AIDS control.'

In the second study, the HIV/AIDS Surveillance Report issued by the Ministry of Health in March 1995, it says that sentinel surveys carried out in up to 20 sites in Uganda 'appear to suggest a stabilisation in the prevalence rates of HIV infection, though the rates are still high.'

The data were first reported in 1994, but were re-examined at six sites to make sure that the results were valid. These results, with the significant downward curve setting in from 1993 onwards, are shown on page 50.

It is a fair assumption that the Uganda Blood Transfusion Service has played its part in this apparent stabilisation (or better than stabilisation) of the HIV rate in Uganda, as its director, Dr Peter Kataaha, explains on page 97, and as is also indicated by recent estimates about the numbers of new HIV infections in Uganda prevented by various means (see page 92).

Voluntary mass HIV testing as a route to behaviour change

Just as the Uganda Blood Transfusion Service has been a pioneering project in the area of safe blood for developing countries, so too the Uganda AIDS Information Centre (AIC) has been a pioneering experiment in the use of mass voluntary HIV testing and counselling as a contribution to AIDS control, and as a way of encouraging behaviour change in face of the HIV epidemic.

Funded by USAID (United States Agency for International Development), the AIC was the first such project in sub-Saharan Africa. There are now other similar projects in Africa (e.g. Zambia, Cote d'Ivoire),

and a multi-country study is under way to determine whether or not such information and testing centres should become an officially recommended part of AIDS control strategy.

Since it began in 1990, the AIC has provided HIV tests with pre- and post-test counselling for about 200,000 people, initially in Kampala only, but more recently through 20 or more regional and local centres as well. The tests are entirely anonymous, based on each person being given a number rather than being asked their name, and about half those coming to the AIC are men, and half women.

The aim has been to replace the negative feelings of hopelessness and fatalism that used to be brought on by the terrifying HIV/AIDS figures in Uganda, by a positive awareness that through knowledge and informed behaviour much can be done to protect those as yet uninfected, not least the partners of infected people. Pre-marital testing, often at the behest of family, priests or clergymen, was another area of unmet demand.

The significance of the AIC and its activities for the Uganda Blood Transfusion Service is two-fold:

1. some people were coming to the blood bank offering to donate blood, and so receiving a free blood test, but with no intention of actually becoming a blood donor. Their sole purpose was to get an HIV test, and to get it for free. This was wasting a lot of time and resources at the Nakasero testing laboratory, which anyway did not have the means to do AIDS counselling. So now such people have another place to go to.
2. the HIV testing of the blood samples taken at the AIC is done for the AIC by the Nakasero laboratory on a contract basis, and the UBTS gets paid for each test done, at the rate of over US\$ 5 per test. This has been a valuable source of extra funding for the UBTS, and has enabled the UBTS to achieve a degree of self-financing and to pay extra salary money to key employees.

Besides the money, the USAID/AIC business has provided an important 'seal of approval' to the Nakasero laboratory. The AIC could hardly send its blood samples to a laboratory in which it did not have total confidence, especially given the highly sensitive nature of the tests done, determining whether or not a person has HIV/AIDS. The high rate of auto accidents in Uganda also meant that expatriates and visitors to the country were very concerned about the safety of the blood supply. So recognising its 'strong

ethical burden to ensure the accuracy of the test results,' USAID used consultants to carry out its own independent evaluation of the Nakasero laboratory, and now calls it 'a remarkable institution... one of the best laboratories in Africa.'

People wanting an HIV test for job or visa applications have to go elsewhere. The AIC does not provide bits of paper stating that the person is HIV-negative. What it does do, is to refer HIV-positive people to TASO, the very active Ugandan AIDS support organisation, and/or to the Post-Test Clubs which the AIC has set up to enable clients, particularly but not only those who are HIV-positive, to get long-term support and advice.

USAID recognises that without an adequate support system for those found to be HIV-positive (which not all countries have) mass HIV testing could have a devastating and negative effect, and would also raise serious moral and ethical issues. Taking into account all aspects, including this pre- and post-test counselling, it costs USAID about US\$ 18-20 for every person tested at the AIC.



Section Three

**THE STORY OF THE UGANDA BLOOD
TRANSFUSION SERVICE**

How the European Commission got involved

The early months of 1987 were a period of intense activity in launching and developing the campaign against HIV/AIDS, both globally, and at the European level, and in Uganda.

– in February 1987, what became known as the Global Programme on AIDS (GPA) was set up in Geneva, under the wing of the World Health Organisation, to co-ordinate the world's reaction to the gathering international HIV epidemic: this followed a resolution passed by the WHO assembly in May the previous year

– in February 1987, the then vice-president of the European Commission, the late Lorenzo Natali, took what was then an unprecedented step for the EC and sent a landmark memorandum to all ACP states (African, Caribbean and Pacific) who had signed the Second Lomé Convention on European aid to developing countries, and invited them at an assembly in Arusha, Tanzania, to take part in an EC/ACP AIDS control programme

– the new government of Uganda, which had quickly recognised and openly acknowledged its AIDS problem, in January/February 1987 issued a call for international assistance for its newly created AIDS control programme.

The contribution of the EC was unprecedented in the sense that the Commission had no tradition of direct intervention in specific health programmes aimed at the control of specific diseases. But there was a desperate need. So in his memorandum, Commissioner Natali said:

'Rapid action using quick and flexible procedures is necessary in view of the priority and complexity of the AIDS problem... the programme is intended as an identifiable EC contribution to the international effort on AIDS control.'

Almost all ACP countries responded to this initiative (later extended to all developing countries) and it remains unique in the history of the EC. To implement it, the EC in 1987 set up a new organisation, the AIDS Task Force, to recommend and evaluate projects. Since then, this effort has grown into a special Health and AIDS Unit within the Commission, for which the ATF acts as technical support. But what exactly should the EC and its AIDS Task Force, actually do?

Dr Lieve Fransen's report

As we have seen (page 37), Dr Lieve Fransen was hired as a consultant in April 1987 by the EC to go to Uganda to investigate and make recommendations. This was only a few months after Commissioner Natali's declaration and immediately prior to the important donors' meeting to be held in Kampala in May of that year, already referred to in Chapter Three. Here is the crucial excerpt from her report:

'Heterosexual activity is the major route of transmission [of HIV] accounting for as much as 80 per cent of all new cases. However, blood transfusions with HIV infected blood is also a very effective mode of transmission to a group of the population which would not be infected otherwise.

'For several reasons the importance of transfusion as a mode of transmitting HIV infection is much greater in Uganda than in most industrialised countries. First, the seroprevalence of HIV infection in the general population is very high [then put at 15 to 20 per cent], transfusions are given much more frequently in Uganda than in industrialised countries, and more than 50 per cent of the transfusions go to children with malaria.'



The Nakasero blood bank under reconstruction

The Ugandan government had stressed that the prevention of AIDS in high risk groups and among young children before the age of sexual intercourse was a priority strategy. But the significance of this proposal to help Uganda clean up its blood supply went wider.

‘The prevention of this mode of transmission is technologically feasible and the high rate of seropositivity among blood donors makes this intervention more cost-effective than in Europe. In addition, the improved medical use of blood transfusions, and the greater availability of properly stored and screened blood, will have a positive effect on health and health systems in general.’

The central recommendation (quickly accepted) was that:

‘the area of choice for long-term support by the European Commission would be to rehabilitate the blood transfusion facilities in Kampala and its surroundings, as a first phase, and provide HIV negative blood for these regions. This would achieve protection from HIV infection for the young, children, and the as yet uninfected, and therefore be a major contribution in prevention of AIDS among the future generation.’

There can be no denying the emotive force of this appeal to save ‘the future generation’, just as there can be no denying the financial appeal of a cost-effective intervention. Also, it is interesting that this was defined, even then, as a first phase. Later, as phase two, the safe blood programme was extended to the whole of Uganda.

So it came about that the restoration of a safe blood supply for Uganda became the EC’s first major project in the AIDS field; formed the immediate impetus for the setting up of the AIDS Task Force to help the EC in its new task; and provided a candidate for the job of director of the new AIDS Task Force, namely Dr Fransen herself, who held that post for the next 6 years, until she joined the new Health and AIDS Unit within the Commission.

But a recommendation was all very well. An agreement to fund the project was even better. But who was actually going to do it? Without someone to do it, any plan is mere paperwork. Here coincidence played its part, for in Kampala at the same time was Dr John Watson-Williams, whose presence and purpose for being there on behalf of the Red Cross are explained on page 38. Dr Watson-Williams soon emerged as the choice for EC technical assistant to carry out the project on the ground. His personal account of what he did, and how, begins on page 67.

The 1987 plan

As we have seen, at the international donors conference in Kampala in May 1987 the European Commission agreed to provide assistance to the Ministry of Health to rehabilitate the blood bank and to provide supplies for up to 10,000 units of blood annually for three years in keeping with the recommendations made by Dr Fransen in her report. The EC saw this project as compatible with the comparative advantages it had in promoting AIDS work, because it was in a position to adopt medium-term rather than short-term strategies and support larger projects rather than the smaller educational or community-based projects which other donors were better placed to carry out.

A grant was approved and a work plan developed. The plan provided 1.3 million ECU to rebuild and equip the blood bank, 0.3 million ECU for emergency equipment and supplies, 0.3 million ECU for technical assistance, and 0.5 million ECU for supplies to provide service until December 1990, when it was expected that Nakasero would reach its target for blood collection.

For its part, the Ministry of Health, working with the then EC Delegate to Uganda, developed plans for the reconstruction of the building and appointed Messrs Peatfield and Bodgener as consultant architects. Ministry responsibility was exercised through the AIDS Control Programme, directed by Dr. Sam Okware (see page 105) and advised by Dr. Peter Kataaha, then consultant immunologist in the Department of Paediatrics at Makerere University (see page 95).

The 1987 starting position

The original project was seen as a first phase of a larger programme, and was to rehabilitate the Kampala blood bank building in Nakasero, provide equipment, consumables and recurrent costs, train staff and provide the technical assistance necessary to process the 10,000 units of safe blood annually, sufficient for the Kampala/Entebbe area. As we have seen, the city hospitals had each developed their own blood bank capability, which varied from crisis management to a public appeal for donors plus HIV testing, to maintenance of an emergency stock of blood at all times.

It was at the big teaching hospital, New Mulago with 1800 beds, that the greatest difficulty was experienced in screening for HIV and providing blood in a timely fashion. Policies had evolved that resulted in individual surgeons

and physicians jealously guarding the blood that had been supplied by their patients' relatives. The most seriously affected were the paediatric and obstetric patients, so the first objective was to fill this gap of about 100 units of blood a month. The Nakasero Blood Bank also collected and tested blood given at the hospital by relatives.

Soon it was apparent that the other major hospitals were experiencing difficulty in obtaining blood bags, typing reagents and other consumables. These items were therefore supplied by the blood bank. Three months after starting to collect blood, the NBB was providing all that was needed to supplement relatives' blood donations at Mulago and was able to assist the other hospitals in the same way, at first on request and when possible, but within three months as a matter of routine twice a week.

Within a year everyone had gained enough confidence in the system for every hospital in the area to send all their blood for processing at the Nakasero Blood Bank and had agreed to receive their fair share of the blood that was safe and available. It was this decision to provide blood bank service to all hospitals equally that was later to become the basis of a national blood bank.

The role of the Red Cross

At the 1987 donors meeting previously referred to, it was assumed that the Uganda Red Cross would resume much of its historical importance in recruiting blood donors. Unfortunately times had changed. The middle class and business community, which had been the mainstay of the URCS donor programme before the time of troubles, had become disenchanted with the idea of volunteering to donate and were concerned with the risk to health, psyche and privacy (as they saw it) that blood donation in the era of the AIDS epidemic might entail.

The URCS was unable to finance projects from its own national resources and was therefore dependant upon external funding. Requests were made for external funding for mobilisation and organisation of blood donation, but no funding had been given. So the first major decision was that the Nakasero Blood Bank would have to develop its own donor recruiting team and policies.

The longer-run position became that the Red Cross gave its name and authority to the EC-supported donor recruitment programme carried out by the



Miss Judith Goddard (nearest camera), the current EC technical assistant to the UBTS, on a visit to Nakaseke Hospital, Uganda.

blood bank – a very useful asset – and did have on its staff several experts trained in blood donor recruitment. But these experts were also expected to give their time to other AIDS-related work for which the Uganda Red Cross did manage to raise external funding. So it came about that responsibility for virtually the whole blood transfusion project fell to the EC and the Nakasero blood bank.



Phase One of the Project 1988-1990

by Dr John Watson-Williams

(as we have seen, the Uganda safe blood project was divided into phases, as a matter of policy, with the successful completion of the first phase being the pre-condition of the start of the second phase. In this chapter, the Technical Assistant to the project, Dr John Watson-Williams, describes what he did, and why, in the first phase. In the next chapter, he goes on to phase two)

I arrived in Kampala to take up my duties as technical assistant on September 20 1988. Kampala had changed little since the end of the war. Like the blood bank, plans to rehabilitate the utilities, roads and communications had been made and funded but were only just beginning to be implemented. Housing was scarce, but I had retained the little house in which I had lived whilst a volunteer Red Cross Delegate. This was the gatehouse of a large property on Tank Hill. It was small but had a reliable water supply and a lovely garden, both of which commanded a premium.

The next day I met Dr Peter Kataaha, the Ministry of Health counterpart for the project, and Paul Senyonga, chief technologist of the Nakasero Blood Bank. The state of the building at the top of Nakasero Hill is difficult to describe. The site is beautiful and looks across the city to Lake Victoria some 15 miles away. The building was built in 1920 as the nurses' home and is a very good example of that period of colonial architecture. A wide veranda under wide sloping eaves surrounds the building. The front entrance is flanked by four palm trees about 40 feet in height, and there are equally good specimens of native Ugandan flora in the one acre grounds.

Although maintenance had been neglected, the building itself seemed waterproof and all windows were intact. Unfortunately the verandas had all been enclosed to provide more space and there were two rather broken down wooden buildings to one side which had been used as offices and laboratory respectively. The grounds were strewn with discarded blood bank supplies and equipment and at the rear were four staff quarters occupied by various govern-

ment workers and their large families. The grounds were being cultivated for food for these families and there were flocks of chickens and herds of goat roaming around.

Inside was an incredible sight. The floor was littered with hundreds of needles, broken (and intact) blood bottles, cotton wool, blood filters and the rest. As we moved from room to room we found five blood bank refrigerators, four blood bottle centrifuges, many waterbaths, domestic refrigerators and bench centrifuges. Only one of the domestic refrigerators was still functioning. There were many beautiful solidly constructed mahogany tables and cupboards and chairs and laboratory stools. There was neither power nor water and the telephone was dead. That first day we listed our goals, problems and resources and made a draft timetable of anticipated actions and achievements. Our task, formidable from where we were starting, was to be collecting 10,000 units of blood annually within 20 months.

Fortunately the hospitals were accustomed to managing with an inadequate blood supply and really did not expect our project to be successful and thus were not pressing for action. This allowed us to plan carefully and to tell the hospitals when we were able to assist them, one by one. Obviously we would start with the teaching hospital - New Mulago - which was experiencing the most difficulty.

A plan for blood donors

Accepting the fact that our donors must be volunteers, we would build on the donor base in secondary schools and colleges. The public, and particularly the students, in Uganda had received a barrage of AIDS information. They knew that HIV could be transmitted by blood but they also believed that syringes and needles, for economy sake, had to be reused, so they were frightened.

Moreover, if they gave blood it would be tested for HIV and everyone else would know the result. Even if it could be kept confidential they would be scared to know their own result. After all, a positive result would markedly affect their sex life and chances of marriage as well as meaning eventually a painful death and being shunned by the community.

We had then to develop a plan of education of potential donors, a system that would ensure confidentiality of test results and a method of counselling blood donors when the result was known. The concept in the funded plan was that the Uganda Red Cross would be responsible for the blood donor education, recruitment and follow-up. But the Red Cross had not succeeded in obtaining funds for these purposes (see page 64). This was probably fortunate because it allowed the blood bank to develop policies to meet the need and to avoid the

difficulties that arise when one organisation is responsible for providing donors and another for providing blood. This can mean that there is never a right balance of demand and supply.

The problem of laboratory space

The next problem was, where would we have laboratory space, whilst the Nakasero building was being reconstructed? The contractor, Roko Ltd., estimated that the reconstruction would take twelve months to complete if all the material, much of which was specialised and had to be imported from Europe, arrived on schedule. Dr Kataaha had considered many possible sites and recommended acceptance of an offer by the Chancellor of Makerere University to use the ground floor of the Institute of Public Health building at New Mulago Hospital. This floor had been abandoned because of vandalism and the whole building of four floors was scheduled for rehabilitation within the European Commission Makerere University project.

In the first week of October a meeting was held at the Institute of Public Health with Mr. Sondeburg, for the EC Delegate; the Registrar of Makerere; the Dean of the Medical School; the Makerere project architects; and Roko construction. Initially it was all gloom. There was too much to be done and there was no money to do it. Roko was over extended and the Medical School was worried that they would never be able to get the blood bank out.

Then something wonderful happened! Mr. Sondeburg said he thought the work could be done by Roko within the already approved construction contract. The architect asked what was really needed and we replied that the windows and exterior doors needed replacement and security proofing, the five rooms needed new electrical wiring and the water supply needed to be restored, with the sinks and drainage system repaired. If these things could be done and a coat of white paint applied to interior and exterior, we would be able to function.

The university authorities were willing to accept the proposal and a final decision was made that day to proceed as quickly as possible. The next day the architect and the construction engineer met us to detail specifications and work started within a week and was completed by November 20. Such rapid decision making, co-operation and implementation had not been seen in Uganda for many years. It was a sign of the good will which was to be a characteristic of this entire project.

The problem of staffing

The next problem was staffing. Although the Nakasero Blood Bank had 98 staff on the roster, the majority were seen only once or twice a month when it was believed the Ministry might be paying salaries. The number was much too large. We decided to start immediately a period of six weeks of intensive training and to report non-attenders to the Ministry for reposting. Within three days 37 people had reported and no more were added to our training after that, so none of the others would be allowed to work at the blood bank.

It was essential that those who did remain were able to afford to survive without other work. When the project was first discussed at the European Commission I stressed the need for money to increase salaries, but the EC AIDS Task Force, whilst very supportive of the idea, said that this could not be done within the approved project funds, except that a case could be made for selected senior staff with special skills. This approach was used to provide some financial support to doctors, technicians and other university graduate level staff.

For junior staff the EC Delegate was willing to consider use of counterpart funds. These had to be approved by the Ministry of Health and the Ministry of Finance and the rules could change at any time. But by imaginative use of training, travel, housing and food allowances we were able to secure for each member of staff about three times the scheduled Ministry pay. The counterpart funds were also available for local expenditures essential to the success of the project. These included purchase of office materials, fuel for transport and emergency generator, lunches when staff could not get home and back to work in time, uniforms and donor refreshment.

This was an extremely fortunate arrangement as it required the blood bank to have a local bank account into which the Bank of Uganda would pay the approved funds every three months. In this way the blood bank was isolated from the contingencies of Ministry of Health fluctuation in money and did not have to fight for priority with other concerns and projects.

Yes, the NBB staff did become an elite within the Ministry, but they were also unique in working more than 40 hours a week and outside of normal hours when needed. This flexibility of staff hours is essential if blood donors can only arrange to come to sessions on Sundays or after work, and if crisis management is to be successful during emergencies.

Staff structure and training

The senior staff divided the thirty seven junior staff into;

- laboratory (two senior laboratory attendants and four certified attendants)
- donor staff (three senior and six certified laboratory attendants, six donor aides who had experience but no certification and four clerks)
- and others (two drivers, three watchmen, five cleaners and two gardeners).

For five days a week for six weeks the entire junior staff attended two lectures a day in such general topics as the need for blood transfusion, the blood groups, the safety of blood transfusion, the care of blood, safe working procedures, and personnel policies. The laboratory staff had practical training for four hours a day in blood typing with tube and micro-titre plate technique, ELISA testing, record keeping and quality control.

The donor staff was divided into three teams each with a team leader, two other phlebotomists, one clerk and two donor attendants. Donor teams were trained in the entire process of receiving, interviewing and accepting blood donors, with bleeding technique and care following donation. The URCS employed two donor recruiting staff. One was fully engaged in recruiting from relatives at New Mulago hospital and the other worked in the secondary schools. The NBB assigned two certified laboratory attendants to perform similar work in new locations.

The need for special skills

In addition to the junior staff there was need for additional staff with special skills to perform duties that had not been blood bank responsibilities before. We needed a highly trained and personable person to be in charge of public relations and donor recruitment policies. We needed an incorruptible and well-organised administrator to perform the duties of personnel officer, financial controller and maintenance officer. We planned to rely on computers for record purposes and must therefore find a person able to manage a database and word-processing.

The Ministry staff establishment for the blood bank did not include any such positions, and to change the establishment would take several years. It was therefore necessary to find these skilled persons ourselves, but we had no way to pay them. Luckily my housing allowance was more than I was using and I decided that I would rather spend this than see the project fail at this critical



Screening blood at the Nakasero blood bank, under strict quality control.

stage. The EC Delegate had no objection to my recruiting people to be my personal assistants and agreed that the next project funding (in six months) should include salaries for them.

The donor recruiter/ public relations officer was the first to be found. My wife, Dr Margaret Newmark, had also been a Red Cross Delegate during the period of the feasibility study. She became involved in AIDS education for schools, a project under the auspices of UNICEF. Also on that team was Mrs Sheila Coutinho, who had recently graduated from the school of social sciences at Makerere and was very interested in the blood bank project. I asked her to consider working at NBB and she accepted a six month probationary appointment with the hope that I could organise more secure funding after that time. Mrs Coutinho was very successful in establishing appropriate methods of donor recruitment and training. In February 1990 she left to devote herself full time to a master's degree in social science but was able to recruit a successor.

The next position to be filled was the administrator. I relate this in some detail because I think it is an example of the sort of freedom that a Technical Adviser must have to get such projects going. One Sunday in December I attended my usual parish church, St. Stephen's in Kisugu, and learned that the night before our neighbours, the headquarters of the German Volunteer Doctors organisation, had been broken into and robbed at gunpoint.

I walked over to see if there was any help I could give and found a very shaken German nurse, who was at that time the only occupant of the house. She insisted that she was able to continue to live and work in the house but would like company on a trip she had planned for that afternoon to Luweero triangle where there was a hospital which had received help from the Germans. I was pleased to take this opportunity of seeing Luweero, which had suffered severely during the previous regime's attempts to destroy the NRA.


When we arrived at the hospital we found the doctor had gone to Kampala for a funeral. However his brother was there and was very willing to find other members of staff and to show me around the hospital. He told me that he had just graduated from the school of law at Makerere University. He was wondering how to get started on a career. He was interested in my proposal that he should try working as the blood bank administrator. I explained that the remuneration was small, about \$30 a month and insecure after six months. To my pleasure he came to Mulago three weeks later and said he would like to try. This was how Richard Wejuli-Wabwire started at NBB. He is still the administrator and has proved an excellent executive.

The computer data manager came to us through the good offices of Dr. Olav Muller, the German Red Cross Delegate. He, being a very active and sociable person, had rapidly made friends with many of the well educated skilled young

people in Kampala. Amongst them was Martha who was working in the Registrar's office at Makerere. She was looking for a job that would utilise the skills she learned at computer school and would be better paid. She accepted our terms and started with NBB in February 1989. She rapidly learned our computer system and was essential in our organisation of irrefutable records. She stayed with the blood bank until she left to work for the International Red Cross Committee in June 1991.

Reconstruction of the Nakasero building

The plans were worked on with the architects from July 1987. The original plan was for a two-storey building with classrooms and lecture hall on the lower floor and laboratories and offices on the upper. But the estimated cost was more than the project could provide. Looking back, it is ironic that the objection to this plan was that it was too grandiose and clearly intended by the Ministry of Health to be the headquarters of a national programme rather than to provide a laboratory for the Kampala area. As described earlier, the 1986




Dr. John Watson-Williams at work on his computer at Nakasero.

project assumed that the NBB would have no responsibility for donor recruitment and that blood would be delivered by the URCS for processing and would be collected by the hospital which would use it. Therefore NBB would not need transport. Between July 1987 and February 1988 the plan was revised.

To maintain the special external features of the building the amount of space was limited to 196 square metres. Within this area we would have to provide offices for director, deputy, administrator, donor recruiter, chief technologist, computer records, donor interviewing, donor bleeding, donor recovery, a seminar room and stores area, corridors and toilets, leaving only 54 square metres for the actual laboratory and blood bank.

This forced us to use micro-methods and as much automation as could be achieved. The laboratory was therefore designed as one open space, with a large central workbench that could provide access from both sides and six specified function areas around the periphery that were divided. These special areas were for blood sample reception and distribution, blood typing, Elisa testing, reagent preparation, wash-up, blood labelling and refrigerated blood bank.



President Museveni formally opening the renovated blood bank.



President Museveni being shown round the blood bank by its director, Dr. Peter Kataaha.

Both the chief technologist's office and the donor interview room were fitted as laboratories for possible extension or research.

The floor was laid with washable seamless tiles and the walls were faced with porcelain tiles up to 1.5 metres in height. The bench tops were made from Coram, a synthetic marblelike surface that allowed the whole bench to be cast without any joins and was easy to clean. Distilled water was piped from a central still to every workbench and a large overhead skylight lit the room which was in the centre of the building. All offices and the laboratory work stations were built with conduits for a central computer system.

The exterior of the building was completed to resemble the original building's style with a wide veranda surrounding three sides. The area beneath the building was left unfinished and provided space for stores, an electric generator and a complex electric current surge protection system.

The staff quarters were refurbished and one was used as a store for the outside bleeding teams equipment and for autoclaving, whilst four essential members of staff – driver, security chief, laboratory attendant and store keeper – would occupy the other quarters without family or animals. There was a large shelter that could be used as a staff rest area and for lunches. A vehicle park, behind a security fence, was adjacent to the East side of the building. The entrance was

changed to lead directly off the Nakasero Hill road through about one acre of landscaped garden up to the impressive front entrance steps between four large palm trees.

Development and ground preparation took three months and building started in February 1989 and was complete by March 1990. The architects, contractor and others did an impressive job. The blood bank is attractive and functional and easy to maintain. Staff, donors and visitors all enjoy the special ambience of excellent working conditions and pleasant views.

On May 9 1990 the President of Uganda, His Excellency Yoweri Museveni, opened the Nakasero Blood Bank in the presence of a large number of distinguished visitors, including the EC Delegate and ambassadors of the European Community nations. Thus the commitment made by The European Community at the donor meeting in May 1987 was achieved on time and within budget.

Phase Two: Creation of a National Service 1990–1991

[Successful completion of the first phase of the blood bank project made it acceptable to both government and aid donors to go on to the second phase, the phase of consolidation and extension to blood safety on a national scale. This took the project and its sponsors into new management challenges and new decisions to be taken. After a review of world-wide experience and discussions with the Ministry of Health, it was decided

a) to develop a national blood security policy and strategy, and

b) that the Nakasero Blood Bank would now start playing its full role as a national reference, quality control and training centre.

Satellites would be created in four centres around the country so that those centres could provide blood to the areas around them, but they would be under the general supervision and co-ordination of the national blood service. The expansion scheme needed a more structured approach to management of the blood transfusion services. Dr John Watson-Williams continues his story.]

Early in 1990 the European Commission started to consider the possibility of extending the EC safe blood project to the rest of Uganda. The benefits, and the economies of scale deriving from a central blood bank in Uganda, with decentralised blood donor recruiting and counselling services, had been recognised by the Ministry and the hospital directors.

The public had recognised that the previous unsatisfactory elements in blood donation, namely the risk to health, the lack of confidentiality and the opportunities for corruption, were being addressed in a determined and co-ordinated manner. The middle class was slowly changing its attitude from eschewing the role of a voluntary blood donor to one of interested support.

The EC requested Drs Kataaha and Watson-Williams to make recommendations, cost estimates and implementation goals for a system that would provide safe blood to every hospital in Uganda. The AIDS Control Programme advisory committee had already, in 1988, recommended the development of eight regional blood banks co-ordinating hospital-based blood transfusion services. Basic equipment and supplies for 10,000 blood donations had been requested and were to be provided by a grant from SIDA, the Swedish aid agency.



Kiwoko Hospital, in Luweero, Uganda.

Building upon this background Dr Kataaha and Dr Watson-Williams made the following recommendations;

- a) the NBB would immediately distribute all blood bank supplies and consumables to all hospitals in Uganda
- b) one regional blood bank would be developed in each of the four regions
- c) the regional blood banks would follow the same principles and policies of voluntary blood donation as at Nakasero
- d) as blood donor numbers in each regional blood bank increased, service would be offered to hospitals
- e) complete service could be achieved by December 1993 with a total of 40,000 donations annually

The plan envisaged that hospitals would continue to collect blood from donors to replace what had been used, and would still be able, if absolutely necessary in an emergency, to do blood grouping and anti-HIV screening, and use the blood, without NBB evaluation. But the main aim was that normally all blood, from replacement donors as well as from a voluntary donor, would be tested at the regional blood bank.

Role of other donors

This proposal was approved by the EC AIDS Task Force in July 1990 and the financial decision was taken in June 1991. There was a lot of preparation to be done if the project was to go ahead from that date. Some of this preparation had already been done, namely;

- a) the AIDS Control Programme supplies, funded by SIDA, were expected in June 1990 and would be distributed from the Nakasero Blood Bank
- b) the Danielle Mitterrand foundation had agreed to provide equipment (refrigerator, Elisa reader and washer, centrifuges etc) and one year's supplies such as test kits, as specified by the NBB, for the South Western Regional blood bank at Mbarara, the first of the regional blood banks. This assistance would include funds from the French Embassy in Uganda for the rehabilitation of the two rooms which had been made available by the hospital laboratory. The interest of Madame Mitterrand, wife of the then French President, had been aroused during a visit to Uganda in early 1991. Madame Mitterrand returned to Uganda to commission this regional blood bank in March 1992
- c) the East African Development Bank had agreed to lend funds for the rehabilitation of a major part of the Mbale General Hospital, including the construction of a new laboratory, and two rooms of this would be available for the Eastern Region blood bank.
- d) the German technical aid agency, GTZ, had been working at Fort Portal and planned to rehabilitate a five-room suite for use as a blood bank for the Western Region.

Staff recruitment

The major challenge was to recruit and train staff for the four regional blood banks. The Uganda Red Cross Society agreed to recruit blood donor recruiters but would have no funds for their support until 1991 at the earliest. Once again the Carnegie Corporation of New York provided \$25,000 via the American Red Cross to the URCS for the training of one doctor, one donor recruiter and one technologist for each of the four regional blood banks. The grant was provided in August 1990.

The URCS was able to recruit one donor recruiter for each of the West, South-west and East regions and the general hospitals at Mbale, and Gulu

agreed to provide a technologist. Doctors for the four regions were selected by the Ministry of Health, and Mbarara University provided a technologist for the South-west. The training programme consisted of three months of intensive teaching at Nakasero, followed by seven months in-service training in each of the regions. This meant that their remuneration could come from the Carnegie grant until the EC funding was available. The training went well and at the end of the three months there was a team for North, South-west and East. The doctor for the West Region had accepted a post in a mission hospital and so this region had no staff.

Regional Blood Banks

a) South-west

Dr Dennis Mperweire rapidly developed a complete team of assistants and soon started to provide blood for the Mbarara University Hospital. The URCS regional officer had a motor cycle and kindly carried the donor recruiter when he travelled out of Mbarara. Thus George, the URCS donor recruiter, was able to recruit voluntary donors from a wide area and with the use of a vehicle loaned by the University hospital or local industry the South-west blood bank was able to collect blood from more than 200 donors a month. For the first three months all blood was tested both in Mbarara and in Nakasero. When five hundred consecutive samples had been tested without discrepant results the regional laboratory became independent. In November 1991 a Volkswagen bus was provided and from then on this regional blood bank was able to supply all 13 hospitals in the area.

b) East

Dr Benjamin Wabwire and his team had to operate at first within the old laboratory at Mbale general hospital. They also occupied as an office and store a shed used previously by TASO as a store. The roof leaked and security was very dubious. But they persevered. An abandoned Volkswagen bus was reconditioned and although it never was completely reliable it did enable this team to collect voluntary blood donors from other nearby towns and so supply the major hospitals in the area.


Other hospitals, such as the mission hospital at Nebbi, were able to come every week and deliver unsorted blood in return for screened blood. One of the more distant hospitals, in an area where terrorist activity was common, was

served by hiring a motor cyclist to do a weekly run. In November 1991 the new laboratory was completed.

c) North

Gulu general hospital provided two rooms which needed major reconstruction. Soon after this was completed security in the region deteriorated and the laboratory was broken into and from then on was not usable. That, and other matters, led Dr Samuel Uringtho to concentrate on providing service to the West Nile region. In effect the North region is divided into two by the Nile river and the crossing points, at the North and South end, became the focus for insurgents and bandits. This made it necessary for Dr Uringtho to travel to each of his areas via Kampala.

Italian medical aid had its headquarters at Arua general hospital. There, a new laboratory was being completed and the blood bank was offered three rooms in the old laboratory building. Dr Uringtho rapidly organised large numbers of voluntary blood donors but until late 1991 was unable to test them locally. The blood was therefore sent to Kampala by public bus and processed. Already tested units of blood were supplied either by bus or by air to Arua.



Families of patients wait in the grounds of Kivoko Hospital.

From there they were distributed to the eight hospitals in the West Nile area.

d) West

There was no team and no progress until October 1992, when Dr Paul Mainuke offered to work in this regional blood bank. He recruited a technologist and a physician's assistant who would become the donor recruiter and this team of three were trained in Kampala during the next six weeks. Immediately on their return to Fort Portal they were successful in organising a good blood bank and supplying all six hospitals in that region with blood from volunteer donors.

Voluntary testing for HIV

On top of the regional blood banks, there arrived a new project that was not in the original specifications. In February 1989, Dr Olav Muller, the delegate from the German Red Cross to the URCS, proposed a plan to provide HIV testing to healthy people who requested it. He obtained the support of the AIDS Control Programme and, in 1990, got funding from two sources, Action Aid and USAID, which was directed through Experiment in International Living (EIL) of Uganda.

The plan was to create an AIDS Information Centre (AIC) in Kampala (see page 53). The centre would provide counselling and arrange for testing, if requested, and do post-test counselling and follow-up for 10,000 clients. The ACP agreed to provide the test kits and the NBB agreed to do the testing. The NBB provided a laboratory attendant to take the blood into a vacutainer.

For the cost of staff, use of laboratory and computer equipment and the records system, the NBB would be paid a fixed fee per client which included confirmation testing of a new sample if required. About half of the fee was for staff remuneration and allowed the NBB to divide this among all staff to provide a wage above survival level. The NBB was permitted to open a foreign exchange bank account and the other half of the fee was deposited into this to pay for imported vacutainers, needles and tubes.

The testing started in March 1990 and the first 10,000 had been done by May 1991. Since then, the total has reached around 200,000. This expanding demand from the AIDS Information Centre came at the same time as the NBB was extending to a national service. The additional laboratory workload

Screening and testing of blood at the Nakasero blood bank.

made it necessary to automate the blood testing procedures, including the sample dispensing, and improve computer capacity.

The EC Aids Task Force, as part of the expanded programme, was able to provide a technical assistant with experience in laboratory computerisation, Lou Dierick. He advised the purchase of a Compaq 3000 desk top computer with a 386 processor and a 300 megabyte hard disc and 8 megabytes of RAM (random access memory). He came to Uganda in November 1991, after all the equipment had been delivered, and using UNIX and MUMPS (Multiple User Medical Programme System) software, provided the blood bank with a state-of-the-art system with which all the samplers and readers were connected directly to the computer data base.

The system automatically determined reliability data for quality control and generated reports that could be printed on adhesive labels for delivery to the AIC. This made falsification of reports impossible. In two subsequent missions Lou Dierick was able to remove all glitches that occurred and make the system even more reliable.

This opportunity to provide tests on a contract basis was of great importance to the NBB. It allowed the NBB to provide continued salary support to all staff and salary increases to keep pace with the rise in the cost of living. The ability

to accumulate a reserve of both local and foreign currency was invaluable when it came to having to make instrument repairs or replacement and to pay for water, electrical and telephone service when the Ministry of Health suddenly found itself without resources and so the utility companies cut off supplies.

Supervision and quality control

The plan for blood transfusion in Uganda included the establishing of quality control and supervision of the hospital blood banks. The World Health Organisation provided a senior technologist, a vehicle and driver, and the cost of travel within Uganda. The technologist, Judith Goddard, arrived in Uganda in October 1991 and was posted to the Nakasero Blood Bank.

She was able to make regular visits to the South-west and the East regional blood banks and help them in their early performance. She helped to plan and to lead two courses in blood transfusion medicine for one doctor, one nurse and one technician from every hospital in the East and central regions and to attend a five day course held in Mbale in April 1991. A similar course was held

in 1992 at Mbarara under the aegis of the Danielle Mitterrand Foundation. So, in brief, the elements of Phase Two, the creation of a national and sustainable blood transfusion service for the whole of Uganda, with its more complex management, funding and logistics, were put into place by the end of 1991. Since then, the project has entered what is in effect Phase Three, the phase of consolidation and analysis of the lessons learnt.

Section Four

**EVALUATION:
THE VIEW FROM KAMPALA**

The costs and benefits of safe blood in Uganda

A. The costs

1. Total support given

For the ten years from the start of the programme in 1988 to the end of its present commitment in 1998, the European Communities will have budgeted over ECU 7.6 million for support of Uganda's safe blood programme, or roughly US\$ 10 million – so averaging about US\$ 1 million a year, which is pretty much what the UBTS cost to run both in 1993 and in 1994. In addition, the government of Uganda is to contribute up to ECU 1.1 million over the 1993–1998 period, on a rising scale. What does Uganda get, and what does the EC achieve, for that money?

2. Units of safe blood

In 1993, around 32,000 units of blood were collected, and over 26,000 units were actually used (that is, transfused). In 1994 those totals went up again, to 37,000 units of blood collected and over 30,000 units transfused to roughly that same number of people. So in both years, well over 80 per cent of the blood collected was put to good use, and many thousands of people have benefited from it, whatever their reason for being in hospital.

3. Cost of safe blood

Using these figures, we can say that the current cost of safe blood in Uganda, in 1995, works out at about US\$ 27–29 for each unit of blood collected, and about US\$ 33–35 for each unit of blood used. This means that since the first full year of operation in 1989, the cost per unit of blood has been halved. Nearly six times more blood is being collected than in that first year, but total costs have gone up only two-and-a-half times. So by these yardsticks there has been a substantial increase in productivity and efficiency. These costs are also more favourable than comparable figures reported from elsewhere in Africa.

4. Cost-effectiveness

Because the overall benefit of safe blood goes well beyond the prevention of HIV/AIDS and embraces the saving of lives that are in danger from whatever cause, a study of cost-effectiveness was carried out in 1994. For this purpose, all costs were taken into account, including the costs of recruiting and counselling blood donors. Certain assumptions were made:

- 33 per cent of patients die, even with a blood transfusion
- 50 per cent of patients would die without a transfusion
- the general rate of HIV infection in the adult population is 25 per cent
- 6.3 per cent are HbsAg positive

On this basis, it was calculated that the costs were:

- for each life saved, US\$ 148
- for each HIV infection by blood transfusion that has been prevented, US\$ 172
- for each Hepatitis B infection by blood transfusion that has been prevented, US\$ 271.

The study concluded that US\$ 148 per prevented death was cost-effective health care, and that US\$ 172 per prevented HIV infection could be the most cost-effective intervention in the field of AIDS control.

B. The benefits to HIV prevention

A recent (1995) formal evaluation report on the UBTS calculates that about 7,200 people would have been given HIV-infected blood in 1994 if the UBTS blood screening programme had not existed. However, a certain proportion of these would have been already infected by the HIV virus, given the high prevalence of HIV in the Uganda population. So the report suggests that a net total of about 5,400 *new* HIV infections were prevented by only using blood which had been screened for HIV. Of the 5,400, the larger number are children. Adults number 2160.

How significant is this figure of 5,400 prevented HIV infections when set against the larger picture of the total AIDS control effort in Uganda? Here

again, the 1995 UBTS evaluation report has some interesting comparisons. Taking some recent figures worked out by a research project in the Masaka district of Uganda (see page 52), and extrapolating them to the rest of Uganda, the report calculates that during the 1990s there may have been a reduction of 21,000 cases a year in the number of HIV transmissions among the sexually active or adult population. Of these, as we have seen above, 2160 – or about 10 per cent – are probably due to the safe blood programme. So it is fair to conclude that the UBTS has made a substantial contribution to reducing the spread of HIV in Uganda among adults, quite apart from the number of children who have been spared HIV infection through infected blood. Put another way, the total of HIV infections prevented every year by using safe blood, at 5,400 if you include both adults and children, compares very well with the estimate of about 18,800 HIV infections (21,000 minus 2160) prevented each year by other means such as changes in sexual behaviour or a natural decrease in sero-incidence.

C. Some other benefits

Another benefit gained for the expenditure is the public education that results from 60,000 people a year attending talks given by UBTS blood donor recruitment officers. An additional benefit to Uganda is the 75,000 or so HIV tests that the blood bank carries out each year on clients of the AIDS Information Centre (see page 53), so earning fees that contribute over 20 per cent to the UBTS's recurrent local currency budget.

The UBTS has also provided continuing support to over 2,000 young men and women in the 'safe blood clubs' which have been set up: has demonstrated to the people of Uganda that they have both the human and the government will and resources to develop an internationally acclaimed technical programme: has trained over 400 health care workers and students in the special skills of blood transfusion medicine: and is playing a significant role in national and international AIDS research.

Overall therefore, the UBTS has produced tangible, varied and measurable results for the country. But perhaps nothing can be quite as blunt and emotive as the final verdict of the 1995 evaluation report:

'the national blood supply is safe'

(See Table over page)

Table 1. Costs of UBTS (ECU X 1,000) by year 1989-1994

Item	1989	1990	1991	1992	1993	1994
Staff	34	41	78	128	158	229
Training	65	73	71	148	80	75
Transport	10	33	37	62	80	119
Supplies	199	220	245	300	280	249
Admin.	3	17	19	24	23	25
Building	0	31	31	38	37	37
Equipment	15	45	71	73	75	81
Total	326	460	552	773	733	815
Blood collected	6588	13806	18392	29104	30026	37967
Blood units given	5866	9996	14325	23852	24082	31017
ECU/Unit given	55.5	46	38.5	32.4	30.5	26.3

Source: Dr John Watson-Williams calculations

Chapter Eight

Interview with Dr Peter Kataaha, Director, Uganda Blood Transfusion Service

Questions put by Rex Winsbury

RW: How did you come to be involved in the UBTS?

PK: I trained in paediatrics and immunology, both in Uganda and in the UK, and when I returned to Uganda in February 1986 I found that they had this AIDS problem, and that the international donors were willing to assist Uganda. One of the problems was that people were being transfused with untested blood and HIV was being transmitted through that. Most of our blood, over 50 per cent, is given to children. I was placed in the department of paediatrics, so this was of great concern to us.

At that time there were not many people, if any, that had the skills to test blood for HIV. Because I had done immunology and I could test blood or adapt certain tests to suit our environment, I was asked to set up a testing facility and initially I had to test blood for the hospitals of Kampala single-handed because I didn't even have a technician.

Some donors based here, members of the British Embassy and the British community in Uganda, offered HIV testing equipment. So then I had to train technicians and supervise them. Initially I thought it was going to be just setting up a testing unit, but eventually it turned out that I had to take on more responsibility.

RW: What is the staffing of the UBTS and what are their skills?

PK: We have 126 people working for UBTS across the country. There are six doctors including myself, senior technicians, technicians and nurses, and then administrators and other support staff. At the headquarters here in Nakasero there are two doctors, and we have four regional centres, each headed by a doctor.


Here at Nakasero there's also an administrator, someone in charge of public relations and donor recruitment, a chief technician and a senior nursing sister. We have a data manager, and five senior technologists and then there are technicians, laboratory assistants, nurses, data entry clerks, one secretary and other support staff.

RW: *The UBTS, or at first the Nakasero Blood Bank, got going fairly quickly and reached its present level of activity fairly quickly compared to other aid projects. What factors contributed to this speedy development?*

PK: There had been a very good blood transfusion programme in Uganda, which broke down. But there were still people in society who were willing to donate blood. That's point one. Point two, when we started, because of the gravity of the AIDS epidemic, many members of the public knew that those who were not infected by HIV had to donate blood in order to save other people. Everybody was aware that it was bad to transfuse infected blood. So many people were eager to help.

Point three, we started with a generous donation from the EC, administered by its AIDS Task Force. One very fortunate thing about this funding was that there was not much bureaucracy. For the ministry to bring in supplies could probably take 3 months or 6 months. But in this case, when we put our needs down on paper, the things came in pretty fast. So this minimum of red tape and bureaucracy made things move much faster.

We were also fortunate to have an experienced technical assistant, Dr Watson-Williams, who had experience as a haematologist, had worked in Africa, knew



Dr. Peter Kataaha (right) with NBB vehicle and driver.

the problems, and had the trust of the AIDS Task Force, so if he said we needed this, they knew we needed this and they would send it immediately. So it was a combination of factors, in a desperate situation.

RW: The project moved from phase one to phase two, from being restricted to the capital Kampala to a full national system. What enabled it to develop that far and be fully accepted as part of the medical scene in Uganda?

PK: When we started here in Kampala, in phase one we were supposed to provide 10,000 units of safe blood and this was achieved well within time. Initially, a lot of funding agencies had withdrawn from funding blood transfusion because they thought it wouldn't work, and some people brought in facilities which were not well used so others shied away and said it couldn't work. When phase one worked and we did it within time and demonstrated that it was cost-effective and there was an obvious need that it should be extended across the country, the EC said it was willing to provide funds to extend to the four regional centres during the second phase. So the success of phase one was crucial in giving us further funding for the second phase.

RW: If someone says to you, how do you measure your success, what do you say?

PK: It's not easy to measure cost effectiveness. But we started from zero. Then in the first year we provided 10,000 units of blood, then 20,000 the next year, and now five years later we are providing close to 40,000 units of blood. We have 92 hospitals in the country, and we are reaching every hospital with safe blood. This means we are preventing HIV infections and hepatitis infections through safe blood transfusions.

When we started testing blood for transfusion, HIV seroprevalence in blood for transfusion was 25 per cent. Now 25 per cent of 10,000 units is 2,500. If you imagine that in a year the Ugandan medical services could have infected 2,500 people with HIV, most of them children, and if they were adults they would infect their spouses and their spouses would infect others, you realise that through blood transfusion alone we might have caused more catastrophe than even sexual transmission or anything else. So realising what HIV infections we have stopped through blood transfusion is one demonstration that it has been worth it.

But also we've been able to provide blood to children who would otherwise have died. Probably half of the children who were transfused would have died. We saved women in childbirth and people who have had motor accidents. Because of the economics of numbers, when we started, each unit of safe

blood we supplied cost us over US\$ 60, that is including technical assistance, but now it has come down to nearer US\$ 30. So we are reducing the cost per unit and are providing a wider service.

In addition, we do health education, because every time we take blood from first-time donors we give health education talks. Usually only 10 per cent of the people we talk to, actually give blood. So for example if we take blood from 20,000 people, that means we have educated 200,000 and in fact the programme could claim to have educated a lot more people than most AIDS programmes. So that is a spin-off.

RW: Is this level of 40,000 units of blood a year likely to be stable from now on?

PK: It has been estimated that probably we need about 35,000 units of blood a year. We look at demand from the hospitals and at how much outdates. So you can only get a rough estimate. The amount of blood that the medical service needs depends on the level of development of the medical service in the country. If they are doing heart surgery or need certain blood components, they need more blood. From now on we shall be driven by the needs of those people. If they need more, we will supply more.

But we need to do more development centred on improving our quality, because certain groups of donors are better than others. For example, HIV seroprevalence is much less among schools than it is among the general public. Repeating blood donors, people who have donated blood more than 3 times, are much safer than first-time blood donors. So whereas you can work hard and get numbers, you then have to say, where am I getting my blood from?

So what we are working on now is to make sure that most of the blood we get is from volunteer donors, volunteer repeating donors, because that is much safer. We have done a pilot study which shows that whereas HIV in Kampala is about 25 per cent or more, if you take blood from repeating blood donors, who we organise into blood donor clubs, the HIV seroprevalence is less than 0.1 per cent, which is very, very low for Africa. So our vision is that we should build up across the country a panel of repeating blood donors, people who know they are HIV-free and have a sense of responsibility to the community.

RW: What other improvements would you like to see?

PK: I want to see the blood transfusion service improve its responsibility to the blood donors, its care for the blood donors, write back to them and say thank you for what you've done and keep up a dialogue. I want to see the blood

transfusion service develop into a source of pride for the blood donor. There are a lot of other things which can be bought for money, but this kind of service should be developed and cultured into a programme which you just can't buy with money overnight.

We also want to see an employment structure for the Uganda Blood Transfusion Service which will be permanent. When I started with a chief technician there was no structure. Since then the Ministry of Health has been very co-operative in keeping people in their positions, but we have asked the Ministry of Public Service to allow us to put a formal job structure in place and have people officially appointed to these positions so that there is more job security.

Also, we recently started a training programme for our staff. I want to see this continue so that in 3 or 4 years time we have trained people in all these positions and can be sure that we have a strong programme.

RW: *What are the main problems you have in keeping this programme going?*

PK: One of the problems is that the AIDS epidemic still frightens away a lot of would-be blood donors. Another problem is that although we have generous

funding from the EC, the money is never enough. The Ministry of Health is supposed to contribute a certain amount of money, but even when it is written into the budget it is not necessarily forthcoming. That puts a strain on our funding and at the moment for example we have ageing machines and ageing vehicles and so on. These need to be replaced as soon as possible.

RW: Physical transport must be a big problem in a country like Uganda. You have been using, for example, air transport through the Mission Aviation Fellowship [see box on page 103] but normally the public bus or taxi services: and you are looking at using the Post Office delivery vans.

PK: Yes. We thought that the bus would cut down costs. Instead of sending a Landrover 300 km away for 2 or 3 or 5 units of blood, we just put them in a cold box with a thermometer which records the temperature and put the box on a bus. We have tested this system to see whether or not the blood will arrive in a good state. We ring or send a radio call to the hospital needing the blood and when the bus arrives they take off the blood. Our bus transport has been very good. They don't tamper with the blood. Maybe they fear that they will get problems if they do. So that is much cheaper than sending a Landrover there, with driver, fuel, maintenance and so on.

RW: So are you able to guarantee that blood will be delivered, even to a remote hospital?

PK: Yes. We have been doing this for over three years now, and blood has been misdirected on very, very few occasions. Surprisingly.

RW: So what would your normal response time be?

PK: Some areas like Mbarara are well served by transport and are three and a half hours drive away. If they wanted blood and rang us and we had the blood, they would get it within five hours. To some areas which are more remote it may take up to 12 hours.

RW: So in 12 hours you reckon to supply most places.

PK: Yes. But sometimes 12 hours may be too long. For example, someone who has had a road accident needs blood there and then. So we've got systems to cope, first of all by having regional centres that cut down on the number of people having to come to the central Nakasero Blood Bank. Sometimes people can ride a bicycle, jump on a bus or even hire vehicles and get blood from their regional centre. That cuts down the response time.

But also in remote places we've got rapid testing kits which are used only in dire emergencies. If a doctor there knows that a patient must be transfused within the next hour or so, he can take blood from relatives, test it and transfuse it. We don't recommend this method be used all the time, because it can cause problems and the quality of service can deteriorate. But in dire emergencies this is a back-up to our main service.

RW: *What is the importance of your research project?*

PK: We are working on the prevention of maternal HIV transmission from mother to child using immunoglobulin from HIV infected people. The blood bank collects the plasma which we ship to Stockholm to be processed. The technicians and others taking part in the project earn money for the staff and this supplements the staff allowances. We probably earn over US\$ 20,000 a year on this project. To some people that may sound a small amount, but US\$ 20,000 for our staff, plus what we earn from the AIDS Information Centre [see box – ed.] keeps us going.

So one of the other reasons for the research is staff motivation. Most members of staff used to spend a lot of their time trying to supplement their salaries, therefore they had less time for official work. So by supplementing salaries

ourselves, it means that they can concentrate on work and do things well. We still do not pay as much as some projects do, but our staff understand.

RW: There are people who say that in theory there should be safe blood everywhere, for everybody, but in a poor country with a very low health budget this is not the correct priority, compared to other things that could be done in the health field.

PK: Blood transfusion is not more expensive than most treatments. For example, treating a child for pneumonia or meningitis may cost as much as a blood transfusion, because a unit of blood is now down to about US\$ 30. When you realise that one has saved a life, and may have prevented HIV infection in the recipient, then you see that this money has been used wisely. And if you compare that cost with an admission of perhaps ten days to a hospital, with the patient getting antibiotics and nursing care and other hospital costs, say for meningitis, then you realise that blood transfusion is not as expensive as other treatments.

RW: When you get visitors who don't have a blood transfusion service, or have one that is fragmented, what are the main things you tell them it is important to do?

PK: We started in a small way with something we could manage and then we expanded gradually. I think it is important to do it like that, in phases. You start with a small number of staff, well trained, well educated. You get the backing of the funders and the administrators who can very easily ruin the whole thing if they don't support you. When you have got that far, move. Then you have to do things methodically. Like central purchasing, which makes things cheaper and secures your supply lines. Then you must train your staff. Also, any project must have clear objectives, so you must set your goals and work out how to get there.

Flying to the rescue

The complex jigsaw of activities that go to make up the Uganda Blood Transfusion Service could not have been completed without MAF, the Mission Aviation Fellowship. It is MAF that enables the UBTS to be a truly national service, by flying supplies of clean blood to remote parts of Uganda, particularly in the North, which are otherwise inaccessible, either because the roads are poor and the journey too long for the blood to survive in a usable state, or because it is the height of the rainy season, or because the roads are unsafe for travellers due to intermittent civil unrest and banditry. MAF flies out screened blood and brings back blood for screening.

MAF is an extraordinary organisation in its own right. It was started at the end of World War Two by British ex-bomber pilots who were Christians and anxious to put their flying skills to humanitarian use. So the year 1995 saw the celebration of MAF's fiftieth anniversary. MAF Europe, based in Folkestone, UK, runs aviation services over most of East Africa, including Kenya, Tanzania, Ethiopia, Chad and Uganda. MAF USA is based in Zaire, operating over Western Africa. There is also a MAF Australia. World-wide, MAF has over 170 aircraft.

In Uganda, MAF operates with 5 Cessna aircraft and six pilots, serving the more distant churches, mission hospitals and aid projects, carrying both people and supplies (and mail). For these places, it is a literal lifeline. MAF has a seaplane (or floatplane) to service the Lake Victoria islands or lake-shore projects, as well as the normal land-based aircraft.

MAF not only supports the churches in their evangelical work and the UBTS and other medical activities, but also work in agriculture, water engineering, education, famine relief, refugees, and medical evacuation of the sick or wounded on stretchers. It is financed partly by Christian churches and other donations, partly by money it receives from aid agencies for specific projects, and partly by charges to its users and passengers.

One characteristic of MAF is that it works to strict safety and maintenance standards, and has the most up-to-date radio and navigation systems. It also builds the actual airstrips at hospitals. In Uganda, operating from the main Entebbe airport, it has never had an accident.



Interview with Dr Samuel Okware, health commissioner at the Uganda Ministry of Health and former director of the Uganda AIDS Control Programme

Questions put by Rex Winsbury

RW: There is some controversy about priorities in health. When money is limited, as it is for everybody, is a blood transfusion service worth the expense? It's not cheap.

SO: Blood transfusion is absolutely, absolutely a priority, because it is the only area where we can actually control the epidemic 100 per cent. Once you have a safe blood supply then you are sure that there will be no infection. So there is no question of having second thoughts about that. But over and above that we must continue with IEC, health promotion, and ensuring that behaviour changes constantly.

RW: Turning to the AIDS Information Centre (see box on page 53) and the concept of mass voluntary testing – there's some controversy about that also. The WHO so far has not formally recommended large scale anonymous voluntary testing as one way of combating AIDS. Your centre here in Uganda is not the only one of its kind, but it is one of the best examples. Do you feel the AIC also makes a valuable contribution?

SO: I think it has been a valuable contribution. Why? First of all, people want to know their serostatus before they take certain decisions. Second, it gives an important opportunity for counselling those people who are spreading the infection or who are likely to get infected. Thirdly, the seropositivity among blood donors in Kampala, and the blood taken and then discarded because it is infected, has actually gone down. This was a collateral advantage that we had not expected.

RW: There is debate about the extent to which a blood transfusion service should be centrally organised, with a very strong centre as you have here in Uganda.

SO: With a disease like AIDS, the central aspects of the problem must be very strong. Why? First of all, you need to make sure that quality assurance is important and, two, make sure there is always a reserve stock, and third, it needs a lot of

input initially which the units on the periphery cannot cope with. So it's better to get a centralised system which ensures that blood can be received when wanted, and wholesome blood. At the beginning we had an experience of having it done by each hospital but then we found out that because of the poor facilities available at these small units the tests left a lot to be desired. So it was necessary for us to centralise the blood transfusion and then make sure they improved transportation for the collection of this blood and also distribution.

RW: You were the director of the AIDS control programme in those early days. So you watched the UBTS develop from the beginning. What factors would you pick out to explain why the blood transfusion service got going very quickly.

SO: I think the major reasons were, one, the fear and the whole momentum of the AIDS problem. Secondly, there was nothing before, really nothing. The Nakasero building has been disused and was overgrown and there were no facilities at that time. Thirdly, there was the issue of management. I think Dr Watson-Williams ought to be congratulated. He did a tremendous job. It was through his force that we were able to put up that facility. And lastly, we obviously needed money, and we were lucky, money at that time was available for the blood transfusion service in this country and I think it was properly applied and that has been sustained.

RW: The structure of the health service in Uganda is now going through reform. Essentially, de-centralisation. Some people say, how can you have a centralised blood transfusion service if the general structure is being pushed down to the districts.

SO: The overall activities, planning, and so on, are done in the district. Fine. But the hospitals still remain the property of the Ministry of Health. So by having all the hospitals in the Ministry of Health we will be able to make sure that there is quality assurance for drugs, quality assurance for blood, quality assurance for staff and personnel in terms of qualification, training and so on. The local authorities have got their own mandate, their mandate is to do the planning at their level. But we are working very, very closely together. What is happening is that the management has been shifted from this end to the other end. That's number one.

Number two is that blood transfusion is a central project, just like there are some development projects which are centrally organised which are cheaper to handle centralised. It is not even a Ministry of Health activity. The blood bank is a sort of a quasi-NGO. So it can stand the test of time.

RW: *There is much debate whether a project like the blood transfusion service will always need exterior financial support, or whether it's realistic to suppose that the government of Uganda, or any other government in Africa, should or could aim to take over the full responsibility for it after a period of time.*

SO: Without AIDS, yes, the government could take over, but with the AIDS problem as it is right now and because of the costs that are involved, I think we will need some support from outside for some time, because the cost of the blood tests is very high. If you had to put that cost in the central budget among competing priorities, you might find that the blood bank would take 10 to 20 per cent of the budget. So I think in the long run the government

will take over. But in the short run there is a need for international support.

RW: If people from other countries ask you about your blood transfusion service because they don't have one themselves, what would be the main advice you would give to them?

SO: The first question is, who should organise the blood transfusion service? Those who are nearest the problem should be the ones who provide the know-how, like the Ministry of Health, which has a vested interest in ensuring that blood is wholesome. So it is important to tie a blood transfusion service in with a government agency, maybe a ministry, so there is accountability, both political accountability and technical accountability. If you make it into an NGO, sometimes it can easily go into outer space and get lost. Of course it is important for everyone to be involved, but you must have a Ministry and you must have a Minister who is accountable.

Number two, it is very urgent that they must set up the service as quickly as possible. But how should the whole thing be started? I think the best way to start is to strengthen a central point, because quality assurance is very important. There is no point in testing blood when you know very well that half of it is not accurately tested. So quality assurance, starting from the central level going downward, is where you start from. I know that with most activities, the ideal is to start from the bottom working upwards. But with this one, you start with a good tertiary institution at the centre, and then work downwards.

RW: How would you sum up the benefits of the rehabilitation of the UBTS to the health care system in Uganda?

SO: First, it has helped to strengthen the health care infrastructure at both central and district levels. Strengthening the blood bank in this integrated way means that hospitals have benefited by having their laboratories updated and equiped. Second, this has promoted general protective measures for infection control. Third, the operational level courses conducted by the UBTS have provided additional training for health care workers.

RW: So what is your general verdict?

SO: The UBTS is perhaps the most successful of our development projects so far. The budget has been modest, and a lot has been achieved. Quality Assurance has been prominent in all its activities. This was possible because of dedicated leadership from Dr Watson-Williams and his counterparts. There was

a detailed plan with specific targets right from the beginning. Regular evaluations have greatly assisted in assessing and improving progress.

Section Five

**KEY ISSUES IN BLOOD TRANSFUSION:
THE UGANDA EXPERIENCE**

The search for safer blood and the drive for voluntary, unpaid blood donors

By Dr Peter Kataaha, Director of the Uganda Blood Transfusion Service, and Dr John Watson-Williams, former Technical Assistant to the UBTS

Blood donor recruitment as we know it today is new to the Uganda Blood Transfusion Service. Whereas in the past it was acceptable to take blood from any donor, the current situation entails the notion of a 'safe donor', bearing in mind HIV, hepatitis and other infections. The main objective is to recruit enough safe blood donors. So the programme is designed to identify these 'safe blood donors'. It includes, as a key item, recruitment of voluntary, altruistic donors.

Such individuals should be at low risk for HIV infection. The process involves educating blood donors before they make up their minds to donate blood (pre-donation counselling). During these sessions the would-be blood donor is given facts concerning the need for blood transfusion and the reasons why people should give blood to save lives. This education should enable them to identify risk factors in their lives, if any, and help them make a decision whether to withdraw from blood donation or not.

Encouragement of repeating donors is of vital importance. Repeating donors are those who have been identified as HIV and hepatitis free, have attended health education talks several times, are highly motivated to keep donating blood, and value the responsibility they have chosen for the sake of their communities.

There are four regional and one subsidiary blood banks in the country, and at each one of these there is a blood donor recruiter. There are six donor recruiters at the Nakasero Blood Bank. Six of the donor recruiters are employed by the Uganda Red Cross while the rest are employed by the Blood Transfusion project itself. Two of the eleven are medical assistants while the rest are university graduates in social services. They have all received additional training in blood donor recruitment at the Nakasero Blood Bank and some have been to Harare, Zimbabwe, for further training.

Seroprevalence trends in donor recruitment

The numbers of blood units obtained from these voluntary donors has continued to go up. In 1993, out of a total collection of 30,217 units of blood, 17,127 were obtained from voluntary donors who were recruited by this programme. The number of such units rose to 18,139 in 1994.

The HIV seroprevalence rate among these donors was 5.3 per cent in 1993, and came down to 3.9 per cent in 1994. This downward trend in the HIV seroprevalence has been going on since the inception of this programme in 1989, when it stood at 14 per cent among the volunteer blood donors used at that time.

HIV seroprevalence among replacement/relative donors has also been going down. In 1993 it was 13.1 per cent and in 1994 10.1 per cent. In 1989 the seroprevalence in relative donors was 24 per cent.

But the important point is that the comparison of the HIV seroprevalence rate among voluntary donors as against relatives who give blood i.e. 3.9 per cent versus 10.1 per cent, clearly demonstrates the value of active blood donor recruitment.

The trend in HBsAg seroprevalence has shown a similar pattern. HBsAg among volunteer donors is lower than among relatives who become blood donors, again demonstrating the relative safety associated with recruited volunteer blood donors (see table on page 116).

A further advantage of volunteer donor recruitment is the availability of a pool of donors whose HIV status is fairly predictable. From this pool, blood can be taken into quadruple bags which, after screening, can be divided into smaller bags for paediatric transfusions. From the same group blood can be taken for the preparation of platelets.

Also, during an emergency or when blood from a rare blood group e.g. Rhesus negative, is needed, donors from this pool can be called upon at short notice to donate.

Costs of relatives versus volunteers

Initially, a unit of blood obtained from a relative blood donor is slightly cheaper than a unit from a volunteer donor, but after tests are done and blood infected by HIV or hepatitis is discarded, then blood from relative donors becomes more expensive due to the wastage.

A blood donor gives blood at the Nakasero blood bank.

Moreover, one can obtain more than one component from blood taken from volunteer donors, which makes it good value for the money used to recruit these donors. Figures for 1994, for example, show that of all the blood discarded, 64.4 per cent was from relative donors (see table again).

Table. Characteristics of blood units obtained from volunteer (V) and relative (R) donors, 1993 and 1994.

Year	Numbers		HIV		Hep		Discard	
	V	R	V (%)	R (%)	V (%)	R (%)	V (%)	R (%)
1993	17,127	13,090	5.3	13.1	4.9	7.0	13.9	20.8
1994	18,139	19,828	3.9	10.1	5.7	7.7	11.1	18.4

Future strategies: donor clubs

In a pilot project in 1993, individuals who had donated more than three consecutive times were organised in blood donor clubs. Individuals in these clubs had undertaken to donate blood at least twice a year and made a pledge to stay HIV negative. Over a period of 2 years, 3,731 units were collected from 913 donors in 13 clubs representing an average of two donations per year per person. This project cost about US\$ 1.90 per unit of blood, for recruitment alone.

But the most significant point here is that the HIV seroprevalence was under 0.1 per cent. In spite of the problems that could be associated with the 'window period' in this group, the level of HIV infection demonstrates that with extra effort blood for transfusion in Uganda can be made virtually safe. The discard rate was minimal. Moreover, club members were always available whenever needed.

The UBTS therefore plans to extend this pilot project gradually and hopes that at least 25 per cent of all the blood is obtained from this group in 1995, increasing to 75 per cent in three years time.

Donating blood.

How are blood donors recruited?

At the beginning it was difficult to overcome commonly held fears among potential blood donors, such as these:

- donating blood is unsafe because of the reuse of needles
- all donors would be tested for HIV infection and the results reported to the government, the press and employers
- blood would be sold to patients in order to enrich the health care workers
- there was no chance of confidentiality
- the real purpose was to do research on their blood
- blood is life and its loss is permanent
- an inadequate diet, because of poverty, would hinder blood replacement
- weakness following donation would result in impaired social and work activities.

Most of these fears required only intensive and time-consuming reassurance to allay. So the system we arrived at was this. A group of potential donors, stu-

dents, office or factory workers, church congregations etc., is selected. A responsible person in the organisation is visited by the blood bank recruiter and asked to provide an opportunity for the blood bank to present its programme and its needs. Leaflets are distributed and a meeting held. This usually lasts 30–45 minutes and reassures potential donors about anonymity, safety, confidentiality, and any of the other fears they held.

If a sufficient number (20 or more) is interested, we set a date for the blood collecting team to visit. At the bleeding session, every potential donor is asked to read a leaflet reiterating the type of personal history that carries risk of HIV infection and other conditions that would make giving blood undesirable, and asked to continue only if they were confident of being safe. Individual questioning follows, in as confidential a setting as possible, and then the donor without known risk has a haemoglobin screen and gives 450 ml of blood.

The donor is given a receipt with the same number as the blood bag and test sample. After two weeks, another appointment is made and the counsellor returns to the site of the bleeding session to discuss results, in a confidential environment, with all those who wished to know. In keeping with blood bank policy, the first time donor uses a surrogate name, usually mother's first name, and gives for verification his/her own date and place of birth. When the results are to be given the donor has to show the receipt and give the correct date and place of birth and mother's first name before any discussion takes place.

If the HIV result is positive, the best possible arrangements for follow-up are made. If the result is negative, the donor is given a suggested time to make the next donation and counselled on methods of ensuring a risk-free life. Condoms are available if desired. All positive results are confirmed with a second sample if the donor wishes.

Nowadays, donors who are acceptable as repeat donors are also given information to reinforce their ability to keep clear of HIV infection risk, condoms if desired, and enrolled in a safe donor club. On their second donation they use their real name and rely on the blood bank to inform them if there is a need to return for further counselling.

Many suggestions were made to reward blood donors with travel allowances, food parcels, or priority for hospital care if needed. But all of these ideas were reluctantly but firmly rejected. But the donor clubs, once formed, are supported by refreshments for their meetings and sometimes their members are given T shirts or other items with blood bank identification. This system of blood

donor clubs was initiated with a grant of CAN\$10,000 from the Canadian aid agency, CIDA.

The organisation of a blood transfusion service

There has been much debate about the relative merits of a centrally organised blood transfusion service, as adopted in Uganda in comparison to a more decentralised structure such as that adopted by, for example, Zambia, where the EC is also providing support (see box on page 125).

The current wave of reform in public health does not always take into account the specific needs of safe blood. This is a pity, because by better organisation of blood transfusion, better results could be achieved. Key factors in the creation of an effective blood transfusion service are:

- a) acceptance of transfusion medicine as a distinct sector in the health care system
- b) establishment of a national blood policy
- c) well trained and dedicated professionals
- d) broadly-based national advisory bodies.

Transfusion medicine is not only the collecting and testing of blood. It is also a major therapeutic art requiring:

- a) recruitment and retention of blood donors
- b) blood collection
- c) laboratory testing
- d) blood processing and storage
- e) training of physicians in appropriate use of blood.

A discipline of such diversity must be recognised as a distinct entity within the health system. It is often the lack of this recognition that contributes to poor organisation of the blood transfusion service.

The type of organisation and level of development of the blood service should be specified in the national health plan. The government bears the ultimate responsibility for organising and backing up the blood transfusion service, regardless of who is operating it. A safe blood policy implies that this operating responsibility is either assumed by national health authorities or partially delegated to a parastatal agency or NGO, such as the Red Cross or Red Crescent. Research carried out by the World Health Organisation showed that, among nations which responded to its enquiries, a national blood policy had been

adopted in 81 per cent of developed countries, but in only 64 per cent of developing and 60 per cent of least developed countries. Since many nations did not respond to the WHO, it is likely that in reality even fewer countries in the developing world have a national blood policy. In nearly half the developing and least developed countries that did respond, the blood transfusion services are hospital-based, which usually implies a lack of national co-ordination. So what exactly is the choice of organisation? In broad terms, the choice lies between a centralised, a regionalised and a hospital-based organisation, with a mixture as the fourth option.

1. A centralised organisation

This usually consists of one national blood transfusion centre which operates the service for the whole country, with or without regional centres. This plan is more feasible in smaller countries. A centralised national blood transfusion service can give better guarantees of blood safety than a hospital-based service by offering:

- a) recruitment of voluntary, non-remunerated blood donors that is less subject to local variations or emergencies
- b) a regular blood supply, because a centralised system is better able to sustain, manage and guarantee an adequate stock
- c) techniques that observe minimum safety standards, such as blood grouping, compatibility testing, screening for infectious diseases, record keeping and quality control
- d) better training of personnel, economies of scale by bulk purchasing, and automation.

Co-ordination at national level becomes easier, and this can make the service more cost-effective. It also increases capacity to provide blood in emergencies, and makes possible a uniform standard of quality assurance and training. National reference laboratories for transfusion medicine (e.g. blood group serology, haematology, tissue typing, coagulation) and support of scientific research are easier to arrange.

A national system also makes it easier to develop a high profile among the medical establishment, as well as in the community at large. This is important both for recruitment of blood donors and for creating trust and confidence in the service.

There are however potential disadvantages in a centralised system. It does

Blood bags stored in a refrigerator.

depend on good communications (e.g. telephone and fax for laboratory results) and on a good transport system (e.g. for laboratory samples and blood products). These preconditions may not exist in some countries. Also, there may be delays in providing laboratory results and blood components, if these are organised centrally. Lastly, the physical distance between a national blood centre and the hospitals and blood donors may create difficulties in relations with both the users and givers of blood.

2. A regional system

In this model, the country is divided into regions, with varying degrees of autonomy for each region and with varying mechanisms for ensuring national control and co-ordination. Even in a regional model, the regulations and policy co-ordination should be done at national level, with input from the regions. A regional system is often preferred in larger countries, where the size of any one region may allow the creation of a blood transfusion service which corresponds to a national service in a smaller country. The advantages and disadvan-

tages of the regional approach have to be weighed up in the light of that country's special conditions and political realities.

3. A hospital-based system

Here, each hospital runs its own blood transfusion service, with or without national co-ordination. This system can cause problems, and even in developed, industrialised countries national co-ordination has proved difficult. For this reason, experts are generally against leaving the responsibility for blood transfusion totally to the individual hospitals.

But blood banks integrated into hospitals can have some (possibly minor) advantages:

- a) hospitals have a close relationship with patients, and analyses can be performed for donors and for patients in the same laboratory
- b) hospital blood banks are closer to those prescribing blood, which makes it easier to discuss the pros and cons

4. A mixed system

Combinations of hospital-based and national/regional blood centres exist in about a quarter of the countries that reported to the WHO. Usually, there is a national blood transfusion service, but many hospitals find its coverage less than satisfactory and so run their own blood bank. Sometimes the local blood centre in the capital city carries the word 'national' in its title, somewhat misleadingly. This type of organisation is often not very efficient and is usually more costly than a national or regional blood transfusion service.

(for a fuller discussion of this question, please see the EC's companion volume *Safe Blood in Developing Countries: Principles and Organisation*)

The Zambian solution

With the encouragement of the World Bank and other donors such as the Danish agency Danida, Zambia is carrying out a far-reaching reform of its health system, by decentralising management, and therefore responsibility for decision-making and spending, down to the districts. Such radical decentralisation is new to Africa.

In that circumstance, the Zambian government decided against the idea of a centralised blood transfusion service on the lines of Uganda, even though this was the initial recommendation from Dr Watson-Williams, who was asked by the EC to go to Zambia after finishing his assignment in Uganda. As in Uganda, the EC is the main external funder of the Zambian blood transfusion service.

The proposal to strengthen the Zambian blood programme originated at about the same time as the Uganda project. But it took longer to get started, partly because of a change of government, partly because of the lengthy discussions about what would be the right structure for Zambia. The Zambian Ministry of Health came to the view that, at a time when it was trying to decentralise many central activities and reduce staff at the centre, it could not accept a new central unit of the size of a blood transfusion service.

On the other hand, with complete decentralisation, there could be problems with quality control, training, and setting minimum standards (for example, on the right choice of blood bags to buy in). So could there be a mixed solution?

Zambia has a number of heavily populated areas, for example, the capital Lusaka and the so-called 'copper belt' where the famous copper mines are. It was decided that these areas should have a centralised blood transfusion service, in which the major hospitals would be supplied centrally. But the remoter provinces and hospitals would each recruit their own blood donors and test the blood themselves. In other words, it was a compromise, but a compromise that corresponds to the population distribution of Zambia.

Similarly, in Cote d'Ivoire, there are one central and two regional blood centres, and the plan had been that these three would divide the country between them in terms of blood supply to the interior of the country. But the difficulties of distribution in Cote d'Ivoire have meant that the central blood bank still supplies much of the interior, and some hospitals still have to do their own recruitment and testing.

So Uganda is unique in Africa in the degree of central organisation that it has achieved. The EC believes that the basic principles are that

a) there must be a strong central agency to formulate a national policy and strategy, advise the Ministry of Health, lay down standards and procedures for obtaining safe blood, set guidelines on the use of blood, promote training of BTS and health staff on how to obtain safe blood, and act as the central 'quality control' for blood transfusion. But

b) the methods for recruiting blood donors and testing blood can and do vary between countries, according to local circumstances.

Blood transfusion takes many skills: the importance of training

The EC publication *Safe Blood in Developing Countries: Principles and Organisation* emphasises that:

‘Successful implementation [of a safe, accessible and adequate blood supply] will largely depend on the knowledge, skills and commitment of the people working in every blood transfusion service and hospital blood bank. Training will obviously play an important part in this process of improving the quality and safety of blood supply.’

So how did the Uganda Blood Transfusion Service, starting almost from scratch but picking up what pieces were left from the old blood transfusion service, set about the task of training its people?

Dr John Watson-Williams contributes the following account, which illustrates the complex training needs of a properly organised blood transfusion service.

A. Training of Nakasero staff

Thirty-six members of the old Nakasero Blood Bank staff reported for training on September 25, 1988. There were eight technicians, who had completed the three years of training of the school for medical laboratory assistants at Jinja; eleven laboratory and donor attendants, who had completed high school with O level certification and had been trained on the job at Nakasero; five clerks, eight cleaners, two yardmen, one driver and four ‘ascaris’ or security guards.

The technicians had many years experience of blood typing and the attendants had experience of taking blood, whilst most of the cleaners had been working with the cleaning and assembly of blood collecting and giving sets. With the three professional staff, Dr. Kataaha, Dr. Kyeyune and Mr. Senyonga, we worked out a training schedule, which would last six weeks, to bring all staff up to date and to explain how we conceived that the project would be developed. None of the staff had received pay for at least six months, but the EC Delegate agreed to provide an allowance while they were being trained. All staff had to

walk at least two miles to work as there was no public transport to Nakasero. The main rooms of the blood bank building had a sound roof and floor and it was there that we held classes. Surprisingly, enough chairs, stools and benches were found for everyone to sit down around tables. All staff attended lectures at 8.30 am and at 2 pm, and after the lectures the laboratory and donor staff had practical training using the limited resources available. There was neither electricity nor water.

Detailed lecture notes were written to cover the subjects of HIV infection, viral hepatitis and other diseases transmissible by blood, the blood groups, IgM and IgG antibodies, compatibility testing, transfusion reaction, donor motivation and health criteria, the collection and storage of blood, record keeping, and quality assurance. These notes later formed the basis of all teaching courses given by the UBTS. Lectures, given in English, were translated into Luganda for the few non-English-speakers.

The lectures were designed to give everyone sufficient knowledge about the life-saving qualities of blood and the risks of blood transfusion for them to be able to discuss the subject and answer the questions of their peers. These classes also helped everyone to understand what other staff did in the blood bank and thus strengthened team spirit. Even at this stage in the project the idea of a national programme was discussed.

The practical classes gave an opportunity not only to reinforce lecture material but also to select those with the better skills who would be able to fill critical positions.

B. Training of hospital staff

During visits to hospitals other than those in the Kampala area, many errors in blood banking technique had been observed. Blood collections were improperly made and skin cleansing was inadequate. Incomplete filling of blood bag, sometimes purposely on a doctor's order, or clotting of the contents, were common. After removing the needle, air was allowed to enter the tubing, and sometimes the bag, and labelling of sample and primary bag, were unreliable. Blood typing, both of donor and patient, was done on reused tiles that often were inadequate and not safely cleaned.

Compatibility testing was almost always by a saline suspension of red cells mixed with serum on a microscope slide and spread with the tip of a Pasteur pipette. Blood donor HIV test results (when they were tested) were not kept in

a way that preserved confidentiality, but at the same time donors were not given their results.

Therefore, before any hospital was added to the list supplied by the Nakasero Blood Bank or one of the regional blood banks, it was required that a laboratory technician should spend five days at the blood bank. We tried to arrange for three or four hospitals to send staff at the same time. This period of secondment was necessary to explain procedures, record keeping, and methods of blood collection and laboratory testing.

During this five day training the technicians attended lectures on HIV and other diseases transmitted by blood, donor selection criteria and care, and record keeping and quality assurance. Practical instruction concentrated on correct blood collection methods and compatibility testing using the one-tube technique for saline and anti-human globulin procedures controlled by adding coated cells to the negative AHG test.

The technician took back to the hospital a copy of the laboratory manual and all standard operating procedures. Follow-up contact with hospitals was necessary to make sure that these procedures were explained and taught to all personnel involved in blood transfusion. It was reported that

these changes resulted in a marked reduction in the number of transfusion reactions.

After technician training, all blood units collected at each hospital were sent to the UBTS laboratory for testing and adding to inventory if found to be satisfactory. Monitoring these blood units was valuable to indicate when there was a need for refresher training at that hospital.

C. Residential courses for hospital staff

The development of safe blood transfusion practice requires three elements; the recruitment and screening of donors with low-risk, the reliable laboratory screening of blood before it is transfused, and the use of blood only when it is indicated to reduce morbidity and mortality for the patient. To address these issues it was decided to invite a team of three, a doctor, technician and nurse, to a five day course at one of the regional centres. Courses were held twice at Mbarara and twice at Mbale in 1992 and once at Kampala in 1993, with funding by the National AIDS Control Programme (NACP). Two hundred and sixty participants came from 88 hospitals.

These courses were designed to emphasise that blood transfusion is not a responsibility solely of laboratory staff. The subjects of the lectures, four daily, were similar to those of the original Nakasero training, and the rest of each day was devoted to smaller group training for each of the three professional groups.

- the doctors discussed the indications for blood transfusion, which had been widely distributed in a NACP publication (*Guidelines for appropriate use of blood in Uganda 1989*), and criteria of donor selection

- the nurses learned about taking a history from a prospective donor, procedures for checking blood before, and checking the patient during, a transfusion, and the possible causes and appropriate responses to reaction during or after the transfusion

- the technologists had a wet laboratory class to learn the UBTS blood typing and compatibility testing methods.

On completion of the course, the three persons returned to their base to form a hospital transfusion committee. Although a formal evaluation of the impact of this training has not been made, two benefits occurred; one was an increase in the hospital collection of blood with a reduced number of units found to be HIV positive, and the other was a reduction in the overall use of blood by the hospital.

D. Training at schools for medical assistants

Uganda has two medical schools, at the University of Makerere and at Mbarara University, and three schools for medical assistants, Fort Portal, Mbale and Gulu. Eighty doctors and one hundred and fifty medical assistants graduate annually. Although at this time only doctors can order blood transfusions, this is likely to change very soon, and in any event it is often the medical assistant who first identifies the need for a transfusion.

In 1994 the UBTS developed a five-day course in blood transfusion medicine and, with NACP funding, gave it for sixty final year students at Fort Portal and repeated it for another sixty at Mbale. It is intended to make such courses a regular offering and taught predominantly by the schools' own staffs, at the schools of medicine and the medical assistants schools. The course is clinically orientated with discussion groups and case discussion presented in an interactive fashion.

E. Training of senior professional staff

1. Doctors

Doctors in medical charge of regional and national blood banks must be offered the chance of a career with possible eventual recognition as a specialist in blood transfusion medicine. In the UBTS there are five blood banks with doctors in charge. Each of the four regional directors had at least two years postgraduate experience and completed three months of full time instruction at Nakasero followed by six months of closely supervised experience whilst establishing the blood bank.

These and the second doctor at Nakasero are, at the time of writing, to be given six months training and experience in a European blood transfusion service and the opportunity to become certified in blood transfusion medicine by the Royal College of Physicians of Edinburgh, or an equivalent body. This, together with obtaining the diploma of Master in Medical Sciences of University of Makerere (a three year programme), should be sufficient for recognition as a specialist. The director of the UBTS must have additional training and experience in related subjects such as haematology or immunology.

2. Technologists

UBTS staff include one chief technologist and five technologists at Nakasero

and one technologist in each of the four regional blood banks. These have all completed the five years of training at the school of medical laboratory technology at Mulago hospital. There is, at present, no internationally recognised diploma in the speciality of blood transfusion for which graduates of the Mulago school are eligible, but it is important that technologists should get specialist training in a blood bank other than UBTS. When this has been accomplished, it is expected that the trained technologists will be able to develop an appropriate curriculum and certification in Uganda to provide for continuity of blood transfusion as a medical laboratory speciality.

3. Administrators

A national blood transfusion service with a multi-profession staff and responsibility for central purchasing and distribution, for development of national guidelines, and for quality assurance and research, is a complex organisation. Appropriate personnel and remuneration policies, continued training, security measures and the maintenance of respect and a high profile among the public – all these matters require competent administration. The UBTS administrator is, at the time of writing, being supported in his studies to acquire a master's degree in business administration.

4. Blood donor recruiters

Continued support of the blood bank by dedicated voluntary blood donors is essential. Because of the high frequency of virus infections transmissible by blood, it is necessary to place even more emphasis on donor recruitment and support in Uganda than in, say, a developed European country. Thus blood donor recruiters must be given the skills and recognition necessary to encourage skilled professionals to take on these jobs and to feel satisfied with their career.

5. Nurses

Although it has been customary for blood donors to be bled and given care by laboratory staff, it is more appropriate and more effective that this be done by nurses. The UBTS expects to develop an education and certification programme for nurses in blood transfusion.

Other issues, and their solutions

by Dr John Watson-Williams

1. Which diseases are screened against - and which are not ? and why not ?

The safe blood programme in Uganda screens blood for the HIV virus, and for Hepatitis B – but not for Hepatitis C, HTLV-1 or syphilis. Why those two infections, and not the others?

Every country has to decide, in the light of the local pattern and incidence of diseases, what infections to screen its blood against. In the case of Uganda, the entire rationale for the EC rehabilitation of the Nakasero Blood Bank was the high rate of HIV infection in the Ugandan donor population. HIV was therefore the first priority. Hepatitis B was the next priority. This could not be screened by donor history, except that those who had recently been ill could be excluded. But 6 per cent of the donor population are Hepatitis B surface antigen positive and therefore presumed to be carriers of this virus.

Consideration was then given, from 1991 onwards, to screening for Hepatitis C carriers, at least on a pilot basis. A preliminary survey found that only 0.5 per cent of donors were positive when tested for anti Hepatitis C and presumably less than this number would be confirmed carriers. As the cost of testing became less, and the sensitivity and specificity of the tests improved, the cost effectiveness of screening for Hepatitis C did improve. Even so, by December 1993 it was calculated that only 56 cases of chronic Hepatitis C could be prevented by screening 37,000 blood units at a cost of 3,300 ECU per case – far above the cost of each AIDS case or Hepatitis B case prevented. Prevention of transmission of HTLV-1 infection would probably have been even less cost-effective. Therefore these two screenings, Hepatitis C and HTLV-1, have not been performed in Uganda.

There is a case for testing all donations for evidence of *T pallidum* (syphilis). This is not however based on reducing risk of transmission of syphilis, because

the organism is destroyed in blood stored at 4 degrees celcius. Rather, the argument is that a positive syphilis test indicates the probable presence of sexual transmitted diseases, and thus an increased risk of being infected with HIV, even if the HIV test is negative (i.e. syphilis testing could be used to reduce the risk of the so-called 'window period', the period before HIV infection shows up in the tests). However, this test is not used for blood donor screening in Uganda.

2. The special problem of malaria

One of the major concerns must be the risk of transmitting malaria by blood transfusion, either *P. falciparum* or *P. malariae*. In Uganda malaria is endemic throughout the country, and is one of the major causes of infant mortality. There is evidence that some strains of *P. falciparum* are resistant to treatment with 4-amino-quinilone drugs (e.g. Chloroquine). Screening of potential donors by microscopic examination of a stained blood smear has been suggested, at least to exclude transfusion of blood carrying more than a certain level of

Mr. Paul Senyonga, chief technologist at Nakasero, at his computer terminal

malaria parasites. This would add about 15 minutes of technician time and cost 0.1 ECU for each unit of blood.

The strongest argument against malaria testing is that it carries a risk of breaking glass and subsequent HIV infection of the laboratory staff, and has very lit-

tle gain in improved patient care. However, all transfused patients must be assumed to have received at least some plasmodia from every unit of blood and are candidates for anti-malaria therapy if fever occurs.

3. Adapting laboratory methods

Both the temporary laboratory and the laboratory in the new Nakasero building were very confined (14 square metres and 60 square metres respectively). It was important to use methods that required as little bench space as possible. A decision was made to use disposable plastics instead of glass to reduce time and space and the danger associated with washing. This had the additional advantage of marked reduction in the risk of contamination from one sample to another.

Staff training emphasised the importance of orderly work and a neat bench. Methods of blood grouping and crossmatching were standardised for use in every hospital. This made it possible to standardise supplies of reagents and disposable test tubes. Microscopes would not be used for crossmatching, for safe-



Dr Peter Kataaha, director of the Uganda Blood Transfusion Service, at his portable computer

ty reasons. Instead, the standard saline and Anti Human Globulin methods were developed to give the greatest sensitivity.

4. The start-up equipment – and computer

The grant from the Carnegie Foundation paid for a heavy duty microtitre plate centrifuge and an incubator. All we then needed to get started again, from the EC funding, was Elisa washers and readers supplied both from Abbott and from Organon Tecnika as part of the Elisa kit order, and domestic refrigerators and one chest freezer shipped by air to arrive in January 1989. An Amstrad computer and a dot matrix printer and three simple portable typewriters completed the emergency equipment purchase.

The computer was used to generate sets of six unique six-figure numbers on adhesive labels. It linked these numbers to the donor identification and, after complete processing, printed larger adhesive labels as blood bag labels with the blood group and HIV (and later Hepatitis B) results. These labels were colour coded by use of crayons (O = blue, A = yellow, B = pink, AB = black, and Rhesus negative = crimson). The computer was also programmed to assist quality control, to make lists of donors by place collected and to prepare confidential results for the counsellor to take to counselling sessions.

5. Transport, for people, supplies, and blood

Transport can be an overlooked item. But it is important, for various reasons. In Kampala, the New Mulago Hospital was well served by public transport and staff could get to and from work. But when the Blood Bank moved back to Nakasero it could have been an impossible situation. The blood bank building is at the top of a high hill and at least one mile from any bus route. So the director of the AIDS Control Programme made a temporary assignment of one Isuzu pick-up truck, for this and other uses.

All goods arriving at Entebbe airport had to be collected by blood bank transport. The goods were consigned to the Ministry of Health (thus avoiding duty) and their staff were of great help in processing clearance rapidly. But the MoH never had a vehicle to carry the goods 50 km from Entebbe airport to the Institute. The contract to supply had no provision to pay for this transport and

the suppliers' responsibility ended when the MoH accepted goods at the airport. In July 1989 two more Land Rovers and a Volkswagen Jetta saloon were delivered and later on more transport was acquired.

So by 1991 the blood bank had four vehicles, and later received more. But transport costs were a major and increasing expense, due to maintenance of older vehicles and rapidly rising cost of fuel. Priority was given to donor recruitment and blood collection activities. UBTS transport was not used for the delivery of blood except when visiting hospitals for other purposes and for a daily run to all Kampala hospitals and to the public bus transport station.

Transport of blood to hospitals outside of Kampala and to and from the regional blood banks was generally by the public bus service (see also interview with Dr Peter Kataaha on page 100). We used four gallon insulated containers, packed with ice which was insulated from the blood bags by corrugated paper. Until 1993, when the public bus service went bankrupt, the system worked well.

For the most remote hospitals we were able to use the Mission Aviation Fellowship (MAF) services out of Kampala via Entebbe airport (see box on MAF on page 103). Even with this however, there were times when some hospitals, due to security problems, lack of flights or other reasons, could not rely on receiving blood quickly. For this reason every hospital was supplied with blood bags and other consumables and test kits and systems for emergency HIV testing.

6. Voice and data communications - or lack of

Communications with hospitals and between regional blood banks have been a major and, as yet, unsolved problem. Until 1992 the NBB rarely had a telephone service. The MoH radio link could sometimes be used for brief messages and occasionally the Uganda Broadcasting Service would deliver messages. But the only real solution will be the expected improvement in the national telephone system to a level that will allow computer communication via modem.

7. Funding staff salaries in a time of inflation

To begin with the entire staff was very happy. They were doing an important job and were doing it well. They were much better rewarded than they had been before. Each person was provided with two sets of uniform or clothing, including one pair of shoes. It was uneconomic to allow staff to leave for a midday break (they would never return in the afternoon) so meals were provided locally.

But there was one big problem which loomed very soon. The staff establishment for the Nakasero Blood Bank was inappropriate, having been unchanged since 1976. No additions were expected and the staff was stable, so no promotion was likely. The cost of living rose steadily, and the allowances initially agreed became insufficient for staff to survive even at the lowest level and, for the senior staff, pitiable compared to potential earnings in non-government service. Every six months the EC Delegate and Ministry reluctantly agreed to make small increases. This situation is integral to any government service in countries with a declining economy and mounting problems. Management has to take every opportunity to provide more remuneration for sustained loyal and excellent service (see also interview with Dr Peter Kataaha on page 101).

8. Keeping records, or trying to

Blood bank records are computer-based but always supported by manual records. The donor record file on the computer allows storage of all relevant information about the donor, the results of testing the blood, the distribution to hospitals, and the name and place of the patient who received the blood. With each unit of blood a utilisation form is sent, to be completed at the hospital, with details of use by patients of every unit of blood, and then returned to the NBB for entry into the blood unit record file. This system was successful only when a senior staff member made continuing efforts to receive correctly completed forms. This problem is not amenable to easy solution until the telephone service is reliable.

9. All or only some hospitals?

The original project document stated that the NBB would, by the end of three years, be processing 10,000 blood donations annually and that this should be sufficient to meet the needs of hospitals within 100 km of Kampala. Did this remit mean only government hospitals or should it include all mission, military and private hospitals?

The decision was taken to be inclusive and not exclusive. This made logistical planning much easier and ensured that there would be uniformity of blood bank arrangements throughout the area. This was the critical decision that led to a national blood transfusion service. As the success of the NBB grew, and each new hospital was offered and accepted service, it was with the concept of total service.

Eventually all blood collections and processing would be the responsibility of the NBB. NBB would supply all consumables and reagents, would establish policies for donor recruitment and laboratory testing, and would determine guidelines for the use of blood and also for the counselling and follow-up of blood donors. In making these policies the NBB was acting for the Ministry of Health. The policies became Ministry of Health policies but were never supported by legislation or regulation.

It followed that the NBB was in a position to know the total blood transfusion activity in the country and also to collect statistics about the use of blood from every hospital. This latter task was very demanding in staff time and only partially successful. But enough data was collected to make it fair to assume

that it was representative of the whole country for the purposes of planning policy.

The Editor adds:

There are also other issues, for example, security, electrical and water supplies, environmental concerns, and legal and ethical principles.

On *security*, Dr Watson-Williams is too modest to mention that there was and is also a personal risk. His report to the EC for 1990 mentions that:

‘On April 6 armed men robbed me of 2,000,000 Uganda shillings on the way back from the bank... From April 10 the Uganda police has supplied two armed men, every twelve hours, for round the clock security... one of these will accompany all bank trips.’

Dr Peter Kataaha, director of the UBTS, was on another occasion kidnapped and feared for his life.

On *electricity and water*, the need for continuous and reliable supplies is obvious enough. But in Uganda, as in other poor countries, they cannot always be guaranteed. So what fall-back arrangements can be made?

On *environmental concerns*, the 1992 proposal for continued EC funding of the UBTS points out that:

‘A blood transfusion project handles a large amount of infected human blood. Some of the risks are known and measures to protect both the staff and the public must be developed and utilised with effective monitoring. This is much easier in a central facility [see arguments about central organisation on page 121 – Ed.] than in widely scattered hospitals. The preferred method of handling contaminated disposable items in Uganda today is high temperature incineration. This necessitates a purpose built incinerator and this must be carefully managed to prevent toxic smoke and fumes in the local atmosphere.’

The *legal and ethical* rules that should govern blood transfusion, along with many other specialist aspects, are dealt with in the publication *Safe Blood in Developing Countries: Principles and Organisation*, issued by the EC.



APPENDICES

- 1. EC safe blood projects elsewhere*
- 2. Useful references*

EC support for safe blood in developing countries

The EC has provided technical and financial support to 47 safe blood projects in 29 developing countries to a total amount of 35 million ECU.

Past programmes:

Burundi, Chad, Costa Rica, Djibouti, Dominican Republic, Equatorial Guinea, Gabon, Grenada, Honduras, Mali, Mexico, Niger, Zaire.

Ongoing programmes:

1. Angola

In an initial phase EC support was given to strengthen safe blood activities in the blood transfusion centres at provincial level. Following the period of civil war these activities are starting up again via the strengthening of the role of the National Blood Transfusion Service in Luanda as well as the services at provincial level.

2. Benin

The EC supports government measures to strengthen the facilities and capabilities of the public health services in the southern departments of Benin. This includes support for the development of a national blood policy of the Ministry of Health, the creation or upgrading of regional blood banks in the three departments, Atlantique, Mono and Queme, and the training of health staff in charge of blood transfusion in Benin.

3. Cameroon

Support was given to develop a national policy and to strengthen two regional blood transfusion centres in Yaounde and in Douala, the country's main urban centres. These centres were refurbished and blood collection, screening

and storage facilities and procedures were improved. Blood donor recruitment was expanded and reoriented towards blood collection among students and enterprises.

4. Congo

The objective of EC support is to assist the government in the development of a national blood policy and to establish a regional blood transfusion centre in Pointe Noire, the country's second largest town, to collect, test and supply safe blood for the hospitals in town and the region around. The premises were rehabilitated, staff has been trained, equipment and supplies were provided. A national legislation on voluntary blood donation and blood transfusion was adopted.

5. Guinea Conakry

The goal of EC support to safe blood activities in Guinea Conakry, carried out with the support of the Belgian Red Cross Society, is the installation of a National Blood Transfusion Service in Conakry as well as blood banks in the prefectures and the training of the personnel of these structures. Considerable efforts have been made regarding the selection of blood donors among school students, the military and the private sector.

6. Guyana

With EC support, a National Blood Transfusion Service has been set up with a blood bank and testing laboratory for HIV and other infections in Georgetown, using voluntary donors. Testing is done on blood from New Amsterdam, Linden and Suddie hospitals.

7. Haiti

With the technical support of the French Red Cross Society, the European Commission supports safe blood activities established by the Haitian Red Cross Society as well as by the public hospitals in the country.

8. Ivory Coast

Following support given to the safe blood activities of the National Blood Transfusion Service in Abidjan and the Regional Blood Transfusion Service in Korhogo and Bonake, coverage has been extended to all transfusion services in the country's hospitals. The role played by the NBTS and the RBTS in training and supervision is crucial for this development.

9. Lesotho

Support is given to the national health budget to sustain the safe blood services which have been put in place, with particular attention for the promotion of regular donations of blood by voluntary donors.

10. Madagascar

EC support consists of strengthening the National Blood Transfusion Service in order to ensure blood provision for the hospitals in Antananarivo (needs amounting to 8,000 blood units per year). Support is also provided to strengthen its role of supervision, training and participation in the definition of a national blood transfusion policy.

11. Mauritius

EC support is provided for essential equipment for blood safety, supervision and quality control, and the improvement of the utilization of blood.

12. Rwanda

EC support (joint action with Belgian Cooperation and Belgian Red Cross) has strengthened the screening capacity of the National Blood Transfusion Service and the organisation of counselling. Following the political conflict all support has been suspended but hopefully will resume soon.

13. São Tomé y Príncipe

The EC supports the rehabilitation and reorganisation of the blood bank of the main government hospital of São Tomé by training of laboratory technicians and the provision of equipment and laboratory supplies. The provision of safe blood to health centres outside the capital is envisaged for the near future.

14. Zambia

The EC supported Zambia to establish a national blood transfusion service, to reactivate voluntary donor recruitment and to improve and safe blood facilities and practice throughout the country. A national blood policy has been formulated within the government's health system reform. The ZNBTS is directed by a core team and consists of two central blood centres serving Zambia's most populated regions around Lusaka and the Copperbelt, and 7 regional blood centres which serve the major provincial hospitals and provide training and support for the staff responsible for blood transfusion at the district hospitals in their area.

15. Zimbabwe

The Zimbabwe Blood Transfusion Service decided to extend donor recruitment and the provision of safe blood to hospitals by creating regional blood transfusion centres. So the EC assisted to create new transfusion centres in three regions (Gweru, Masvingo and Mutare), to improve capacities at the Harare centre through support for staff training, transport and laboratory supplies, and to develop a policy for blood use.

Appendix 2.

Useful references

1. *Safe blood in developing countries:*

Principles and organization, Office for Official Publications of the European Communities, 1995.

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2. *AIDS in the world*, edited by Jonathan Mann and others, Harvard University Press, Cambridge, Massachusetts, USA, 1992.

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