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VOLUME ONE

BLOOD DONOR MOTIVATION AND RECRUITMENT.

A COMPARATIVE STUDY IN WEST OF SCOTLAND AND THE SUDAN

by

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of Philosophy in the Faculty of
Medicine

July 1982

Tribute to a Blood Donor

No badge of service does he wear
he lives, a "hero" unaware,
A man who rolls his sleeve to give
his blood, to help another live,
Who gives without return or fee,
in simple answer to a plea
That flush of health again may glow
on cheeks of one he'll never know
His blood a newborn babe may save
from yawning brink of early grave
That child, so weak and small today,
a hero's role may later play
Or one, a prey to accidents
by his life's blood new strength intense
His blood may help a surgeon's knife
to bridge the gap from death to life
No, none of these will know his name
nor see it carved on walls of fame
But we who toil that man may live
a hearty, humble "Thank You" give.

Inter-County Blood Banks, Inc.,
Rockville Centre, Long Island, NY

American Associates of Blood Banks
National Volunteer Blood Donor
Month 1980

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My personal thanks must, of course, go to the voluntary unpaid blood donors in West of Scotland and in the Sudan who have given me access to their private thoughts, their fears and ambitions for the future without which the thesis could not have been written.

DECLARATION

I declare that this research has been entirely carried out and supervised by myself. I also confirm that the work of which this thesis is a record has not previously been submitted for a higher degree.

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Signed 

Date: 25.8.1989

DEDICATION

To my wife, Asma and children,
Sahar and Saria for their
tolerance and endurance.

Ismat Abdelgadir Khalil

July 1982

CARLUKE

ABSTRACT

In modern society, blood donor motivation and recruitment is a fundamental part of health care delivery. Well defined and documented programmes exist throughout the world but new ideas are always welcome. The situation in the Sudan is different and much remains to be done by way of comparison with elsewhere.

This thesis outlines the objectives of a study, how it was supported, sponsored and achieved. It describes briefly the geography of the Sudan, the source of Sudanese economy, climate, culture and historical backgrounds. The problems of existing services in the Sudan are reviewed and a brief account of the demographic characteristics of the Sudanese population is given. Two surveys done in West of Scotland and in the Sudan are described in detail.

This work discloses and compares the positive motives that enhances giving of blood and the negative motives that hinders its donation.

The comparison is between an Eastern Society with a voluntary motivation not fully activated because of lack of understanding and awareness of the need to give blood voluntarily for strangers and Western Society with a well established voluntary system of donation.

An addition to this research was the investigation

into the immunity to tetanus and hepatitis in the Sudanese population. An estimate of the percentage of individuals with detectable levels of hepatitis A and B antibodies and tetanus antibodies is included since there is a need to establish a plasmapheresis programme as part of a good Blood Transfusion Service for the procurement of specific immunoglobulins. This work has revealed major differences between the West of Scotland and the Sudan and suggestions are made for their resolution. The main conclusion and comparison are summarised in Chapter 7. It is hoped that many of the suggestions in this thesis can be introduced in the Sudan at an early date.

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CHAPTER 1

INTRODUCTION

1.1 Preamble

This study is vital for a country like Sudan. Being interested in such a research that has got a social element in it and at the same time inspired by the great need of the country for a well organised voluntary blood donation system the author welcomed the proposal of the topic of blood donor motivation suggested by the present Regional Director of the Glasgow and West of Scotland Blood Transfusion Service, particularly his suggestion of a comparative study of Khartoum with the West of Scotland blood donors.

This proposal was given priority over the topic of research, namely, the use of blood products in blood diseases suggested at first by the Department of Pathology in Khartoum University.

In fact, the first topic suggested is included coincidentally in the context of the present research.

Nevertheless, the teaching staff in the author's Sudanese Department have been very aware of the great need for blood and blood products and therefore greatly appreciating the urgent need to establish a system based on the experience of a well known voluntary service.

Having spent nearly three years of Postgraduate training in Glasgow in the early to middle 1970s, the author believed that the research could be conducted in

that place.

I was delighted that the Department of Epidemiology also decided that this would be a useful project to be carried out.

1.2 Objectives of the Study

The aim of this study is to establish a voluntary blood donation system in the Sudan by a comparative study with an established voluntary system.

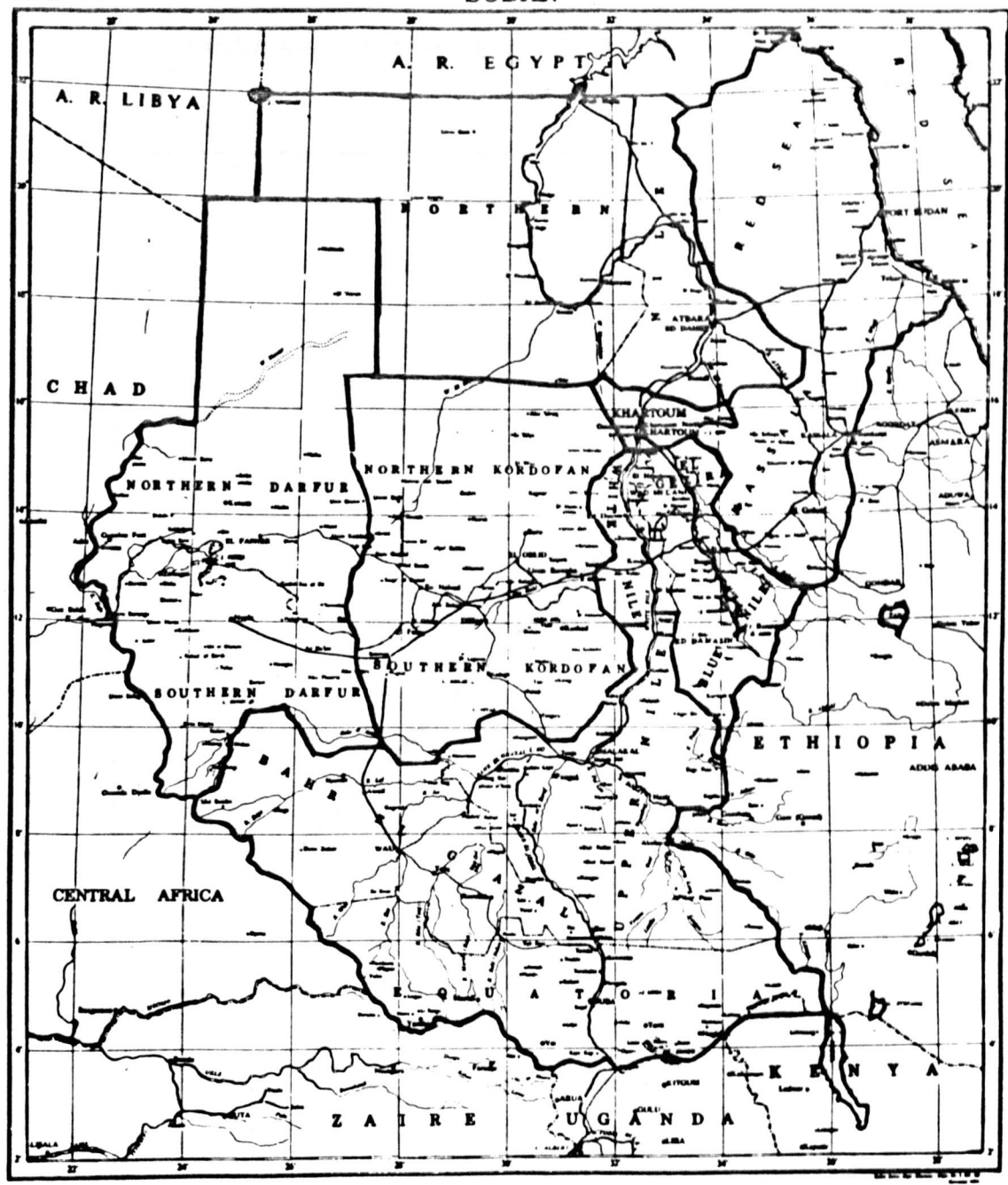
1. To replace the present lending system by a voluntary system as recommended in the Declaration of Helsinki (XIVth Congress 1975) (Appendix 1, p.18).
2. To encourage and protect voluntary blood donation (Titmuss 1970).
3. To transfer the ideas and experience of the blood donation system of West of Scotland which will benefit the Sudanese Blood Transfusion Service.
4. Recruitment and plasmapheresis of donors to provide human anti-tetanus immunoglobulin and other therapeutic immunoglobulins (WHO 1981).

1.3 Geography and Demography of the Sudan

Sudan is the largest single land mass in Africa, 1300 miles long and 1000 wide with an area of one million square

MAP 1-1

SUDAN

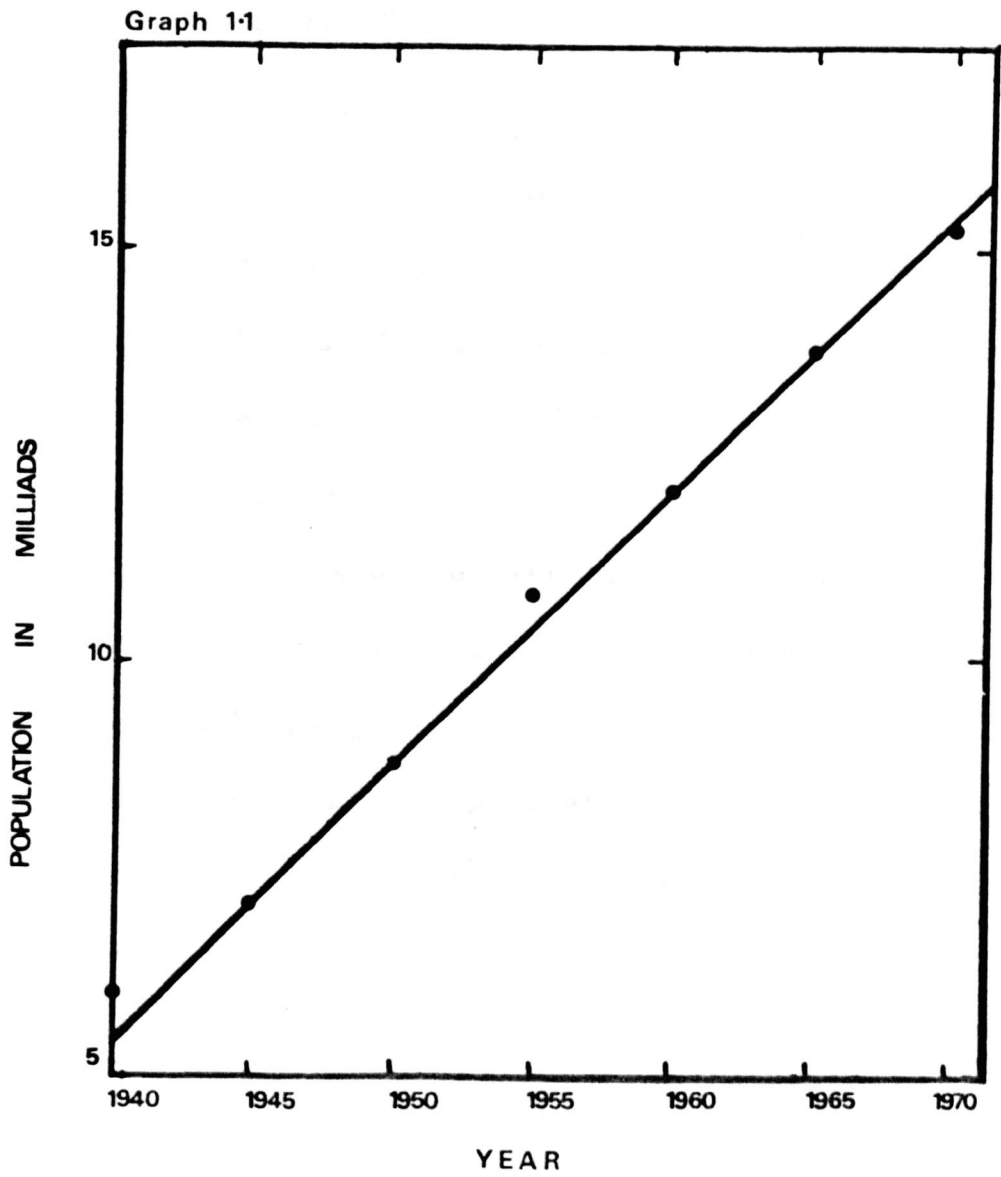


Scale: 1:1,000,000

Legend:

Major City	Minor City	River
Khartoum	Atbara	Nile River
Khartoum	Khartoum	Atbara River
Khartoum	Khartoum	Khartoum

POPULATION GROWTH GRADIENT OF SUDAN 1940 to 1970



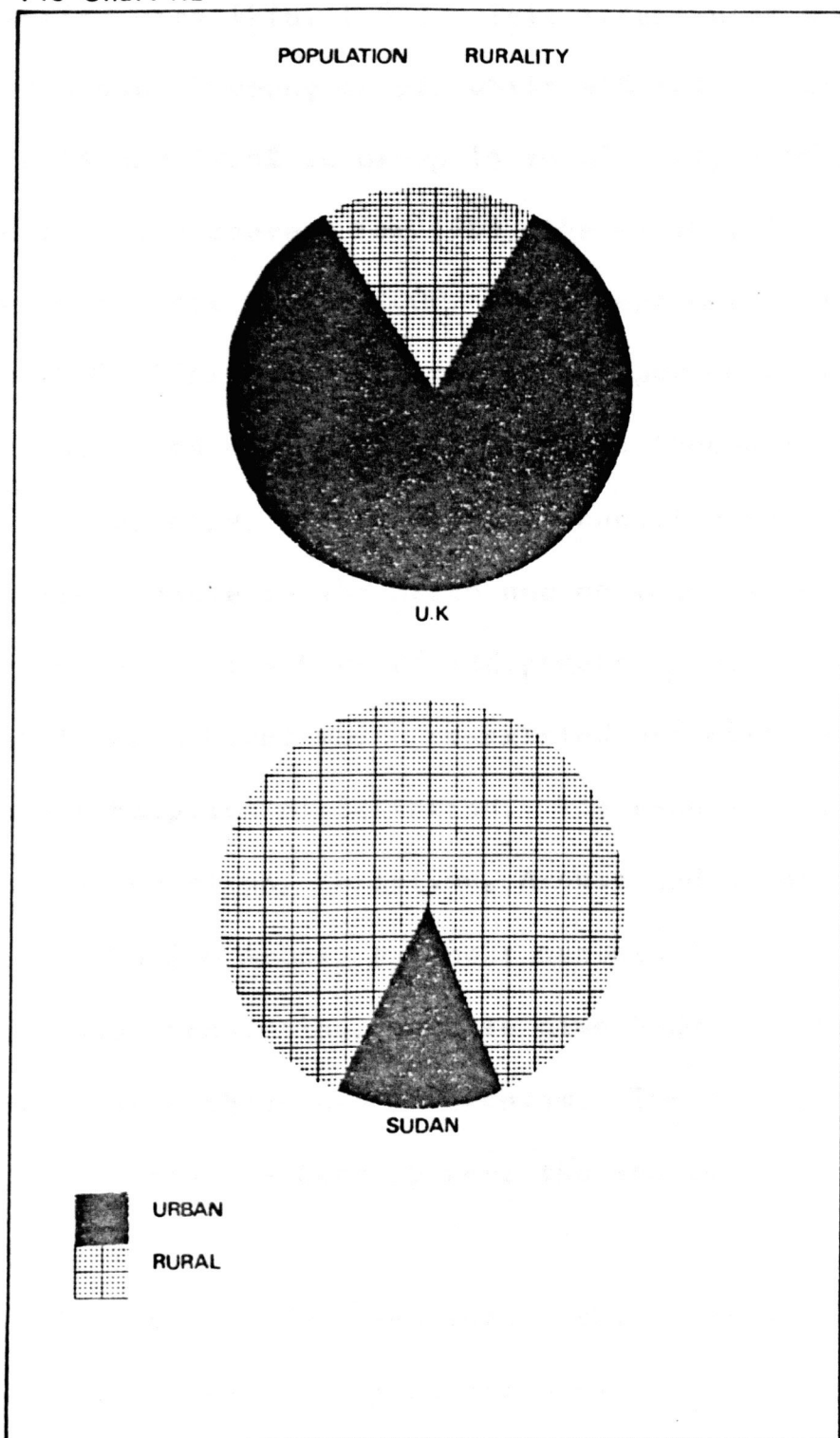
miles sharing common borders with several countries where conflict already exists, especially in the horn of Africa (Ethiopia, Somalia) and Uganda which, in turn, have created many local refugee problems in the Eastern and Southern Provinces (Map 1.1).

Demographic Characteristics

Population : In 1980 the population of the Sudan was estimated at 19.5 million. Graph 1.1* shows the growth gradient of the population of the Sudan during the period 1935-1970 based on estimated figures except for 1955. The demographic trend is a population growth rate of 2.8% per annum, which is one of the highest in the world and is a feature of developing countries where a population explosion is looming.

The majority of the population (about 88%) live in rural areas, where lack of transport between the scattered rural localities imposes major difficulties on the provision of medical care (this will be dealt with later in the Chapter of the Sudanese survey). Pie-chart 1.2* shows the population rurality of the Sudan compared to the United Kingdom. The bulk of the population is concentrated along the Nile and its tributaries. Most of the urban population is concentrated in the main Cities of the North. The urban population growth rate is increasing at a rate of about 5% per annum. This is due to internal migration

Pie Chart 1.2



induced by better chances of employment.

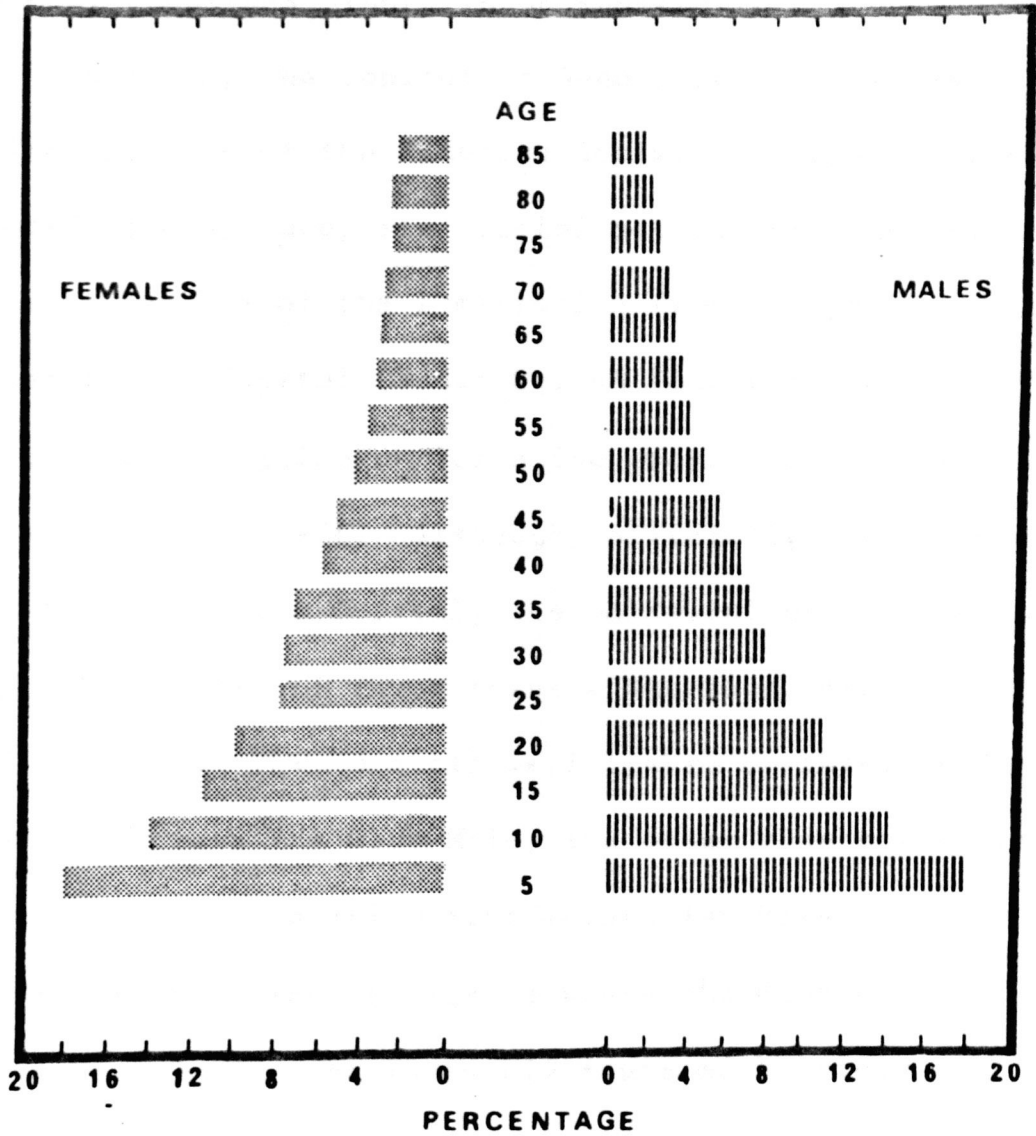
The population pyramid of the Sudan is typical of that of a developing country with a broad base and tapering apex (Fig. 1.3*). This illustrates a high percentage of young people while 45% fall in age group 0 to 14 and 52.5% in group 15 to 65, only 2.5% belong to group 65 and above. For 1965, the birth rate 49 per 1000, the death rate 21 per 1000, the infant mortality rate 86 per 1000 (1967-1968) and the life expectancy 44.6 years for males and 46.9 years for females (Sudan 1969).

Originally, a land largely inhabited by Hamitic-speaking people in the North and negroid tribes Southwards. The Sudan was the home of indigenous civilisation (the Cushite or Nubian) which co-existed and mixed with the ancient Egyptian civilisation. The country was a meeting place of Egyptian, Christian, Arabic and Islamic cultures but the Muslim Arabs, by their success in penetrating the indigenous population, were to give Sudan its present day flavour of Arabism and Africanism. The Western stimuli of the Nineteenth Century were the source of contemporary modernity.

Education : Children enter schools at age 7 years. About two-thirds of pupils are boys. Compulsory primary education for children is unlikely in the very near future.

* These three figures are by courtesy of Dr. Bayoumi (1979)

FIG. 1.3
THE POPULATION PYRAMID OF SUDAN — 1969

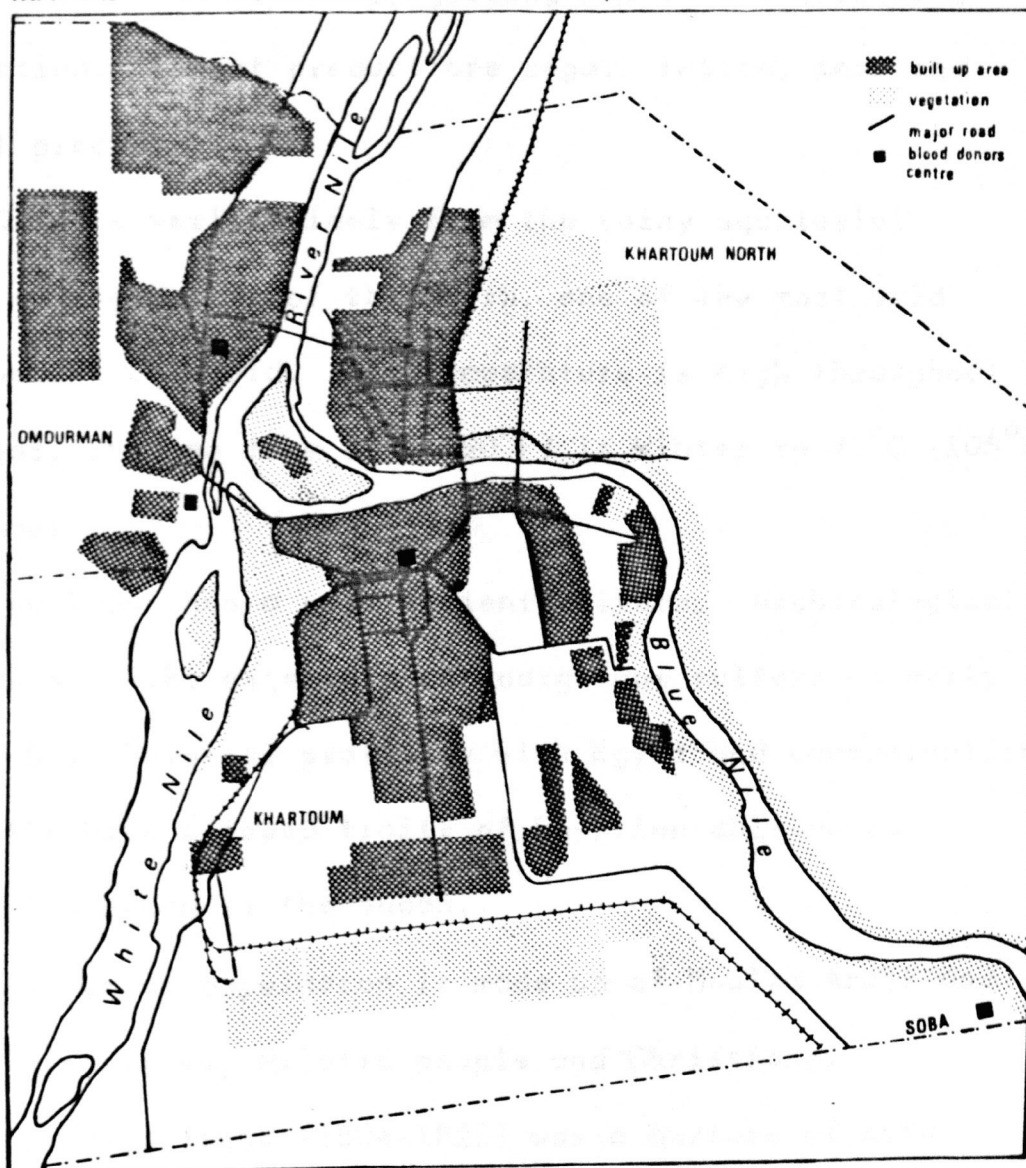


Apart from Sudanese indigenous problems these additional difficulties place strains on many Governmental services including the provision of the unique resource of human blood, blood products and derivatives for which, on many occasions, there is no substitute.

Khartoum, the Capital of Sudan, represents the infrastructure of the Sudanese Society in general with regard to age, race, sex, social aspects and classes. This is because of the immigration from all parts of the Sudan to the Capital (Sudan Second Population Census 1973) which has been going on for a few years mainly after the Independence in 1956. Although, officially, Khartoum is the Administrative Capital, the political and economical Capital consists of three towns - Khartoum, Khartoum North and Omdurman. They are all well linked by three bridges, one runs across the Blue Nile, the other runs across the White Nile and the third runs across the River Nile just a few miles after the confluence where the Blue and the White Nile join. The three old towns of Khartoum, Khartoum North and Omdurman population is about a million and together with their new extensions they have a population of about two million (Map 1.2).

Agriculture is still the main source of Sudanese economy. The majority of working people are engaged in the agricultural sector. 33% of the total area of the

GREATER KHARTOUM
MAP 1-2 Location of Blood Donor Centres Surveyed



Sudan is covered by forests.

Gum arabic and timber are the main products of the country's forests. The Gazera Irrigation Scheme is the backbone of Sudan economy, growing 75% of the country's production. Export products are sugar, cotton, meat and animal products.

Climate varies widely from the rainy equatorial South to the desert of the North, one of the most arid regions in the world. Air temperature is high throughout the year, ranging from 32°C (90°F) in Winter to 42°C (108°F) in Summer.

The Sudan has a very ancient culture. Archaeological surveys show the existence of indigenous culture as early as 400 BC. Physical proximity with Egypt and communications along the Nile allowed traits of Egyptian culture to spread Southward to the Sudan.

The varied population is made up of Moslem Arabs and ethnic minorities, Nilotic people and Christians.

The Fungi State (1504-1821) was a mixture of both Arabic and Egyptian culture. It controlled most of Central Sudan and showed a great deal of tradition in administration, education and other aspects.

The first real invasion of the Sudan was in 1821. Mohamed Ali Basha, the Ottoman Viceroy of Egypt, invaded the Sudan in search of gold and men for his Army. The

Mahdist State (1881-1896) was the first National Revolution and ended the Turkish Government control in 1881. The Mahadist State was short-lived and the country was conquered by the British in 1896. They continued to rule the Sudan until 1956 when Independence was achieved (Bayoumi (ibid)).

1.4 Existing Services and Problems in the Sudan

Sudan is still a developing country with limited resources despite its historic background of culture and literacy. This vast area is medically served by fewer than 200 hospitals which are hardly interconnected. The majority are served by full board electricity, others are provided with part-time electricity generators and some depend only on oil lamps for their lighting.

The Sudanese medical history is scattered and few authors have been trying to collect it from the different records and write it in a good style to read (Bayoumi (ibid)).

Great progress has been going on in the last few years but still health care is primitive in many parts of the country. The Medical Service is multideficient. As this research is mainly concerned with blood donation the author will concentrate only in some points relevant to the blood transfusion in the Sudan.

Electrically supplied hospitals in the whole country with large blood transfusion requirements are provided with

proper Blood Banks and Transfusion Centres. These Centres act as Centres for collection, preparation, storage and crossmatching of the blood. They serve the main hospital and all the hospitals within easy reach of it.

A large number of hospitals are neither provided with a Blood Bank nor have any easy access to one. These hospitals can be divided into several groups. One group includes those hospitals which are provided with basic equipment for standard grouping and crossmatching and with technically trained staff in blood transfusion. These run only an emergency Blood Transfusion Service, but have no facilities for banking or prior storage of blood. This system has many drawbacks; first, the blood may be so desperately needed that the time taken for grouping, Rh typing and crossmatching of blood may mean the difference between life and death; second, the blood is always transfused with no chance for testing for diseases such as syphilis or hepatitis which are known to be transmitted through blood transfusion.

The second group includes those hospitals which are electrically supplied and in which the technical staff of the hospital general laboratory are also trained in blood transfusion techniques but owing merely to the lack of a water bath or an incubator, they cannot provide standard grouping or crossmatching (Mollison 1979). This group of

hospitals runs only emergency blood transfusion like the former group, but the crossmatching is only carried out by one technique instead of four, the "saline technique" at room temperature. This system of emergency blood transfusion has the added possible danger of transfusing incompatible blood.

The third group of hospitals includes those which are not provided with any source of electricity, and in which the laboratory assistant is not trained in basic blood transfusion techniques. These run an emergency blood transfusion service, like the pre-war days by slide crossmatching without prior ABO grouping or Rhesus typing either the patient or the donor. This system, apart from the risks mentioned above, carries a tremendous risk of transfusing incompatible blood, or conversely, hesitancy and rejection of what was, in fact, compatible blood (Maurice King 1966). Moreover, this system carries an added risk of transfusing Rhesus Negative females, 6% of the population are Rhesus Negative (Abu-Sin et al. 1978), with the possibility of Rh-alloimmunisation of the mother and affection of the infant with Haemolytic Disease of the Newborn. In contrast, while in fully equipped, properly staffed hospitals, the problem of the "Rhesus Baby" is solved beyond treatment to actual prevention of Rh-alloimmunisation of the mother, in underequipped,

improperly staffed hospitals, haemolytic disease of the newborn is, in a way, iatrogenically induced. This carries the possibility of increasing infant mortality and increasing the number of mentally-deficient babies in these less well-equipped regions.

It was not until the late fifties when a permanent Blood Transfusion Service in the Sudan was established. Up to early 1974 the Service was entirely based on transfusion of whole blood and red cell concentrates; most of the blood products had to be imported from abroad with valuable foreign currency. So expensive were these that the requirements of all patients were beyond the economic capabilities of the country. In 1974, the situation was improved when Khartoum Blood Transfusion Centre started to process, from donors blood, fresh frozen plasma, platelet concentrates and cryoprecipitate. All the other blood products still have to be imported at expense still beyond the economic status of the country.

In 1976, the Sudanese National Blood Transfusion was formed. Nevertheless, the blood is still not available, perhaps due to lack of education about blood donation. Voluntary blood donation is negligible. The patient's requirements for blood are not satisfied and the establishment of any proposed blood fractionation centre will have, under such circumstances, very little raw

material for production.

The need for reform is evident and unless every citizen makes a contribution, any achievements will be very difficult.

In Sudan, blood donations at present belongs neither to a paid nor a purely voluntary system. It belongs to a banking system in which donors lend themselves only to their relatives or friends and then only when these get sick. Although better than the paid system, which at its worst entails a health risk to both the donor and the recipient, this system is far from perfect. In the first place, if a patient develops an urgent need for blood transfusion, it may be too late if we wait for his relatives and friends to come and donate for him. Patients have been lost even when relatives were at hand because they unfortunately proved not to be of the appropriate group. Moreover, some patients may develop an urgent need for blood while they are away from relatives. Consequently, blood is not always available at the appropriate time and the little blood available is not totally left to the discretion of the doctors to use it according to medical priority, but must to a large extent be issued according to the donor's specifications.

From my own observations and through personal communication with El Shiekh (1979), who has been responsible for the main Blood Transfusion Centre in Khartoum over the

last few years, there is yet no clearly defined donor programme. The causes of motivations have not been studied, recruitment is basically an appeal system and selection and rejection of donors has to be reassessed.

In this thesis motivation has been assessed by a modified questionnaire broadly resembling the one used to document the motivation in the West of Scotland. The modification has taken into account the many variables of the individuals, of the population as a whole, of its economic and health standards, of the various religious and cultural factors. Reciprocity and direct appeal are probably the mainstay of donor recruitment in the Sudan but several other ideas about recruitment can be applied, eg recruitment can be enhanced by adopting a wider scale of motivation among certain sectors of the population as in Institutions, mainly Prisons, Schools, Colleges, Social Clubs and Mosques. Motivation of these different sectors of the population can be stimulated through suitable ways, eg religious beliefs can be used to stimulate interest in the Mosque. Visitors of the patients being primed by the health of one of the members of the family can be used for a suitable recruiting programme. The role of specialised Social Workers in Blood Transfusion Service is probably crucial in a society like Sudan. They can educate and greatly influence the visitors of patients (relatives and friends) to become regular donors (Bisserup et al. 1973).

A donor programme like the one in West of Scotland is practically impossible in Sudan at this stage and therefore one has to accept the fact that in order to fulfil the requirements, one must devise a totally different system whereby donors are either paid, and the author is absolutely against this because a paid system is undependable and can be a dangerous basis of donor programme for a Blood Transfusion Service (Donellan 1978) or recruited from the family members of the patients in which case it will at least be possible to estimate the number of expected donors. The number of patients is known or can be estimated and out of this number a certain percentage of family members will volunteer. This could be the basis of a workable donor programme based on self-interest or kinship. Criteria of selection of donors and rejection in the Sudan is also different from the West of Scotland and the planning has to take into consideration several health factors that are characteristic of the area.

In the Sudan there are certain specific criteria for rejection which might be absolute in the West of Scotland but will not be suitable for the Sudan, eg malaria is endemic, hepatitis is more common and a low haemoglobin level is a common finding. Hepatitis will be discussed later in the thesis in more detail.

Other medical causes of rejection must also be looked at, like syphilis, brucellosis (Hantchef 1977) and

major heart diseases.

Women have a special position in Sudanese Society and very little has been done to recruit women donors, although the author believes that they can represent a considerable donor population that should be approached in a special way.

The survey done in Khartoum assesses and documents the motivation by a questionnaire modified from that used to document the motivation of donors in the West of Scotland.

This questionnaire reflects the characteristics of the blood donors and reveals the motives that encourage the people to donate their blood in a society where the basis for voluntary donation is more or less present but there is no established voluntary system at a community level.

The experience gained from the survey done in West of Scotland throws light on new methods of recruitment and motivation other than reciprocity and appeal. I have in mind altruism for instance, the roots of which are found in Sudanese Society like in many others but it is subconsciously suppressed probably due to the lack of education in the field of blood donation and perhaps through misunderstanding or misinterpretation of religious thoughts and beliefs.

As well as regular donors there is a need for special donors who possess and are willing to donate valuable type

of blood or blood products which may be required (Greenwalt and Gajewski 1962). These can be special donors for rare blood groups, rare antibodies to certain antigens, valuable antibodies to certain diseases or simply special donor panels to be recalled at any time when needed. Donors of plasma on its own are important to produce albumin and other blood products.

Plasmapheresis is a technique whereby volumes of plasma can be obtained from donor whose red cells can be retained (WHO 1981).

Donors of such plasma require a special programme of recruitment (Cataldo et al. 1975). They usually have to be treated in a special way because they give more time to the Blood Transfusion Service. They also need closer contact. Advertisements for these donors are more elaborate and scientific. Plasmapheresis donors can be selected for collection of antibodies like anti-D or other rare red cell antibodies used for serological reagents, antibodies against disease like tetanus, varicella, hepatitis, rubella, measles and vaccinia. On special occasions, a programme can be organised to collect plasma for coagulation factors for later fractionation. Therefore, it reflects the importance of the plasmapheresis procedure and its use in many branches of medicine.

Since a complete National Blood Transfusion Programme

is a necessity for the Sudan in the future, it will be very useful to plan to include in such a programme the necessary arrangements for special donors of plasma and blood when fractionation becomes applicable. Such a specialised programme should provide the necessary requirement for blood products, components and derivatives. One example of this application is to supply the needs of haemophiliacs in the Sudan with the necessary supply of Factor VIII. This can be calculated according to the number of patients referred to in various Haematology Departments. Accordingly, plans for future developments can be drawn. As another example, a detailed consideration of tetanus immunoglobulin in the later part of my study will be reported in this thesis. Since tetanus is an important disease in the Sudan (Elhassan 1976), part of this study was designed to introduce the concept of plasmapheresis and to try to convince the Ministry of Health and the University of Khartoum of the importance of establishing a Centre for plasmapheresis to collect such immunoglobulins since there is a need to provide them in the prophylaxis and treatment of tetanus and to estimate the supply of anti-tetanus immunoglobulins to cover the National demand.

This will involve a detailed study of the requirements based on the prevalence of the disease and this will lead to the recruitment of special donors with high titre

antibodies among vaccinated individuals or from individuals who have recovered from clinical tetanus in the Sudan.

The collection of such plasma can be obtained by introducing and developing a programme of plasmapheresis for the first time in the Sudan. There is no Fractionation Centre at the present time in the Sudan and because of the financial situation it is unlikely that we will have one in the foreseeable future. Therefore, a cheaper alternative and a least option would be to consider using single donations of fresh or fresh frozen plasma from hyperimmunised blood donors with sufficiently high titre levels of anti-tetanus.

Plasmapheresis may be useful to suit the collection of plasma from special donors even when their haemoglobin is low. All this study has been done or based on work done in the Sudan and West of Scotland by the author in the period May 1979 to the present time including a field study in the Sudan for four months in 1980 between June and October.

In planning a blood donor programme careful assessments must be made of the local and regional requirements in individual hospitals. Such data can be used with population growth predictions in attempts at improvements of health standards. Titmuss (1970) has

extensively studied the problems of blood donation in the United Kingdom (England and Wales). No similar study has been done in the Sudan before. Since this research is the first extensive one in a study of Sudanese donors and the Sudanese Blood Transfusion area, efforts were concentrated in the towns of Khartoum and Omdurman with four Centres serving a population of 2 million, in addition to Khartoum North Centre which was excluded in this survey due to shortage of staff and difficulty of transport.

A careful evaluation of the needs for blood and blood products in the Sudan is extremely important for the final shaping later on of donor recruitment programmes and the types of donors required.

Attention was directed by the author to the negative aspects of present policies to try and establish what hindrances may exist to recruitment so as to determine how these might be identified and overcome.

The annual blood yield from relatives and friends is very little, unstable and mostly decreasing in comparison to the continuous increasing demand.

In 1979, the total number of donations in Khartoum City was 15,319 units of blood which may be accepted as an approximate annual average (El Shiekh and Haggar 1980).

This is supposed to cover a population of 1.5 million in the Capital City with its suburbs and a large number of the inhabitants of the Central area (Map 1.2), which may add

up to 2 million.

To calculate the requirements of blood there is no internationally accepted criteria in view of the large discrepancy observed in developed, as well as in developing, countries (Hantchef 1982).

A fairly acceptable formula to calculate the blood requirements per year is on the basis of 50 units of blood per 1000 individuals of the population (Mitchell 1981). Therefore, the quantity of blood to cover the need of Khartoum with its suburbs and the surrounding towns and villages per annum would be:

$$= \frac{50}{1000} \times 2,000,000 = 100,000 \text{ units of blood}$$

This shows the magnitude of the problem concerning the need for blood in Khartoum and may reflect the situation in the whole of the Sudan, knowing that donations in other parts of the Sudan is even poorer.

This figure of 50/1000 individuals of the population assumes that some members of society cannot give blood by reason of age or infirmity. Nevertheless, the WHO figures assumes that the average requirement will cater for the foreseeable needs of a developed country. In the case of the Sudan this may be desirable but not yet practicable. It has to take its place with other conflicting pressures on Central Government such as education which is very important.

The Blood Transfusion Service of West of Scotland

covers 12,062 beds (23 hospitals) supplied with 118,831 pints of blood per annum (Table 1.1). The average amount of blood issued per bed per annum is 9.8.

The Khartoum Blood Banks cover 3528 beds (22 hospitals) supplied with 15,300 pints of blood per annum. The average amount of blood per bed per annum is 4.3.

One may wonder that the difference between the available blood and the required one is big. That is true and although some blood is sometimes bought from a neighbouring country, yet the deficit is still enormous, people are still dying in Khartoum City as well as in other parts of the Sudan because of the need.

The required blood is primarily for urgent needs, but also for a future well developed medical care which cannot be well utilised without a solid nucleus for an efficient Blood Transfusion Service.

Therefore, whatever number of donors would be recruited at the beginning will help to cover a part of the immediate need. Probably the calculation on the basis of units per bed per annum will be the immediate drive to recruit donors to cover the urgent need and the calculation per population would be the aim of a well developed medical care in the future.

Looking at the Tables sent by Khartoum Minister of Health (Fadl 1982) (Appendix 1, Table 1.1.1, 1.1.2, 1.1.3) it is noted that the number of donations in Khartoum Hospital,

TABLE 1.1GLASGOW AND WEST OF SCOTLAND BLOOD TRANSFUSION SERVICEDistribution of Beds and Issues of Blood for 1981

<u>Hospital</u>	<u>No. of Beds</u>	<u>Issue of Blood</u>
Ballochmyle	400	8169
Beatson	47	22
Bellshill	196	1412
Dumfries	418	3917
Falkirk	443	6447
Glasgow Royal	797	18774
Hairmyres	534	3394
Inverclyde	438	4358
Law	767	4387
Monkland	590	4457
Oban	147	769
RAI Paisley	227	4648
Royal Maternity	188	2473
Ruchill	451	221
Southern General	1228	7527
Yorkhill	472	3990
Stirling	407	4444
Stobhill	975	6992
Stonehouse	369	1691
Victoria etc.	758	10272
Vale of Leven	378	2815
Western	1768	16317
Wm. Smellie	64	1335

Central Blood Bank for 1980 was 5481; in Omdurman Civil Hospital was 2211; in Khartoum North 1537. Soba and the Army Hospitals are not mentioned except for minor donations donated in Khartoum Blood Bank on behalf of these two hospitals (see the rest of the information of the previous reference at the end of Appendix 1).

The following figures for 1979 could be accepted as an annual average of donations (El Shiekh and Haggar (ibid)):

Khartoum Teaching Hospital Blood Bank	5136
Omdurman Civil Hospital Blood Bank	2599
Khartoum North Hospital Blood Bank	5134
Army Hospital Blood Bank	750
Soba Hospital Blood Bank	1700
Total	<u>15,319</u>

From the above two references it could be seen that Khartoum Teaching Hospital Blood Bank and Omdurman Hospital Blood Bank had roughly similar numbers of donations in 1979 and 1980. There is a great discrepancy between 1979 and 1980 in Khartoum North number. The total donations of the Army and Soba Hospital in 1980 are not known.

This may indicate that records system is not very accurate or that the total number of donations is greatly changing from one year to the other.

In any case, Soba and the Army would not be expected to have more donations than the figures given in 1979.

Therefore, taking into consideration the smaller number of donations for 1980 in Khartoum North Hospital the total would be less than 15,319 as it was in 1979.

The recording system may definitely need improvement. For further information about distribution of beds and consumption of blood according to speciality in Khartoum (see end of Appendix 1). Within the limitations of all of the data collected by the author an extensive survey was carried out over a period of three years.

1.5 A Review of Blood Donor

Motivation and Recruitment

The interest in blood donor motivation has increased with the advance of technology which lead to development of more complex methods for the treatment of patients, especially in surgery.

Many elements contribute to motivation which is a mixture of medical, social and psychological factors. The stimulating reviews by Titmuss (1970-1971) of the social phenomena of blood donation in Great Britain and North America have led many researchers to investigate the motivation of blood donors in their own countries.

A report by the Medical Journal of Australia (1972) drew attention to the importance of sociological aspects of blood donation and blood transfusion practice which is a special feature of Titmuss' work. This shows that donors may be classified as follows:

Type A. The Paid Donor

Irregular donor for whom the payment for blood is a source of needed income. He can be categorised as the mercenary donor, one who is primarily motivated to donate by the prospect of a cash payment.

Type B. The Professional Donor

Donor who gives blood on a regular, registered, semi-permanent or semi-salaried basis, contrary to the irregular,

occasional, less frequent "walk in" donors from Type A.

Type C. The Paid-Induced Voluntary Donor

Donor who receives a cash payment, but claims that he is not motivated by the payment. The payment can be considered as a stimulus, or for the trouble to which they have been put.

Type D. The Responsibility Fee Donor

Patients, who themselves have formerly received blood are charged a fee variously called a "responsibility" or "replacement" or "deposit fee".

They have to repay the transfusion back either in blood or in money.

Type E. The Family Credit Donor

These are eligible donors who make a pre-deposit donation of one pint of blood each year in return for which he and his family are "insured" for their blood needs for one year without any charge.

Type F. The Captive Voluntary Donor

Donors in positions of restraint and subordinate authority who are expected to donate or they might be exposed to disapproval or shame.

Type G. The Fringe Benefit Voluntary Donor

Donors who volunteer and are attracted or induced to donate by the prospect of tangible rewards in non-monetary

forms other than medals or "thank you" certificates.

Many of these fringe benefits are common in the Union of Soviet Social Republic where it is reported that about one-half of all blood donations are drawn from donors of this type and one-half from paid donors. The most general ones are days off work on full pay; longer holidays, free holidays in rest homes and other holiday centres, free meals and medical care.

Type H. The Voluntary Community Donor

These donors were asked to give blood in order that an adequate supply of blood would be available to meet the need without any tangible rewards. It is a free human gift.

In addition to the donor motivation, which is the main topic of this research, it was considered that tetanus antibodies and hepatitis markers in the Sudanese population would be relevant to investigate. Tetanus and hepatitis will be reviewed separately each in the specific part of the thesis for that particular subject.

Although most people recognise the need for blood, only a few donate blood. To find out the reasons for this a number of surveys have been conducted to measure the positive and negative motivations surrounding donating and at the same time the best way to save human blood from the market place. Most researchers have chosen to study these reasons by working with actual donors. Other studies

included in their investigation a consideration of non-donor motivation.

Differences between donors and non-donors

The purpose of the study of non-donor motivation was to determine if differences existed between blood donors and non-donors in the selected characteristics of altruism, social responsibility, incentives, perceptibility of effects and response to social pressure.

Result of data analysis revealed that (Boe 1976) donors and non-donors did differ significantly in a number of relevant characteristics. Donors were found to be more vigorous and possessed a great tendency for Original Thinking than non-donors. Donors were also found to be better educated and more socially active in terms of organisational memberships and voluntary contributions. One of the unexpected findings was a significant difference between the two groups with regard to their cooperation in participating in this study. Non-donors refused to cooperate at a significantly higher rate than blood donors. Bettinghaus and Milkovich (1975) study indicates that there was little difference between donors knowledge of the donating process and access to mass media disseminated information about blood donation. Non-donors receive more information about donation from friends than do donors and interpersonal influence is an effective means of donor recruitment. Non-donors do lack knowledge about the location of local

collection facilities.

Condie and Maxwell (1976) show in their comparative study no difference between donors and non-donors in their altruism scores (University A). University B shows that donors do have significantly greater altruism scores than do non-donors. So there is no important relationship between altruism and donation (being a donor or a non-donor).

Incentives appear to be more strongly related to donorship than do perceived costs.

TABLE 1.2

Demographic characteristics of blood non-donors

Demographic Characteristics	Reference Number			
	6	9	12	18
Male	55	17	45	61
Female	86	1	55	38
Single		8		
Married		10	100	49
Age: 18-30				61
31-50				34
Over 50				4

The figures in the above Table are percentages

TABLE 1.3

Negative motivations of blood non-donors

	Reference Number						
	6	9	12	17	18	19	*21
Medical disqualification			28	60	57		
Fear (fear of the needle)	14	33	13	37	23	33	61
Apathy (lack of motivation)				16	16	17	
Inconvenience (transport)	29			19	13	7	
Unaware of need, ignorance	7	28				11	22
Unpleasant effect							
Never been asked	38						
Dislike sight of blood						3	
No tangible reward							
Lack of personal approach						8	

* Titmuss Book, p. 183. Non-donors in France.

The figures in the above Table are percentages

Demographic characteristics

Several past studies have investigated the demographic characteristics of donors. These surveys have been of two major types. The first has concentrated on the demographic characteristics of blood donors. The second type of survey has measured the expressed positive and negative attitudes of donors and non-donors towards giving blood.

Results of most of these studies are almost the same,

motivation to donate are altruism, humanitarian and social pressure. Reasons for not donating or discontinuing are fear of the needle, adverse reaction and inconvenience. A recent study was done by Burnett (1982), introduced several new variables (eg self-esteem, blood type, risk-taker, health) and has shown that several traditional variables are not as important as expected. Humanitarianism and altruism have given way to concern for self and family. Burnett (ibid) indicates that donors tend to be male, married with children, have rarer blood types, low self-esteem, low risk-takers, concerned with health and better educated. Non-donors showed the opposite characteristics. Different promotional programs suggested by Burnett (ibid) to be developed to attract and retain donors and to attract non-donors.

The demographic factors are very important, first, to have a clear picture of the respondent population such as their age, sex, family background, etc., second, as some researchers have indicated that demographic factors may have an important influence on the composition of the donor pool. London and Hemphill (1965) indicate that some demographic factors may have a bearing on donor motivation and retention.

TABLE 1.4

Demographic characteristics of blood donor

Voluntary donor												Paid Donor		
Reference Number												UK (survey)		
Demographic characteristics	3	4	9	20	11	13	14	19	22	21	*	**	5	
Male	66	83	91	59	68	79	80	67	70	80	45	56	99	90
Female	34			4	32	21	20	33	30	20	55	43	1	10
Single				40	15	18	33		31			46	68	47
Married				23	80	82	57		66			52	32	44
Age: 20	14	1	23											
20-29	23	30				28	40							53
30-39	20	34				29	43							33
40-49	24	25				25	5							14
50-59	15	10				17	10							
69-69	3						2							
First time donor	25					19			25	11				
Repeated						80			74	89				

* The present study by the author on donor motivation of West of Scotland
** The present study by the author on donor motivation of the Sudan
The figures in the above Table are percentages

The demographic profile of a voluntary donor, which is reported by most studies, indicates that donors are mostly males, younger than the general population and with previous experience as blood donors.

The demographic profile of a paid donor reveals that he is mostly male, of younger age group, with low education, and does not belong to any organisation (Condie and Maxwell 1970).

Positive Motivation

The primary motivations expressed by donors in all studies included expressions of general altruism. Such as desire to help and help relatives or friends and the majority also indicated the importance of personal contact as an agent of persuasion (Osborne and Bradley 1975).

Altruism/Humanitarian:

These altruistic attitudes were expressed by a desire to help those who are in need of blood.

Though most of the results are altruistic and humanitarian, it is impossible to determine whether this is a true motivation or a rationalization (Oswalt 1977).

Women and young people always respond to humanitarian, romantic and dramatic appeals. Grace (1957) reports that women not only prefer humanitarian appeals but also donate more frequently for voluntary social reasons than do men.

Predeposit:

A predeposit program involves a group or a member of a family donating blood against possible future needs. This motivation entails giving of oneself with the expectation that something will be given in return (if needed) (Oswalt 1977). London and Hemphill (ibid) reports that 42% donated as they thought they might need blood some day. Bisserup et al. (ibid) suggests that programs should be worked out with insurance companies so that coverage for blood and blood products is dependent on actual donations of blood by its members. The aim behind that not only 20% donate and the remaining 80% get a "free ride".

Replacement:

Is the feeling to repay a transfusion of blood. The general notion of replacement is a conviction among donors that at least one member of a family should give blood (Titmuss 1970). London and Hemphill (ibid) report that 50% of their donors replaced blood for a family or friends who had received transfusions while only 10% had themselves received transfusion. Wallace and Pegels (1974) report that 17% of donors began by replacing blood for a friend or relative.

Social Pressure:

It has been confirmed by numerous studies that most blood donors have been approached personally, or know other

donors' family members or friends. 75% of donors (London and Hemphill (ibid)) had family or friends who had been donors. Phillips (1961) reported that more donors than non-donors had family members who had given transfusions. 56% of donors sample (Osborne and Bradley 1975) indicated peer pressure was the only reason for their donating.

Grace (ibid) has found social pressure to be related to blood donation. Bettinghaus and Milkovich (ibid) report that 38% of those who donated were influenced by a friend.

Face-to-face has been shown to be more effective in recruiting than the telephone (Oswalt 1975; Ford 1975; Wallace 1974) though telephone recruiting is cheaper in terms of time and effort.

Personal Request:

This category consists of donors who stated that they had been originally influenced to give blood by encouragement, requests made by individuals, either from their relatives or friends. Results of data analysis of the present study by the author revealed that 26% of the Sudanese donors and 16% of the Scottish donors were influenced by a friend to donate blood. London and Hemphill (ibid) had 63% of their donors influenced by personal request.

Community Needs:

Community needs show the awareness of donors of the need for blood. Such donors are those who become aware of

Blood Bank, which has become an essential part of a community's medical services and plays a great role in saving lives and accelerating the return of patients to their ordinary activities and employment. Phillips (ibid) reports that 49% of the donors gave their reasons for becoming donors under the rather general term of "service to the community". Grace (ibid) reports that the recruiter must be personally convinced that blood donating is good, important and necessary. .

Reward:

Many donors rejected the idea of being rewarded. Oswalt and Napoliello (1974) reported that 80% of the donors indicated that a monetary reward would not influence their donations positively or negatively.

This monetary reward may induce the paid system, so donor rejected this idea to save human blood. The best way to save blood is to exclude commercial blood mainly for the risk of hepatitis and then from introducing dishonest donor to the Blood Transfusion Service. Titmuss reports that a paid donor will give false information to give blood more frequently than is medically recommended. Condie and Maxwell (1970) report from their comparative study of voluntary and paid blood donors, that within the medical profession there are those who feel strongly that all donors should be remunerated for their efforts in some

tangible way, while at the other end of the continuum some maintain that, "Ideally, not one pint of blood should ever have to be bought or sold (Anonymous 1963, cited by Condie and Maxwell 1970), some maintain that self-satisfaction should be an adequate reward". "If blood is considered in theory in law, and is treated in practice as a trading commodity then ultimately human hearts, kidneys, eyes and other organs of the body may also come to be treated as commodities to be bought and sold in the market place" (Titmuss p. 158 (1970)) and this is what is going on nowadays in Rio de Janeiro.

The XIVth Congress of the International Society of Blood Transfusion (1975) reaffirms its support for the development of National Blood Services based on voluntary non-remunerated donations of blood (Appendix 1). The effect of rewards on motivated donor (Upton (1973)) was that high motivation group would thus demonstrate a dissonance effect, ie would respond negatively to the reward while the low motivation would demonstrate an incentive effect, ie would respond positively to the reward. This proved the theory of altruism of Titmuss (1970) which states that the payment of blood donors tends to suppress the free expression of altruism and that consequently less blood would be donated under conditions of remuneration than under conditions of free "giving". A suggestion by Cagnard (1978) for a voluntary blood donation in the poor

countries where remuneration can take place should be in the form of nutrition or an improved standard of living, but not of financial reward which might defeat the object of the gift.

Publicity:

For several years it has been suitable to lean heavily on various mass media and advertisement to attract people to the bleeding session. Some research suggests that publicity should change its role from trying to motivate people to donate to that of attempting to inform in order to reassure since there is a significant amount of fear associated with blood donation (French Red Cross 1972). Fear, which is the main reason that hinders donation, could be alleviated by publicity. Future media appeals to blood donors should be geared to the active, creative and original thinking individual. A variety of media appeals should be developed to educate the public regarding the continued need for blood. Boe (ibid) and Bettinghaus (ibid) report that mass media have been and will continue to be an important tool for donor recruitment campaigns while Osborne et al. (1978) report that publicity is relatively ineffective in recruiting donors compared with the amount of emphasis that is usually placed on them. It has been reported that the most fruitful media seem to be in the visual field through television, films or posters

TABLE 1.5

Positive Motivation of Blood Donors

	Reference Number																	UK (survey)		
	1	2	3	7	9	10	11	12	13	14	15	16	17	18	19	21	22	*	**	
Positive Motivation																				
Altruism					87		11	14		65		21		16		26		65		
Community Need							26	24				18			49					
Humanitarian	27			52			11	14	78			21	66				54			
Help friend or relative									58			22						80		
Replacement		46		17		47			46									10	18	
Peer pressure													19	19	15					
Personal request	46	63			16				63						33	13		16	26	
Personal contact					22					10	42			26				27		
Reward		17							12											
Mass Media									25		40									
Television																		44		
Radio																			79	
Convenience of blood mobile													18	26						
Predeposit			30	22				11	42		13						40	32		

* A present study by the author on donor motivation of West of Scotland

** A present study by the author on donor motivation of the Sudan
The figures in the above Table are percentages

(Phillips (ibid)).

Rushton (1979) concentrates on procedures for advertising which could be most effective if it makes use of modelling procedures. Highly salient, attractive, powerful and prestigious persons should be shown both actively volunteering and subsequently giving blood at blood donor clinics. They should be seen as feeling pleased with their behaviour.

Review of Motivating Factors:

It seems clear that most of the reasons given by the donors and non-donors in all these studies for giving blood are almost the same. The prime motivational factor for donating is humanitarian to help humanity motivated by different reasons.

Negative Motivation

Fear and anxiety appear to be the major factors which stand in front of donation, "fear of the unknown", fear of the needles", "fear of weakness", "fear of the sight of blood" and "fear of an unpleasant experience". Inconvenience could be a barrier against the donating of blood and continuity of attendance to the bleeding session is one of the major problems which face blood donation beside recruitment of new donors.

Fear and Reaction:

Apart from medical reasons, fears were most commonly

reported as reasons for non-donation. Nikolaeva et al. (1980) reports that the commonest causes of refusal to donate are unfounded fear. Hocking et al. (1974) reported that fear was an important factor retarding blood donation. Fear which is a natural human feeling could be alleviated by the donor's recruiter. Phillips (*ibid*) suggests that dispelling of these fears by the giving of information freely, by invitation to groups to visit the Blood Bank and Mobile Collection Centres, by visual demonstration, by television, by films or by demonstrations, will have to be one of the main points of attack on this form of barrier against blood donation. Blood has a very special place in people's unconscious mind and it is no wonder there is a strong tendency to find excuses to escape from such a forbidding act. Dichter (1972) suggests using the idea of lending blood instead of giving it. That means, blood is loaned to a friend and the body will replace it. The idea is to overcome the anxieties. Oswalt and Hoff (1975) reported that 87% of his donors had no fears before or after donating and only 23% of the non-donors had fear. This included fear of the needle, fear of blood and fear of Doctors.

Miller and Weikel (1974) indicated that a large percentage of donors are lost to the system because of adverse reactions such as weakness, dizziness, fainting, pain or hematoma during or after at least one donation.

Dichter (1952, cited by Phillips (ibid) has pointed towards unconscious anxieties connected with the thought of giving blood. So since 1952 fear seems to be the largest negative motivation and still no solution has been found.

Inconvenience:

Donor Centres should be located within easy reach of the donors. The use of mobile donating units might be considered, waiting time should be avoided. Inconvenience could be one of the main reasons to prevent donor from coming to donate. Ford (ibid) reports that 75% of people interviewed are not willing to spend more than 90 minutes in total in travelling and donating. Phillips (ibid) reports that only 4% of his donors and 7% of the non-donors responded to inconvenience. Oswalt and Hoff (ibid) reported that 26% responded to convenience as another major motivating factor while 13% of the non-donors responded to inconvenience as a negative factor for giving blood. Lack of transportation, problems with obtaining babysitters, inconvenient hours of blood clinics and the time involved in actually donating. Caruso (1978, p. 140) reports that non-donors of the general public gave passive reasons for not giving blood as there was no convenient opportunity. It has been reported by Bisserup et al. (ibid) that another innovation that proved extremely effective was the rearrangement of the blood donor hours.

Retention:

When donor's activity starts to become less or drop out completely, his card should not be transferred to the passive file immediately (Akerblom 1979), if reminded, the donor may become active again.

In fact, retention of donors is very important for a successful blood donation programme. It is not only the recruitment of new donors one should be after, but also the keeping of the already recruited donors active as long as possible.

This subject has attracted the attention of few researchers. The effect of sending reminder notices has been evaluated (Oswalt and Napoliello 1974). The results of this study indicated that they significantly increased donations.

Oswalt and Hoff (ibid) report that the drop out rate is 89% for women and 63% for men.

Miller and Weikel (ibid) report that 60% of repeat donors donate only one time per year, and the remainder donate 2.25 times per year.

In the area served by the Welsh Region of the National Blood Transfusion Service, for example, approximately 16% of donors each year discontinue donating and are removed from the active donor list (Oborne et al. (ibid)).

Miller and Weikel (ibid) report that most drop outs are still healthy eligible and 25% of these have donated

within the last ten years. A blood donor program which stresses on retention is likely to be the most efficient means of achieving adequate blood supplies.

TABLE 1.6

Negative Motivations of Blood Donors and Non-donors

	Reference Number										
Negative	9	8	12	11	13	16	17	18	19	*	**
Fear	47	61	13	17		58	37	23			
Fear of the needle					15		27	+		64	26
Sight of blood					13			+			
Medical dis- qualification			28	34			60	57	17		
Apathy							16	16			
Reactions										28	68
Weakness		14	28	16	8						
Dizziness			28	16	6						
Inconvenience					13		19	13			
Ignorance	17		22			11			11	19	54

* Present study by the author on donor motivation of West of Scotland

** Present study by the author on donor motivation of the Sudan

+ Less than 10%

The figures in the above Table are percentages

Conclusion

The study of past and present recruitment methods revealed the influence of a wide range of variables on donor response.

The criteria which must be fulfilled for a donation to be considered voluntary is that the blood must be given free, that is to say, a reward must not be the incentive to give blood.

The success or failure of any blood procurement program is largely dependent on the efforts of the blood donor recruitment staff. The convenience of the opportunity to donate became more important as a reason for donating among donors sure of their decision. The mass media and advertisement should be developed to educate the public regarding the continued need for blood and finally the success of donor recruitment programme depends very heavily on the commitment of individuals from the community (McBarnette et al. 1974).

CHAPTER 2

METHODS AND DESIGN OF THE STUDY

2.1 Populations of the Sudan Studied

The population studied in the Sudan has already been defined (see Introduction). The target population for this study was all blood donors in Khartoum City with its suburbs, who numbered roughly 15,000 per annum up to the time of the survey in 1980.

Due to time constraint, since the whole survey had to be done in a period of 6-8 weeks, and due to the limited number of donors we have in the Sudan because of the non-existence of a voluntary system (as will be discussed in Chapter 3) no estimation of the number of donors could be made beforehand.

The majority of donors who came to donate in any of the four Blood Banks in the City of Khartoum, where the survey was carried out during that period, were interviewed (Gilmour 1980; Eltai 1980). A small number from each Centre was not interviewed. The reason for that was:

- i) shortage of the staff, ii) one of the Centres (Khartoum North) was excluded, iii) Ramadan time (will be explained later in the section dealing with Collection and transport of Sudanese samples).

One of the Centres, Shora*, where the questionnaire was distributed to the donors to be answered by them

* Shora: Shora Centre named after Shora, the first Donor Organiser in Khartoum National Blood Bank, whose emergency donor panel filled the questionnaire in Khartoum.

instead of being questioned by somebody responded with 25% only. Due to the above reasons the number of donors who shared in this survey was far less than the average monthly attendancies but, nevertheless, represented about 1:4 as compared to Glasgow and West of Scotland where approximately 1:25 were interviewed over a similar period. A total of 577 donors were interviewed in different Hospital Blood Banks (Appendix 2, Graph 2.1).

Population of West of Scotland Studied

Demographic Characteristics

The age distribution and sex of the population studied in the West of Scotland is defined in the Scottish Chapter (Table 4.1.2). In Scotland, in general, where there is a population of 5,117,146 (Census 1981), the two factors affecting the size of the population are death and birth rates.

Deaths have remained fairly constant at around 64,000 per year over the intercensal period. Births, on the other hand, have exhibited a significant decrease from over 80,000 per annum at the start of the decade to a record low of just over 62,000 in the year ending 30th June 1977, although there have been modest increase since. Although there was a natural increase (excess of births over deaths) of 58.6×10^3 over the whole intercensal period there was a natural decrease in the years ending 30th June 1977 and 1978.

Age, sex distribution, birth and death are the main demographic characteristics of the Scottish that the author thought are relevant to maintain in relation to the population studied in West of Scotland.

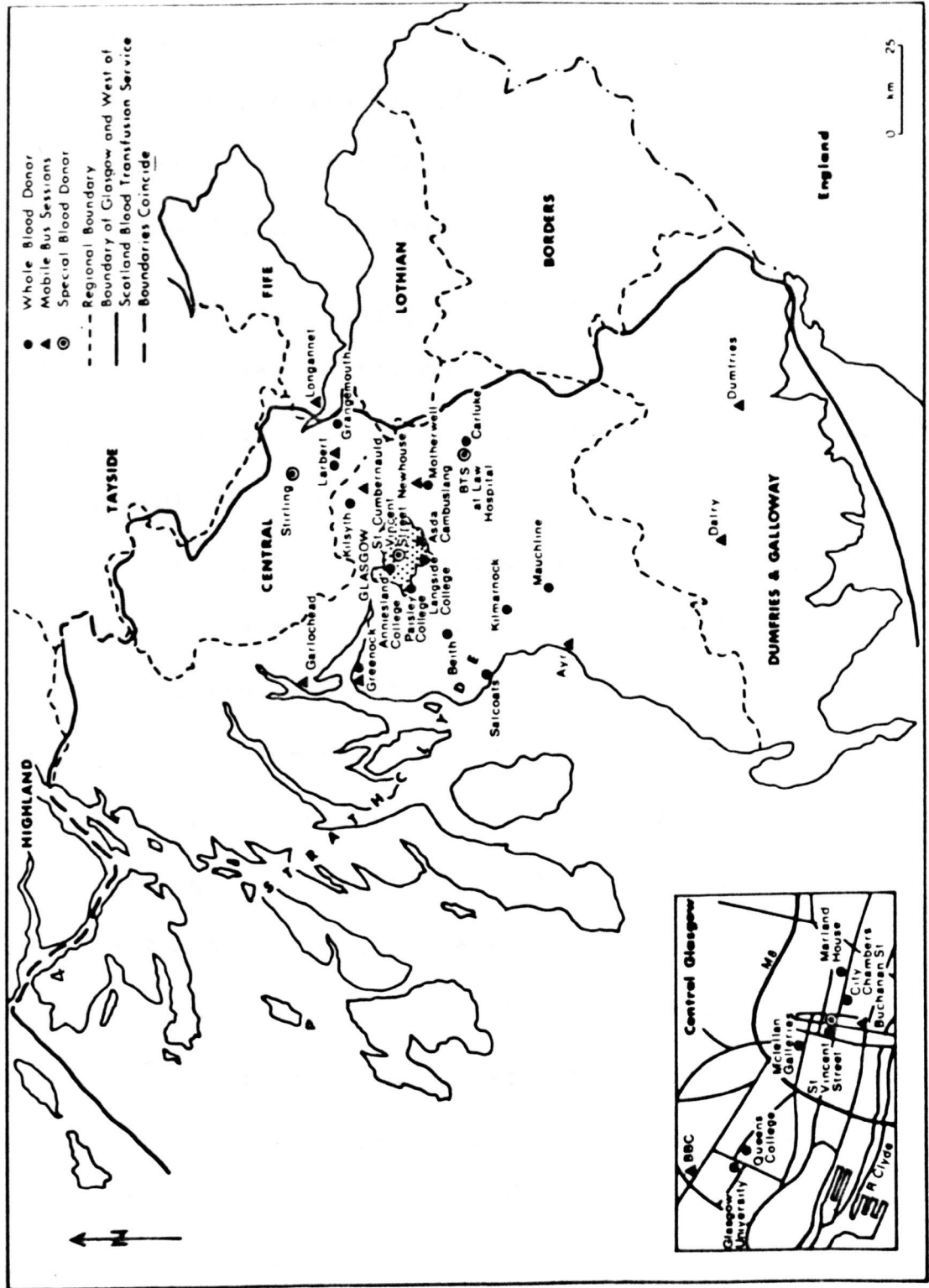
The target population for this study was all active blood donors in the West of Scotland who numbered about 150,000 in the single year 1979. Since the whole survey had to be completed in a period of 6-7 weeks, a simple random sample was out of the question, so a multistage sampling procedure was devised to ensure that the different types of session (town, works, college and bus) and different areas within the West of Scotland were represented in the correct proportions. This involved choosing a sample of donor sessions from each of these types of sessions and then choosing a sample of donors from each category.

Since the author wished to supervise the completion of all questionnaires himself, and since he could visit no more than one donor session on any day, this restricted the number of donor sessions from which the sample could be drawn to 31 at most.

It was decided to aim for a sample of approximately 1000 donors since this was the maximum number which could be coped with in the time available. To achieve the desired sample size, the total number of donors who attended the 31 sessions in the sample in 1979 was noted

MAP 2.1

Blood Donor Sessions visited - West of Scotland



and, assuming that approximately the same number of donors would attend in 1980, a 1 in 4 (sometimes 1 in 3 or 1 in 2 depending on the number of donors present at the session) random sample of the donors at these sessions would result in a sample of approximately 1000 donors. The number of donors in each of the sessions (Map 2.1) in the sample is shown in Table 2.1 on the following page.

2.2 Formulation of the Questionnaires

The formulation of the questionnaire was one of the difficulties the author had to face at the very early days of this research.

The basis for this questionnaire was achieved by consulting many relevant references and few individuals in West of Scotland and their comprehensiveness and good quality was confirmed when the author attended the 4th Annual Symposium and Seminar in Blood Donor Motivation in Drenthe/Groningen, North of the Netherlands, in October 1979. A small report about the Symposium is included in Appendix 2. It was thought that that would be a good start for this research after four months of reading about this topic and after the questionnaire started to take its final shape. In fact, the Symposium proved to be very useful and stimulating. The timing was perfect, just at the preliminary stages of preparation for the survey.

The persons consulted about the questionnaire were the

TABLE 2.1

Types of Sessions Visited in West of Scotland and Number of Donors Interviewed

Town Session	No.	%	Works Session	No.	%	College Session	No.	%	Bus Session	No.	%
Mauchline	35	3.4	Kilmarnock	65	6.4	Langside Glasgow	23	2.3	BBC (Works)	20	1.8
McLellan Galleries (Glasgow)	41	4.0	Larbert	53	5.2	Paisley	34	3.3	Dalry (Town)	19	1.9
Kilsyth	60	5.9	Grangemouth	34	3.3	Students Union, Glasgow University	50	4.9	Gareloch- head (Town)	17	1.7
Greenock	60	5.9	Marland House (Glasgow)	31	3.1	Queens College	10	1.0	Kincaid (Works)	14	1.4
Motherwell	73	7.2	Beith	16	1.6	Anniesland College	40	3.9	Asda, Cambuslang (Works + Town)	18	1.8
									Honeywell (Block 16) (Works)	15	1.5

TABLE 2.1 (cont'd.)

Town Session	No.	%	Works Session	No.	%	College Session	No.	%	Bus Session	No.	%
Carluke	90	8.9							Buchanan St. (Public)	15	1.5
									Lochlands (Works)	10	1.0
St. Vincent St. (BTS Depot)	56	5.5							Uniroyal (Works)	17	1.7
Saltcoats	36	3.5							Longannet (Works)	12	1.2
									Thames (Works)	17	1.7
City Chambers (Glasgow)	20	2.0							Ayr (Town)	16	1.6

Direct Supervisor of this research and the Co-supervisor. The first advised the author to use Titmuss' (ibid) questionnaire as a tool since Titmuss' work was the first detailed survey of its kind in the world. The second arranged meetings for consultations about the questionnaire with the Statistician (Gilmour 1979), who is a Lecturer in Medical Statistics in the University of Glasgow and the Computer Science experts in the Department of Community Medicine (Murdoch 1979). The computer expertise recommended the second of the reading after Titmuss' book and that was by Greaves et al. (1973). Although the title of this text bears no relation to the survey, yet it included a useful example of the questionnaire models used in surveys.

Other references consulted by the author were:

Bettinghaus and Milkovich (ibid); Boe PhD (1976); Bourke and McGilvray (1978); Brewer, T. et al. (ibid); Burnett, J. (ibid); Caruso (1978); Condie and Maxwell (1970); Condie (1969); Drake (April 1977); Drake (October 1977); Drake (1978); Dubois (1964); Ford and Wallace (ibid); Grace, H.A. (ibid); Hocking et al. (ibid); Korzekwa et al. (ibid); Leibrecht (1976); London and Hemphill (ibid); Mai and Beal (ibid); Osborne and Bradley (1975); Oswalt and Hoff (1975); Oswalt and Napoliello (1974); Phillips (ibid);

Proceedings 4th Annual Symposium and Seminar on Blood Transfusion (ibid); Rushton (ibid); Scottish Health Statistics (1977); Talafuse (1978); Upton PhD (ibid).

In Groningen the author had the chance to listen to some topics on blood donor motivation and abstracts on some of the surveys carried out by different researchers which assured him that the questionnaire would serve the purpose efficiently. Also, the author had the chance to meet some researchers who were recently involved in such surveys and with whom he had useful discussions round the question of motivation in general. Following his return from Groningen being sure of the tool to be used in conducting the survey, the author had some meetings with the Consultant in Statistics (Gilmour 1980) to determine the sample for the two surveys in whole blood donors and plasmapheresis in West of Scotland and whole blood donors in the Sudan, as will be seen in the section about sampling. Some meetings were also held with the Computer Science Consultant (Ackland 1980) to discuss the best way to write the answers in the questionnaire sheet in order to make it suitable for an easy and correct coding and punching on cards or paper tape ready to be entered into computer storage for subsequent analysis.

The Scottish Survey was conducted primarily by means of questionnaires distributed by the Blood Bank of West

of Scotland to its blood donors immediately after they had completed donating. Some were first time donors due to the Charities Week. This questionnaire contained 33 questions specifically designed to identify the type of the future blood donors and their original motivation. Information concerning age, sex, marital status, number of children, level of education and social classes was requested. Donors were asked their major reason for not donating and opinions on what could motivate them to donate and if provided transport might be of help. Question about the amount of blood donated, the frequency of donation and whether or not donation should be compulsory. Question to see the influence of membership of voluntary organisation and if having a kidney card would have any effect on donation. Finally, if the gift of blood should or should not be rewarded and what kind of various mass media and advertisement will attract donors to give blood. Details of the Scottish Survey Questionnaire can be obtained in Appendix 2.

The questionnaire used in the survey of the whole blood donors in the Sudan is slightly different from the one used in West of Scotland. The difference between the two questionnaires could be seen by looking at the Sudanese Survey Q.11, 14, 15, 16 and 17 in Appendix 2, which would indicate that one is asking different category of donors who

are not accustomed to voluntary system of donation, although they might have read about it and been aware of it. The results of which will reveal the willingness and readiness of the Sudanese population to accept such a system. The original Sudanese questionnaire was written both in English and in Arabic in order to give the Sudanese blood donors the chance to read and understand the questions.

A questionnaire for the survey of the plasmapheresis was done to give the author the chance to learn something about the special donor in case it would be possible to establish such a Centre as a part of the Blood Transfusion Service in Khartoum (Appendix 2). In fact, this is the main reason that tetanus and viral hepatitis have been selected in this research. They have been chosen due to their importance in the Sudan as a model for the need of immunoglobulins for the prophylaxis and treatment of preventable diseases.

The viewing of these conditions has been studied only from the possible involvement in the future of the Blood Transfusion Service.

Since plasma donors are special donors, the questionnaires are different in certain questions from both questionnaires (Q.20, 31, 32 in Appendix 2).

2.3 Pilot Study

Before the survey was carried out the questionnaire was tested by means of a pilot study in the Winter of 1979 in two areas, St. Vincent Street Donating Centre and four town sessions, in West of Scotland (Easterhouse, Drumchapel, Milngavie and Clarkston). These sessions were to give a comparison between two more middle-class owner occupier areas and two working class areas and their attitudes towards donor motivation. The idea of selecting donors varied between St. Vincent Street and town sessions in that they involved two totally different interviewing situations.

At St. Vincent Street, the Centre averaged around 60-70 donors per day. This meant that more time was available to interview and select a wider range of donors, making the survey more realistic. One in four donors was interviewed and sometimes groups of donors together had to be interviewed.

At the town sessions, the Centres were usually full averaging around 180 donors, thus making random selection more of a necessity than choice. Mostly housewives were interviewed at this session, missing the working husbands who attended in the evening.

The response was regarded as satisfactory and, as a result of this pilot study, useful lessons were learnt and accordingly the main questionnaire was revised and

finalised. The main results of the pilot study will be found in Appendix 2.

. The main survey was carried out between January and March 1980.

2.4 Organisation of the Survey

Questionnaires for whole blood donors were distributed in different sessions as it was shown earlier (Table 2.1) in Chapter 2.

Every 1 in 4, 1 in 3 and sometimes 1 in 2 were given a questionnaire after they had been tested for haemoglobin and requested to fill them after donating their blood while they were having a rest.

All the sessions were supervised by the author except the mobile bus sessions to whom the questionnaire was distributed in the same manner, but they were asked to answer them and send their answers by post. The questionnaire was contained in an envelope with a stamp and with the author's name and the West of Scotland Blood Transfusion Service at Law Hospital. The response was over 95%.

Since most of the donors are literate they all answered the questions without any help, except for some of the points which now and again were made clear by the author or by someone from the staff at the session.

The aim of the study was explained in the first page

of the questionnaire and the donors were requested to answer the questions if they wished.

Analysis of data

At the end of the day the questionnaires were collected, and screened by the author. They were rejected if the answers to any question were invalid.

The data from each questionnaire was then coded, punched on cards or paper tape and entered by the Computer Consultant into computer storage for subsequent analysis, using the SPSS package to do that (Appendix 2) (analysis for the survey on GUC ICL 2976 computer).

The same procedure was repeated again when performing the Sudanese Survey, with the only difference that most of the donors did not answer the questions themselves because majority were illiterate and since the author was keen to get the useful answers they were interviewed by a trained Social Worker, except for the few who requested to answer the questions themselves.

Map 1.1 of the Sudan shows the areas from where the donors originally came and where they lived at the time of the survey. The plasmapheresis survey was also done in the same way. They were only two Centres - one at St. Vincent Street in Glasgow, and this also included the donors from Stirling, and the other was at the Blood Transfusion Service at Law Hospital.

The same procedure was repeated here again. When the results of the information of the different surveys fed into the computer were obtained and tidied the author thoughtfully wrote the desired combination that could project the different types of donors primary characteristics combined with different positive and negative blood donor secondary characteristics which are shown in the results in the text.

2.5 Collection and Transport of Sudanese Samples

The donors tested were selected according to the scheme implemented in the Sudanese whole blood donor survey and it was decided to take randomly a sample of blood from each donor who came during the period of the survey.

131 donors gave blood without filling the questionnaire for the reasons mentioned before. Most of them were in Ramadan month, attending night sessions as they could not donate during the day while they were fasting. Night sessions started from 8.00 pm - 10.00 pm after breaking the fast. This group of donors had no time to fill the questionnaire for two reasons, i) difficulty of transportation as they had to leave as soon as they gave blood, and ii) most of them had to hurry for their shops as it was the high season of their work (since most of their sales had to be done at night due to Ramadan and

preparing for the coming "Eid").

From the total number of samples, 19 were collected from Sister School (girls) and Comboni College (boys), both of them are Italian schools. They were in the age group 10-18 years old (primary and secondary). As they were not blood donors, only 10-15 ml from each were taken.

A number of these children were vaccinated against tetanus as a part of combined triple vaccine. Both blood donors and pupils were cooperative and willing to donate their blood for research.

15-20 ml of clotted blood were collected in glass Universal containers (Mackie and McCartney 1978). The serum separated has been used both for tetanus and hepatitis testing as outlined in the technical Appendix 2.

Samples which were collected under sterile condition Universal containers were washed, dried and sterilised in an oven at 160°C for one hour (Mackie and McCartney (ibid)).

Samples were taken, when donors were donating from the end of the donor line, immediately after withdrawal from the vein and all necessary precautions were taken to avoid contamination. The containers with blood were labelled and immediately taken to the refrigerator within 10-15 minutes of their stay on the bench.

At the end of the working day before 2.00 pm (working hours are between 7.00 am - 2.00 pm) the specimens were transferred by motorcar from all Centres including

Khartoum Centre to Soba University Hospital, a distance of 20-25 km. They were kept on ice in transit because of the hot weather (see Map 1.2).

In Soba Blood Bank they were kept in the refrigerator till the afternoon or evening of the same day and sometimes overnight.

They were then taken out of the refrigerator and put on the bench for about an hour before separation process started.

The daily samples from the different Centres were tested for HBsAg by counterimmunoelectrophoresis (CIEP), as it will be mentioned later in the technical methods.

Testing was performed in batches of 60 samples to avoid waste of the kits used for Hepatitis screening. Therefore, the test was done sometimes in the same day and at other times the next day.

As these samples had to come over to West of Scotland all HBsAg positives were excluded in order to conform with the International Regulations concerning carriage of potentially infective human material.

Samples were centrifuged at 3000 rpm for 5 minutes at least. An average of 5 ml of serum from each sample was transferred to plastic vials with screw caps. All this was done on a bench regularly disinfected with hypochlorite (Howie Report 1978).

The technician handling the samples during the process of separation wore gloves.

Disposable Pasteur pipettes were used but sometimes due to shortage of pipettes, they were only washed in water and then in alcohol and allowed to dry.

The serum containers were transferred on ice to Soba Veterinary Research Laboratories where it was kept at -70°C in mechanical refrigerators.

Sometimes the sera were kept at -20°C in Soba Hospital Blood Bank where they were transferred the following day to the Veterinary Laboratories again in iced boxes to minimise thawing.

All samples of sera were continuously refrigerated in the Veterinary Laboratories up to the moment of onward travel to the United Kingdom. The caps were then sealed in parafilm to prevent leakage in case of thawing during the flight. They were transferred from the deep-freeze on a cool evening in October in an iced box and kept in a deep-freeze at -50°C till morning.

The samples were embedded in carbon dioxide freshly prepared in the Department of Chemistry, University of Khartoum, and were carried in a thermos flask and ice chest. These were stored in the deep-freeze at the Airport until the departure time at dawn to Scotland.

A letter from the Regional Director at Glasgow and West of Scotland Blood Transfusion Service, describing the

material and the purpose for carrying the specimens helped to pass all Airports security including Glasgow.

The specimens were taken from Glasgow Airport by taxi directly to the Centre at Law Hospital where they were stored at -30°C .

Before being tested the sera were thawed in the high risk room, transferred to glass tubes with new labels and kept at -30°C ready for screening.

The total number collected in the Sudan was 708 tubes each containing 5 ml of serum plus 19 samples from pupils. All the samples were tested in the Sudan for HBsAg by counterimmunoelectrophoresis before being taken to Scotland. 33 samples of sera were found positive and removed from the total 708. Only 675 samples from donors plus 19 samples from pupils were transported to West of Scotland.

2.6 Technical Methods of Analysis

2.6.1 Methods used for testing antibodies (Scotland)

The Principle of CIEP

In this technique a double row of wells is punched in agarose gel and samples contain antigen (tetanus toxoid) are placed in the cathodly orientated wells (-).

Antibody-containing materials (test samples) are placed in the anodal wells (+) and an electric potential applied across the test plate. Because of the adjusted electroendosmotic flow the Ag and Ab migrate towards each

other and where they meet in optimal proportions a visible precipitin line forms (details of assay procedures in Appendix 2). Method used Barr et al. (1975).

2.6.2 Principle of RIA

Polystyrene beads coated with tetanus toxoid are challenged with test sera. If any anti-tetanus is present in the test sera this will bind onto the solid phase tetanus toxoid in the first incubation period. The beads are then washed and radioactive iodinated tetanus toxoid is added. In a subsequent incubation period the radioactive labelled tetanus toxoid will bind onto any anti-tetanus which has been captured by the solid phase tetanus toxoid forming a solid phase Ag-Ab-Ag complex.

After the incubation period the beads are washed and transferred to counting tubes and counted in a gamma counter. Positive results are indicated by high counts (see assay procedure in technical Appendix 2). Method used Dow et al. (1982).

2.6.3 Testing for HBsAg

The principle of CIEP

A similar immunoelectrophoretic technique (CIEOP), as the one used for testing tetanus antibodies, is used by commercially available kit in the Sudan (Immuno Diagnostika GES. MBH. Austragen-Rapidophor).

2.6.4 Testing for Hepatitis B markers

For details of both principles using sensitive radio-immunoassay methods, for Hepatitis B markers and Virus A antibodies in Glasgow and West of Scotland Regional Blood Transfusion Service on the Sudanese samples, refer to Abbott Laboratories (Hepatitis A antibodies in Appendix 2).

CHAPTER 3

SUDANESE WHOLE BLOOD DONORS' SURVEY CHARACTERISTICS OF SUDANESE BLOOD DONORS (PRIMARY AND SECONDARY CHARACTERISTICS)

3.1 PRIMARY CHARACTERISTICS - DEFINITION

Primary characteristics are social characteristics which define the human being and without which it is difficult to recognise him as an individual.

3.1.1 Age

The age range of Sudanese blood donors in this survey was between 16-50 years. This is possibly due to other factors beside the fact that the percentage of young people among the populations of Khartoum has increased during the last few years because of the continuous immigration movement of young adults, from different parts of the Sudan to the capital where they settle and look for jobs.

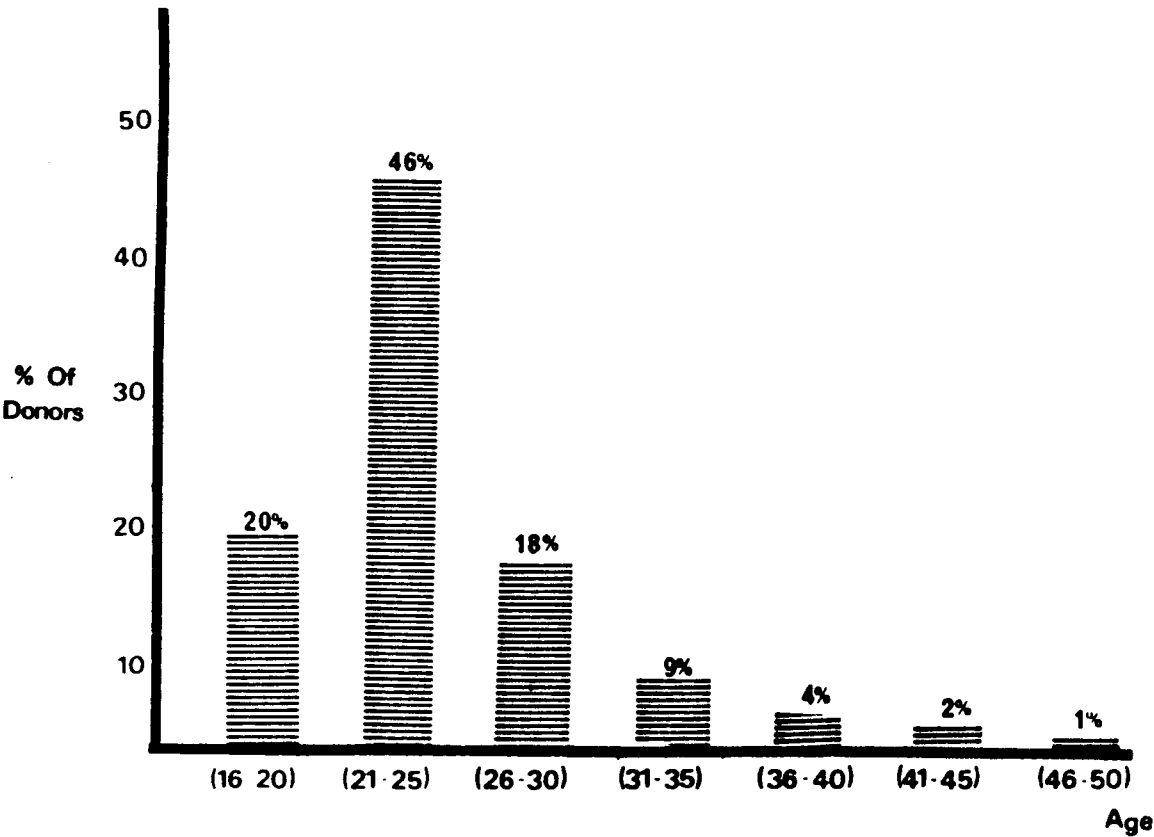
It would have been interesting to compare the general population age groups with the blood donors' age groups. Unfortunately, the last census was 1973 and the number of population has increased in Khartoum.

In the age group 18-67 it was found that the highest percentage in the population of Khartoum was between 18-22 (Eltai 1980).

Out of traditional respect for the elderly, the younger generations are usually the first to go when blood is needed for a member of the family, friend or relative; the elderly are spared this trouble unless they are desperately needed.

Bar-chart 3.1

Age Distribution of Blood Donors in Khartoum



The age distribution of the donors in this sample survey is given in (Bar Chart 3.1). 11 of the sample did not answer the question relating to age. The most interesting feature of the distribution is that 46% of the sample are between 21-25 years of age.

3.1.2 Place

Most of the donors who took part in this survey dwell in the city which consists of three big towns, Khartoum, Omdurman and Khartoum North. Thus, when talking about Khartoum from the point of view of dwelling, what is meant are these three towns with their suburbs.

The overall distribution of the donors in this survey according to where they live, whether in the city, town or village, differ from the distribution of the donors according to their original homes. It could be noticed that most of the donors who are city dwellers originally came from towns and villages.

Thus, it will be more reliable and useful in the future to depend on city dwellers although town and village dwellers also contribute. This should be taken into consideration when one is campaigning in the future.

It is hoped in the future to be able to cater for the city dwellers and those who are coming from outside, although usually, they do not come only to give their relatives blood, but as well to support them morally.

This possibly explains the population movement from villages and towns in different parts of the Sudan to the City' (Khartoum). This internal immigration induced 1) by better choices of employment, 2) universities and higher institutions is concentrated only in Khartoum. University of Khartoum is the only fully equipped University in the country, with only one medical school. Another school of medicine is being established in the Gezira area at Wad Medani: Omdurman Islamic University and the Khartoum Branch of Cairo University are limited to only human sciences. Other higher educational Institutes are Higher Teacher Training, Shambat High Agricultural and Khartoum Technical and some other military and teacher training schools. Postgraduate education is still very limited.

The majority of these donors in the survey have their original homes in this Central area; this sounds logical as perhaps the majority of each region donate in the blood banks nearest to them except for those moving from one place to another looking for jobs to sustain themselves. This constitutes 225 (39%) of the total number (Table 3.1).

Next greatest number of blood donors in this survey comes from the West of the Sudan and that is 159 (28%). The North participates with quite a significant number of 123 (21%). The South, 35 (6%) and the East, 19 (3%).

TABLE 3.1

The distribution of donors original
home and where they live

Where do you live	North	East	Original South	Home West	Central	Other	Row Total
North	71.4	0.0	0.0	0.0	28.6	0.0	2.4
East	50.0	30.0	0.0	20.0	0.0	0.0	1.7
South	0.0	0.0	75.0	0.0	25.0	0.0	0.7
West	18.7	6.2	0.0	75.0	0.0	0.0	2.8
Central	19.8	2.8	6.0	27.1	41.4	2.8	92.2
Other	0.0	0.0	0.0	100.0	0.0	0.0	0.2
Column Total	21.4	3.3	6.1	27.6	39.1	2.6	100.0

Row % is quoted

1 donor did not answer the questions

Others are refugees, 15 (3%).

On the other hand, when looking at the blood donors according to the areas where they lived at the time of donation, it could be observed that the distribution is very different.

The greatest majority of the donors live in the central area; the number is more than double the original number of the donor population who originally come from that area, 532 (92%) : 225 (39%).

The other donors who live in other parts of the Sudan but who might have been there in Khartoum mostly accompanying their patients, as is usually the custom, or for some other reasons are 16 (3%) from the West, 14 (2%) from the North, 10 (2%) from the East, 4 (1%) from the South and 1 immigrant. The total of which constitutes 8%.

The majority of these donors who come to settle in Central area are unmarried and usually they live in groups to share the cost of renting a house. Some live in boarding houses; others with their relatives who have been in the Central area for some time before them.

It is not exactly known what is the percentage of patients treated in the Central area and who originally do not belong to it, and the consumption of blood per annum, to cover these patients.

More effort should, of course, be done to recruit permanent donors from those whose home is originally in the Central area. This will help to avoid too many donors who may lapse into the passive file (Akerblom (ibid)) though if properly recruited and good contact is made with them, those future non-Central Region donors can be useful in other parts of the country if they go back to their original homes or to any other place.

3.1.3 Religion

The distribution of the blood donors from the point of view of religion. Mohammedans are the majority in the Sudan. 530 (92%) of donors are Mohammedans and 45 (8%) are Christians.

2 (2%) did not answer the question about religion.

This was probably not a very helpful question. These donors, whether Mohammedans or Christians, are brought up in the same society and they have the same feelings and therefore the same attitudes towards blood donations.

3.1.4 Sex

The blood donors in the Sudan are almost exclusively males. 570 males (99%) and 7 females (1%).

This may be due to some habits and customs in the Sudanese society. Firstly, since women are more exposed to physical exhaustion during deliveries, abortions, etc. they have to keep away from donations. Secondly, man, as a protector in his family, has to face this alone if it is

for a friend or for a relative. Thirdly, donation in a Sudanese society means courage among men. They are all willing to donate to a friend or a relative whenever it is needed or even to a stranger if they are requested.

In most places of Sudan, women are still separated from the society. They have to stay home, do the housework and bring the children up. In such a society, social workers could be of great help to enlighten them.

To make it easy and encouraging for Sudanese women to donate, one would need a well organised donor centre as the one in Soba University Hospital where donors can be cared for and where there is no overcrowding. Female donors could be encouraged to give blood without having to be subjected to long hospital queues and to other inconveniences that face men.

Female staff instead of male staff in the donor centre may be more inviting. Women social workers may play a great role in motivating and recruiting female donors. Practical demonstrations of the process of donating on ladies may be very stimulating.

Separate apartments in the building for women may be more appreciated.

3.1.5 Marital Status

Most of the donors in this survey are single. 389 (68%); 187 (32%) are married.

Unmarried people seem to be more willing to give their blood in this survey. They may be more enthusiastic due to their younger age and not yet burdened by other obligations like those who are married.

Married people were more expected to be blood donors especially those with children. The motive is that their children might need a blood transfusion in the future.

From the point of view of blood donation, it would have probably been an interesting comparison between marital status of the donors with the overall society (Bazuin and Smit Sibinga 1979) as in the survey done in Groningen-Drenthe where there was no difference between the two populations. In the Sudan, however, the comparison would be difficult as there is no significant available statistics of marital status (Mohamed 1980).

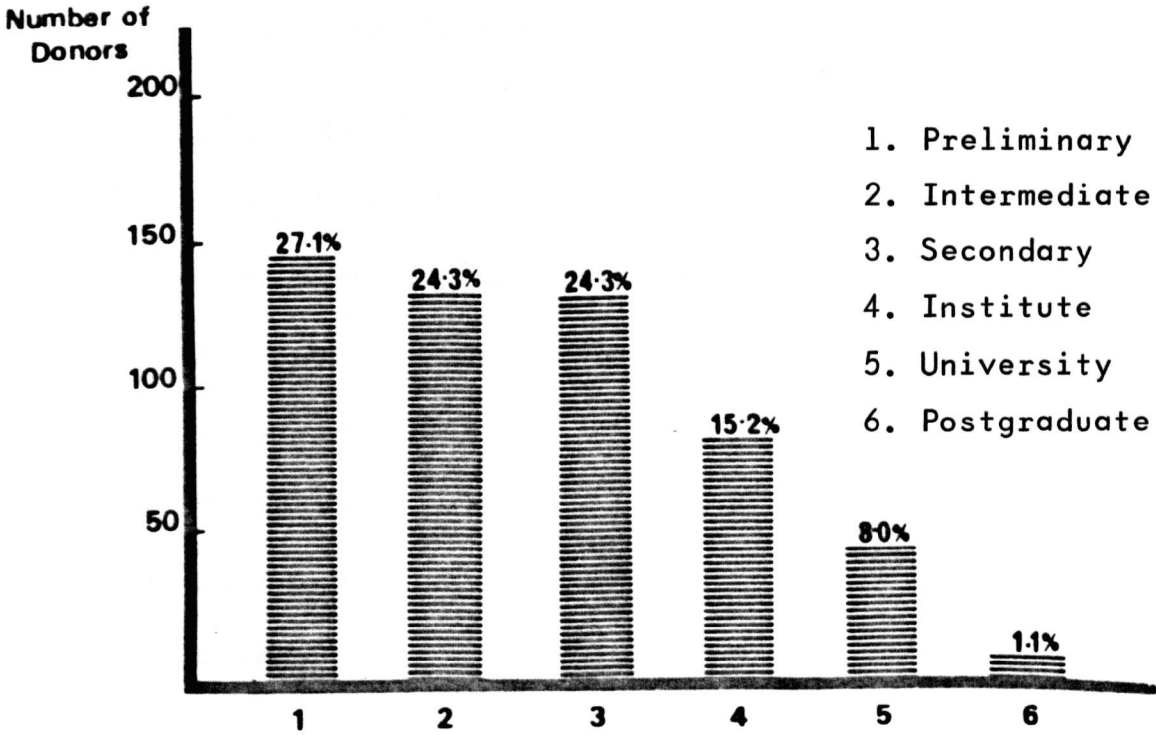
3.1.6 Education

One may have expected that the more people are educated, the more they are encouraged to donate. Though they are more aware of the need of blood and the importance of donation, they still need to be reminded.

The highest percentage of donors in this survey are those who have preliminary education (27%) (Bar-chart 3.2). That means they have other motives which has stronger effect in this field than education has. In my opinion, recruiting a voluntary system to replace the present one

BAR - CHART 3.2

THE EDUCATIONAL LEVELS OF DONOR SAMPLES.



depends on education.

The young generation of today, and which is the future community donors, must be brought up to develop national community love. It may prove easy to get University Institutes or Postgraduates to donate, if they are reminded. There must be lectures about blood donation in all the higher level of education to encourage donors and short films from time to time to remind them.

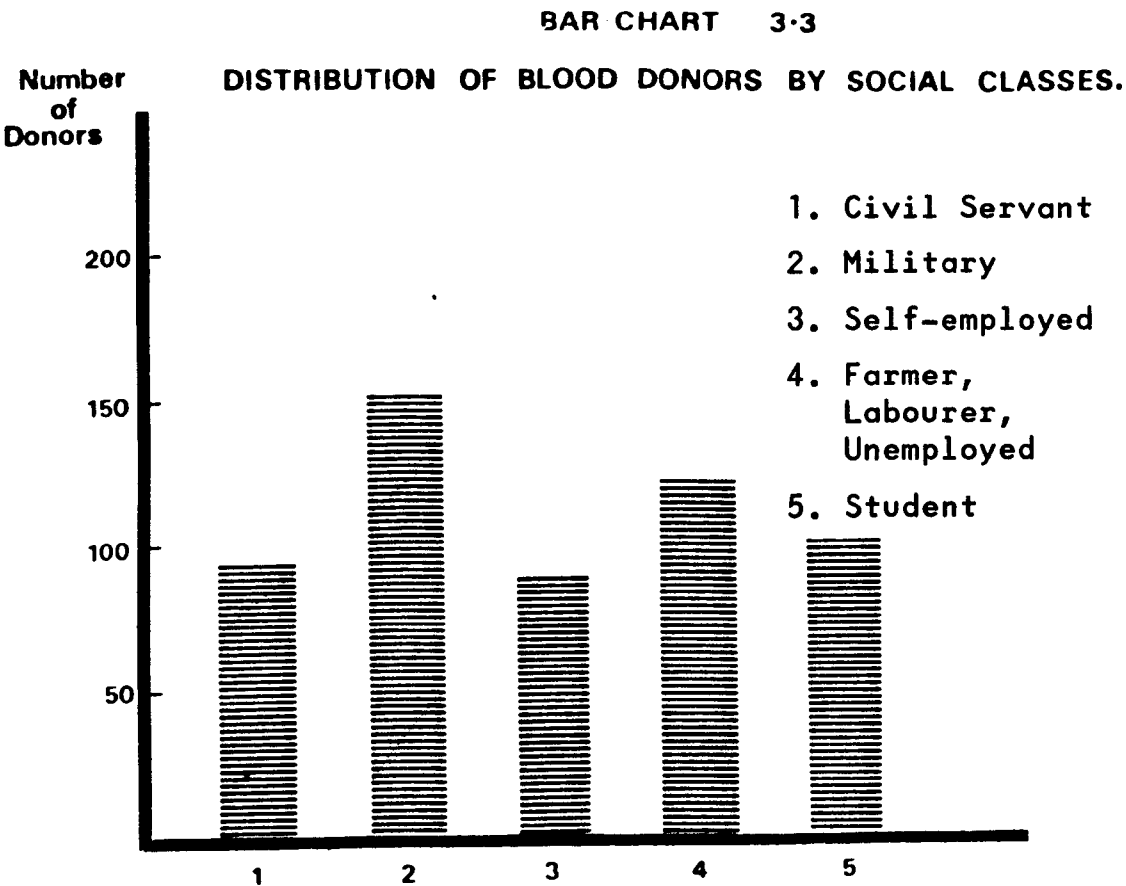
3.1.7 Social Classes

The Sudanese Society in this survey is divided into five different groups of people. This division will hint at their position on their society.

- (i) Civil Servant
- (ii) Military
- (iii) Self-employed
- (iv) Farmer, Labourer, Unemployed
- (v) Student

After a long discussion with Dr. Salih (1980) and Dr. Mohammed (ibid), it was agreed that this is the most suitable classification of the Sudanese Society.

The distribution of the Sudanese blood donors according to different social classes in this survey shows that the highest percentage of donors is from the Military (27%) (Bar-chart 3.3). Owing to the nature of their work, they are more aware of the need for blood. They are more



NOTE: 11 Donors did not answer this question.

educated in this field than the other classes. Besides all these facts they are always reminded and encouraged to donate.

The second highest percentage amongst these different classes was the Farmers, Labourers and the Unemployed grouped together. Labourers had the highest percentage of these three 19%, Unemployed 2% and, unexpectedly, Farmers are represented with 2%.

As it was mentioned in the Introduction that agriculture is the main source of the country, it would be expected that Farmers should have been presented with a higher percentage, if not the highest, in this survey.

Not only in the survey, but also when comparing professions of donors who donated blood in Khartoum and Khartoum North hospitals in 1980 (the same year the survey was carried out in Khartoum City) percentages of Farmers were 6%.

There must be some reasons hindering Farmers from donating their blood, as there is no religious or social barriers against either giving blood or taking it in the Sudan. Well then, it seems that there must be other causes which hinder them from donating; most probably, lack of both general and specific education about blood, act as hindrances here.

They are mostly educated up to the preliminary level, and those educated are the lucky minority.

Proper specific education about blood donation and the need for blood seldom reaches these communities.

Another very important reason is their valuable time. Those Farmers are mainly either from the Island of Toti which is not connected to the City by any bridge, so people have to cross to the other shore by a vessel, or from the outskirts of the City along the Nile.

To get a successful recruitment record, we have to involve this community which forms a high percentage of the Sudanese population.

An effective way of reaching this community could be through the Imam*. He has a great influence in convincing such communities through his religious speeches. That could be easily done by him every Friday. The Imam could explain to the audience the importance of donation and the need for their help. In fact, the Imam can help the representative from the Blood Bank to reach the community. The representative can be the Doctor responsible for the Blood Bank or a Social Worker who can develop very good relations with this community.

The third highest percentage are Students 18% and Civil Servants 16%.

* Imam; the Leader of prayers in a Mosque.

Friday prayer; Muslim go every Friday noon to perform their prayers in the Mosque and listen to the Imam speech.

The lowest percentage of donors were self-employed and these are categorised as a group and constitute 88 (15%) of the total. These Self-employed differ in respect of their free time. Some of them are very busy and they would not go unless the call was a strong one ie in an emergency or for a relative or friend. Therefore, these people should be approached in a special way. Direct contact may be very effective. The sessions could be arranged through mobile teams in less busy times, for example, in the evenings after working hours. This should be preceded by announcements in the radio, television and newspapers that these mobile teams will be at a certain time and place. The evenings are particularly more suitable because during the day the weather is sometimes so very hot that people are less inclined to do anything.

3.2 SECONDARY CHARACTERISTICS - DEFINITION

Secondary characteristics are those characteristics that emerge from the interaction of the donor with the society in which he lives.

Some questions were asked to reveal such secondary characteristics amongst Sudanese blood donors, the aim being to see whether some have acquired any knowledge in the field of blood donation that may stimulate them to donate, or whether they have any attitudes that will help to establish a voluntary donor panel. In other words, the

objective was to see whether they have positive motives that make them donate, or perhaps negative ones that inhibit the blood donation.

As well as analysing the secondary characteristics of the blood donors this portion of the thesis also seeks to analyse the results in their relationship to the primary characteristics of the population which, as earlier defined, are not subject to social change.

"God grant me serenity

To accept the things I cannot change

Courage to change the things I can

And wisdom to know the difference"

3.2.1 Blood Group

Over half of the donors in this survey (64%) do not know their blood group. This could be expected in a country where there is no established system for voluntary donation, when every donation is decided by the circumstances at that moment and when perhaps neither the Doctor is interested to inform the donors of their blood groups, nor most of the donors keen to know it. This possibly reflects the limited information about blood groups and transfusion in general. The publicity about blood donation is not existing. Concept of donating voluntarily is not known. That is why, although the

majority of donors in the survey has some degree of education that allows understanding such facts as blood groups, they do not know.

3.2.2 Voluntary Organisation

Donors in this survey were asked whether they have been members of a voluntary organisation or not. The aim was to see if those who came to donate were socially involved in any organisation which could have led to donorship.

In the report by Bazuin and Smit Sibinga (ibid p.12) figures are given but it is mentioned that the average donor seemed to be more socially involved compared to the average Dutchman and that is why they believe the response to the questionnaire (93%) could also be seen as an indication for this fact.

Researchers have reported that voluntary donors are more likely to belong to humanitarian organisations than non-donors (Titmuss 1970 (p.75-89); Condie and Maxwell 1970; Grace (ibid)).

In some surveys, donors were also queried as to the population of the community on which they were raised. Findings from ecological psychology (Barker and Gump 1964, cited by Wiesensthal and Emmot 1977) indicate that smaller communities exert greater demands for community participation than do larger communities. Perhaps residents from smaller communities are more apt to belong to organisations and also more apt to become a

blood donor.

Influence of voluntary organisation on motivated donors. The experience of the Sudanese blood donor survey in Khartoum City has informed us (Table 3.2) that the greatest number of donors 435 (77%) out of 565 who donated blood for different motives were not, at the time of the survey, or had never been members of a voluntary social organisation. 12 did not answer the question. Thus, it could be concluded that it is not always necessary to have any social participation in order to be a donor (see the Scottish Survey for comparison). Probably another survey in the future in a smaller town in the Sudan will give a different answer to this question.

3.2.3 Donation in Emergency

To get to know the stimulus to become a donor such a question was raised to find out if donors are willing to give blood in an emergency.

Most of those who donated blood 558 (93%) during the survey in the Sudan believe that it is of help to donate in an emergency. 19 did not answer the question. This is a good step forward towards voluntary attitude of donation (Table 3.3).

It seems that emergencies trigger humane feelings in the individual. Therefore, they are one of the best stimulants and if announced in the television or radio,

TABLE 3.2

Voluntary Organisation and Motivation

	Yes	No	Row total
Gave to help relatives and friends	105	351 76.9	456
Gave to repay a transfusion	22	80 78.4	102
Gave after witnessing an accident	41	122 74.8	163
Influenced by a friend, neighbour	27	122 81.8	149
Gave in response to an appeal	52	130 71.4	182
Total	130	435 77.0	565

Row % is quoted

12 did not answer the question

Note: In this Table and in similar ones
the Column numbers do not add up to
give the Column Totals as donors
ticked more than one item as a motive
for giving blood.

TABLE 3.3Motivated donors willing to give blood for emergencies

	Yes	No	Row total
Gave to help relatives and friends	416 *80.3 **93.3	30 *75.0 **6.7	446 *80.0
Gave to repay a transfusion	87 *16.8 **89.7	10 *25.0 **10.3	97 *17.4
Gave after witnessing an accident	147 *28.4 **93.6	10 *25.0 **6.4	157 *28.1
Influenced by friends and neighbours	131 *25.3 **91.0	13 *32.5 **9.0	144 *25.8
Gave in response to an appeal	171 *33.0 **96.0	7 *17.5 **4.0	178 *31.9
Total	518 *100 **93.0	40 *100 **7.0	558 *100.0

Note: * Col % to show influence on different motives

** Row % to show motivated donors who are and are not willing to give blood for emergencies

19 donors did not answer the question

they may have many respondents from the public who will be willing to come and donate. Here will be a golden chance for the Donor Organiser who, at the start, will be a Social Worker until a few are trained in the field of blood transfusion to be Donor Organisers. They will be able to talk to these people at a convenient moment, either (if this will be suitable) at the time of donation or while visiting their patients. Being primed by the illness of their relatives and friends, feeling the importance of the blood and appreciating the great need for it, they will probably respond to recruitment more than at other times. The stimulus and positive motives usually play a greater role at such moments than others.

It is clear from the answers to this question (as is previously mentioned) that those who come to donate for their relatives believe that it is of help to donate blood for emergencies.

This result inspires one with hope that the basis for voluntary donation is there. It only needs tactful approach proper education into this field through lecturing in schools at a suitable age, Universities, Institutes, Churches, Mosques and Clubs to try to convince people that it is not only relatives and friends and not only emergencies that call for blood. They should be aware that behind the screen there is always continuous demand for blood. This goal will definitely be achieved when,

through continuous efforts of education, people will understand the great value of donating their blood. They will then know that they give only one tenth of the quantity they have, say at half-year intervals, to save a life and that this quantity will be compensated and they will suffer no residual adverse effects in the future.

The look of the occasional donor who is moved by his relative's or friend's need should be broader and general. His attitude of individual responsibility type of donor where non-donors are required to replace blood they receive, should change to community responsibility type, where all in need of blood receive it under identical circumstances without regard to their donation history (Caruso (ibid) p. 16). Perhaps proper scientific explanation of the blood need and donation procedures in addition to an artistic and diplomatic way of approach to the public will have the best results in recruiting donors.

3.2.4 Giving Blood in Emergency Only

Probably the reader may have noticed that few questions in the Sudanese Survey were included to know the opinions of those donors who came to give blood to their relatives or friends about voluntary donation.

The questions were not direct to the point to avoid bias as much as possible.

To make the reader appreciate the association between Q.11 and Q.14, it could be said that Q.11 was to disclose

the donors motives towards giving their blood in emergency situations. Q.14 went further to investigate whether they would give their blood in emergencies only or at any time. It should be noted that whatever the motive is this does not seem to affect the donation in emergencies. The comments in this discussion will be mostly on the part that deals with giving not only in emergencies; this is because it has a stronger base for a voluntary donation (Table 3.3).

As can be seen from the results (Table 3.4) which are combinations of Q.14 with different age groups, social classes, levels of education, religion and places where blood was donated.

Slightly less than half (46.5%) of the donors in this survey would give their blood in emergencies and more than half (53.0%) would give their blood not in emergencies but at other times.

Looking at the percentage of the Sudanese blood donors who would support the idea of giving blood in emergency only which is 46.5% one can interpret this in different ways. One explanation is that these donors who donate in emergency only are those who are accustomed to give when their friends or relatives need blood which is the drive behind giving blood in the Sudan.

The percentage of 46.5% would be considered very high as a response for emergency only had it not been in a country where voluntary system is not known. Effort should

TABLE 3.4
Donors who would give blood in emergency
only according to the following criteria

TABLE 3.4.1

Age groups

	16-25	26-35	36-50	Row total
Yes	165 (46.3)	71 (48.6)	17 (40.5)	253 (46.8)
No	191 (53.7)	75 (51.4)	25 (59.5)	291 (53.5)
Column total	356 (65.4)	146 (26.8)	42 (7.7)	544 (100.0)

TABLE 3.4.2

Social classes

	Civil Servant	Military	Self- employed	Farmer, Labourer, Unemployed	Student	Row total
Yes	52 (59.1)	58 (40.8)	40 (47.6)	61 (46.2)	46 (46.9)	257 (47.2)
No	36 (40.9)	84 (59.2)	44 (52.4)	71 (53.8)	52 (53.1)	227 (52.8)
Column total	88 (16.2)	142 (26.1)	84 (15.4)	132 (24.3)	98 (18.0)	544 (100.0)

TABLE 3.4.3

Education

	Preliminary Intermediate Secondary	Institute University Postgraduate	Row total
Yes	186 (48.0)	50 (41.6)	236 (46.5)
No	201 (51.9)	70 (58.3)	271 (53.5)
Column Total	387 (76.3)	120 (23.7)	507 (100.0)

Percentage shown in brackets

TABLE 3.4.4

Religion

	Muslim	Christian	Row total
Yes	238 (46.9)	20 (45.5)	258 (46.7)
No	270 (53.1)	24 (54.5)	294 (53.3)
Column total	308 (92.0)	44 (8.0)	552 (100.0)

TABLE 3.4.5

Different centres

	Khartoum	Soba Hospital	Omdurman	Army Hospital	Shora	Row total
Yes	153 (55.0)	28 (29.8)	29 (56.9)	21 (53.8)	28 (30.4)	259 (46.8)
No	125 (45.0)	55 (70.2)	22 (43.1)	18 (46.2)	64 (69.6)	295 (53.2)
Column total	278 (50.2)	94 (17.0)	51 (9.2)	39 (7.0)	92 (16.6)	554 (100.0)

Percentage shown in brackets

be done to decrease this percentage by encouraging the voluntary donation system.

3.2.4.1 By Age Group

Most of those who did not support the idea of giving blood in emergencies only are 191 (54%) and 75 (51%) were from the younger age group of 16-25 and 26-35 respectively. This could be explained by the fact that most of the donor population in the Sudan are from those two age groups. It is reassuring to have the dream of future panel of donors from this younger age group.

3.2.4.2 By Social Classes

As can be seen from Table 3.4 the predominant social class is the Military with 84 (59%) out of 142. This is probably due to the fact that Military people are accustomed to give blood on request, appeal or when directed to give blood to some people who are neither their relatives nor friends and perhaps although they might have answered these requests not for any voluntary reasons but because of their occupation they are more aware of the need for blood and more familiar with the blood donation procedures. Consequently, this familiarity has destroyed the negative motives.

This awareness is due to the different ways by which they get information about the need for blood. It is one of their routine teachings. Due to the nature of their life,

they are more acquainted with Red Cross Society and the Red Crescent Organisation and this makes them more aware of the need for blood and prompt to donate in all circumstances. Thus, being a small number in comparison to the population in general, it could be said that it is their genuine characteristic that makes them willing to donate. Additionally, Farmers, Labourers and the Unemployed are well represented in Table 3.4.2, although these three groups of donors overlap. Since an ex-Farmer can be a Labourer, an ex-Labourer a Farmer, both can be Unemployed and an Unemployed can be either of them.

Most Farmers, Labourers and the Unemployed would have been expected to be willing to donate both in emergencies and at other times. Yet, if the difference of percentage is evident, the number who would donate in emergencies only among those groups is more than those who would donate in emergencies only among Military people. This is probably due to lack of self-discipline; lack of awareness; lack of organisation; lack of suitable Centres near donors' homes, so this percentage would give in an emergency only. Military people have transport facilities to reach Blood Banks, as they are collected together and encamped in suitable premises with desirable facilities.

As it was expected from the Civil Servants to respond with the highest percentage of 52 (59%) to give in emergencies only. The reason may be multi-factorial, they

may not have confidence in the system and therefore afraid of contracting diseases; lack of awareness of the continuous need for blood; lack of proper publicity among themselves.

3.2.4.3 By Education

The impact of education on whether donors would volunteer in emergencies and at other times. Looking at Table 3.4 one would see no great difference of the effect of various educational levels on whether the donor would be willing to donate in emergencies only or at other times.

I have combined up the different levels into two groups which are shown in Table 3.4.3 to make it easy for the reader to notice at a glance, the slight differences between those who would agree to donate in emergencies only and those who would donate in non-emergencies.

Unexpectedly, is the high percentage of the Postgraduate 4 (67%) who would give only in emergencies. One would have thought that the highest percentage, if not all, of the Postgraduates would support the idea of voluntary donation in non-emergency situations. Due to the small number of Postgraduates in this survey no great importance should be given to this result (Gilmour 1982). A further investigation in the future into the attitudes of Postgraduates towards donation may be of interest.

3.2.4.4 By Religion

Donors who would volunteer for emergency only according to different religion.

The main two religions in the Sudan are broadly speaking Mohammedans and Christians as can be seen from Table 3.4.4. The percentage who said they would volunteer in emergencies only were 238 (47%) out of the total of 508 Mohammedans and 20 (45%) among Christians out of the total of 44. On the other hand, those who would give in non-emergency situations were 270 (53%) out of 508 among Mohammedans and 24 (54%) out of 44 among Christians.

From the point of view of donating in emergencies and non-emergencies, there seems to be neither an effect of religion on the attitudes of the donors in both situations, nor an effect of different religions on this attitude.

3.2.4.5 By Different Centres

Donors who would volunteer for emergency only according to the different Centres.

An analysis of the place of donation available to donors has shown interesting findings. Although Soba University Blood Bank is the newest Centre in the City of Khartoum, yet it has the biggest percentage of donors who would agree to donate in non-emergency situations for blood requirements in the community (Table 3.4.5).

It is interesting to speculate that people are attracted to Soba Centre more than Khartoum National Blood Bank, Omdurman and Army.

Firstly, no reason could be detected beside the fact

that Soba Hospital Centre has an air of cleanliness and a tranquil serene atmosphere. Secondly, being the newest, attractive and most modern big University Hospital in the City of Khartoum with many experienced Doctors in many of the greatly needed branches, it has become more popular than other hospitals. The strict regulations for visitors has prevented the hospital from looking rather chaotic as is the case in other hospitals. Probably all these factors, particularly the peaceful atmosphere of the Blood Bank itself, are inviting to donors to come and donate their blood at any time more than emergency only.

Next group of donors who were as big in number as the Soba University Hospital Blood Bank donors was Shora.

The Army Hospital Blood Bank* in Khartoum is a clean, well organised place, but if the difference of 8% is significant between those who said "yes" and those who said "no" that is probably because the Army Blood Bank is mostly restricted to the patients from the Army, except for very few and thus it is satisfied with these emergency donors.

If one compares the two groups from the Army Hospital and Soba University Hospital who would agree to donate in emergencies only, the percentage of the Army is larger because Army Hospital donors are usually the ones who are asked to cover emergencies more than Soba University Hospital because

* Army Hospital has only 39 donors in this survey

of immediate availability. The reader may have noticed the difference between those who would volunteer in non-emergency situations in both the Army Hospital (Table 3.4.5) and Military*.

The percentage of the result is almost the same in all combinations with the exception of Civil Servants among whom less percentage than the other social classes. 41% would give in other times than emergencies and donors from Centres of Khartoum, Omdurman and Army Hospitals where less than half the donors would give in non-emergency situations in comparison to Soba University Hospital and Shora Centre. Probably as mentioned before, Soba Centre is more attractive to the donor and Shora Centre more acquainted with the problems of the blood demand. If the difference is significant between those who would donate for emergencies only and those who would donate at other times as well, one would wonder that the donors from the Army Hospital would give more in emergencies only. An explanation to this, is that Army people are accustomed to be called for emergencies and perhaps that is why they would respond to that more.

3.2.5 Family, Relative Need

It could be assumed that this was the motivating and possibly recruiting factor which made them come and donate

* Military includes many donors who came to different Centres to donate

their blood.

The result in this survey shows that more than half of the donors had someone from their families or their friends who needed blood.

In fact, it is not known whether the donation at the time of the survey was for a relative, friend or for a stranger. Slightly less than half (48%) did not have any relative or friend who needed blood before, but probably at the time of the survey the motive was a friend or relative. 9 donors did not answer the question.

The wording of the question particularly in the arabic translation explains to the donor whether one of his family or friends needed blood before, but it does not necessarily exclude the probability of his being motivated at the time of the donation when the questionnaire was asked, by the need of a friend or a relative.

This question is rather untimely for the Sudan where no voluntary system is in existence. Yet, if the donation were for a relative or friend it would be good but not to the extent of purely voluntary reasons towards which the efforts should be aimed. Once more, this could have been decided by a better formulated question.

On the other hand, if it were for the stranger, although he were called, for nobody comes without an appeal or request, this would be the start of realising the great aim of a voluntary system.

3.2.6 Motivation by Need

Whether the donors who answered these questions on the need and type of need (Appendix 2, Q.11-15) were completely or partially stimulated by the previous need of a relative or a friend needs another more psychologically orientated survey, but still it is possible to believe that these certain incidences had an effect upon them, although they might not be aware of their direct effect on their motives.

In the article by Wiesenthal and Emmot (1977), it was mentioned that although failing to reach acceptable levels of significance using chi square it was seen that greater activity in the blood programme was related to an increased probability that a family member received a transfusion (% for non-donors, 38% for single unit donors, 45% for those donating two to four units with 56% of the more active donors reporting a transfusion administered to family member).

213 (37.0%) is the highest percentage among those whose relatives or friends received blood during an operation. An operation is usually a strong call for the relatives and friends to come and donate their blood, if he is in need, they are usually very primed by the news and greatly motivated to donate.

These feelings reach the maximum when it is an emergency call, when prompt response is noticed and a maximum peak of persons come accompanying the patient

willing to give their blood.

Seeing this, one would hope that with great effort it would be possible to recruit voluntary donors from these occasional emergency ones who come to donate for a particular person. At these moments the skill of the recruiters could play a great role.

In some parts of the United States like the Community Blood Center in Dayton, Ohio, the recruitment staff is usually instrumental in bringing in donors for the first time. However, it is up to the rest of the staff to help bring that donor back (Krueckeberg 1979, p. 21).

This depends greatly upon the tactics and different ways the staff use to make the donor come back. Therefore, although it may be more difficult to do this in the Sudan, because there is no established voluntary donor system, it seems that emergencies stimulate the willingness of the people and therefore give the chance of getting into contact with, let us say, "rare voluntary donor" who is not very aware of the continuous need due to lack of education in the field of blood donation or due to the need of proper approach that triggers his good will to come and donate regularly. Here comes the role of the staff of the Blood Bank, the Donor Organiser and the responsible Doctor to try and recruit permanent donors from those emergency ones. This needs great effort,

probably time wise, which cannot often be afforded by the staff, Doctor or even the Donor Organiser when they have other duties to do and therefore the best way is to appoint Social Workers who will dedicate their time to meet these donors, talk to them and to understand some of the problems that stand in their way to come and donate from time to time. There may be difficulties such as to find time to come, financial difficulties (Bazuin and Sibinga (ibid) p. 14) and unawareness of the continuous community urgent need etc.

Thus, an intimate conversation, in a way of a chat, with the donors while having their drink, may reveal many of the obstacles that keep them away from coming to donate voluntarily at reasonable intervals.

An effort should be made to solve these problems in order to gain more donors. In each hospital Blood Bank certain funds should be made available in the budget yearly for these recruiting efforts. The Ministry of Health, the University, the Director of the Hospital and the Ministry of Finance should be the first that are aware, in the country, of the great demand for blood and that whatever the expenses may be they will not outweigh the need for blood to save the lives of people.

Some effort should also be made to create a nice and peaceful atmosphere in the Blood Bank. Things which may seem familiar to the medical staff in the Blood Bank

may greatly disturb the donor. Therefore, everything around him should be calm and the atmosphere inviting, the way he is received, the tidiness and the colour of the place will influence the donors first impression. Light colours, which gives the impression of being home are recommended (Krueckeberg (ibid) p. 20).

The medical examination by the Doctor, as this is done routinely in the Sudan, before taking the blood, the way of treating the donor, the process of taking the blood, all share in either gaining more donors or losing them (El Shiekh 1980). The second highest percentage (23.0) when relatives and friends of the donors received blood and at the same time a dramatic motivating factor that made rare donors appear in the scene was complicated childbirth as in anti-partum or post-partum haemorrhage and Caesarian section.

The third respond of 14% was for the treatment of anaemia.

The least percentage was 7.5 for which relatives or friends of the donors in this survey received blood was witnessing accidents.

Whether the awareness of the need for blood during accidents is not strong enough to motivate people to donate their blood is still to be answered in a different survey.

Q.11 was meant to see the awareness of the importance of the need for blood which is a step before motivation.

296 (52%) of the donors has a member of their family or friends who needed blood. This was probably the reason why these donors were aware of the need of blood and its importance and that is why they came to donate their own blood for others.

In the Sudan donors lend themselves only to their relatives and friends and then only when these get sick. This system is far from perfect for both the donor and the patient as was mentioned earlier in this Chapter.

The gift should be between two strangers and not between a patient and one of his relatives. The feeling of a return gift one day in the future, while a blood gift should remain unpriced.

For the donors it is a duty to go and give his blood to a relative or a friend willing or unwilling and so his donation in this case will not be altruistic.

There should be no moral obligation and pressure on the relatives, adding to their grief and worry. But this cannot happen until the present system is changed to a voluntary system.

The other group whose family or friends never needed blood also came to donate, whether they were of the need for blood through other means than the need of their family members or friends; it is beyond the scope of this question to decide. It would have been a good idea to ask this group what made them aware of the need for blood or why

they came to donate. Both groups, possibly being aware of the need for blood, came to donate. One group motivated by the need of their relatives or friends, the other by other factors.

3.2.7 Giving Blood for Non-Relatives

By Primary Characteristics

The question was asked to determine whether or not those who came to donate their blood had a voluntary inclination which was not only limited to relatives or friends. Out of 577 donors questioned, 483 (86%) indicated that they would donate for non-relatives. It is clear that most of the donors who came on certain occasions are willing to donate their blood to a stranger. This, I believe, will be the cornerstone for a successful future voluntary blood transfusion system in the Sudan. A great effort will be needed to dispel the reasons that prevent people giving blood to strangers.

To achieve this, one should try to convey to these donors, in simple words, the importance of giving the blood to a stranger. Not only from the social and ethical point of view but also the requirements for medical practice.

The value of gift exchange and the freedom of choice to express altruism is necessary to understand.

They should know that anyone may at one time practice the appreciation of this high value gift as well as he may

suffer the pains of lacking it, which is more liable if their donation is only limited to their relatives and that is because in such situations the law of replacement (Caruso (ibid), p. 85) must be applied, and replacement of blood may prove rather difficult sometimes, particularly where blood is not treated as a commercial commodity (Titmuss (1970), p. 163).

It will take considerable time and effort in the Sudanese society to educate people along those rather philosophical lines; different channels should be taken to utilize these efforts properly; the individual culture, probably education, although from previous experience in the Scottish survey there were no significant differences between the altruistic feelings of different levels of education; the way the person was brought up, all are factors that will affect his understanding to the social and ethical aspects of donating one's blood to someone he does not know.

The understanding of the social and ethical behaviour towards blood donation will play a great role to convince the "specific" donor to be a "general" one, useful to all. An understanding of the therapeutic uses of the blood groups and the use of blood components may also be useful in converting the same.

3.2.7.1 By Age Group

Further analysis of the responses (Table 3.5.1) shows

TABLE 3.5

Donors who are prepared to give blood
to non-relatives according to the following criteria

TABLE 3.5.1Age group

	16-25	26-35	36-50	Row total
Yes	305 (85.2)	129 (87.2)	39 (92.2)	473 (86.3)
No	53 (14.8)	19 (12.8)	3 (7.1)	75 (13.7)
Column total	358 (65.3)	148 (27.0)	42 (7.7)	548 (100.0)

TABLE 3.5.2Social classes

	Civil Servant	Military	Self- employed	Farmer, Labourer, Unemployed	Student	Row total
Yes	78 (88.6)	135 (92.5)	68 (80.0)	108 (81.8)	87 (88.8)	476 (86.7)
No	10 (11.4)	11 (7.5)	17 (20.0)	24 (18.2)	11 (11.2)	73 (13.3)
Column total	88 (16.0)	146 (26.6)	85 (15.5)	132 (24.0)	98 (17.9)	549 (100.0)

TABLE 3.5.3Education

	Preliminary Intermediate Secondary	Institute University Postgraduate	Row total
Yes	342 (87.4)	103 (85.0)	445 (86.9)
No	49 (12.5)	18 (14.8)	67 (13.0)
Column total	391 (76.4)	121 (23.6)	512 (100.0)

Percentage shown in brackets

TABLE 3.5.4

Religion

	Muslim	Christian	Row total
Yes	447 (87.3)	35 (77.8)	482 (86.5)
No	65 (12.7)	10 (22.2)	75 (13.5)
Column total	512 (91.9)	45 (8.1)	557 (100.0)

TABLE 3.5.5

Different centres

	Khartoum	Soba Hospital	Omdurman	Army Hospital	Shora	Row total
Yes	241 (86.1)	80 (84.2)	40 (78.4)	39 (100.0)	63 (88.3)	483 (86.4)
No	39 (13.9)	15 (15.8)	11 (21.6)	0 (0.0)	11 (11.7)	76 (13.6)
Column total	280 (50.1)	95 (17.0)	51 (9.1)	39 (7.0)	94 (16.1)	559 (100.0)

Percentage shown in brackets

no clear difference in age group who would give for non-relative.

. It could be deduced that the more mature and generally experienced and aware of blood need, the more likely the donor would give for a non-relative.

3.2.7.2 By Social Classes

There are no great variations in the pattern of giving for non-relatives in the different social classes, but it would appear once again the donor recruited from Military authorities would be more likely to give for strangers (Table 3.5.2).

To speculate further about the psychology of these well organised groups would require a more detailed investigation. These Military people live with camaraderie feeling in their communities. They were made aware of the need to give blood to help injured.

3.2.7.3 By Education

One of the impressive facts about Table 8.3 is that in spite of the small number of high education in this survey a high percentage was shown very close to those of lower education, 85% out of 121 and 87% out of 391 respectively. Among the six Postgraduate students the percentage was 100%.

Obviously, those of high education have altruistic

feelings as they are willing to give to non-relatives. But these feelings are hidden due to the lending system in the Sudan.

Those of lower level, they were brought up with the love of helping their relatives and neighbours, sharing with them their grief and happiness.

It is a custom and a tradition to which the people stick firmly. They have strong relationships among their relatives and neighbours, supporting each other with time and money whenever there is a need.

3.2.7.4 By Religion

There is no religious, Christian or Mohammedan, barrier in giving or taking blood in the Sudan.

Christians and Mohammedans have a strong community relationship which is very good in the Sudan. Christmas, Easter, Ramadan-Eid* and the Big Eid** are Public Holidays for both religion groups sharing with each other joy and happiness. Friday and Sunday are Public Holidays in most Schools, Governmental Departments and Shops. Both Sudanese Christians and Mohammedans are brought up in the same way with the same customs and traditions. It is hard to distinguish the difference between them.

As a conclusion to Table 3.5.4 it could be said that both religions have a strong influence which made donors aware of replacing the giving of blood to relatives and

* Ramadan-Eid : Feast at the end of Ramadan

** Big-Eid : Feast when Mohammedans go to Mecca for pilgrimage

non-relatives.

3.2.7.5 By Different Centres

There are no obvious differences among the donors at the donor session except for the Army. It greatly supported the idea of giving blood to non-relatives. This is mostly done on request. Therefore, it is rather difficult to judge whether this is due to frank altruism or not for there may be an element of the feeling of a captive donor (Titmuss (1970), p. 84).

Even excluding the Army donors there is still abundant evidence, that in blood donor centres there is a high percentage of donors who could be educated towards the welfare of the community in general (Table 3.5.5).

Motivation and giving blood to non-relatives : it is very clear from Table 3.6 that the community spirit of Sudanese blood donors is quite high. The result of this cross tabulation shows that various motivated donors are equally agreeable to give blood to non-relatives. This is one of the very important elements, if not the most essential for establishing a voluntary donation system. One of the good things that could be deduced from the willingness of most of the donors in this survey is that they have no superstitious barriers and misconceptions about giving their blood.

TABLE 3.6

Motivated donors willing to give blood to non-relatives

	Yes	No	Row total
Gave to help relatives and friends	394 86.2	63	457
Gave to repay a transfusion	86 82.7	18	104
Gave after witnessing an accident	146 89.6	17	163
Influenced by friends, neighbours	132 86.8	20	152
Gave in response to an appeal	160 88.9	20	180
Total	483 86.4	76	559

Row % is quoted

3.2.8 Taking Blood from Non-Relatives

By Primary Characteristics

. A deeper investigation of the human motives for giving and taking blood may throw more light on the reasons for not receiving blood from strangers.

If it is assumed that the donors who said they would take blood, would also give then those who are willing to give are 86% (Table 3.5) and those who are willing to take are 62% (Table 3.7). Therefore, those who would give and not take are $86 - 62 = 24\%$. Looking at Table 3.7 it could be seen that 37% would not take blood from non-relatives. If those who would give and not take (24%) are taken from those who would not take blood from non-relatives (38%) $38 - 24 = 14\%$ leaves us with those who are not willing to give to or take from non-relatives.

Those who are willing to give blood to non-relatives show their generosity towards strangers, outside their own network of family and friends. Those who are willing to give and take from non-relatives are those who have a desire to help strangers and encourage a voluntary system in the Sudan.

We have to draw our attention to 1) those who are willing to give and not take and 2) those who reject the idea of giving and taking.

Those who are willing to give and not take : to take blood from a relative gives the recipient the feeling

TABLE 3.7

Donors who would take blood from
non-relatives according to the following criteria

TABLE 3.7.1Age group

	16-25	26-50	Row total
Yes	288 (63.5)	112 (60.2)	340 (62.4)
No	131 (36.5)	74 (39.8)	205 (37.6)
Column total	359 (65.9)	186 (34.1)	545 (100.0)

TABLE 3.7.2Social classes

	Civil Servant	Military	Self- employed	Farmer, Labourer, Unemployed	Student	Row total
Yes	57 (64.8)	101 (69.2)	47 (56.6)	79 (69.8)	60 (61.2)	344 (62.9)
No	31 (35.2)	45 (30.8)	36 (43.4)	53 (40.2)	38 (38.8)	203 (37.1)
Column total	88 (16.1)	146 (26.7)	83 (15.2)	132 (24.1)	98 (17.9)	547 (100.0)

TABLE 3.7.3Education

	Preliminary Intermediate Secondary	Institute University Postgraduate	Row total
Yes	234 (60.1)	79 (65.3)	313 (61.4)
No	155 (39.8)	42 (34.7)	197 (38.6)
Column total	398 (76.3)	121 (23.7)	510 (100.0)

Percentage shown in brackets

TABLE 3.7.4

Religion			
	Muslim	Christian	Row Total
Yes	319 (62.7)	26 (57.8)	345 (62.5)
No	190 (37.3)	19 (42.2)	209 (37.7)
Column total	509 (91.9)	45 (8.1)	554 (100.0)

TABLE 3.7.5

Different centres						
	Khartoum	Soba Hospital	Omdurman	Army Hospital	Shora	Row total
Yes	145 (52.2)	75 (78.9)	39 (78.0)	26 (66.7)	62 (66.0)	247 (62.4)
No	133 (47.8)	20 (21.1)	11 (22.0)	13 (33.3)	32 (34.0)	209 (37.6)
Column total	278 (50.0)	95 (17.1)	50 (9.0)	39 (7.0)	94 (16.9)	556 (100.0)

Percentage shown in brackets

of safety. But to take from a non-relative it is a risk since it is unknown whether the donor has been a healthy one or not. To accept a non-relative donor he would have the doubts of infected blood that may transmit a disease. The donor has to be confident that the criteria of acceptability that was applied to his donation has been applied to every donor and these should dispel anxiety. This morning's donor may be this evening's recipient.

Those who reject the idea of giving and taking. As mentioned before, there is no religious barrier which hinders donation in the Sudan, but it could be due to some tribal obstacles which need a further study to reveal it. As to the medical side, the refusal of blood from non-relatives should be fought against by the Blood Transfusion Service staff. The Doctor responsible at the Centre, the Donor Organiser, with the help of a Social Worker and paid helpers, can do a great deal to instil confidence that the quality of blood is good, whatever the source, provided it has passed all the necessary checks routinely done to the blood before it is transfused. Demonstrations of the different tests done may help. This could be shown directly at least to a group of those donors. Films could be helpful and could be shown on television in special programmes.

Lecturing is possibly very useful and simple

explanation of the blood components, the transmission of certain diseases by blood, how the recipient is protected by the different tests done, helps to restore the confidence of the recipient and of the donor.

It may be interesting and useful to look at some of the results of the answers to Q.16 when combined by some of the characteristics as age and education (Table 3.7).

3.2.8.1 By Age Group

There seems to be no significant difference between different age groups neither in the positive response nor in the negative one to Q.16 (Table 3.7.1). Therefore, it could be concluded that there is no impact of age on whether one would take blood from a non-relative or not.

3.2.8.2 By Social Classes

There are no great differences noticed between all groups except the Military one. The highest percentage of donors in the survey who would take from non-relatives is the Military donors which is 101 (69%) out of 146 (Table 3.7.2). This is due to their exposure to the Blood Transfusion Service and blood donation procedure more than other categories and therefore they reflect their feelings as if they were recipients. On the other hand, the biggest group which would not take from non-relatives is the Self-Employed, 36 (43%) out of 83. The majority of these Self-Employed who took part in this survey were

probably from multitribal origin with many beliefs that discourages them from taking blood from non-relatives.

3.2.8.3 By Education

When looking at Table 3.7.3 it could be seen that there is no obvious difference between different stages of education who would take blood from non-relatives.

When looking at those who would not take from non-relatives there is also no evident difference between different educational levels. This means that also education has no great impact on whether taking or refusing non-relative's blood.

3.2.8.4 By Religion

The majority of donors from both religions, broadly speaking prevalent in the Sudan, would take from non-relatives and there is no obvious difference between those who would not in both religions (Table 3.7.4).

3.2.8.4 By Different Centres

Nearly two-thirds of the donors from all Centres would take blood from non-relatives. The total is 347 (62%) out of 556 (Table 3.7.5).

Another interesting point to comment on is the refusal percentage among the Army people to take blood from non-relatives. Since the Army people are more aware of the concept of blood donation one would have thought that those who would take from non-relatives would still be

a higher percentage.

Motivation and taking blood from non-relatives : it could be observed that although the percentage of the total number of those donors who would take from non-relatives is 62%, yet the average response of the differently motivated groups is below 50%.

In comparison with Table 3.8 it seems that those who are willing to take blood from non-relatives is less than those willing to give which is about 86%. This difference may be due to the fact that still a very significant percentage do not accept non-relative's blood either for tribal reasons or misconceptions.

3.2.9 Frequency of Donation

To explore the potential donor more deeply this question (Q.17) was asked to see whether, in addition to his willingness to cover emergencies, and to give to the stranger, he will be willing to donate on regular basis. Regularity of donation is very important for keeping the donor active and maintaining adequate supply of blood. In answer to this question, 387 (70%) out of 577 would give regularly (Table 3.9). This means that not only a large number is willing to donate for non-relatives, but also that another big number of the donors is ready to come to donate their blood regularly. These two factors are complementary and one would hope that this will help

TABLE 3.8

Motivated blood donors willing to
take blood from non-relatives

	Yes	No	Row total
Gave to help relatives and friends	274 50.0	183 40.0	457
Gave to repay a transfusion	46 46.2	58 55.7	104
Gave after witnessing an accident	63 38.9	99 61.1	162
Influenced by friends and neighbours	81 53.6	70 46.3	151
Gave in response to an appeal	75 41.4	106 58.6	181
Column Total	347 62.4	209 37.6	556

Row % is quoted

TABLE 3.9
Donors who would give blood regularly
according to the following criteria

TABLE 3.9.1

Age group			
	16-25	26-50	Total
Yes	239 (67.1)	144 (76.1)	383 (70.3)
No	117 (32.9)	45 (23.80)	162 (29.7)
Column total	356 (65.3)	189 (24.67)	545 (100.0)

TABLE 3.9.2

Social classes						
	Civil Servant	Military	Self- employed	Farmer, Labourer, Unemployed	Student	Row total
Yes	66 (76.7)	104 (72.2)	59 (69.4)	96 (71.6)	57 (58.2)	382 (69.8)
No	20 (23.3)	40 (27.8)	26 (30.6)	38 (28.4)	41 (41.8)	165 (30.2)
Column total	86 (15.7)	144 (26.3)	85 (15.5)	134 (24.5)	98 (17.9)	547 (100.0)

TABLE 3.9.3

Education			
	Preliminary Intermediate Secondary	Institute University Postgraduate	Row total
Yes	285 (73.6)	69 (57.0)	354 (69.7)
No	102 (26.3)	52 (42.9)	154 (30.3)
Column total	387 (77.0)	121 (23.8)	508 (100.0)

Percentage shown in brackets

TABLE 3.9.4

Religion			
	Muslim	Christian	Row total
Yes	361 (70.9)	26 (57.8)	387 (69.9)
No	148 (29.1)	19 (42.2)	167 (30.1)
Column total	509 (91.9)	45 (8.1)	554 (100.0)

TABLE 3.9.5

Different centres						
	Khartoum	Soba Hospital	Omdurman	Army Hospital	Shora	Row total
Yes	194 (70.0)	72 (75.8)	41 (78.8)	38 (97.4)	42 (45.2)	387 (69.6)
No	83 (30.0)	23 (24.2)	11 (21.2)	1 (2.6)	51 (54.8)	169 (30.4)
Column total	277 (49.8)	95 (17.1)	52 (9.4)	39 (7.0)	93 (16.7)	556 (100.0)

Percentage shown in brackets

towards the establishment of a successful voluntary blood transfusion system.

3.2.9.1 By Age Group

It may probably be of interest to the reader to see some of the figures expressing the percentage of regularity in terms of different social characteristics. Age has no great impact on regularity, 239 (67%) out of 356 between age 16-25 and 144 (76%) out of 189 between 26-50 would give regularly.

There is no evident difference in the response of different age groups to regularity (Table 3.9.1).

3.2.9.2 By Social Classes

According to the different stratification of the population there are no great differences between the different groups of the population. The average percentage of all groups who would donate their blood regularly is 70%. The highest percentage is among Civil Servants when 77% would give regularly and the lowest percentage is among students, 58% (Table 3.9.2). This could be due to the difficulties like lack of time, transport and expenses. Thus, it seems that social stratification has no great impact on regularity.

3.2.9.3 By Education

There is no obvious percentage difference between the first three educational attainments, ie preliminary to secondary.

In the higher educational level the percentages rather differ, the smallest is from Polytechnic Colleges which is 50%, University is still higher and 100% is the Postgraduate. No great consideration should be given to the Postgraduate percentage because they are only six in the whole survey. Thus, it seems that education has no great impact on frequency of donation when it is combined together into two major groups; yet when each level of education is looked at separately there is no evident difference between the first three stages of education, but the last three obviously differ (Table 3.9.3).

3.2.9.4 By Religion

Different religions response to donation. Muslim response is 361 (71%) out of 509 and Christians response is 26 (58%) out of 45. It seems that Muslim response is greater, but at the same time it should not be forgotten that the number of Christians in this survey is small. To become a regular donor is neither a characteristic nor a monopoly to any religion (Table 3.9.4).

3.2.9.5 By Different Centres

The highest percentage of donors who would give regularly is from the Army, 38 (97%) (Table 3.9.5). This is expected for the reasons already mentioned before, like more exposure to blood donation. Moreover, self-discipline may be one of the factors that help the donors from the Army Hospital to be more regular (Hagaar 1980).

Strangely enough is Shora provisional panel of donors - although one would have expected a bigger percentage of response, because this is a group which is known to the Blood Transfusion Service. They have been a sort of 'donors on call' ready to come whenever blood is needed. Therefore, one would be inclined to believe that the change to regular donors would be easily accepted. Nevertheless, it seems that this group of 'on call donors' appreciate the need when it is for an emergency but they do not value highly the essence of the continuous demand for blood. Although they respond to donate for non-emergency, they did not welcome the idea of regular donation. Maybe due to the present system to which they have been accustomed. They are willing to donate whenever they were asked in emergency or in non-emergency, but not to involve themselves as a regular donor, the reasons are unknown. Still, the desire to convert these donors to a regular program is most important. They are in close contact with the Blood Transfusion Service; their names and addresses are known.

Moreover, this group, who are at least over a hundred in number, work in different Governmental and Private firms in a nearby premises to Khartoum Donor Centre. It would be a great idea to approach and encourage them by offering to have among them representatives of the Blood Transfusion Service.

The duty of these representatives will be in close contact with the Blood Transfusion Service to try to have a deeper and more practical understanding of the need of the community for a continuous supply of blood and henceforth to try to motivate and recruit as many as possible from their workmates and also to play a good role towards motivating people in the areas where they live.

The trust of the Blood Transfusion Service in these people will, itself, be a great motivation tool which will supply the Blood Transfusion Service with a panel of regular donors, provided that they appreciate the fact that one of the motivating factors, beside direct contact, is to be a donor. This will encourage more people to come (El Shiekh 1980).

At the worst even if these representatives would not donate themselves for some reason or other they would still be able to have a powerful effect upon others to come and donate.

Motivated donors and giving blood regularly - A very significant percentage as seen from Table 3.10 is willing to give blood regularly. This is a very important factor for a voluntary system and it is complementary to the idea of the willingness to give blood to non-relatives expressed in Table 3.6. Fortunately, both ideas are highly represented in the order of 87% of those willing to give to non-relatives and 70% of those

TABLE 3.10Motivated donors willing to give blood regularly

	Yes	No	Row total
Gave to help relatives and friends	334 72.9	124	458
Gave to repay a transfusion	69 66.3	35	104
Gave after witnessing an accident	122 75.3	40	162
Influenced by friends and neighbours	100 67.1	49	149
Gave in response to an appeal	125 69.8	54	179
Total	387 69.6	169	556

Row % is quoted

willing to give regularly.

3.2.10 Donation More than Once

Of all the donors who answered this question, 39% gave their blood before (computer data sheet 1). The highest percentage were from the Army Hospital, 62% out of 32 donors and as mentioned before the Army Hospital is more used to donation.

It seems that for some reason or another, these people come to donate. It is not known how many times they have donated but probably they are aware of the need for blood.

This is very useful because at least the recruiter will be able to talk to some of the occasional donors who have a better understanding of the problem of donation and blood need. Such a group of donors could be very useful in helping to establish a voluntary system.

An announcement could be done through the media that those who donated before in any of the Centres in Khartoum City are requested to contact Soba Hospital Blood Bank. Another alternative is to see those who donated before among the newcomers and try to talk to them to explain the problem of the continuous need for blood, make them understand the importance of the establishment of voluntary donation and how they can have a great role in this.

A routine health care arrangement for these donors and their families can be a good incentive. This does not only

help to recruit donors but also to have community helpers.

3.2.11 Fear of Giving : By Primary Characteristics

Donors of this survey were asked if they felt any apprehension or anxiety when they gave blood for the first time.

It is human nature, probably more expressed in some than others, to be rather anxious at every new adventure particularly, perhaps, when the adventure is of medical nature.

Usually two factors affect the donors' reaction to blood withdrawal; the first is the stress upon the donor and the second his response to the stress. Age, height, weight, sex, amount of blood withdrawn and racial background are common "stress" factors since these are external factors outside the control of the donor. On the other hand, blood pressure, pulse pressure, heart rate are internal and they are either physiological or psychological 'response' factors since these are temperature hemodilution and anxiety (Callahan 1962, p. 76).

Anxiety is sometimes due to the ignorance of the person about the consequences of a risk or adventure he has to undertake. It could, to a great extent, be alleviated by continuous education of the potential donors and the public at large in this field.

Anxiety is one of the factors that play a role in causing reactions such as pallor, sweating, dizziness and

even fainting and convulsions upon withdrawal of a pint of blood. It is different with different blood donor reactors and can be a cause of permanent rejection of the donor (Callahan (ibid), p. 76).

Education could be done in different ways, like lecturing, when a detailed account of the donation procedure can be given. Still more useful, is a practical demonstration of the process of donation.

This will give people the chance to get accustomed to the process of donation and this perhaps will gradually relieve the donors from the sort of internal stress that they suffer.

To know the procedure will have a calming and reassuring effect upon the public. This is very important since this may encourage more people to come to donate.

Let us now have a look at the different social characteristics of the donors who participated in this survey in relation to anxiety.

3.2.11.1 By Age Group

No obvious difference in percentages of various age groups to be mentioned (Table 3.11.1).

3.2.11.2 By Social Classes

On the whole, there is no great difference between different categories of people. The highest two percentages are of students, 26 (32%) out of 81 and

TABLE 3.11Fear of giving according to the following criteriaTABLE 3.11.1

Age group

	16-25	26-35	36-50	Total
Yes	104 (32.2)	34 (23.3)	10 (24.4)	148 (29.0)
No	219 (67.8)	112 (76.7)	31 (75.6)	362 (71.0)

Missing cases 67

TABLE 3.11.2

Social classes

	Civil Servant	Military	Self- employed	Farmer, Labourer, Unemployed	Student	Total
Yes	32 (37.6)	30 (23.1)	19 (22.6)	40 (30.1)	26 (32.1)	147 (28.7)
No	53 (62.4)	100 (76.9)	65 (77.4)	93 (69.9)	55 (67.9)	366 (71.3)

Missing cases 64

TABLE 3.11.3

Education

	Lower	Higher	Total
Yes	105 (74.0)	37 (26.0)	142 (100.0)
No	271 (82.4)	58 (17.6)	329 (100.0)

Missing cases 106

Percentage shown in brackets

TABLE 3.11.4

Religion

	Muslim	Christian	Total
Yes	146 (30.5)	5 (12.8)	151 (29.2)
No	333 (69.5)	34 (87.2)	367 (70.8)

Missing cases 59

TABLE 3.11.5

Different centres

	Khartoum	Soba Hospital	Omdurman	Army Hospital	Shora	Row total
Yes	80 (29.0)	29 (30.5)	14 (27.5)	5 (13.9)	24 (39.3)	152 (29.3)
No	196 (71.0)	66 (69.5)	37 (72.5)	31 (86.1)	37 (60.7)	367 (70.7)

Missing cases 58

Percentage shown in brackets

Civil Servants, 32 (38%) out of 85 (Table 3.11.2).

The anxiety of the students could be due to their young age and emotional instability (Callahan (ibid), p. 76). As to the Civil Servants it is rather difficult to explain why it is the highest percentage who suffered from anxiety when they donated for the first time. The reason may be multifactorial. 37 (42%) out of 88 were in the age group 16-25. Other common reasons for more expressed anxiety in this "class" may be due to less exposure to blood donation.

3.2.11.3 By Education

As it was expected that the degree of anxiety might decrease among those who are more educated, donors of higher education in this survey appeared with a lower percentage of 26.0 among those who were anxious the first time to give blood. Donors of lower education responded with a high percentage of 74.0. The reasons are unknown but it might be fear of the needle or fear of adverse reactions during donations. Donors of high education in this survey who said to be anxious for the first time could be due to their awareness of the transmissible diseases they may contract, when they are donating (Table 3.11.3).

3.2.11.4 By Religion

In most studies anxiety appeared to be a major factor

that has a negative effect on donor motivation. Fear is a natural human feeling and it has nothing to do with different religions. It seems to be an acceptable reason that keep donors away from giving blood. This includes fear of the needle, sight of blood, weakness, dizziness and disequilibrium of the circulatory system. There may be also some unconscious fears of feelings of weakness and fatigue, loss of substance, loss of strength and loss of vitality. Fear of giving a valuable substance and since it is worth so much, donor is worthless after donating (Oswalt 1977).

In comparing Mohammedans with Christians it is noticed that 30% out of 479 were anxious when giving blood among Mohammedans and 13% out of 39 among Christians (Table 3.11.4). The combination of this question was made just for the sake of continuity, but the author does not believe in any religion to have an effect on the nature of a human being whether he is a Mohammedan or a Christian.

3.2.11.5 By Different Centres

There is no great difference between the different Centres of Khartoum, Soba University Hospital and Omdurman in the percentage of those who were anxious when donating for the first time. There is also no obvious difference between the three Centres and the "provisional" or non-

official donors of Shora.

The percentage of those who were anxious from the three Centres of Khartoum, Soba and Omdurman taken together will be 123 out of the total number of donors in these Centres, ie out of 422 and this is equal to 29%. Shora is 39% which is not very much different, but in contrast to the group of three hospitals together and to Shora the percentage of donors who were anxious the first time to donate from the Army Hospital were far less than the rest, they were 5 (14%) out of 36 (Table 3.11.5).

This is acceptable as the soldiers have got stoicism and are more exposed to blood donation and this familiarity as mentioned before makes them less apprehensive.

3.2.12 Reasons for Donation

To find out the motives behind the donation is sometimes difficult and it perhaps needs much sociopsychological orientated research.

Donation of blood could be a sort of gift, but the theme of the gift in itself is a complex issue.

Anthropologists like Levi Strauss (1969) have tried to interpret the theme of the gift in different ways. In his book "The Elementary Structures of Kinship", in the Chapter about the Principle of Reciprocity, he also mentions that Mauss sought to show that exchange in primitive societies consists

not so much in economic transactions as in reciprocal gifts, that their reciprocal gifts have a far more important function in their societies than in civilised ones and that this primitive form of exchange is not merely, nor essentially, of an economic nature but is what he aptly calls "a total social fact" that is, an event which has a significance that at once social and religious, magic and economic, utilitarian and sentimental, jural and moral. Other interesting thoughts are conveyed by Sorokin (1954), Tonnies (1955, p. 217-220) and Blau (1964, p. 88-114).

The late Professor Richard Titmuss has analysed many of these writings and written extensively on the gift relationship concerning donation of blood, the quality and the mode of the gift (Mitchell 1982).

In this Encyclopedia work the founder of the Harvard Research Committee in creative altruism presents his analysis of the factors and techniques of moral transformation through the power of love. Professor Sorokin's thesis is simply stated, "there is no solution to any of humanity's problems - war, crimes, materialism, revolutions, suicide, psychoneurosis, except by way of a creative altruism".

Tonnies summarises the theme of alms in two different concepts, one is originating from an individual natural will than from a general rational will. In the first case, it is given out of special or general sympathy or out of a

special or general sense of duty and prompted by a desire to help. It then involves the idea of a necessity (on one's own initiative) or of an obligation (resulting from a kinship or neighbourhood relationship or social and professional ties, or, finally, from a religious or humanitarian feeling of brotherly love). But it makes a significant difference if the alms is given with complete detachment for an external purpose, for instance, to get rid of the unpleasant sight of a beggar, or in order to show generosity, thus sustaining a reputation of power and wealth (for the sake of one's credit strength). Finally, and that is the most frequent incidence but closely related to the others mentioned, alms are given under the pressure of social conventions and etiquette which have very good reasons to prescribe and enforce such rates.

Blau concludes that social exchange refers to voluntary actions of individuals that are motivated by the returns they are expected to bring and typically do in fact bring from others.

The previous conclusions are related to the theme of the gift in general.

On the other hand, Professor Titmuss has touched many of the aspects related to the donation of blood. He concludes that the gift should be a good one free of disease particularly hepatitis since it is the most widespread transfusion danger for the hospital patient.

He quoted that the Journal of the American Medical Association indicated that essential therapeutic measures in blood transfusion causes death in approximately one in every 150 transfusions in persons over 40 years of age as a result of serum hepatitis. Since this is the age group to which most blood transfusions are given, and since many hundreds are given daily, such a high fatality rate becomes a problem. He emphasises that commercialisation never guarantees a blood of good quality. He mentions that many studies in the fifties in different parts of the United States have incriminated the paid donor and blood obtained from commercial blood banks as the major source of infection. He quotes that one of these studies was conducted by Dr. Paul Schmidt and his colleagues at the National Institute of Health, Bethesda.

It was a controlled prospective study (unlike many previous retrospective ones) of two groups of patients aged over 21 undergoing cardiac surgery at the NIH Hospital. There were no significant difference between the groups in respect of age, sex, type of heart disease, type of operation and severity of preoperative symptoms. One group received 94% of their blood obtained from one or both of two commercial blood sources employing paid donors (in the Mississippi Valley area and an East Coast port City). The second group received 97% of their blood from voluntary donors in Washington area. The average number of units of

blood transfused per patient was 18.5 in the commercial group and slightly more (19.6) in the voluntary group.

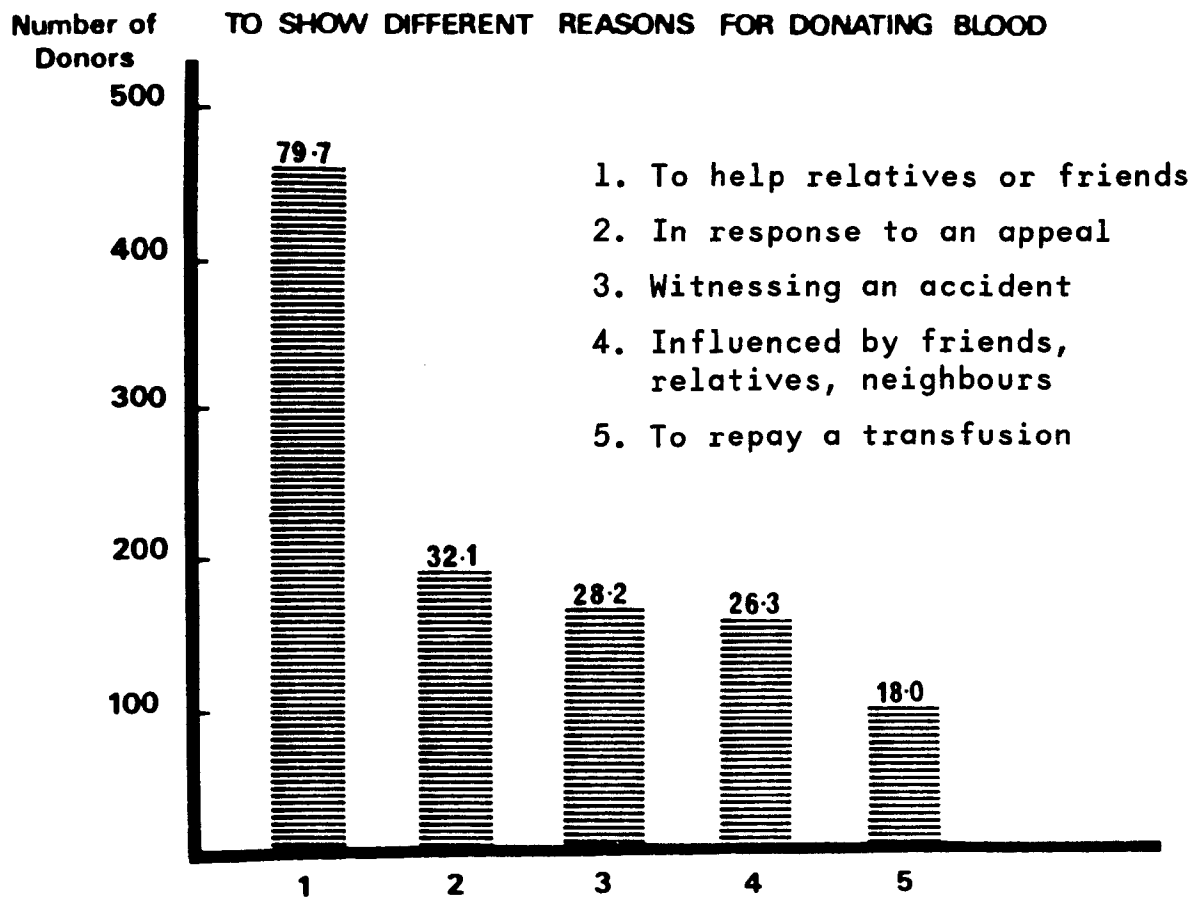
In the commercial group, the total hepatitis risk attack rate was 53%, in the voluntary group it was nil. This study suggests not only an extremely high attack rate among cardiac surgery cases (average age 47) transfused with paid blood in the United States but that an immense number of cases of infection are at present undetected. What Titmuss quoted emphasises that the quality of the gift of blood must be a good one and to achieve this the most ideal giver is the voluntary donor.

In his classification of blood donors (Titmuss (1970), p. 75-89) he gives a fair amount of information about different types of blood donors one may encounter in the Society. These are the paid donor, the professional donor, the paid-induced voluntary donor, the responsibility fee donor, the family credit donor, the captive donor, the fringe benefit voluntary donor and the voluntary community donor.

As positive motivation is a very important element upon which the blood collection depends, this question was included to know about different motives that bring the donor to give his blood.

As it would be seen from the result among Sudanese "occasional" blood donors, the distribution of the motives was as follows:

BAR - CHART 3.4



NOTE: 50 donors did not answer the question.

460 (80%) out of 577 (Bar chart 3.4) said that they came to help their relatives and friends (663 (65%) in West of Scotland); 104 (18%) donated to repay a transfusion given to them or to somebody they know (102 (10%) in West of Scotland); 163 (28%) were motivated by witnessing an accident (20 (2%) in West of Scotland); 152 (26%) were influenced by friends, relatives, neighbours, etc. (162 (16%) in West of Scotland) and 185 (32%) donated in response to an appeal (112 (11%) in West of Scotland).

- (i) In Khartoum most of the donors, 460 (80%), came to donate for their relatives and friends.

Although they willingly came to donate, but since the donation was for a relative or friend, it was not purely altruistic because the donor was not disinterested in the action of donation. This may be due to the present lending system in the Sudan.

All age groups more or less responded to this, specially age group 36-50 which is the highest percentage of 93.0 (Table 3.12.1). The percentage is increasing with age. It seems that the more mature the donor is, the more is his understanding to the need for blood.

When this question to reveal positive motives was combined with different social categories (Table 3.12.2), the highest percentage in all

TABLE 3.12

Reasons for donation

TABLE 3.12.1

By different age group

	16-25	26-35	36-50	Row total
To help relatives and friends	278 (75.3)	135 (87.7)	40 (93.0)	453 (80.0)
To repay a transfusion	62 (16.8)	35 (22.7)	7 (16.3)	104 (18.4)
Moved by an accident	91 (24.7)	57 (37.0)	13 (30.2)	161 (28.4)
Influenced by friends and neighbours	93 (25.2)	47 (30.5)	9 (20.9)	149 (26.3)
In response to an appeal	112 (30.4)	55 (35.7)	14 (32.6)	181 (32.0)
Column total	369 (65.2)	154 (27.2)	43 (7.6)	566 (100.0)

Percentage shown in brackets

TABLE 3.12.2

By social classes

	Civil Servant	Military	Self- employed	Farmer, Labourer, Unemployed	Student	Row total
Gave to help relatives and friends	80 (87.0)	111 (74.0)	77 (87.5)	118 (86.8)	69 (69.0)	455 (80.4)
Gave to repay a transfusion	11 (12.0)	19 (12.7)	18 (20.5)	35 (25.7)	21 (21.0)	104 (18.4)
Gave after witnessing an accident	22 (23.9)	25 (16.7)	33 (37.5)	52 (38.2)	29 (29.0)	161 (28.4)
Influenced by friends and neighbours	25 (27.2)	30 (20.0)	32 (36.4)	37 (27.2)	27 (27.0)	151 (26.7)
Gave in response to an appeal	34 (37.0)	37 (24.7)	34 (38.6)	42 (30.9)	38 (38.0)	185 (32.7)
	92 (16.3)	150 (26.5)	88 (15.5)	136 (24.0)	100 (17.7)	566 (100.0)

Percentage shown in brackets

TABLE 3.12.3

By education

	Lower	Higher	Total
To help relatives and friends	338 (80.5)	82 (19.5)	420 (79.7)
To repay a transfusion	82 (85.4)	14 (14.6)	96 (18.2)
Gave after witnessing an accident	132 (86.3)	21 (13.7)	153 (29.0)
Influenced by friends and neighbours	121 (85.8)	20 (14.2)	141 (26.7)
Gave in response to an appeal	134 (77.0)	40 (23.0)	174 (33.0)
Total	339 (45.7)	128 (24.3)	527 (100.0)

Percentage shown in brackets

classes response was to help relatives and friends.

- Self-Employed responded with the highest percentage, 87%; Civil Servants, 87.0%; Farmers, Labourers and the Unemployed with 87%.

To see the effect of education on motivated donor (Table 3.12.3). Lower levels of education responded to help a relative or friend with their highest percentage of 80.0 and higher education responded with 19.0. Those who are of lower education are more motivated while those of higher education are more selective in their answers.

- (ii) In the Sudan, response to an appeal is the only altruistic type of donation. Probably one would consider that this is not also 100% altruistic feelings because there is the element of appeal for an emergency or certain need which may induce a sense of interest in the donor who may go to donate for some reason or other. It is not the same as when he goes voluntarily without a call and without knowing the circumstances under which he will be donating and also without knowing anything about the recipient. The donor cannot go and donate without a call. He is not to be blamed since the principle of uncompelling impersonal totally voluntary attitude

is not known to him. Perhaps there are more latent altruistic feelings among many of the donors who come in response to an appeal. Among these may be a large number of the public who could be persuaded to respond if they are given the opportunity. Providing a program for a voluntary donor system in the Sudan could result in a higher number of altruistic responses. There is almost no difference in the different age groups which would respond to an appeal, the highest percentage of 36% from the age group of 26-35, 33% from the age group 36-50 and 30% from the youngest group.

In response to an appeal on different social categories, Self-Employed responded with 39% and students with 38%. The effect of lower and higher education represented with 77% and 23% respectively.

- (iii) 28% of donors were motivated after witnessing an accident (20 (2%) in West of Scotland). It is rather a strong social obligatory motivation since the donor may feel compelled to donate by an overwhelming desire to help someone in need.

It can be against his will but still he donates because he feels it is a duty.

The smallest percentage is among age group 16-25. The mostly moved group by accidents was age group 26-35.

Among different social categories, Farmers, Labourers and the Unemployed responded with the highest percentage of 38%.

- (iv) 26% donated under the influence of friends, neighbours. Thus, once more the reasons for donation were not pure altruistic ones, and at the same time we have to bear in mind the absence of an organised voluntary system.

Level of education did not interfere with the motives of our donors. Lower education responded again with its highest percentage of 86.0 while higher education responded with 14%.

Age group 26-35 responded with the highest percentage of 30%, next to them was the youngest group.

Self-Employed appeared with the highest percentage (36%) among the different classes. The others appeared with a common percentage of 27.0 except the Military which is more organised and accustomed to donate without an influence of a neighbour or a

friend. Higher education respond with 86% while lower education respond with 14%.

- (v) 18% of the total of 577 donors responded because of the need to repay having received a transfusion. Here also there is a high sense of obligation which compelled them to go and donate. It is a feeling of a favour which a patient or a member of his family has to repay in the future. The repayment gift did not come from a stranger and will remain as a debt and a duty to reciprocate. Therefore, this would not also be accepted as an altruistic way of donation (it is an enlightened self-interest) (Mitchell 1982).

Although the only altruistic reason for donation was the response to an appeal which was 32%, yet one would not underestimate the value of all other reasons particularly where there is no foundation for a voluntary donation system.

Moreover, even in a developed society like West of Scotland where the system is considered to be almost 100% voluntary, one would find non-altruistic motives as is seen from the survey in Glasgow and West of Scotland where behind apparently altruistic attitudes are non-altruistic motives. Perhaps a further sociopsychological research both in West of

Scotland and Khartoum will reveal more facts about real attitudes towards donation.

The total who responded to repay a transfusion is 104 (18%). There are no great differences between different age groups.

When looking at the column total, it can be noticed that the greatest percentage of all motives in different age groups is the largest in the 16-25 and decreases with the increase of age.

This is not due to the support of this young group to all motives, but is due to the fact that this group as mentioned previously, constitutes the greatest percentage of the donors in the survey.

Thus, on the whole, there seems to be no great effect of different motives on different age groups except for the effect of helping relatives and friends on the 16-25 and 36-50 age groups which is 75% and 93% respectively. According to the last census in 1973 already mentioned, the majority of Khartoum inhabitants were between 18-22 and as most of the donors in this survey were young greater efforts should be made towards recruiting young age group.

Among different classes the groups of Farmers, Labourers and the Unemployed respond with the highest percentage. These groups emerge with the second highest

percentage at the column total (24.0). Military appeared with the highest percentage of 26.0.

Lower education respond with 85% while higher education respond with 15%.

3.2.13 Reasons Which May Prevent Donation

It was analysed in terms of primary characteristics of those who gave and those who did not.

Being impossible to do a non-donor survey because of time shortage and financial difficulties it proved very satisfactory to have this question included in the survey to know from donors why people do not like to give their blood. This opinion might be very useful because at one time of their lives they may have experienced these same reasons that usually hinder people from coming forth and giving blood.

This question is more meaningful in West of Scotland because the donors in West of Scotland may have more realistic answers. Due to the lack of a voluntary donor system in the Sudan the answers may be based greatly on imagination and assumption. Looking at the answers of the donors (Table 3.13) it could be seen that whether different age groups, social classes or education they all agree that the main reasons that hinder blood donations are, first, fear of adverse reactions, second, fear of future health risk and third, unawareness of the need.

TABLE 3.13

Reasons which prevent donation

TABLE 3.13.1

By different age groups

	16-25	26-35	36-50	Row total
Adverse reactions	257 (69.6)	99 (64.3)	32 (74.4)	388 (68.6)
Future health risks	239 (64.8)	99 (64.3)	31 (72.1)	369 (65.2)
Religious reasons	31 (8.4)	9 (5.8)	2 (4.7)	42 (7.4)
Fear of the needle	99 (26.8)	39 (25.3)	13 (30.2)	151 (26.7)
Unaware of the need	208 (56.4)	80 (51.9)	23 (53.5)	311 (54.9)
Total	369 (65.2)	154 (27.2)	43 (7.6)	566 (100.0)

Percentage shown in brackets

TABLE 3.13.2

By social classes

	Civil Servant	Military	Self- employed	Farmer, Labourer, Unemployed	Student	Row total
Adverse reactions	66 (71.7)	97 (64.7)	59 (67.0)	93 (68.4)	75 (75.0)	390 (68.9)
Future health risks	60 (65.2)	89 (59.3)	56 (63.6)	92 (67.6)	74 (74.0)	371 (65.5)
Religious reasons	8 (8.7)	12 (8.0)	5 (5.7)	11 (8.1)	9 (9.0)	45 (8.0)
Fear of the needle	22 (23.9)	24 (16.0)	30 (34.1)	51 (37.5)	28 (28.0)	155 (27.4)
Unaware of the need	43 (46.7)	75 (50.0)	54 (61.4)	78 (57.4)	65 (65.0)	315 (55.7)
Column total	92 (16.3)	150 (26.5)	88 (15.5)	136 (24.0)	100 (17.7)	566 (100.0)

Percentage shown in brackets

TABLE 3.13.3**By education**

	Lower	Higher	Total
Adverse reactions	270 (73.8)	96 (26.2)	366 (63.4)
Future health risks	259 (74.8)	87 (25.1)	346 (60.0)
Religious reasons	38 (86.4)	6 (13.6)	44 (7.6)
Fear of the needle	116 (80.5)	28 (19.8)	144 (25.0)
Unaware of the need	218 (75.4)	71 (24.6)	289 (50.1)
Total	339 (58.7)	128 (22.2)	577 (100.0)

Percentage shown in brackets

If they were aware of the faints which sometimes occur one would make it clear to them that these are minor vasovagal responses the rate of which decreases with age and that donors who give more than once may not suffer from such benign attacks.

The second strongest reason in the opinion of donors that prevent non-donors from giving this blood is fear of future risk. They are usually preoccupied with fear due to false beliefs.

Repeated radio and television programmes on the effect of giving blood can be linked with the donor appeal programme.

The third reason suggested by the donors is the unawareness of the public of the need for blood. A great effort should be done by the whole team who is taking part in recruiting donors. The continuous need must clearly be explained to the public. Examples of those who need the blood and what for should be reckoned by them. Regular and repeated talks through media would be rewarding. Scientific explanation of the blood components and its function may make the donors more aware of the need, nevertheless, the emotional side is very important. Therefore, a mixture of both is the best.

In fact, to know how to address different audiences in an understandable way is what matters.

The fourth reason in order of importance is fear of

the needle. It should be made clear to the public that this is not very bad and that a local anaesthetic is used before the needle is inserted into the vein, a demonstration will be the best convincing way.

It seems that fear of the needle is an important hindering factor. In the survey of whole blood donors done in West of Scotland fear of the needle has been supported by 651 (64%) out of 1015 of the donors as a factor that prevents people from giving their blood. In the survey done by the Operation Research Centre in blood donation attitudes and behaviour, it was noted that among Insurance Company firms non-donors, nearly half, said that fear of the needle was very important (Caruso (ibid)).

The fifth reason is a very small number of the donors (45 (8%)) suggested the idea that non-donors may have religious reasons for not donating. Titmuss (1970 p. 16) has cleverly defined this problem in his book "From Human Blood to Social Policy".

"Symbolically and functionally blood is deeply embedded in religious doctrine, in the psychology of human relationship, and in theories and concepts of race, kinship, ancestor worship and the family. From time immemorial it has symbolised qualities of fortitude, vigour, nobility, purity and fertility. Men have been terrified by the sight of blood; they have killed each other for it, believed it could work miracles; and have

TABLE 3.14Payment according to the following criteriaTABLE 3.14.1

Age group				
	16-25	26-35	36-50.	Row total
Yes	14 (4.5)	1 (0.8)	2 (5.7)	17 (3.6)
No	299 (95.5)	122 (99.2)	33 (94.3)	454 (96.4)
Column total	313 (66.5)	123 (26.1)	35 (7.4)	471 (100.0)
Missing cases 106				

TABLE 3.14.2

Social classes						
	Civil Servant	Military	Self- employed	Farmer, Labourer, Unemployed	Student	Row total
Yes	6 (8.7)	6 (5.2)	1 (1.3)	5 (4.3)	1 (1.1)	19 (4.0)
No	63 (91.3)	109 (94.8)	77 (98.7)	110 (95.7)	93 (98.9)	452 (96.0)
Column total	69 (14.6)	115 (24.4)	78 (16.6)	115 (24.4)	94 (20.0)	471 (100.0)
Missing cases 106						

Percentage shown in brackets

TABLE 3.14.3

Education			
	Lower	Higher	Row total
Yes	13 (76.5)	4 (23.5)	17 (3.8)
No	320 (75.0)	107 (25.1)	427 (96.2)
Column total	333 (75.0)	111 (25.0)	444 (100.0)

Missing cases 133

TABLE 3.14.4

Religion			
	Muslim	Christian	Row total
Yes	15 (3.4)	3 (7.3)	18 (3.8)
No	422 (96.6)	38 (92.7)	460 (96.2)
Column total	437 (91.4)	41 (8.6)	478 (100.0)

Missing cases 99

TABLE 3.14.5

Different centres						
	Khartoum	Soba Hospital	Omdurman	Army Hospital	Shora	Row total
Yes	7 (2.7)	2 (2.9)	4 (8.9)	0 (0.0)	6 (6.2)	19 (4.0)
No	249 (97.3)	67 (97.1)	41 (91.1)	14 (100.0)	90 (93.7)	461 (96.0)
Column total	256 (53.3)	69 (14.4)	45 (9.4)	14 (2.9)	96 (20.0)	480 (100.0)

Missing cases 97

preferred death rather than receive it from a number of different ethnic groups".

The percentage of those with religious barriers is very small. Anyhow, Islam, the predominant religion in the Sudan, does not oppose the donation of blood. The religious beliefs that stop people from giving blood are misconceptions.

3.2.14 Payment for Blood and Motivation

The results of the idea on payment of donors motivated by different factors emphasises the altruistic gift of donation.

Table 3.14 analysed the terms of primary characteristics of those who reject the idea of payment. Over 90% rejected the idea of payment.

Table 3.15 analysed the views of donors in payment of blood in combination with different motives. 95% of the motivated donors of this survey rejected the idea of payment.

This reflects the good will of the Sudanese donors which may be of great help in establishing a voluntary system.

Symbolic gifts

Sudanese donors were asked if they would accept symbolic gifts as an appreciation from the Blood Transfusion Service. Over 80% refused the idea. In the Sudan at the time being the only thing given to a donor

TABLE 3.15Payment, Symbolic Gift and Free GiftTABLE 3.15.1Payment

	Yes	No	Row total
Gave to help relatives and friends	16	368 (96.0)	384
Gave to repay a transfusion	4	93 (96.0)	97
Gave after witnessing an accident	6	150 (96.1)	156
Influenced by friends and neighbours	6	136 (96.0)	142
Gave in response to an appeal	8	160 (95.2)	168
	19	461 (96.0)	480

TABLE 3.15.2Symbolic gift

	Yes	No	Row total
Gave to help relatives and friends	59	318 (84.3)	377
Gave to repay a transfusion	16	80 (83.3)	96
Gave after witnessing an accident	27	128 (82.5)	155
Influenced by friends and neighbours	21	120 (85.0)	141
Gave in response to an appeal	23	140 (85.8)	163
	79	394 (83.3)	473

Percentage shown in brackets

TABLE 3.15.3

Free gift

	Yes	No	Row total
Gave to help relatives and friends	415 (91.6)	38	453
Gave to repay a transfusion	90 (86.5)	14	104
Gave after witnessing an accident	144 (89.4)	17	161
Influenced by friends and neighbours	133 (88.0)	18	151
Gave in response to an appeal	168 (91.8)	15	183
Total	507 (90.0)	56	563

Percentage shown in brackets

is a 24-48 hrs rest. This is not an incentive or an appreciation. It is for the difficulties of transportation which keep him 12 hrs away from his work and 24 hrs if he lives outside the Centre.

Free gift

It is widely accepted by differently motivated Sudanese donors (Table 3.15), 70% welcome the idea.

3.2.15 Views of donors on mass media and advertisement (Table 3.16)

An attempt was made to evaluate the effectiveness of various sources of information in influencing various donors to give blood. For several years it has been expedient to rely heavily upon general appeal through the mass media.

3.2.15.1 By radio

Donors of different age groups of this survey were influenced most by radio (Table 3.16). It was expected since radio is more common in Sudan. It has a strong transmission which can easily reach all towns, villages, and Farmers in the Central area. Transistor radio is one of the best and most effective ways to approach small communities in the rural area where people are in complete segregation from the City.

3.2.15.2 By television

Television percentage, unexpectedly, came next

TABLE 3.16

Blood donors from different age groups and
their opinion about means to recruit new donors

	16-25	Age Group 26-35	36-50	Row total
By television	244	101	27	372 (65.7)
By radio	290	121	35	446 (78.8)
By cinema	128	53	17	198 (35.0)
By school education	222	72	23	317 (56.0)
By newspapers	190	73	20	283 (50.0)
By adverts on hoardings	113	51	15	179 (31.6)
By lectures	189	63	21	273 (48.2)
By Mosques, Churches etc.	221	75	20	316 (55.8)
By personal contact	171	85	23	279 (49.3)

Different social classes and education levels are excluded from the tables as there is no obvious difference in their percentages.

(Table 3.16). The majority cannot afford it and have no facility for renting one. Transmission is not strong enough to reach towns, which are far from the Central area and most villages have no electricity.

3.2.15.3 By education

School education is an important way of educating the younger generations in the field of blood donation. It should be done at the proper age which will appreciate the importance and value of blood transfusion and not too young to be afraid of the idea.

It differs from other means of education and motivation because it will be a part of the daily routine for certain groups and this will help to make the idea of blood transfusion and blood donation appear as a very ordinary event. In many parts of the World, including the United States, one of the best ways of ensuring a future blood supply is by educating the young people in the schools. This is one area that most blood banks in the United States are just starting to cultivate. The minimum age for donating in the United States is 17 years. In most cases, the blood drive in schools is conducted by the students themselves. It is used as a training program in various areas of study. For example, the Home Economics Class will supply certain needs; the Business Class will be involved

in the actual recruitment of donors by making signs and promotion of the same; the Health Class will be involved in reminding the people of the basic health requirements for donation. All this not only educates them in various areas of their high school study, but helps to ensure that some of these individuals will become blood donors in the future.

Being inspired by the ethics of blood donation, the value of the help a donor can offer to the society, the continuous need of the community for this help, the recruitment of the donors in the future from these students will be successful.

In France, guides for teaching about blood transfusion in secondary schools were published in 1979. These guides contain essential information on the composition of blood, blood types, heredity, the utilization of blood, fractions, blood donation and detailed answers to the most common questions (Newsletter 1980).

The Cameroon Red Cross Society recently issued a manual for primary school teachers and Red Cross Youth instructors (Newsletter 1979).

Information on blood donation simply expressed and clearly defining the most important notions on blood and blood transfusion is included in the Chapter "Mutual Aid". It is illustrated by the reproduction of a Burundi Red

Cross poster showing a smiling 0 positive donor and a grateful 0 positive receiver.

Besides this Chapter, the manual contains information on the Red Cross movements, the National Society and the Cameroon Red Cross Youth as well as a first aid, food and water, the protection of health, hygiene and sanitation on National and International friendships. Thus, early education in the schools may be one of the most valuable ways of motivation to donate blood.

3.2.15.4 Mosques and Churches

Mosques and Churches come fourth in order, 56% among different age groups, 55% among different social classes and 56% among different educational levels think that Mosques and Churches may be suitable places to talk to people and try to motivate them to donate.

Mosques and Churches in the Sudan, in my opinion, are very suitable places for explaining to people the need of the community for blood. Being primed by the prayers and divine inspiring thoughts at such moments, the people will accept the idea of donation. If, for example, the Imam in the Mosque or equivalent to him the Priest in the Church is convinced he can have a great influence on the people because he is the Religious Leader who can act as a linkman between the Blood Transfusion Service and the public. Explanation to the public that the process of

donation is very simple, painless and safe may be very encouraging. Possibly, it would be useful to request those who are willing to write down their names and addresses for further contact. Arrangements for a mobile bus at a future date after the talk (near the Mosques or Churches) may be a successful idea.

The talk may hopefully overcome the misconceptions or fear caused by lack of knowledge.

The "linkman" can do a great deal towards explaining to the public that there are no religious barriers. This can be during the usual routine talk delivered in "Friday Prayers" in the Mosques and "Sunday Prayers" in the Churches. In the community outside, Religious Leaders could be of help to take away those misconceptions from the people. Thinking this is very important in our countries where religion is a central aspect of life.

3.2.15.5 Newspapers

Newspapers comes fifth in order of importance as a media to motivate people to donate their blood. 50% of different age groups, social classes and educational levels support the idea of using advertisements in newspapers. Although this may not be the best, it is the cheapest and most available everywhere in the Sudan.

Advertisement in the newspaper should be very attractive and impressive. It should be included in one

or two of the most popular newspapers at least once or twice a week. If done this way, it may attract the attention of the public for any appeal that is advertised and therefore can be very helpful (Lassen and Nagel 1979).

3.2.15.6 Personal Contact

Personal contact is supported by 49% of all age groups among Sudanese donors as well as by all social classes and educational levels. In my view, it is very useful and needs to be done cleverly. The approach should be done by a certain team who is experienced in this field and knows the art of talking to people and influencing them. If done properly it can be very effective. In the Sudan it will be very useful in influencing people to donate. It needs a big effort to be done but I believe that it will be worth while.

It would not be very expensive as may be in Glasgow and West of Scotland. Personal contact with Chiefs of different firms will help to motivate great numbers. I believe that to do direct contact and personal solicitation has a strong positive effect (Drake 1978).

3.2.15.7 Public Lectures

The idea to motivate people by means of lectures was supported by 279 (48%) of the total 566. In fact, lectures can be very useful. One would be able to utilise such lectures to talk about donors and non-donors about the

different aspects of blood transfusion and concentrate on blood donation. They can be arranged at suitable times all over the year and they can be held in different places such as Universities, Institutes, Clubs, different Institutions, Factories and Farms. They should be short, interesting and meaningful, ie educating and inspiring, so that the main aim of motivating the public could be achieved. Films and demonstrations showing the importance of the blood donation usually have a very stimulating effect (Achterhof 1979). A great stimulus as well is when distinguished donors and community helpers take part in these lectures.

3.2.15.8 Cinema

About one third of all ages, all social classes and all educational levels supported Cinemas. Cinema could be a useful media even if it is supported by only one third.

Whether the effect of the appeal in those relaxing, amusing moments will be taken seriously by every individual is difficult to say. The human nature, his thinking, his response, differs at different times. This may be due to the way the person is brought up and the circumstances in which he lives at the moment of the advertisement. It is really a complex of thoughts and feelings which needs a deep psychological analysis. One could be very attracted by an advertisement, but his response to it could be very

poor. On the other hand, just a thought tied up with certain circumstances the person lived might be a very strong drive that leads him to donate. Anyhow, due to the need of any single unit of blood it is worth trying to advertise in Cinemas.

3.2.15.9 Hoardings

Advertisements on Hoardings is the least supported means of advertisement. Slightly less than one third recommended it. It seems that with the increasing tempo of life people are getting too busy to observe certain types of advertisements particularly when these are silent ones.

Therefore, advertisements on Hoardings should be done very artistically in order to attract the passer-by and at the same time perhaps, rather dramatic, to touch their feelings. If the advertisement is in a form of words, it should be written very distinctly so that it can easily be read at a distance.

In general, it could be said that in a country like Sudan it would be advisable to use all methods at the beginning, concentrating perhaps more on the media chosen by the higher percentage of the donors in the survey. This will have the benefit of a better orientation into the different techniques to advertise and accordingly one will perhaps be able to evaluate each of the different media.

Media, whatever its type, are usually meant to stimulate potential donors with hidden altruistic feelings. If donors do not possess these feelings they may not be very different from non-donors. Why some people have got such positive tendencies and others do not, perhaps needs a different survey.

Condie and Maxwell (1970) showed that the results of general appeal in the media are problematic. They concluded that media entice paid donors to give much more readily than volunteer donors. Half (51%) of the paid donors in their study were recruited via the mass media in contrast to one third (33%) of the replacement donors and only 17% of the pre-deposit volunteer donors.

This is probably true in a country where paid system is still existing, but not in a country like Sudan where paid donors are not known. Therefore, the trial of appeal in the media should be done, making sure that whoever would come would be a volunteer.

Some Researchers have found that appeal through different media in general is less effective than personal contact. Thus, Ford and Wallace (ibid) concluded that face to face contact, being a sort of social pressure, was over three times as effective as was telephone contact. A member of Hospital Blood Banks has capitalised upon this fact by hiring blood donor recruiters (McBarnette et al. (ibid)).

They have concluded that the increased attractiveness of utility of personal recruitments counterbalance "the salary and minor overhead expenses of the recruitment program" (Chapman and Blevins 1972).

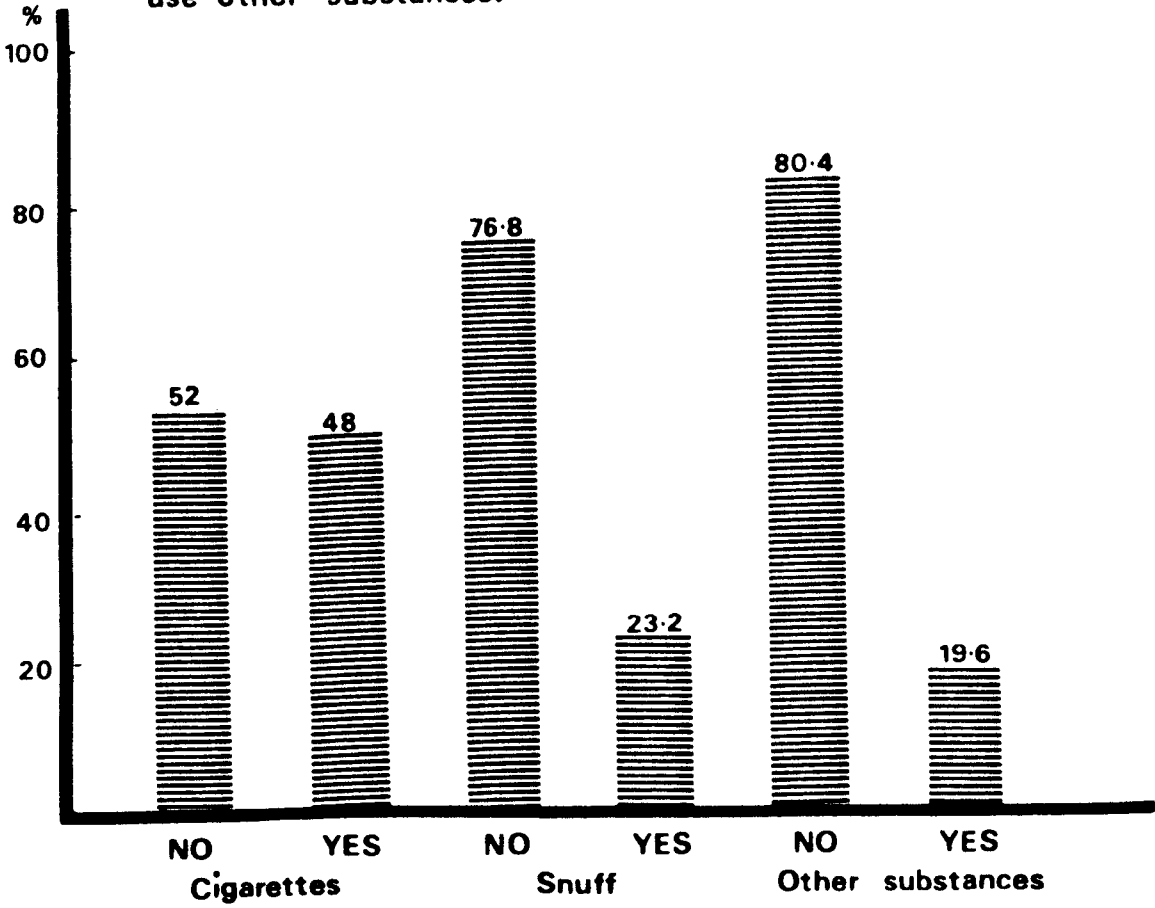
3.2.16 Donors and Smoking

The main aim of this question was to see whether blood donors care for their health more than the average. This question is more suitable for the West of Scotland donors where the system of donation is regular and where some of these donors might have changed their habits after being donors for some time, whereas in the Sudan most of the donors are occasional ones and it is very much doubted whether they care for their health more than the average population. Figures for the percentage of smokers among Sudanese population is not available for comparison, but perhaps the percentage of smokers etc. will be almost the same if a random sample of the population is compared with these occasional donors.

Bar chart 3.5 shows that 48% of the Sudanese donors smoke, 23% take snuff and 20% use other substances.

BAR CHART 3.5

Sudanese blood donors who smoke, take snuff, and use other substances.



3.3 DISCUSSION

The principal basis of the plan is to change the present lending Bank system to Voluntary organised system in which the door will be left open to all volunteers who have an interest to help the Blood Transfusion Service.

There is no doubt that without a panel of regular donors there could be no Transfusion Service. The donor's wishes must therefore be fully considered and any inconveniences to blood donation must be improved. In Sudan, public transport is a big problem; facilities must therefore be made for transportation of donors from their communities to the bleeding sessions and back again. Many donors, at the moment, request some time off work and this must be offered where possible.

During a bleeding session, the donor must be reassured by kind treatment, attention to the bleeding session by the Doctor himself, ensuring a painless venepuncture and avoiding repeated venepunctures except under strong insistence by the donor. The donors must be provided with a nice place where they can relax after donation, take refreshments and enjoy some entertainment from radio, tape recorder. This helps very much to encourage the regular donors to return and they in turn act as a good means of advertisement for new donors to come. The need for blood must be advertised in newspapers, radio, television, cinemas,

Mosque and Church gatherings. In majority of advertisements, the time and place, and preferably the easiest means of transport to the local blood withdrawal sessions, must be shown.

All communities, whether in town or village, factory or industrial centre, school or college, government department or organisation, Mosques or Churches, must be approached to participate in voluntary blood donation.

Another approach must be made to the Ministry of Education to introduce at the various stages of education, lessons about the need for blood.

In each community, at least one citizen who is aware of the need for voluntary donors and who is highly esteemed by his fellows, must be approached to help as an Honorary Local Community Organiser for recruitment within that community.

Posters must be displayed and leaflets or enrolment forms distributed to the population urging them to become voluntary blood donors and showing them when and where they should report for donation.

Direct, respectful and informative canvassing must be carried out, explaining to the citizen how short a time blood donation takes, how painless and harmless it is and yet how life-saving a transfusion can be.

Having discussed the problems which stand in front of

the Sudanese blood donors, the next paragraph will be dealing with the characteristics of donors in this survey.

The age range of donors in this survey was between 16-50. The majority was among the younger age and decreased by the increasing of age. It was expected to have most of our representatives from the younger age but not to accept the cease of donation at the age of 50.

570 of the representatives of this survey are males and only 7 of the representatives are females. A female with strong faith in blood transfusion and who is known for her voluntary help in other aspects, such as building hospitals and helping the handicapped could have a great influence in convincing and encouraging female donors.

27% of the representatives are from the military, 18% are students and both civil servants and self-employed are represented with 16% each. Labourers are represented with 19% and the unemployed and farmers are represented with 2% each. Farmers were expected to appear with a high percentage as the majority of the Sudanese population are farmers. They must be approached by the "Imam" as it was mentioned earlier. Donors who participate in voluntary blood donation must be from all different classes as it is in Scotland.

The shift from the banking donor system to the voluntary system, however, cannot happen like putting on

a switch. Therefore, the present donor system must go on while the voluntary donor system is initiated. When the latter system succeeds the banking donor system will gradually fade away.

An especially important step may be to concentrate on getting non-donors in for their first donation and using the opportunity to convert them to regular, or at least semi-regular, donors with reinforcing information or persuasion (Leibrecht et al. 1976). Another way of establishing a permanent panel is to recruit relatives and friends of patients to become blood donors. It is well known that, in the earlier days of development of blood transfusion, most donors were relatives and friends of patients (Nikolaeva et al. (ibid)).

One of the indispensable elements in a national blood donation system is an accurate up to date donor record system. Lack of such records in Sudan is another strong cause of the present severe shortage of voluntary blood donors.

A perfect record system, in collaboration with the blood withdrawal team and the laboratory, facilitates communication with the donor for continuous regular donation. It helps to establish good community relations with the donors, maximum utilisation of blood and maximum economisation of valuable time, material and reagents. Not only that, it also helps in the investigation and diagnosis of any blood

transfusion complication by tracing donors involved in such cases.

3.4 CONCLUSION

Conclusions of this study will be drawn from the analysis of the Primary and Secondary Characteristics of the Sudanese blood donors in this survey.

This study of attitudes and motivation of blood donors have been analysed by their primary characteristics to reveal any obstacle which may hinder donation in the future.

The respondents to this survey seem to support the idea of establishing voluntary organised system in the Sudan which will need a great deal of effort. It must be adapted to the economic capabilities of the country. Another difficulty is to remove any obstacle which prevent giving and taking from non-relatives, and recruit voluntary blood donors.

From an understanding of their motivation to donate one can tell that most of the donors have a desire to help.

70% of the donors are willing to give blood regularly

86% of the donors are willing to give blood to

non-relatives

62% of the donors will take blood from non-relatives

96% of the donors are against payment

These groups of donors have an altruistic behaviour that will encourage the establishment of a voluntary organised system in the Sudan.

47% give blood in emergency only. This group gives blood as a duty only in emergency, they are either not aware of the need or not encouraging a voluntary system.

To help a relative or a friend appears to be a major factor, 80% of the donors responded to it.

This 80% of donors who are willing to help relatives or friends can be easily converted to become voluntary blood donors.

While most interest has centered around investigations of motivation to give blood, reasons of not giving emerged to be of more importance.

It is interesting to note that an overwhelming majority of the donors reported having no fear of the needle. The major reasons for not donating were: adverse reaction and future health risk. They are afraid that blood donation will be harmful to their health, will reduce their capacity to work or bring some other kind of future complications.

54% responded to unawareness of the need. This shows their general ignorance and lack of knowledge toward donation. They are unaware and not grasping the importance of blood donation. Lack of education is a major problem. Many people in Sudan are unable to read, so it is difficult to motivate a person who does not understand what blood is and what it is needed for without being approached. 26%

who responded to fear of the needle appeared to be among younger age groups and more among those with lower education. This is natural and expected but it could be alleviated with a little effort through films and valuable lectures about the benefit of giving blood.

7% of the donors responded to religious reasons which, in my belief, is not existing in Sudan. It could be due to tribal reasons which exist mainly among uneducated people in the small villages.

Radio seems to be the best and most effective media which can easily reach all different communities.

The most striking observation one can tell from the results is that a high percentage of donors supported the idea of establishing a voluntary organised system.

Profile of Sudanese Donors
and their reasons for donating

The conclusion that can be drawn from the results of this study is as follows.

To identify the donors who are
willing to give in emergency only

Age Group:	26-35
Social Class:	Civil Servant
Education:	Lower education
Place of Donation:	Omdurman

Unwilling to give

Age Group:	16-25
Social Class:	Self-employed
Education:	Higher education
Religion:	Christian
Place of Donation:	Omdurman

Unwilling to take

Age Group:	26-50
Social Class:	Self-employed
Education:	Lower education
Religion:	Christian
Place of Donation:	Khartoum

Those who would take

Age Group: 16-25
 Social Class: Military
 Education: Higher Education
 Religion: Muslim
 Place of Donation: Soba University

Donors who give to help relatives

Age Group: 36-50
 Social Class: Self-employed
 Education: Lower Education

Donors who did not give for adverse
 reaction, future health risks

Age Group: 36-50
 Social Class: Student
 Education: Lower Education

Motivated donors willing to
 give to non-relatives

Age Group: 36-50
 Social Class: Military
 Education: Lower Education
 Place of Donation: Army Hospital

Donors against payment and give
to help relatives or friends

. Age Group: 26-35
Social Class: Student
Education: Lower education
Place of Donation: Army Hospital

CHAPTER 4

WEST OF SCOTLAND WHOLE BLOOD DONORS SURVEY

(PRIMARY AND SECONDARY CHARACTERISTICS)

4.1 PRIMARY CHARACTERISTICS - DEFINITION

The same criteria were applied as is outlined in Chapter 3 for the primary and secondary characteristics.

4.1.1 Age

Most of the blood donors in this survey are between 16-35 (Table 4.1.1). This young age group provides Glasgow and West of Scotland with the quantity of blood which covers three-quarters of the requirement.

16-25 : This younger age group is much more prominent. It is reassuring to note that there is such a substantial proportion of young people to replace those who will cease to donate at an elderly age.

26-35 : The total number of donors at this age in both sexes fall down almost to one-half the number of the previous age groups.

24% of all males and 23% of all females are in the 26-35 age group.

36-45 : At this age group both male and female dropped to 14.3 and 16% respectively. The reasons why donors stay out at this age group could be i) work pattern, ii) bringing up family, iii) non-availability

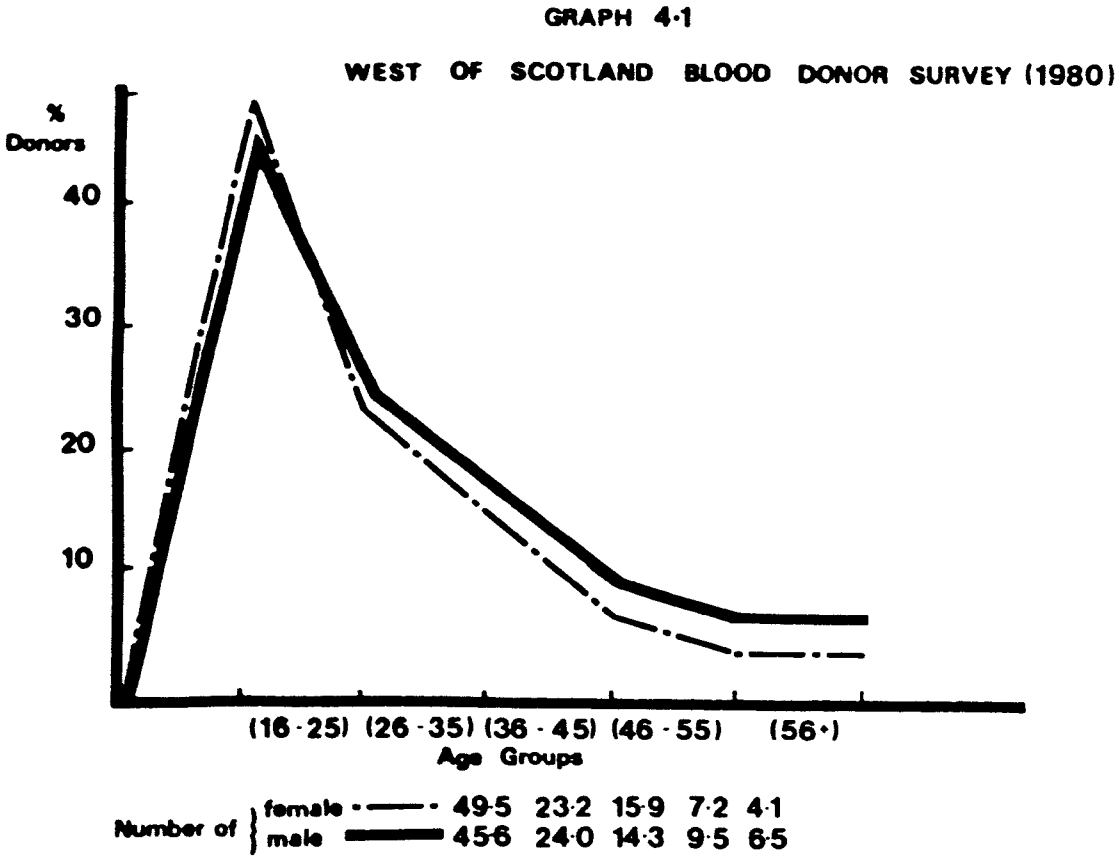
TABLE 4.1.1.1

Donor of West of Scotland (Survey 1980)

	Sex by Age group					Total
	16-25	26-35	36-45	46-55	56+	
Males	245 (45.6)	129 (24.0)	77 (14.3)	51 (9.5)	35 (6.5)	537 (56.5)
Females	205 (49.5)	96 (23.2)	66 (15.9)	30 (7.2)	17 (4.1)	414 (43.5)
Total	450 (47.3)	225 (23.7)	143 (15.0)	81 (8.5)	52 (5.5)	951 (100.0)

Missing cases 41

Percentage shown in brackets



(looking after children; overtime work to earn more money for supporting their families).

The drop in the percentage of the male donors is slightly higher than those of the female. More attendance of the female may be due to the reason mentioned before (non-availability of her husband).

46-55 : The drop in the percentage of donors from this age onwards may be due to the effect of age, weakness and morbidity.

56+ : Late fifties and early sixties donors start gradually moving towards the "permanent" passive file at which they cease totally to donate except for the very few who are fit, very conscientious and remain active (Graph 4.1).

Age distribution of the entire donor population which is divided into males and females was obtained (Table 4.1.2) and (Graph 4.2) with the help of the computer (ISD)* of the Common Services Agency for the Scottish Health Service. This information made it possible to compare the distribution of the donors in the planned survey done by the author in Glasgow and West of Scotland in different age and sex groups with the entire donor population of the area.

* ISD : Information Services Division

TABLE 4.1.2

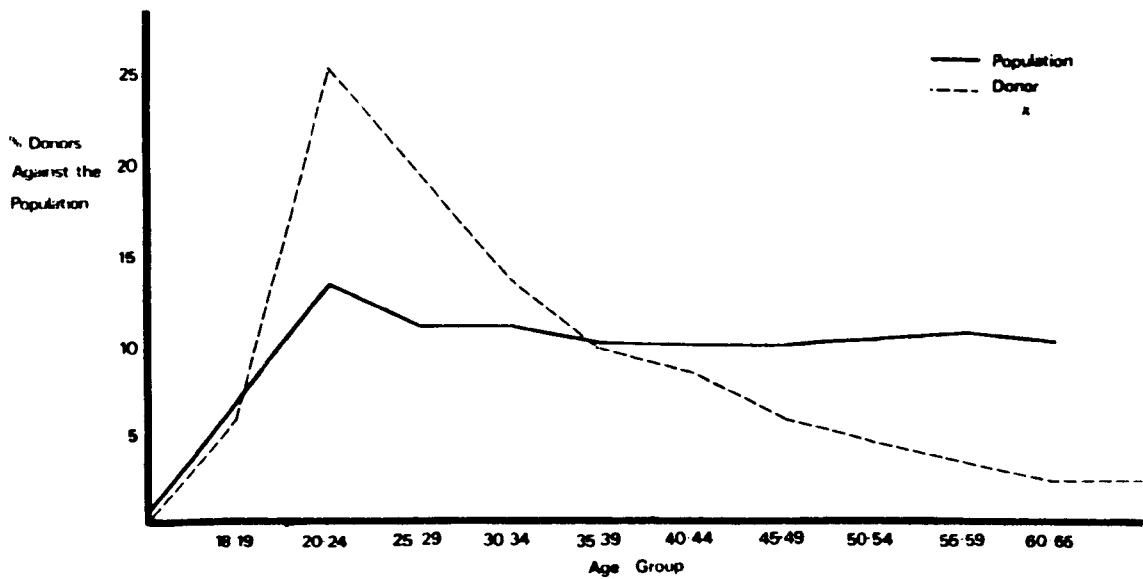
Glasgow and West of Scotland Blood Transfusion Region
Number of blood donors by age group and sex 1980

Sex	Age group										Total
	18-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-65	
Males	6,921 (4.9)	38,464 (27.6)	27,108 (19.5)	20,100 (14.4)	13,607 (9.8)	10,477 (7.5)	8,051 (5.8)	6,080 (4.4)	5,031 (3.6)	3,378 (2.1)	139,217
Females	6,135 (6.5)	30,184 (32.2)	17,529 (18.6)	11,297 (12)	8,174 (8.7)	6,880 (7.3)	5,247 (5.6)	3,867 (4.1)	2,893 (3.0)	1,670 (2.4)	93,876
Total	13,056 (5.6)	68,648 (29.4)	44,637 (19.1)	31,397 (13.4)	21,781 (9.3)	17,357 (7.4)	13,298 (5.7)	9,947 (4.2)	7,924 (3.3)	5,048 (2.1)	233,093

Percentage shown in brackets

GRAPH 4.2

Glasgow And West Of Scotland Blood Transfusion Region



Number of	Donor Population	5	6	25	2	19	1	13	5	9	3	8	4	5	7	4	3	3	4	2	2
		5	9	13	1	10	9	10	9	9	7	9	7	9	7	9	8	10	3	9	8

In comparing the results of the sample donor population with the total donor population we found out that female is more represented in the age group 18-24 (total donor population) as well as from the (sample donor population) at the age group 16-25. Males are more represented from both (sample and total donor population) at the age of 26-35 and 25-29 respectively.

The drop in percentage of donors start from the age group of 30+ in the total donor population and mostly among female donors.

In the sample donors, the drop of donors start from the age group of 36+ and mainly among female donors except at the age group of 36-45 for the reason mentioned before. The total of both (sample and total donor population) are more represented by male donors.

At the elderly age group of 60-65 total donors, only 2.2% are eligible and presumed fit. From the sample donor (56+) 5% were eligible and presumed fit (it is almost the same if we take only age 60-65).

By looking at Graph 4.2 we can see the dropping out of the donor population of Glasgow and West of Scotland from the age group of 35-39 and the gap between the donor population and the estimated population becomes wider and wider by increasing of age. Donors at this age start to discontinue donating and are removed from the active donor list, though they are still healthy and eligible.

Retention of donor is very important for a successful blood donation programme. It is not only the recruitment of new donors which should attract the attention but also the keeping of the already recruited donors active as long as possible.

To compare these results with the age group of 60-65 of the estimated population (1979) we found out that only 10% of the total population at this age are not all fit and eligible. That is why we do not expect the whole 10% to give blood (Table 4.1.3).

At the same time it is unacceptable to see the donor intake drop to roughly 2% whereas the figure is 10%. It will be accepted only if the reason is increasing of age and infirmity, since the "spirit is willing but the flesh is weak".

The general conclusion which emerges from these results is that the donor sample broadly resembles the total donor in respect of age, sex, effects of the age incapacity and reproductive factors. We observe the similarities and dissimilarities between the two samples of donors and the estimated general population.

In interpreting the comparison we made of the donor total population and the general estimated population one important point should be made and that is to calculate the different age groups of the total donors from their different age groups of the estimated population in order

TABLE 4.1.3

Glasgow and West of Scotland Blood Transfusion Service Region
Estimated population by age group and sex 1979

Sex	Age group										Total
	18-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-65	
Males	50,264 (6.1)	111,094 (13.6)	91,425 (11.2)	92,397 (17.8)	80,349 (9.8)	79,510 (9.7)	78,769 (9.6)	79,327 (9.7)	81,006 (9.9)	73,274 (8.9)	817,415
Females	48,550 (5.6)	108,388 (12.6)	91,436 (10.6)	91,149 (10.6)	82,849 (9.6)	83,650 (9.7)	83,803 (9.7)	85,972 (10.0)	91,074 (10.6)	90,651 (10.6)	857,522
Total	98,814 (5.9)	219,482 (13.1)	182,861 (10.9)	183,546 (10.9)	163,198 (9.7)	163,160 (9.7)	162,572 (9.7)	165,299 (9.9)	172,080 (10.2)	163,925 (9.7)	1,674,937

Percentage shown in brackets

TABLE 4.1.4

**Percentage of Potential Blood Donors in Different Age Groups
in Glasgow and West of Scotland Blood Transfusion Region**

Sex	Age group										Total
	18-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-65	
Males	14%	35%	30%	22%	17%	13%	10%	8%	6%	5%	17%
Females	13%	28%	19%	12%	10%	8%	6%	4%	3%	2%	11%
Total	13%	31%	24%	17%	13%	11%	8%	6%	5%	3%	14%

to find out figure of potential donors (Table 4.1.4). The results indicate that a higher number of young donors of both sexes in the first 10 years of donating, balance the withdrawal of older donors of both sexes in the last 30 years (who, inspite the desire to give may be prevented by reasons of increasing age and infirmity). Total number of donors of West of Scotland are 233,093, this usually covers a population of 2.9 million. The young come in to balance the effect of age and morbidity and to meet the need.

4.1.2 Place

In this survey the highest number of donors come from towns (Table 4.2). Next highest number of donors is from the village, 213. This may be due to the social pressure in each small society. Unexpectedly, city appeared with only 203 donors. This may be due to the busy life in the city and the long distance to the donor session. The rest of the donors are from hamlet and 18 are from others.

The above figures show the place of residence of the donors. Except for the city where blood donations in colleges is about 3% higher than in the town session, it could be said that most of the blood donations are made in town sessions. The number of the sessions tabulated under "others", is too small to affect this conclusion.

The place of living can play an important role in

TABLE 4.2

The Distribution of Blood Donors from
Different Types of Sessions and where they Live

Type of Session					
Area of Residence	Town	Works	College	Bus	Total
City	77 (37.9)	17 (8.4)	83 (40.9)	26 (12.8)	203 (100)
Town	297 (51.9)	122 (21.3)	60 (10.5)	93 (16.3)	572 (100)
Village	87 (40.8)	59 (27.7)	10 (4.7)	57 (26.8)	213 (100)
Hamlet	3 (60.0)	0 (0.0)	2 (40.0)	0 (0.0)	5 (100)
Others	6 (33.3)	1 (5.6)	1 (5.6)	10 (55.6)	18 (100)
Total	470 (46.5)	199 (19.7)	156 (15.4)	186 (18.4)	1011 (100.0)

Percentage shown in brackets

No missing cases

relation to the type of sessions.

Those from the City give blood mostly in colleges. A high percentage of the middle class have their children in colleges and most colleges are in the City. So a college session can easily have a great influence in recruiting donors.

Town sessions supply an opportunity for so many people to give blood. Sessions must be available and as easy as possible for people who would give if they found a chance. Those who live in Hamlets had to give blood at other sessions. In this survey 2 out of 5 donors had to give at college and 3 donors at the Town sessions. There are usually no sessions in Hamlets as it is not economical to do that. The Donor Organiser has to balance the cost of running a session against the likely collection of donations.

"Others" donors who are not living in a fixed place, so they have to give blood at the nearest session to their temporary address.

4.1.3 Religion

It might have been interesting to include a question about religion in the Scottish Survey as it was done in the Sudanese Survey. Fortunately, and with careful consideration, this was excluded because it was not thought to be terribly important in a Western Society from a practical point of view as a reason for giving blood or not.

In this country of mixed Society (Catholic, Protestant, Hindu and Islamic religion) people believe in equality. They are entitled to the same benefit in a voluntary unpaid donor service. Where Jehovah's Witnesses are concerned they prefer death rather than receive blood from others or even their own blood. For them it is a religious belief and a necessity.

Religions, according to the author, should never interfere with disease remedy. It could be only tribal beliefs which exist among uneducated tribes. Such tribes refuse to give or receive blood from a member of a different ethnic group.

If we believe that all human beings are the ancestors of Adam and Eve then we should believe that we are all from the same blood (Jewish or Christian, Muslim or Hindu).

4.1.4 Sex

49% of the females and 46% of the males were in the age group 16-25 (Table 4.1.1) (Graph 4.1). The total number of females turned out to be less than the total number of males (433 and 559) respectively. Women at the age group 16-25 are more compassionate. They are more family orientated than men and therefore they would like family ties maintained. They are more concerned than men at this age group and more aware of the importance of giving.

This will explain the high presence of female at this

age group which was mentioned earlier in the Chapter.

It can also be seen that the slight increase in number of females is maintained up to the age of 45 and it may be that beyond this age women begin to suffer from diseases (menorrhagia and hysterectomy). These observations are in stark contrast to the figure in the Sudan where (Chapter 3) almost 100% of the donors are exclusively men and beyond the age of 50. There are very few donors of either sex. In West of Scotland men and women are almost represented in the correct population distribution.

4.1.5 Marital Status

Computer analysis of 508 donors who answered the question showed that 52% of donors were married and 46% were single, 0.8% were widowed and 1.9 were "others". 63% of those who were married were males and 52% of those who were single were females (computer data sheet).

4.1.6 Education

From the results of the male donor population (Table 4.3) 13% are University Graduates. In this survey of whole blood donor population the females who have University education are only 8%. Comparing these results with the Scottish education department figures of 1979/1980 for the whole population of Scotland only 5100 males out of the total 5 million (population) have University education (0.10%). 3600 females of the total population have University education (0.07%).

TABLE 4.3

Blood Donors Education Levels Distribution by Sex

	University	Tech. or training	Sec. Coll. or Appre.	Only to 16 or 17 years	Only to 15 or less	Total
Male	72 (12.9)	260 (46.6)	42 (7.5)	82 (14.7)	97 (17.4)	553 (56.3)
Female	33 (7.6)	118 (27.3)	48 (11.1)	111 (25.6)	119 (27.5)	430 (43.7)

Percentage shown in brackets

The population of Glasgow and West of Scotland is 2.9 million and the whole population of Scotland is 5 million. The result of this analysis indicates a high representation of University Graduates of donors in this survey comparing it with those of the whole population of Scotland.

This shows that higher educational attainment is associated with higher recruitment levels. Higher understanding of social need would therefore be one of the main reasons which is hindering donation in the Sudan.

Most of the male donors in this survey are represented from Technical College. From the whole population of Scotland many thousands have University or Technical College education. Clearly, this is an important population of potential donors. The results of this survey indicate that 47% of the male and 27% of the female donors are technically trained.

Glasgow is the biggest City in Scotland with a large number of colleges. The average number of students graduating per annum is approximately 3-4000. Some of these students are blood donors with temporary residence in Glasgow. This floating population go home as soon as they finish their studies and that is why the number of donors fall. Students who are blood donors move to some other place where no sessions are available and become lost from the donor list.

To solve this problem, donors could be asked to give

their new address before leaving in order that if they are willing to continue being a donor they could be called to the nearest session at their home or place of work.

Females are more represented as school-leavers than males (Table 4.3). One should bear in mind that the results of these donors are not compared with the educational level of Glasgow and West of Scotland but with the educational level of the whole of Scotland.

4.1.7 Social Classes

To see if the relationship of the donor within his own society has any effect on his donation a question on social classes was included (Table 4.4). The social class was examined according to accepted criteria. In Britain, social class is a very viable phenomenon by differences in dress and audible by differences in accent.

A person's occupation determines his social class (or socioeconomic group). The position of a person's occupation within the wider social structure has important implications for how he spends his life. Hence, knowledge of a person's social class can be used to ascertain his likely attitudes and behaviour.

Social class was first officially used in medicine early this Century when the Registrar-General classified infant mortality returns by the occupation of the child's father (Reid 1980). The social class is divided into the

TABLE 4.4

Distribution of Social Classes by Sexes

TABLE 4.4.1

	1-2	3	4-5	Other	Total
Male	108 (19.6)	252 (45.7)	84 (15.2)	107 (19.4)	551 (56.2)
Female	71 (16.6)	169 (39.4)	63 (14.7)	126 (29.4)	429 (43.8)

TABLE 4.4.2

	1	2	3N	3M	4	5	Un- employed	House- wife	Students	Total
Male	41 (7.4)	67 (12.2)	57 (10.3)	195 (35.4)	78 (14.2)	6 (1.1)	8 (1.5)	0 (0.0)	99 (18.0)	551 (56.2)
Female	2 (0.5)	69 (16.1)	150 (35.0)	19 (4.4)	57 (13.3)	6 (1.4)	7 (1.6)	51 (11.9)	68 (15.9)	429 (43.8)

Missing cases 34

following:

- I Professional, higher administrative
- II Administrative, managerial
- III Clerical and skilled manual
- IV Semi-skilled
- V Unskilled

Other Unemployed
 Housewife
 No answer
 Illegible (students, chronically ill, etc.)

Social Class III is divided into 3n, non-manual (clerical, etc.) and 3m, manual (skilled worker)

Preponderance of social class III is obvious among donors in this survey. Also, more indirectly, socialisation is related to education. That is, one's upbringing gives one certain aspirations typical of one's position in society. For example, skilled workers typically aim at higher education for their children but not usually University education. More likely, it will be Technical education.

To compare these results of social class III with the education we observe that the highest percentage of both sexes from (Table 4.3 and 4.4) social class III and Technical College 46% of the male donors are represented from social class III (Table 4.4.1). On the other hand,

47% of the male donors are from Technical College (Table 4.3) which means that almost 47% of the male donors in this survey are from Technical College and Social Class III.

Class I and II (I - upper and middle; II - intermediate) higher professional and lower professional. 20% of the male donors represent somewhat higher proportions compared to the general population of Glasgow and West of Scotland (Table 4.4.3).

Social Class III is well represented among the male donors in this survey as well as among the different social classes of Glasgow and West of Scotland.

Class IV and V are represented with 15% of the male donors of this survey and in the estimated population is represented with 14%.

The group of "other" (Unemployed, Housewife, Student) are represented by 18% of male student donors and 16% of the female student donors. 12% are housewives and only 2% of the female and 1% of the male donors are unemployed. Voluntary donation does not seem to attract the Unemployed.

Anyhow, donors from all different social classes made their contribution to the Blood Transfusion Services except the Unemployed who do not seem to be attracted by voluntary donation. It seems that their own problems looking for jobs and settling down do not give them a chance to contribute with the other.

TABLE 4.4.3

Glasgow and West of Scotland Blood Transfusion
Service Region - Estimated Social Class Distribution
of Economically Active Males 1971

<u>Social Class</u>	<u>No.</u>	<u>%</u>
I	36,810	4.4
II	114,910	13.7
III(N)	83,610	10.0
III(M)	340,340	40.5
IV	150,150	17.9
V	93,170	11.2
Armed Forces	5,080	0.6
Inadequately described occupations	15,370	1.8
Total	839,440	100.0

Notes: (i) Percentages do not add to 100.0
due to rounding

(ii) (N) non-manual

(iii) (M) manual

On the contrary, the paid system appears to attract unemployed donors who are desperate to make their living.

4.2 SECONDARY CHARACTERISTICS - DEFINITION

The same criteria were applied as is outlined in Chapter 3.

4.2.1 Blood group

73% of the donors knew their blood group, 27% did not know and 14 donors did not answer the question (computer data sheet 1).

As the survey was done during charity weeks, there were many students who did not know their blood group. It might have been their first time to give blood and they never needed to know their blood group. 75% of those who know their blood group come to donate regularly (Table 4.5). Those who gave most - the long service donors - contributed (Table 4.5.2). In general, the number of donors decrease with the increase of the number of donations (Table 4.5.3). Donor's contribution of giving blood are mostly among "twice yearly" (Table 4.5.4). Percentage of respondent was high "about right" at twice yearly and at more than twice and "not frequent enough" at yearly and irregular (Table 4.5.5).

These results suggest that once a person starts giving blood he may continue and become a regular blood donor. Although donors fall off but some would like to

TABLE 4.5Knowledge of Blood Group

In each table, knowledge of blood group
is the row variable

TABLE 4.5.1

Do you give blood regularly?

	Yes	No	Total
Yes	536 (75.5)	174 (24.5)	710 (78.1)
No	80 (40.2)	119 (59.8)	199 (21.9)

Missing cases 105

TABLE 4.5.2

How long have you been a blood donor (years)?

	0-0.5	0.5-1	1-2	2-3	Over	Total
Yes	37 (5.2)	70 (9.9)	113 (15.9)	101 (14.2)	389 (54.8)	710 (78.1)
No	110 (55.3)	11 (5.5)	12 (6.0)	17 (8.5)	49 (24.6)	199 (21.9)

Missing cases 105

TABLE 4.5.3

How many times have you given blood?

	< 10 times	10-20 times	> 20 times	Total
Yes	485 (67.9)	154 (21.6)	75 (10.5)	714 (75.2)
No	200 (84.7)	25 (10.6)	11 (4.7)	236 (24.8)

Missing cases 64

Percentage shown in brackets

TABLE 4.5.4

How often do you come to donate blood?

	Yearly	Twice yearly	More than twice	Irregular	Total
Yes	123 (17.4)	371 (52.5)	91 (12.9)	122 (17.3)	707 (81.4)
No	27 (16.7)	54 (33.3)	17 (10.5)	64 (39.5)	162 (18.6)

Missing cases 145

TABLE 4.5.5

Do you think this is:-

	Too frequent	About right	Not frequent enough	Do not know	Total
Yearly	3 (2.0)	51 (33.6)	90 (59.2)	8 (5.3)	152 (17.4)
Twice yearly	5 (1.2)	253 (59.1)	152 (35.5)	18 (4.2)	428 (49.0)
More than twice	1 (0.9)	84 (78.5)	20 (18.7)	2 (1.9)	107 (12.2)
Irregular	2 (1.1)	8 (4.3)	156 (83.4)	21 (11.2)	187 (21.4)

Missing cases 140

Percentage shown in brackets

remain if they were given the opportunity.

A good percentage of donors in this survey would like to give but they do not give for some reason, may be this questionnaire for the first time made them appreciate that they have to give more than once.

It demonstrates that they are recruited, but they go away. Some only contribute once in case they may need blood.

Rare blood group:

The general idea expressed in this type of answer was to find out whether donors who knew their blood group to be unusual came to donate regularly. Such answers further imply that because one's blood is rare or unique there is a particular responsibility to make it available to others who may need it.

64% of those who knew their blood group thought that it was a usual group and came to donate regularly. 25% thought it was an unusual group and came to donate regularly. 11% did not know whether it was a usual group or not (Table 4.6).

This 25% shows that one has in one's make-up some element of 'uniqueness' which may contribute to feelings of self-respect as well as to acts of giving (Titmuss (1970)).

Donors with special blood groups are very useful for the Blood Transfusion Service. These rare groups are used in the transfusion of patients with irregular

TABLE 4.6Knowledge of whether it is a usual group

In each table, knowledge of whether it is a
usual group is the row variable

TABLE 4.6.1

Do you give blood regularly?

	Yes	No	Total
Yes	371 (63.9)	124 (56.6)	495 (61.9)
No	144 (24.8)	51 (23.3)	195 (24.4)
Do not know	66 (11.4)	44 (20.1)	110 (13.7)

Missing cases 214

TABLE 4.6.2

How many times have you given blood?

	< 10 times	10-20 times	> 20 times	Total
Yes	325 (65.3)	116 (23.3)	57 (11.4)	498 (61.8)
No	137 (80.6)	36 (18.6)	21 (10.8)	194 (24.1)
Do not know	93 (81.6)	16 (14.0)	5 (4.4)	114 (14.1)

Missing cases 208

Percentage shown in brackets

TABLE 4.6.3

How often do you come to donate blood?

	Yearly	Twice yearly	More than twice	Irregular	Total
Yes	84 (17.1)	257 (52.2)	64 (13.0)	87 (17.7)	492 (62.5)
No	31 (16.0)	108 (55.7)	22 (11.3)	33 (17.0)	194 (24.7)
Do not know	22 (21.8)	36 (35.6)	14 (13.9)	29 (28.7)	101 (12.8)

Missing cases 227

Percentage shown in brackets

antibodies and a number of groups have been suggested by Grove-Rasmussen (1973) to be stockpiled in a frozen cell bank to deal with such emergencies.

These special donors could be contacted by correspondence, thanked for their donation; the rarity of their blood group should be explained and this may be an added stimulus to continue giving.

This letter of thanks and the knowledge of their group as being rare could be very stimulating to keep them coming regularly.

A record of these donors is usually available in the file in the computer, therefore their follow-up can be quite easy.

4.2.2 Voluntary Organisation and Motivation

There is no doubt that membership of a voluntary organisation can be a key to a successful recruitment.

This attempt was made to see how far donors were affected by membership of voluntary organisation either in the past through Boy Scouts, Boys Brigade, Girl Guides, or at the present, Vomen Voluntary Service, Church Groups and others.

It was difficult to decide if voluntary organisation was the main reason why they became blood donors. Anyhow, the result of the donors survey for those who belong to any organisation was only 21% and those who have never been

a member of any organisation was 79% (computer data sheet 2).

It would be an almost impossible task to make necessary arrangements in respect of a factory or office session without the cooperation of someone from within that organisation. An effective way of reaching the community could be through members of different organisations.

It would have been interesting to compare figures of members of different social organisations among the general population with the percentage of members of voluntary organisations in the survey. Unfortunately, no statistics are available at the present time to quote the proportion of the population who have been members of voluntary organisations (Greater Glasgow Health Board 1981).

4.2.3 Recruitment by an Associate

Usually direct approach has a motivating effect though in this survey the response of the donors who were approached by someone was only 22% and of those not approached was 73%. 12 of the donors did not answer this question (computer data sheet 1).

The aim behind this analysis (Table 4.7) is to find out which of the reasons has a strong influence on donors who were not approached by someone. Most respondents came to help people, 67%.

Personal approach is often good and better than

TABLE 4.7Miscellaneous reasons for donating

Those who were and were not approached
by someone is the row variable

	Yes	No	Cannot remember	Row Total
To repay a transfusion	19 (8.4)	80 (11.0)	2 (4.1)	101 (10.1)
To help people	130 (57.8)	491 (67.4)	37 (75.5)	658 (65.7)
Witnessed an accident	4 (1.8)	14 (1.9)	2 (4.1)	20 (2.0)
Influenced by friends, relatives, neighbours etc.	64 (26.8)	86 (11.8)	9 (18.4)	159 (15.9)
Response to an appeal (Media)	27 (12.0)	83 (11.4)	1 (2.0)	111 (11.1)

Percentage shown in brackets

Percentage do not add to 100 because
donor ticked more than one item.

correspondence. It was revealed by some researchers as mentioned in the review (Chapter 1) that it could be one of the effective ways in recruiting blood donors. These 22% may not have come if they had not been approached by someone. That means, one-fifth of the donors were influenced by someone.

4.2.4 Family Relative Need

One of the most important things in this survey is to find out what is more convincing to the public to give blood and to indicate the influence of the various reasons which will have more effect on them.

Donors of this survey were asked if a member of their family needed blood. The result shows the effects of the positive motives on the blood donors. 366 (37%) out of 982 of the donors have a member in their family who needed blood. 616 (63%) out of 982 donate for other reasons and 32 did not answer the question. Those whose family needed blood were 366 but when the question was combined with the reasons blood donors have for giving blood it totalled to 434. The reason was that donors ticked more than one item on this question which made it difficult to decide which of those reasons has a great influence on the donors. Percentage do not add to 100 for the reason mentioned above.

An analysis of Table 4.8 indicated the other reasons through which donor, whose member of their family did not

TABLE 4.8Family Relative NeedTABLE 4.8.1

	No.	(%)
Yes	366	37.3
No	616	62.7
Total	982	100.0

Missing 32

TABLE 4.8.2

Those who needed blood was for

		(%)
1. Childbirth	129	12.7
2. After an operation	195	19.2
3. An accident	53	5.2
4. Treatment of bleeding	27	2.7
5. Treatment of anaemia	30	3.0

Those who needed were 366, the total answers are 434 due to those who needed more than once

TABLE 4.8.3

Those whose family needed blood and those who did not but came to give blood

	Yes	No	Total
1. To repay transfusion	81 (22.1)	19 (3.1)	100 (10.2)
2. Desire to help	222 (60.7)	426 (69.2)	648 (66.0)
3. Witnessed an accident	9 (2.5)	11 (1.8)	20 (2.0)
4. Influenced by friends, relatives	49 (13.4)	101 (16.4)	150 (15.3)
5. Response to an appeal	32 (8.7)	78 (12.7)	110 (11.2)

need blood, came to donate. Of the total sample of donors of this survey 69% have no member in their family who needed blood but had a desire to help people. 16% were influenced by friends, 13% responded to an appeal through 'Media', 3% donated to repay a transfusion, 2% witnessed an accident.

It seems that the need of blood for a member in the family has no great effect to induce a blood donor.

4.2.5 Motivation by Need

The impact of the need was aimed to draw out the reasons blood donors have for giving blood. The response to this question was over expected as 434 answers responded to it while the number of those whose family needed blood were 366. Again, many donors ticked more than one item on this question. The aim behind this question was to draw out the response to the main motives and find out what factors of these have more influence on the donor for giving blood. The analysis of Table 4.8.2 indicates that the need for blood was more "after an operation", second of importance was "childbirth".

4.2.6 Family, Relative Donation

To find out the effect of positive motives on blood donors caused by members of their family who has given blood such a question was asked. 64% of donors of this survey had a close contact motivation by the presence of

a donor in their family (computer data sheet 2). 36% had no donor in their family, that means they came to transfusion through other motives. 19 donors did not answer the question. Close contact appeared in many studies to be of great importance in motivation. London and Hemphill (ibid) reported that 75% of their donors had family or friends who had been donors.

This high percentage indicates that any donor can easily have an influence on his friends or family. "Be a donor bring a friend". This should be a slogan for motivating people.

4.2.7 Compulsory Donation

The opinion of donors about whether it should be compulsory for all healthy people to give blood or not. The answers are analysed first by different age groups and then by different social classes (Table 4.9).

A comparison of male and female percentages among different age groups of donors shows only small differences. Those who support the idea of compulsory donation are 36% from the males and 39% from the females. The higher percentage was among the younger age groups of the females and among the age groups of 56+ of the males. 76 of the donors did not know what side to support. The younger groups are more enthusiastic and at the same time it has to be remembered that they are over-represented in this

TABLE 4.9

TABLE 4.9.1

Compulsory donation by age and sex

		16-25		26-35		36-45		46-55		56+		Total	
		M	F	M	F	M	F	M	F	M	F	M	F
Yes		93 (38.4)	86 (42.2)	39 (31.0)	35 (36.5)	27 (36.0)	25 (38.5)	19 (37.3)	8 (26.7)	14 (41.2)	7 (41.2)	192 (36.4)	161 (39.1)
No		135 (55.8)	99 (48.5)	80 (63.5)	53 (55.2)	44 (58.7)	35 (53.8)	30 (58.8)	20 (66.7)	18 (52.9)	6 (35.3)	307 (58.1)	213 (51.7)
Do not know		14 (5.8)	19 (9.3)	7 (5.6)	8 (8.3)	4 (5.3)	5 (7.7)	2 (3.9)	2 (6.7)	2 (5.9)	4 (23.5)	29 (5.5)	38 (9.2)

Missing cases 74

TABLE 4.9.2

Compulsory donation by social class

		1-2	3	4-5	Other	Total
Yes		51 (28.3)	170 (39.4)	72 (48.6)	86 (37.1)	379 (38.2)
No		124 (68.9)	231 (53.5)	58 (39.2)	130 (56.0)	543 (54.7)
Do not know		5 (2.8)	31 (7.2)	18 (12.2)	16 (6.9)	70 (7.1)

Missing cases 22

Percentage shown in brackets

survey. Donors of age group 56+ responded with 41% from both sexes. The explanation to this is the effect of age.

Looking at the social class percentages, it appears that male and female donors who supported the idea of compulsory donation is higher in social class (4-5) 49% and lower at (1-2) 28%, next high percentage emerged from Social Class 3.

It was slightly surprising to see that more than one-third of the donors 38% were in favour of regular compulsory donations. This group of donors thought it is a good idea to their realisation of the need for blood and compulsory donations are for the best.

Alternatively, most donors said no (55%) since they thought this would be a further erosion of individuality. They preferred the freedom of choice to remain with may be a hint of remaining in a select group.

By compulsion we mean to make efforts to persuade people to donate. It is a friendly persuasion, we do not use sanctions to persuade people to give blood as in some Arab countries. Donation in such countries is humiliating to the individual where freedom is restricted, and lack of choice.

Such practice, which is not a gentle persuasion, will spoil the meaning of donation, eg if you do not give blood no driving licence. This system is as dangerous as the

paid system. People who are desperately in need of a licence would give their blood but would, at the same time, hide their medical history.

4.2.8 Frequency of Donation

In order to find out why some of the donors give blood irregularly, a comparison among sets of regular and irregular donors of different sessions was made. Active donors (regular donors) show their awareness of the general need as important to their decision to donate. 68% of the donor representatives in this survey gave blood regularly (Table 10). The most regular donors are 50% represented from town sessions. The least regular donors are 7% represented from college sessions. The most irregular donors are 39% represented again from town sessions while the least irregular donors are 14% represented from work sessions. This reflects a sort of discipline. College sessions respond with 30% of irregular donors. Bus sessions are represented with 17% of irregular donors. 298 donors gave blood irregularly.

4.2.8.1 Reasons for irregular donation

The question went further to find out the reasons which stand in front of regular donation.

Only 250 out of 298 answered the question.

102 donors - 40% did not know the reason

88 donors - 35% claim that time of donation was

TABLE 4.10TABLE 4.10.1

Percentage Distribution of Frequency of Donation
By session type

	Town	Works	College	Bus	Row total
Regular	314 (50.3)	143 (22.9)	46 (7.4)	121 (19.4)	624 (67.7)
Irregular	116 (38.9)	42 (14.1)	90 (30.2)	50 (16.8)	298 (32.2)

Missing cases 92

TABLE 4.10.2

Why irregular	No.	%
Time unsuitable	88	35.2
Miss appointment	60	24.0
Do not know	102	40.0
Total	250	100.0

Missing cases 48

TABLE 4.10.3

How often given blood

	Town	Works	College	Bus	Row total
< 10 times	312 (69.6)	120 (61.9)	142 (98.6)	120 (68.2)	694 (72.1)
10-20 times	83 (18.5)	50 (25.8)	2 (1.4)	47 (26.7)	182 (18.9)
> 20 times	53 (11.8)	24 (12.4)	0 (0.0)	9 (5.1)	86 (8.9)

Missing cases 52

Percentage shown in brackets

In each table frequency of donation is the column variable

TABLE 4.10.4

By session type

	Town	Works	College	Bus	Row total
Yearly	44 (10.5)	55 (30.6)	27 (23.7)	27 (16.1)	153 (17.4)
Twice yearly	210 (50.2)	101 (56.1)	23 (20.2)	96 (57.1)	531 (48.9)
More than twice	71 (17.0)	8 (4.4)	16 (14.0)	13 (7.7)	108 (12.3)
Irregular	93 (22.2)	16 (8.9)	48 (42.1)	32 (19.0)	189 (21.5)

Missing cases 134

TABLE 4.10.5

Opinion of donors about frequency

	Too frequent	About right	Not freq. enough	Do not know	Row total
Yearly	3 (2.0)	51 (33.6)	90 (59.2)	8 (5.3)	152 (17.4)
Twice yearly	5 (1.2)	253 (59.1)	152 (35.5)	18 (4.2)	428 (49.0)
More than twice	1 (0.9)	84 (78.5)	20 (18.7)	2 (1.9)	107 (12.2)
Irregular	2 (1.1)	8 (4.3)	156 (83.4)	21 (11.2)	187 (21.4)

Missing cases 140

Percentage shown in brackets

unsuitable for them

60 donors - 24% probably forgot and missed the
appointment

48 donors did not answer the question

In fact, the unsuitable time of donation appears to be the main factor which stands in front of regular donation. 24% of the respondents need to be reminded.

4.2.8.2 Number of donation

This could be considered one of the characteristics of the Scottish Survey donor population. 72% of the donors gave less than 10 times. It is the younger age group, healthy and enthusiastic that can continue to give blood.

10-20 times : small proportion of 19%. The dropping may be due to immigration of some donors to the North Sea or some other place seeking jobs. It would have been interesting to compare the different age groups of the blood donor of West of Scotland with age groups from other Centres but figures are unavailable. Females at this time start their reproductive age and stop donating blood.

More than 20 times : only 9% of donors gave blood more than 20 times. Affect of age may be the only explanation for that.

Among different sessions, college appeared to be the most convenient place for donors who gave blood less than 10 times. This could be explained by the fact that most

of these donors being students are of young age, just eligible to be donors; moreover the effect of the charity weeks during which the survey was conducted.

Bus appeared to be more convenient for those who gave regularly 10-20 times. Town sessions seemed to be more suitable for those who donate more than 20 times.

4.2.8.3 How often

The question went more deeply to find out the willingness of donors who committed themselves to donate blood twice yearly. 50% are regular donors; conventional representative, gave twice a year. Those are, in fact, the percentages of the regular donor.

Only 12% of the donors gave more than twice. This can be considered as a family of motivated donors. This shows that the majority of the donors (50% and 12%) are conscious of the need for blood and are willing to donate regularly. 21% of donors gave irregularly.

4.2.8.4 Ideas of donors

The total number of donors who gave yearly is 152 (17%). 59% tend to agree this is not frequent enough (Table 4.10.5). 33% about right. Only 2% think it is too frequent. The total of those who gave twice are 428 (49%). 59% is the highest among those who think that it is about right. 35% think that it is not frequent enough. The total of those who gave more than twice are 107 (12%).

The highest percentage is 78 who think that it is about right and the total of irregular donors are 187 (21%). 83% think it is not frequent enough.

4.2.9 How Long Being a Donor

The number of donation increases with a percentage of new donors in all different sessions (Table 4.11).

0-0.5 (half year) : college responded with quite a high percentage of 37.0. Those are new donors who gave blood for the first time. Total represented are 16%.

0.5-1 (year) : college again responded with a high percentage of 23.0 among the different sessions. Donors of this group are not yet committed regularly. Total represented are 9%.

1-2 (year) : stage when donors have probably started to think to become regular in giving blood. This is represented with 14%. College high percentage of donors start to disappear. A reason for that is students by this time will be finishing their study and moving somewhere else, which makes it difficult to follow them up, for the reason mentioned before.

2-3 (year) : college percentage of donors went down to 12.0. Total represented are 13% from all different sessions. Here still, probably, the decision to become regular donors is not firm. It seems that the donor, whatever his motive, at the beginning to donate blood needs 2-3 years to get

TABLE 4.11

Distribution of blood donors from different sessions and how long they have been blood donors. It also shows the percentage of new donors from different sessions 0-0.5 (half year).

Length of donation (years)	Type of Session				Row Total
	Town	Works	College	Bus	
0-0.5	55 (12.7)	23 (12.2)	47 (36.7)	26 (15.0)	151 (16.4)
0.5-1	34 (7.9)	8 (4.2)	30 (23.4)	9 (5.2)	81 (8.8)
1-2	56 (13.0)	20 (10.6)	19 (14.8)	31 (17.9)	126 (13.7)
2-3	65 (15.0)	20 (10.6)	15 (11.7)	18 (10.4)	118 (12.8)
>3	222 (51.4)	118 (62.4)	17 (13.3)	89 (51.4)	446 (48.4)

Percentage shown in brackets

completely used to this new adventure and perhaps only then he can make up his mind as to whether or not he can become a regular donor.

Over 3 (year) : almost half of donors gave blood for 3 years or more, 48%. The percentage of donors from different sessions is increasing by time. The decision is really solid now, except for college sessions whose donors percentage is dropping from 37%, at the beginning of donation, to 13%. The reasons for this has already been mentioned.

The more suitable session of donation is work sessions which is represented with 62%. Next to it are both bus and town sessions which are represented with 51%. College percentages drop down to 13.0. Overall, almost half of donors gave blood for 3 years or more (48%).

4.2.10 Difficulty When Leaving Work to Donate

The question was included in the survey in order to investigate the nature of the difficulties which face working donors as a direct consequence of their having to leave their place of work. Donors who have to leave works constitute only 27% (265 donors out of 998) of the total number of people who answered the question (Table 4.12). This means, that this is a well organised Blood Transfusion Service which gives all the facilities to donors to enable them to give blood without

TABLE 4.12

Percentage Distribution of donors who had
difficulty when leaving their work

TABLE 4.12.1

Percentage of donors who have to leave their place of work

Leave work	Town	Works	College	Bus	Row total
Yes	81 (17.4)	88 (44.2)	38 (25.0)	58 (32.0)	265 (26.6)
No	385 (82.6)	111 (55.8)	114 (75.0)	123 (68.0)	733 (73.4)

Missing cases 16

TABLE 4.12.2

Classification of donors who find difficulty in
leaving work according to social class

Find difficulty	Yes	No	Sometimes	Row total
<u>Social Class</u>				
1-2	2 (22.2)	34 (15.6)	6 (18.7)	42 (16.2)
3	2 (22.2)	116 (53.2)	20 (62.5)	138 (53.3)
4-5	1 (11.1)	36 (16.5)	2 (6.2)	39 (15.1)
Other	4 (44.4)	32 (14.7)	4 (12.5)	40 (15.4)
Column Total	9	218	32	259 (100.0)

Missing cases 6

Percentage shown in brackets

TABLE 4.12.3

Time taken off work by donors who had
to give blood in working time

How long off work	No.	%
Half an hour	109	44.7
One hour	122	50.0
Two hours	9	3.7
More than two hours	4	1.6
Total	244	100.0

Missing cases 21

interruption to their work.

Donors in work sessions have obviously to leave their work, especially those who work in different factories as machinests. In this survey, 44% of donors from work sessions have to leave their work while 56% of donors do not have to interrupt their work. This shows that the administration is prepared to give time off to almost half those who volunteer to give blood.

Donors who lose their jobs due to closing of factories, which is common nowadays, drop out completely and their card transferred to the passive file. The Blood Transfusion can never contact them as they do not have their home address. It is very important for donor retention to keep in contact with donors. It is necessary to remind the donors to leave their home address. "If you move away, please let the Donor Organiser know".

Three questions were asked to indicate the difficulties which face donors in this survey.

4.2.10.1 Difficulty of time off work for donation among donors of various social classes

Those who had to leave work were 265 donors but those who answered the question were 259. 6 donors did not answer the question.

Only 9 donors of all different classes had difficulty in leaving work. 32 donors sometimes had difficulty in

leaving work. In Social Class 3, 20 donors out of 32 were either occasionally not allowed, or found it difficult, to leave to give blood.

This difficulty is expected to arise in more time-conscious industrial countries.

4.2.10.2 How long a donor can be away from work

This shows the average time needed by a donor to be away from work to give blood. Only 244 out of 265 donors answered the question. .

45% take half an hour to give blood

50% take one hour

4% take two hours

2% take more than two hours

One observes that 50% of the donors had to leave work for one hour which seems quite reasonable. 21 donors who had to leave work did not answer this question. They might have to leave work for less than half an hour.

4.2.10.3 If transport is provided by the Blood

Transfusion Service

It was expected that it would be of great help to give blood if transport was provided by the Blood Transfusion. 32% of the donors agreed that it would be of help while 67% of the donors did not think it would make any difference.

A combination was made to see the effect of providing transport among donors of different places and to compare

TABLE 4.13

Effect of providing transport on donors
in each table is row variable

TABLE 4.13.1

According to session type

If transport is provided	Town	Works	College	Bus	Row total
Yes	115 (25.7)	65 (34.0)	59 (38.3)	76 (43.4)	315 (32.5)
No	333 (74.3)	126 (66.0)	95 (61.7)	99 (56.6)	653 (67.5)

Missing cases 46

TABLE 4.13.2

According to different residential areas

If transport is provided	City	Town	Village	Hamlet	Others	Total
Yes	78 (40.4)	162 (29.8)	64 (31.2)	2 (40.0)	7 (38.9)	313 (32.4)
No	115 (59.6)	382 (70.2)	141 (68.8)	3 (60.0)	11 (61.1)	652 (67.6)

Missing cases 49

Percentage shown in brackets

it with those of different sessions (Table 4.13). Donors seem to be prepared to give blood even if transport is not provided. Again, a total of only 32% of the donors of different places and different sessions think that it might be of help.

Among those who said that providing transport would help them to donate blood, 40% came from the City (mainly Glasgow) and the hamlet areas (Table 4.13).

This seems reasonable as donors in the City may find difficulty in coming to Donor Centres due to the long distances travelled.

The answers of those who live in hamlets may also have good grounds due to the distance to the donor sessions and expenses.

4.2.11 Fear of Giving

First donation could be the most exciting experience in the donor's life. Fear could be a reasonable reason which keeps donors from coming back.

As it was expected, young donors in this survey responded with a high percentage among the other different age groups, especially female donors who were represented with 77% and the male donors with 53% (Table 4.14).

The percentage of anxious donors decreased with the increasing of age. Total of the male donors responded with 45% and total of the female donors responded with 66%. The first donation experience has a greater impact on the

female than on the male. Bad donation experience will make donors less willing to donate again. The collecting agencies should make a successful effort to make donating a pleasant experience.

4.2.12 Reasons for Donation

- i) Desire to help was most common among donors of different age groups, different social classes, different sessions and different education (Bar-chart 4.3). These type of answers assure the altruism, though it was difficult to know whether donors were just being sentimental because they were being questioned, but it was still encouraging to learn that so many donors thought of this reason even after reading a given set of choices.

4.2.12.1 By age group

Most donors of different age groups responded to desire to help as the main reasons of their donation. Males responded with 64% and females with 66%. It can be seen from the results that the percentage of a desire to help increases with the increasing age and it is more frequent among females (Table 4.15.1).

- ii) Influenced by a friend : appeared to be the second reason of importance among all different

TABLE 4.14

Blood donors by age and sex who were and who
were not anxious the first time they came

		16-25		26-35		36-45		46-55		56+		Row total	
		M	F	M	F	M	F	M	F	M	F	M	F
Yes		129 (53.1)	155 (76.7)	61 (47.3)	58 (60.4)	28 (36.8)	38 (57.6)	18 (26.0)	15 (50.0)	5 (14.3)	5 (29.4)	241 (45.2)	271 (65.9)
No		114 (46.9)	47 (23.3)	68 (52.7)	38 (39.6)	48 (63.2)	28 (42.4)	32 (64.0)	15 (50.0)	30 (85.7)	12 (70.6)	292 (54.8)	140 (34.1)

Missing cases 70

Percentage shown in brackets

BAR-CHART(4.3)

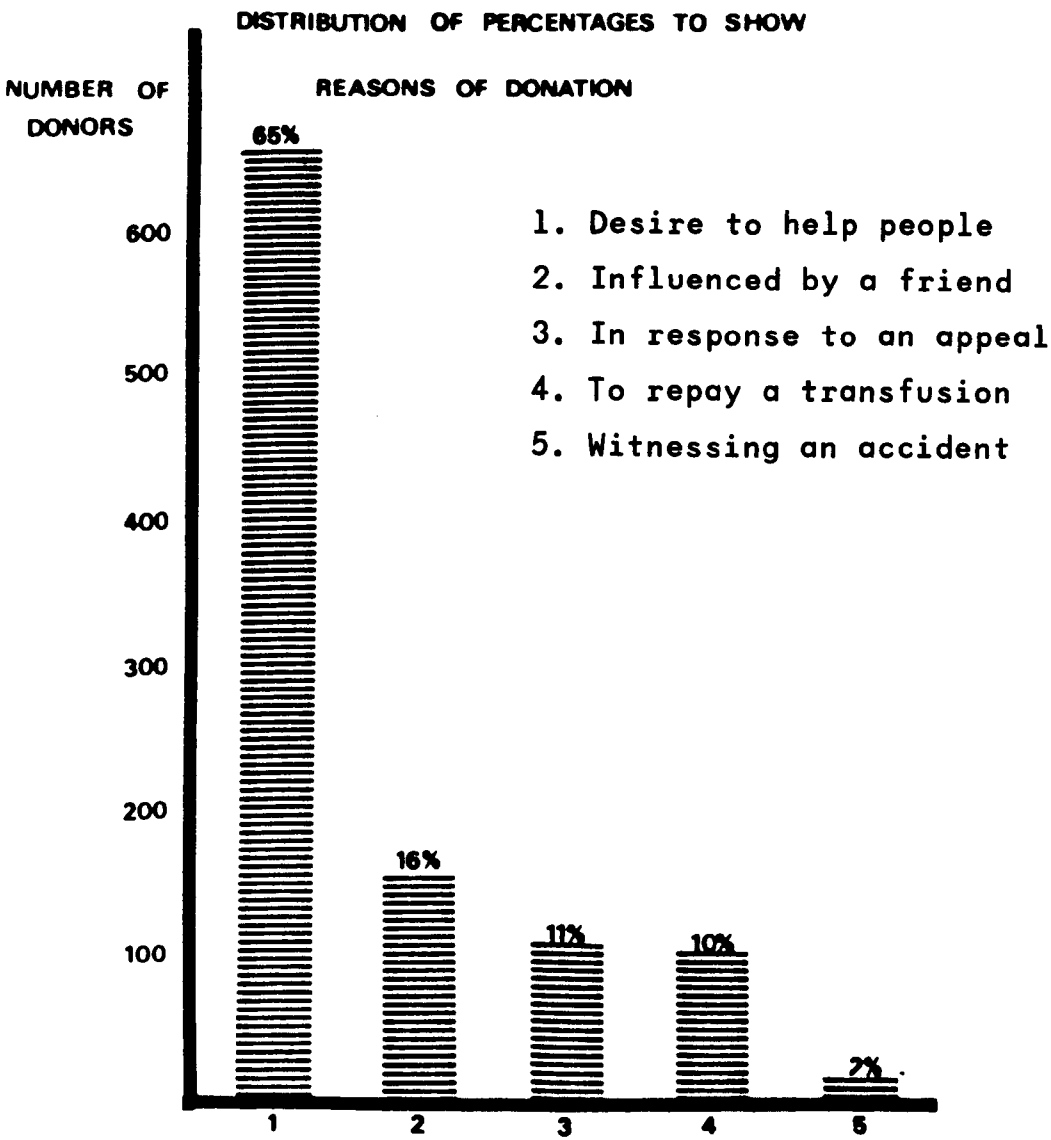


TABLE 4.15

In each table reasons for donation is the column variable

TABLE 4.15.1

By age group

16-25		26-35		36-45		46-55		56+		Total	
M	F	M	F	M	F	M	F	M	F	M	F
To repay a transfusion	15 (6.1)	11 (5.4)	10 (7.8)	14 (14.6)	10 (13.0)	17 (25.8)	8 (26.7)	5 (14.3)	2 (11.8)	43 (8.0)	52 (12.6)
Desire to help people	139 (56.7)	135 (65.9)	86 (66.7)	67 (69.8)	51 (66.2)	43 (65.2)	15 (50.0)	27 (77.1)	14 (82.4)	347 (64.1)	274 (66.2)
Witnessed an accident	6 (2.4)	6 (2.9)	2 (1.6)	0 (0.0)	2 (2.6)	0 (0.0)	0 (0.0)	1 (2.9)	1 (5.9)	13 (2.4)	7 (1.7)
Influenced by friends	61 (24.9)	39 (19.0)	19 (14.7)	11 (11.5)	13 (16.9)	5 (7.6)	0 (0.0)	2 (5.7)	2 (11.8)	97 (18.1)	57 (13.8)
In response to an appeal (Media)	30 (12.2)	22 (10.7)	14 (10.9)	12 (12.5)	5 (6.5)	8 (12.1)	7 (23.3)	2 (5.7)	0 (0.0)	55 (10.2)	49 (11.8)
	245 (45.6)	205 (49.5)	129 (24.0)	96 (23.2)	77 (14.3)	66 (15.9)	30 (7.2)	35 (6.5)	17 (4.1)	537 (100.0)	414 (100.0)

Missing cases 63

Percentage shown in brackets

TABLE 4.15.2

By social class

	1-2		3		4-5		Others		Row total	
	M	F	M	F	M	F	M	F	M	F
To repay a transfusion	8 (7.4)	10 (14.1)	22 (8.7)	19 (11.2)	6 (7.1)	7 (11.1)	11 (10.3)	16 (12.7)	47 (8.5)	52 (12.1)
Desire to help people	66 (61.1)	52 (73.2)	167 (66.3)	111 (65.7)	58 (69.0)	45 (71.4)	64 (59.8)	76 (60.3)	355 (64.4)	284 (66.2)
Witnessed an accident	4 (3.7)	2 (2.8)	3 (1.2)	2 (1.2)	4 (4.8)	1 (1.6)	2 (1.9)	2 (1.6)	13 (2.3)	7 (1.6)
Influenced by friends	20 (18.5)	6 (8.5)	48 (19.0)	23 (13.6)	11 (13.1)	7 (11.1)	20 (18.7)	21 (16.7)	99 (18.0)	57 (13.3)
In response to an appeal (Media)	19 (17.6)	12 (16.9)	20 (7.9)	17 (10.1)	5 (6.0)	6 (9.5)	13 (12.1)	19 (15.1)	57 (10.3)	54 (11.9)

Missing cases 34

Percentage shown in brackets

TABLE 4.15.3

By different sessions

	Town	Works	College	Bus	Total
To repay a transfusion	53 (11.3)	22 (11.1)	10 (6.4)	17 (9.1)	102 (10.1)
Desire to help people	319 (67.7)	131 (65.8)	90 (57.3)	123 (65.8)	663 (65.4)
Witnessed an accident	9 (1.9)	5 (2.5)	3 (1.9)	3 (1.6)	20 (2.0)
Influenced by friends	70 (14.9)	25 (12.6)	35 (22.3)	32 (17.1)	162 (16.0)
In response to an appeal (Media)	49 (10.4)	22 (11.1)	26 (16.6)	15 (8.0)	112 (11.0)

No missing cases

TABLE 4.15.4

By education

	Univ.	Tech. or Training College	Secret. Coll. or Appr.	Only to 16-17	Only to 15 or less	Row total
To repay a transfusion	9 (8.5)	33 (8.5)	13 (14.1)	17 (8.7)	29 (13.2)	101 (10.1)
Desire to help people	55 (51.9)	244 (63.0)	59 (64.1)	138 (70.4)	159 (72.3)	665 (65.4)
Witnessed an accident	0 (0.0)	10 (2.6)	1 (1.1)	4 (2.0)	5 (2.3)	20 (2.0)
Influenced by friends	32 (30.2)	71 (18.3)	13 (14.1)	21 (14.8)	16 (7.3)	161 (16.0)
In response to an appeal (Media)	17 (16.0)	46 (11.9)	11 (12.0)	21 (10.7)	16 (7.3)	111 (11.0)

No missing cases

Percentage shown in brackets

age groups, social classes, different sessions and different education.

- iii) In response to an appeal (media) is in third place of importance.
- iv) Donors who stated that they were giving blood to "repay a transfusion" that they themselves had once received or given to a relative or close friend are 10%.
- v) Only 2% of the donors who came to realise the need for blood after witnessing accidents of some kind. Motoring accidents were usually the ones mentioned.

4.2.12.2 By social class

As donors become more aware of the need for blood a higher number of donors of different social classes come to donate only as a desire to help. Females respond with 66% and males with 64% (Table 4.15.2).

4.2.12.3 By session

65% representative from different sessions. 68% the highest percentage from town sessions. College represented with the least percentage of 57 and responded to the second motive influenced by a friend with 22% (Table 4.15.3).

4.2.12.4 By education

72% is the highest percentage represented from the

group (only 15 or less). University responded with 52% and responded to the second motive with 30% (Table 4.15.4).

4.2.12.5 Approached by someone

To find out if approaching of donors had any influence on their donating.

67% of the donors were not approached by someone but came to donate for desire to help. This group of donors have 100% altruism (Table 4.15.5).

12% of those who were not approached by someone came to donate influenced by a friend. This category consisted of donors who stated that they had been originally influenced to give blood by encouragement, requests or appeals made by their friends but not approached by an Organiser of a Blood Transfusion Service.

11% responded to an appeal. In this category were included all donors who stated that they had originally been influenced by an organised appeal made by the Blood Transfusion Services.

11% came to repay a transfusion.

2% witnessed an accident.

4.2.12.6 By voluntary organisation

To see the effect of those organisations on motivated donors. 63% are socially involved and 66% are not, but both had a desire to help. This shows the awareness of the need and the altruism among donors who are socially

TABLE 4.15.5

Those who are approached by someone

	Approached by someone	Not approached	Cannot remember	Row Total
To repay a transfusion	19 (8.4)	80 (11.0)	2 (4.1)	101 (10.1)
Desire to help people	130 (57.8)	491 (67.4)	37 (75.5)	658 (65.7)
Witnessed an accident	4 (1.8)	14 (1.9)	2 (4.1)	20 (2.0)
Influenced by friends	64 (28.4)	86 (11.8)	9 (18.4)	159 (15.9)
In response to an appeal (Media)	27 (12.0)	83 (11.4)	1 (2.0)	111 (11.1)

Missing cases 12

TABLE 4.15.6

Those who are member of organisation

	Member of Organisation	Not a member of Organisation	Row Total
To repay a transfusion	19 (10.2)	83 (10.0)	102 (10.1)
Desire to help people	117 (62.6)	546 (66.0)	663 (65.4)
Witnessed an accident	5 (2.7)	15 (1.8)	20 (2.0)
Influenced by friends	25 (13.4)	137 (16.6)	162 (16.0)
In response to an appeal (Media)	21 (11.2)	91 (11.0)	112 (11.0)

No missing cases

Percentage shown in brackets

TABLE 4.15.7

Those who have a kidney card

	Yes	No	Row total
To repay a transfusion	36 (10.9)	66 (9.8)	102 (10.2)
Desire to help people	224 (68.1)	431 (64.2)	655 (65.2)
Witnessed an accident	7 (2.1)	13 (1.9)	20 (2.0)
Influenced by friends	50 (15.2)	109 (16.2)	159 (15.9)
In response to an appeal (Media)	32 (9.7)	78 (11.6)	110 (11.0)

Missing cases 14

Percentage shown in brackets

involved as well as among those who are not (Table 4.15.6).

4.2.12.7 Those who have a kidney card

Such questions were asked to see the motive behind those who have a kidney card and come to donate. Those who have a kidney card and had a desire to help are 68%, while those who had not a kidney card and came to donate are 64%. The overall percentage of kidney card holders among these donors is 33% (Table 4.15.7).

Finally, these motives were combined by those who were anxious the first time they came to donate and those who are against payment.

62% were anxious and had a desire to help in the first place (Computer data sheet 2).

66% were against payment and had a desire to help.

4.2.13 Reasons which may Prevent Donation

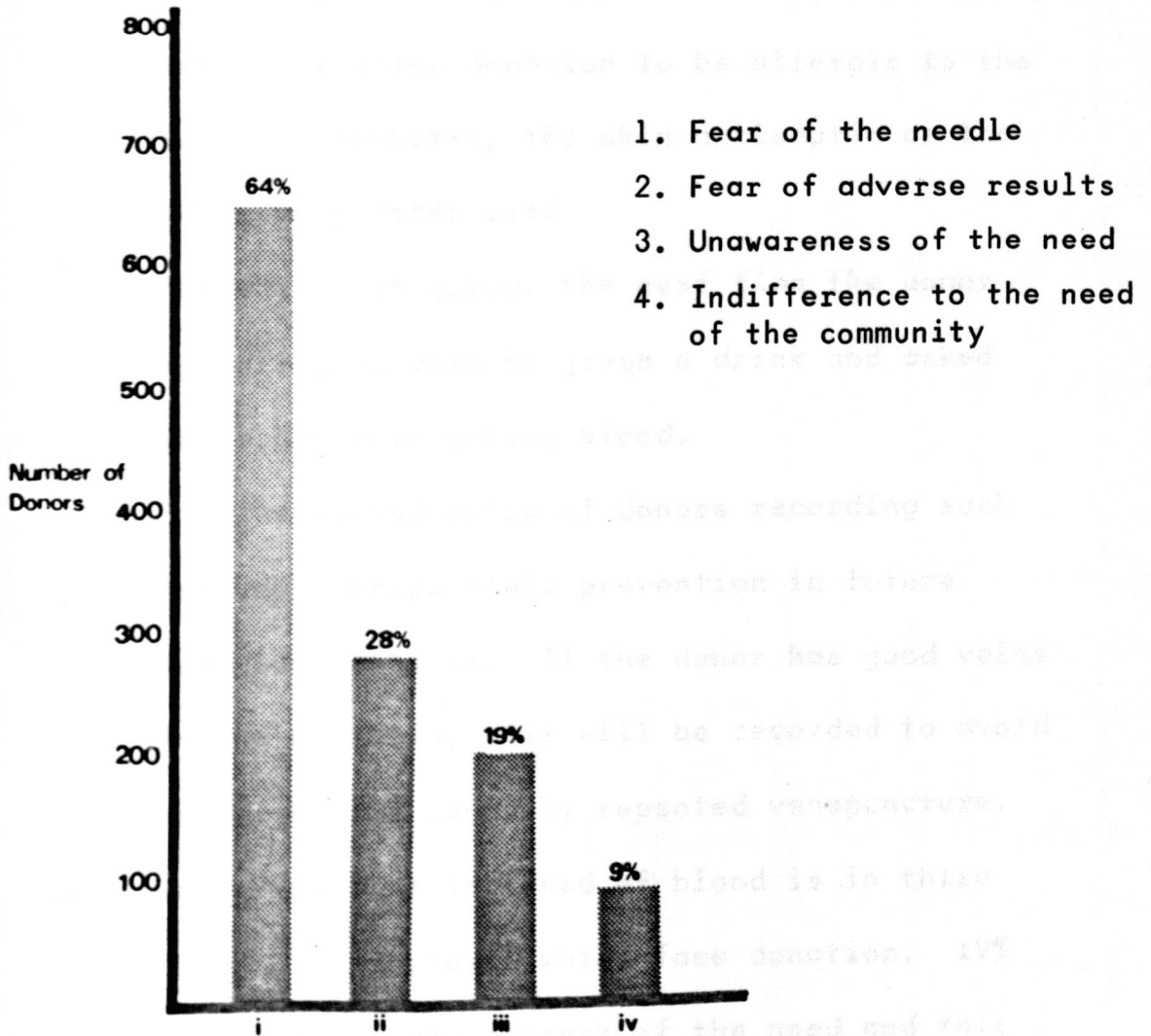
512 donors in this survey were anxious the first time they came to donate, 45% males and 66% females (Table 4.14.)

- i) Fear of the needle appeared to be the main reason which stand in front of donation. 64% of the respondents responded to fear of the needle (Bar-chart 4.4).

Donors must be reassured by kind treatment; attention to the bleeding session by the Doctor himself, ensuring a painless venepuncture, and avoiding repeated venepuncture except under strong

BAR CHART 4.4

Distribution Of Different Motives Which Prevent Donation



insistence by the donor.

- ii) Second reason of importance in preventing donation was fear of any adverse results during donation.

During blood withdrawal, especially in a first donation, few donors may feel faint and some may prove after donation to be allergic to the local anaesthetic, the skin antiseptic or the adhesive plaster used.

For the first group, the next time the donor is called he will be given a drink and asked to rest before giving blood.

For the second group of donors recording such incidents helps their prevention in future bleeding sessions. If the donor has good veins in one arm only, this will be recorded to avoid upsetting the donor by repeated venepuncture.

- iii) Unawareness of the need of blood is in third place of importance which face donation. 19% responded to unawareness of the need and this group had no experience which could expose them to the need of blood, a family need or witnessing an accident.

- iv) Indifference to the need of the community : only 9% of the donors responded to it as it appeared

TABLE 4.16

In each table reasons which may prevent donation is the column variable

TABLE 4.16.1

By age group

	16-25		26-35		36-45		46-55		56+		Row total	
	M	F	M	F	M	F	M	F	M	F	M	F
1. Indifference to the need of the community	17 (6.9)	9 (4.4)	11 (8.5)	8 (8.3)	19 (24.7)	5 (7.6)	8 (15.7)	3 (10.0)	10 (28.6)	1 (5.9)	65 (12.1)	26 (6.3)
2. Fear of any adverse results during donation	70 (28.6)	51 (24.9)	47 (36.4)	24 (25.0)	26 (33.8)	17 (25.8)	17 (33.3)	4 (13.3)	9 (25.7)	3 (17.6)	169 (31.5)	99 (23.9)
3. Unaware of the need for blood	45 (18.4)	27 (13.2)	32 (24.8)	14 (14.6)	19 (24.7)	16 (24.2)	8 (15.7)	5 (16.7)	8 (22.9)	6 (35.3)	112 (20.9)	68 (16.4)
4. Fear of the needle	156 (63.7)	149 (72.7)	74 (57.4)	71 (74.0)	41 (53.2)	41 (62.1)	31 (60.8)	23 (76.7)	18 (51.4)	14 (82.4)	320 (59.6)	298 (72.0)
Total											537	414

Missing cases 63

Percentage shown in brackets

TABLE 4.16.2

By social class

	1-2	3	4-5	Others	Row total
1. Indifference to the need of the community	28 (15.5)	34 (7.8)	12 (8.1)	17 (7.2)	91 (9.1)
2. Fear of any adverse results during donation	54 (29.8)	119 (27.4)	42 (28.2)	59 (25.0)	274 (27.4)
3. Unaware of the need for blood	45 (24.9)	78 (18.0)	24 (16.8)	43 (18.2)	190 (19.0)
4. Fear of the needle	116 (64.1)	279 (64.3)	96 (64.4)	151 (64.0)	642 (64.2)

Missing cases 14

TABLE 4.16.3

By different session

	Town	Works	College	Bus	Row total
1. Indifference to the need of the community	49 (10.4)	17 (8.5)	12 (7.6)	13 (7.0)	91 (9.0)
2. Fear of any adverse results during donation	121 (25.7)	71 (35.7)	43 (27.4)	46 (24.6)	281 (27.7)
3. Unaware of the need for blood	101 (21.4)	27 (13.6)	25 (15.9)	39 (20.9)	192 (18.9)
4. Fear of the needle	297 (63.1)	129 (64.8)	108 (68.8)	117 (62.6)	651 (64.2)

No missing cases

Percentage shown in brackets

with the least importance.

4.2.13.1 By age group

Among different age groups, 72% of the females and 60% of the males responded to fear of the needle. 31% of the males and 24% of the females responded to fear of adverse results during donation. 21% males and 16% females responded to unawareness of the need for blood (Table 4.16.1).

12% of the males and 6% of the females responded to the indifference of the need of the community.

4.2.13.2 By social class

64% of the donors gave a reason as fear of the needle; 27% fear of adverse results during donation; 19% were unaware of the need for blood; 9% were indifferent to the need of the community (Table 4.16.2).

4.2.13.3 By session

College responded with the highest percentage of 69 among different sessions to fear of the needle.

Works responded with the highest percentage of 36.0 to fear of adverse results during donation.

Town responded with the highest percentage of 21.0 to unawareness of the need.

4.2.14 Payment

96% of blood donors of all different age groups are against payment. They do evaluate the giving of blood as a precious gift to save those who desperately need it.

They have a desire to help without being rewarded.

Only 4% of the donors in this survey did not appreciate the theme of the gift. Probably they are unaware of the disadvantage of the paid system which has been discussed earlier in the Chapter of the Sudan.

The presence of a paid system is mainly due to poverty where people are desperately in need of money. An example to that is India where donation of blood is becoming a way of making a living (Titmuss 1970, p. 179).

Another reason for the spreading of the paid system is the increasing of the demand and no voluntary donors to cover it.

4.2.15 Mass Media and Advertisement

This group of combinations, age, social class, sessions and education by the type of media, indicate donors idea about the best media that can motivate and recruit new blood donors. Table 4.17 illustrates that the selection of the media and advertisement are in the same order of importance by the different age, social classes, session and education. By Far, the most popular "way of encouraging more donors" was school education among all age groups, social classes, session and education. School education is the best way to teach the public and make them aware of the importance of blood donation and thus recruit future donors.

Second media of importance is television, 43% of the

TABLE 4.17

Blood donors by different sex and age groups and
their opinion about means to recruit new donors

	Age group												Total	% Opinion*								
	16-25				26-35				36-45						46-55				56+			
	M	F	M	F	M	F	M	F	M	F	M	F			M	F	M	F	M	F		
Television	97 (39.6)	93 (45.4)	49 (38.0)	50 (50.1)	37 (48.1)	24 (36.4)	28 (54.9)	15 (50.0)	14 (40.0)	8 (47.1)	225 (41.9)	190 (45.9)	43.6									
Radio	40 (16.3)	29 (14.1)	16 (12.4)	9 (19.4)	9 (11.7)	4 (6.1)	6 (11.8)	2 (6.7)	4 (11.4)	2 (11.8)	75 (14.0)	46 (11.1)	12.4									
Cinema	41 (16.7)	44 (21.5)	16 (12.4)	17 (17.7)	10 (13.0)	4 (6.1)	6 (11.8)	4 (13.3)	5 (14.3)	2 (11.8)	78 (14.5)	71 (17.1)	15.3									
Newspaper	45 (18.4)	40 (19.5)	25 (19.4)	11 (11.5)	12 (15.6)	8 (12.1)	8 (15.7)	5 (16.7)	6 (17.1)	3 (17.6)	96 (17.9)	67 (16.2)	16.7									
School Education	105 (42.9)	97 (47.3)	49 (38.0)	46 (47.2)	43 (55.8)	34 (51.5)	20 (39.2)	14 (46.7)	16 (45.7)	6 (35.3)	233 (43.4)	197 (47.6)	44.5									
Advertisement	34 (13.9)	26 (12.7)	14 (10.9)	13 (13.5)	8 (10.4)	3 (4.5)	8 (15.7)	4 (13.3)	4 (11.4)	3 (17.6)	68 (12.7)	49 (11.8)	11.6									
Lectures	28 (11.4)	18 (8.8)	11 (8.5)	3 (3.1)	7 (9.1)	4 (6.1)	2 (3.9)	0 (0.0)	4 (11.4)	3 (17.6)	52 (9.7)	28 (6.8)	8.3									
Television, Radio and Newspaper	90 (36.7)	71 (34.6)	55 (42.6)	35 (36.5)	27 (35.1)	24 (36.4)	18 (35.3)	11 (36.7)	14 (40.0)	6 (35.6)	204 (38.0)	147 (35.5)	36.1									
Lectures, School Educ. & Hoardings	82 (33.5)	59 (28.8)	39 (30.2)	22 (22.9)	15 (19.5)	16 (24.2)	12 (23.5)	4 (13.3)	9 (25.7)	6 (35.3)	157 (29.2)	107 (25.8)	27.2									

Percentage shown in brackets

* Distribution of percentages of donors' opinion towards mass media and advertisement

donors responded to it.

Third in importance is television, radio and newspaper, 38% of the donors support this. Lectures, school education and hoardings respondents are 27%. This appeared to be fourth in importance. Newspaper represented with 17% and cinema with 15%. Radio respondents are 12% and finally only 8% supported lectures.

Most of the donors ticked more than one answer which made it very difficult to find out the main choice of the media. The importance of education must attract our attention by means of approaching students at reasonable age, explain to them the concept of the Blood Transfusion Service and the importance of the need. If this matter of education is taken seriously and done properly, will come with better understanding for the problems of the community faced by the Blood Transfusion Service with less fear and apprehension that keeps them away from donating blood. The next generation will react with the help of such education more naturally and with the emphasis of the need of the community these generations will be more aware of the need for blood and possibly from the young students of today the Blood Transfusion will have more donors than before.

Television : people are very attracted to most of the television programmes and especially the news and definately television can play a great role in recruiting

new donors. The appeal should be before the news or immediately after it. It should not be long and not very dramatic.

Television, Radio and Newspaper : radio and newspaper could play the same part as television to recruit new donors.

Nearly all the responses here were in favour of the media in general which show how a good, intense advertising campaign could surely help increase the number of donors. The least mentioned choice appeared to be "lectures". The response to it was only 8% and this could be accounted for by the number of young students from the colleges and Universities.

4.2.16 Smoking

This question was meant to see the awareness of health care of the donors in West of Scotland. 59% of the female donors and 56% of the males, from all different age groups, do not smoke. Those who used to smoke were 7% of the males and 6% of the females. Although the reason for stopping smoking is unknown, it could be that after becoming blood donors it made them more aware of their health care (Table 4.18).

In comparing different social classes of donors of this survey (1980) with the general population among cigarette smokers (1972-1976), we found that the total percentage of the general population of Scotland, Glasgow

TABLE 4.18

Survey of whole blood donors in West of Scotland 1980

This table illustrates blood donors in different sex and age groups who smoke etc.

Smoking	16-25		26-35		36-45		46-55		56+		Row total	
	M	F	M	F	M	F	M	F	M	F	M	F
Yes	79 (32.3)	67 (32.8)	45 (35.4)	42 (43.75)	33 (43.4)	24 (36.3)	22 (44)	11 (37.9)	17 (48.5)	3 (17.6)	196 (36.8)	147 (35.7)
No	154 (63)	126 (61.76)	64 (50.3)	47 (48.9)	37 (48.6)	38 (57.5)	25 (50)	18 (62.06)	17 (48.5)	13 (76.4)	297 (55.8)	242 (58.7)
No, but used to	11 (4.5)	11 (5.3)	18 (14.17)	7 (7.2)	6 (7.8)	4 (6.0)	3 (6)	0 (0.0)	1 (2.8)	1 (5.88)	39 (7.3)	23 (5.6)
Column Total	244 (100)	204 (100)	127 (100)	96 (100)	76 (100)	66 (100)	50 (100)	29 (100)	35 (100)	17 (100)	532 (100)	412 (100)

Percentage shown in brackets

Health Board (1980) is higher than the total percentage of donors in this survey, 44% to 36% respectively. This explains that the awareness of health care is higher among donors of West of Scotland. Class IV-V are represented with the highest percentage of smokers among different social classes of both general population of Scotland and Glasgow and West of Scotland donors in this survey. A large number among this group of people might have lost their jobs and the worry about the future made them live in tension and depression which might have encouraged them to smoke more than the others (Table 4.19).

The least percentage of smokers emerged from Social Class I-II from both donor sample and the general population of West of Scotland 32% and 34% respectively. Such percentages of smokers among high professional and low professional was unacceptable. Although they are aware of the danger of smoking still they find unconvincing excuses for smoking.

The smokers percentages among the different sex and age groups of the general population of Scotland (1978) of Glasgow Health Board (ibid) are 48% males and 43% females. In comparing with the different social classes of 1976, average of 44% and different sex and age group average of 46%, we found that the percentage of smokers from 1976-1978 is increasing. The average of smokers in this

TABLE 4.19

Distribution of smokers among blood donors of
different social classes (Survey 1980)
and the general population Scotland 1976)

	1-2	3	4-5	Others	Total
Yes	57 (32)	163 (37.9)	65 (44.2)	75 (32)	360 (36.4)
Scotland (1976)	(33.6)	(44.5)	(53.7)		(43.9)

Percentage shown in brackets

Note: Due to the four year interval between the two
Surveys the lower percentage among donors may
be a reflection of Government health warnings.

survey is 36%. It is still a high percentage of smokers among donors who are supposed to be more careful and aware of health care than the rest of population.

4.2.17 Kidney card

The aim behind this question was to find out if donors in this survey who had a kidney card were more aware of the need for blood as it was expected. Donors who have kidney cards are trying to help others who are desperately in need for a kidney. They are thinking to save other lives even when they die. These groups of donors are definitely more aware of the need for blood than others.

The overall percentage of kidney card holders among these donors is 33%. Among those who have a kidney card and give blood regularly are 66% out of 300 donors (computer data sheet 2). The highest percentage of kidney card holders are from the age group of 16-25. This young age group are more represented as they come in to compensate for the effects of ageing as sickness and disability make it more difficult for older people to take part in the act of giving (40% of the female and 35% of the male donors). Females appear to be more sentimental and compassionate than males in this age group (Table 4.20). Among different social classes (computer data sheet 2), Class 1-2 responded with the highest percentage of 35% and the least percentage was 25% from Class IV-V.

TABLE 4.20

Blood donors by different sex and age groups
 who have and those who do not have kidney cards

	Age group												Row total							
	16-25				26-35				36-45						46-55				56+	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F		
Yes	85 (35.1)	82 (40.4)	42 (33.1)	33 (34.4)	20 (26.3)	21 (31.8)	14 (27.5)	6 (20.7)	2 (5.7)	4 (23.5)	163 (30.7)	146 (35.5)								
No	157 (64.9)	121 (59.6)	85 (66.9)	63 (65.6)	56 (73.7)	45 (68.2)	37 (72.5)	23 (79.3)	33 (94.3)	13 (76.5)	368 (69.3)	265 (64.5)								
Column Total	242 (45.6)	203 (49.4)	127 (23.9)	96 (23.4)	76 (14.3)	66 (16.1)	51 (9.6)	29 (7.1)	35 (6.6)	17 (4.1)	531 (100.0)	411 (100.0)								

Missing cases 72

Percentage shown in brackets

The results of this survey reveals that kidney card holders are highly motivated when combined with different reasons for donation (Table 4.15.7).

A report by Marplan (1980) reveals that 5% of legibile population are kidney card holders.

4.3 DISCUSSION

The Scottish Survey was carried out to obtain further information on blood donor motivation and to identify some of the reasons which hinder donation. The increasing need for blood has led to an increased interest in the reasons which encourage and which discourage giving blood. A distinction should be made between what donors report was the major motivation for their donation and the main reason which prevented them from giving. The Scottish Survey has been of two main sections. The first section has concentrated on the demographic characteristics of the blood donors, the second section has gone further examining the secondary characteristics with the positive and negative attitudes of donors towards giving blood.

In this survey, 49% are female and 46% are male donors from the age group 16-25. As expected, the younger age group is over-represented. Major recruitment effort might be more effectively targeted at this age group. The percentages decrease with the increase of age. Reproductive age, which is a period of a female donor ineligibility, may have reduced the size of the potential donor population. Only 6% of the male donors and 4% of the female donors are included in the over 56 age group. Throughout donation history and besides those who cease giving blood due to the effect of age and illness, many donors discontinue

donating and become lost to the blood procurement agency.

Probably adopting a new system of follow-up of the donor's new address of work or residence would help the retention of the donors for a longer period. Such a donor who is, for example, recruited in West of Scotland if followed up could continue to give blood in other sessions in the same region or different parts of the country. A donor may be very willing to continue but because of change of place he might be lost altogether to the Blood Transfusion Service. As has already been mentioned earlier in the thesis, many donors from the "passive file" are willing to become active. Therefore, great efforts should be made to retain the recruited donors active as long as possible.

Most of the donors of this survey come from towns. 433 of the representatives are females and 559 are males. The highest percentage of the males are technically trained and from the female donors are school leavers. Preponderance of social class 3 is evident. This reflects the general population of West of Scotland.

This study attempted to derive a better understood approach to those who are not participating. Since the demand for blood is increasing, the approaching of non-donors has become necessary.

An especially important step may be to concentrate on getting non-donors in for their first donation. Then, more

effort might be made to ease the decision to convert them to regular blood donors.

With these ideas in mind, several suggestions relevant to donor recruitment emerge. The most important is to find out what the reasons are for not giving. After overcoming this obstacle, we have to find out what is more convincing to the public to donate and to indicate the influence of various reasons which might be of great help in recruitment and retention.

In interpreting the results of this survey, fear of giving blood seems to be the major reason which prevents donation. This includes fear of the needle, sight of blood, weakness and dizziness.

Fear of the needle seems to be the largest negative motivation. Fear is a natural human feeling, but could be alleviated. The Doctor could assure a painless venepuncture by avoiding repeated venepunctures and by using local anaesthetic. If the donor has good veins on one arm only, this should be recorded to avoid upsetting the donor by repeated, and probably unsuccessful, trials of getting the needle into his veins. Such unfortunate experience may make the donor refrain from attending future bleeding sessions.

Fear of adverse reactions appears to be second in importance. Some studies as mentioned in the review found

that a large percentage of donors are lost to the system because of adverse reactions. Most of these reactions are either pain, discomfort, hematoma, weakness and/or dizziness during or after donation.

Difficulty of leaving work seems to be of no importance in preventing donors from giving blood. This shows the good organised Blood Transfusion Service of West of Scotland. 73% of our donors give blood in their place of work. 67% of the donors think that provided transport would not be of great help. The average time needed by the donor for leaving work, including travel and processing time, is one hour.

More publicity is necessary to increase blood donation, mass media could be very effective in recruiting new donors. Blood donor recruitment effort is significantly influenced by recruitment method, the type of message. School education appears to be of great influence in recruitment. Television appears in second place of importance. Radio and newspaper appear in third place.

This suggests that major recruitment efforts might be more effectively targeted at those group of messages.

4.4 CONCLUSION

73% of donors in this survey know their blood group. 55% of those who knew their blood group have been regular donors for more than three years. 52% of them gave twice a year. 10% of them gave more than 20 times. Bearing in mind, most of the donors in this survey are from the younger age group and that is why 68% gave less than 10 times. This reflects the good will and the commitment of the donor in this survey towards giving blood.

73% of the respondents have not been approached by anyone. 63% of the respondents had no member of their family who needed blood. This category of donors have no influential factors to induce them to give blood. Their reasons are altruism and humanitarian.

64% of the donors have a close contact motivation by the presence of a donor in their family, this might be of help in leading them to the bleeding session.

36% of the male donors and 39% of the females support the idea of compulsory donation, most of them are among the younger age group.

62% give blood from work session for over three years

15% give blood from town session for 2-3 years

18% give blood from bus session for 1-2 years

23% of donors give blood at college sessions

for 0.5-1 years

37% of donors give blood at college sessions
for 0-0.5 years

· Colleges appear to be the most active session for
the first year of donation.

The conclusion which is drawn from the analysis of
the results of this study is that the high percentage of
younger people donating must be a welcome sign since the
new young donors will be the main contributors in the
future. The Blood Transfusion Service should encourage
them and try to persuade them since they do seem willing.

One important conclusion which could be drawn from the
demographic characteristics of the Scottish population is
that the number of deaths per year has remained fairly
constant while birth rate has decreased (Census 1981).
This may mean that the number of eligible donors is
gradually getting smaller in comparison to the increasing
demand of blood.

Profile of Donors of Glasgow and West of Scotland
and their reasons for not donating

The conclusion that can be drawn from the results of this study is as follows:

Desire to help

Sex: Mainly males

Age Group: 46-55

Social Class: IV-V.

Session: Town

Education: School leaver

- is not approached by someone
- does not belong to any organisation
- does not have a kidney card

Influenced by friends

Sex: Mainly males

Age Group: 16-25

Social Class: III

Session: College

Education: University

- is not approached by someone
- does not belong to any organisation
- does not have a kidney card

In response to an appeal (Media)

Sex: Mainly females

Age Group: 46-55

Social Class: I-II

Session: Works

Education: University

- approached by someone
- belong to a voluntary organisation
- does not have a kidney card

To repay transfusion

Sex: Mainly females

Age Group: 46-55

Social Class: I-II

Session: Town

Education: Secretarial College

- is not approached by someone
- belong to a voluntary organisation
- have a kidney card

Witnessed an accident

Sex: Mainly females

Age Group: 56+

Social Class: I-II

Session: Works

Education: Technical College

- approached and not approached
- belong to a voluntary organisation
- have a kidney card

Fear of the needle

Sex: Mainly females
 Age Group: 56+
 Social Class: IV-V
 Session: Collège

Fear of any adverse results

Sex: Mainly males
 Age Group: 26-35
 Social Class: I-II
 Session: Works

Unaware of the need

Sex: Mainly females
 Age Group: 56+
 Social Class: I-II
 Session: Town

Indifference to the need to the community

Sex: Mainly males
 Age Group: 56+
 Social Class: I-II
 Session: Town

CHAPTER 5

TETANUS, PLASMAPHERESIS AND PRODUCTION OF ANTI-TETANUS IMMUNOGLOBULIN (TIG)

5.1 INTRODUCTION

Reasons for Studying Tetanus

Tetanus is a severe neurological disease caused by toxin of *Clostridium tetani*, a gram positive anaerobic organism. In developed countries immunoglobulin prepared from the plasma of blood donors who are highly immune to tetanus is used in the prevention and management of the disease.

The epidemiology of tetanus in the Sudan will be reviewed and strategies for acquiring anti-tetanus immunoglobulin will be discussed in relation both to the place of immunoglobulin in the prevention and management of tetanus and in relation to the expansion of plasmapheresis facilities to provide a wide range of essential blood products.

One of the problems in developing countries is the lack of suitable blood products due to limited plasmapheresis and fractionation facilities in the Blood Centres (Das and Smit Sibinga 1981; Lovric et al. 1980; Gino Tann and Syfei 1980).

There are many reasons for intensive plasma collection. In particular, a donation of plasma can be processed to yield coagulation factors such as Factor VIII for haemophiliacs, immunoglobulin preparations and albumin. Thus, intensive plasma collection could supply the Factor VIII required by the haemophiliacs in Sudan

(Omer 1980). It is not surprising that plasma processing has not been developed in the Sudan in view of the short fall of whole blood and the difficulty in recruiting volunteer donors both of which have been described in previous Chapters (El Shiekh (ibid)).

Nevertheless, the need for these blood products has been a stimulant to think, at least as a start, of introducing the concept of plasmapheresis (Eastlund et al. 1979) in Sudan at the same time while one is planning a complete national blood transfusion programme for the future.

The study in this Chapter looks at the development of a programme for special donors in Sudan which will require special approach for motivation and recruitment taking into consideration various factors based on the experience of Glasgow and West of Scotland Regional Blood Transfusion 1979-80, England and Wales (Titmuss 1970; Lockwood 1979), United States (Eastlund et al. (ibid)) and Holland-Groningen (Smit Sibinga and Das 1979). The introduction of a plasmapheresis system in the Sudan aimed primarily at the provision of anti-tetanus plasma for immunoglobulin preparation. This could be used as a model for a wider study of plasma procurement by plasmapheresis.

The *Clostridium tetani* is a large gram positive bacillus, approximately five micrometres long. A characteristic feature is the spore which is produced

whenever the organism is placed in adverse conditions.

The spores are widely dispersed in nature and are especially plentiful in soil.

They are contaminants of the human and animal intestine and are excreted in the faeces and returned to the soil in the form of manure (Walter and Israel 1979).

The organism may be carried out in the air and must be expected in all environments particularly rural communities. Health Education, hygiene and vaccination programmes help to reduce the incidence.

The main method to prevent tetanus is vaccination.

Through proper surgical treatment of the wounds and the administration of human tetanus immunoglobulin, continued release of tetano-spasmin from the wound can be prevented (Warrel 1978).

Increasing attention has been paid in recent years to the place of human anti-tetanus immunoglobulin preparation in preventing and treating tetanus (Cook et al. 1976). This will be discussed with particular reference to the Sudan later in the Chapter.

5.2.1 Review of Literature

The following sections review the current morbidity of tetanus and its historical backgrounds. Tetanus is still a possible complication of immunisation or wounds despite the availability of safe and effective immunisation

(Wilson 1967).

Tetanus is a worldwide disease with serious complications particularly in developing countries like Sudan due to the lack of comprehensive mass vaccination, hygiene and intensive care.

History:

Although the association of soil bacilli with tetanus was discovered (Nicolai 1884) late in the Nineteenth Century, it was only during the first World War that a commercial anti-toxin was produced and used (Parish 1968).

Active immunisation with tetanus toxoid to protect those at risk was suggested in the late 1920s and became a standard procedure in World War II virtually eliminating tetanus in wounded soldiers (Stoll 1979).

Epidemiology:

Despite the availability of immunisation 500,000 deaths from tetanus occur annually in the world and 50% of these are in neonates. The incidence of tetanus is directly related to poor socioeconomic conditions, being much more common in the underdeveloped countries where it is the commonest cause of neonatal death after prematurity (Stoll (ibid)).

In the United States morbidity data for tetanus are incomplete prior to 1951 mainly because it was not a reportable disease in many states.

Mortality data have been available since 1900, but prior to 1938 deaths from tetanus following surgical operations, abortions and childbirth were assigned to these causes (Carl et al. 1968).

In the United States, the incidence of tetanus has declined over the last 70 years, eg the number of deaths fell from 181 in 1965 to 32 in 1976, where it occurs in unimmunised or partially immunised persons particularly neonates, the elderly and drug addicts (Stoll (ibid)). While mortality from tetanus has decreased among children in the past 70 years adult mortality has not changed significantly since 1950.

Ongoing immunisation is vital in developed countries because the mortality rate is high among the elderly and the neonates despite the intensive care facilities (Stoll (ibid)).

The average case mortality of tetanus throughout the world is about 50% (Warrel (ibid)).

In some areas, tetanus neonatorum is responsible for up to 70% of neonatal deaths (Warrell (ibid)).

Among infective diseases, tetanus has a special epidemiological character. It is very sporadic disease and although cannot be infective agent, the organism is widely distributed in the human environment (Rey et al. 1978).

The distribution of its portal of entry has recently

been studied. According to this, traumatic wounds represents the most common (30-45% of cases) and best known type of contamination, but there are other ways of contracting tetanus, such as chronic otitis (up to 15 or 18% in India and Iran), ear-piercing, circumcision (Vakil and Dalal 1975).

All human beings are naturally exposed to the risk throughout their lives.

It is not known whether people may become immunised against tetanus by exposure to the organism and its product. The subject is controversial. Recently, it has been reported by Dastur et al. (1981) that antibodies were present but were always below the protective concentration. The population's receptivity is maintained throughout life. The illness itself does not immunise. It follows, therefore, that the most effective protection against this individual risk is permanent immunisation of all individuals (Rey et al. (1978)).

As has already been mentioned the notification of the disease according to the WHO is 500,000 cases per year (Bytchenko 1975).

More than 99% of these cases are observed in developing countries (Rey 1976), particularly in tropical regions.

In these countries, surveys have revealed that the incidence of tetanus is still between 10 and 50 cases per year per 100,000 people and sometimes higher. Neonatal

tetanus accounts for 25 to 50% of all cases in these areas (Cvjetanovic et al. 1972), while in the industrialised countries the incidence is between 0.01 and 1 case per 100,000 people. The majority of these cases are old, unvaccinated persons.

Tetanus in Britain

There has been a decline in the number of deaths assigned to tetanus from 134 in 1930 to 5 in 1979; it is mentioned that the steepest fall being in the decade 1950-1959. There were generally fewer deaths in females than males in most years except in 1967, 1972 and 1978 when deaths in the sexes were equal (Galbraith et al. 1981).

In 1971, 1975 and 1977 death in females exceeded those in males. Over the 50 years there was a greater fall in male deaths than in female.

The average annual death rate in males in the decade 1930-39 was 4.46 per million and in 1970-79, 0.13 per million; the corresponding rates in females were 1.17 and 0.09 respectively. Thus, in 1930-39 the ratio of male to female death rates was 3.8 but in 1970-79 only 1.4.

Although there has been a decline of death rates in all age groups, yet the greatest was in children and young adults.

In children aged less than 15 years the decline was most apparent in the last two decades, the rate reaching

virtually nil, only five deaths being recorded in 1970-79. Death rates also declined to very low levels in adults aged 15-64 years, 18 deaths being recorded in 1970-79, but remained highest in the elderly aged 65 years and over, 29 deaths were recorded in 1970-79.

Tetanus in Scotland

The Scottish Health Service recalls all hospital discharges and deaths in computer records according to the International classification of the disease.

A search of these records was carried out to identify these patients in whom disease 037 in the classification of disease (Tetanus) was cited either as a principle diagnosis (Column 1) or as a secondary diagnosis.

The data mentioned can be classified (Tables 5.1 and 5.2) according to different diagnosis from 1974 onwards. Prior to that there were no computer facilities.

In 1974 there were 12 cases, out of these 8 were genuine tetanus cases, 4 males and 4 females.

The remaining 4 cases included a case of tetani, another of delirium tremens and two duplicates of the same patients.

In 1975 four cases were reported but two were real tetanus cases. One of the other two was drug dystonia and the other was a readmission of a 1974 case.

TABLE 5.1
Tetanus cases admitted to hospital

Source : Scottish Hospital In-patient Statistics;
Diagnostic Indexes

Year		Diagnostic Position				All
		1	2	3	4	
1968	M	9	-	-	N/A	9
	F	4	1	-	N/A	5
1969	M	7	1	-	N/A	8
	F	4	-	-	N/A	4
1970	M	3	-	-	N/A	3
	F	6	-	-	N/A	6
1971	M	3	1	-	N/A	4
	F	3	1	-	N/A	4
1972	M	5	1	-	N/A	6
	F	3	-	-	N/A	3
1973	M	2	-	-	N/A	2
	F	-	-	-	N/A	-
1974	M	5	1	1	-	7
	F	4	1	-	-	5
1975	M	3	1	-	-	4
	F	-	-	-	-	-
1976	M	2	-	-	-	2
	F	1	-	-	-	1
1977	M	3	-	-	-	3
	F	-	-	-	-	-
1978	M	4	1	-	-	5
	F	1	-	-	-	1
1979	M	2	1	-	-	3
	F	3	1	-	-	4

TABLE 5.2Tetanus cases dying in hospital

Source : Scottish Hospital In-patient Statistics;
Diagnostic Indexes

Year		Diagnostic Position				All
		1	2	3	4	
1968	M	3	-	-	N/A	3
	F	-	-	-	N/A	-
1969	M	-	-	-	N/A	-
	F	-	-	-	N/A	-
1970	M	-	-	-	N/A	-
	F	1	-	-	N/A	1
1971	M	-	-	-	N/A	-
	F	1	-	-	N/A	1
1972	M	1	-	-	N/A	1
	F	1	-	-	N/A	1
1973	M	-	-	-	N/A	-
	F	-	-	-	N/A	-
1974	M	1	-	-	-	1
	F	-	-	-	-	-
1975	M	-	1	-	-	1
	F	-	-	-	-	-
1976	M	-	-	-	-	-
	F	1	-	-	-	1
1977	M	-	-	-	-	-
	F	-	-	-	-	-
1978	M	-	-	-	-	-
	F	-	-	-	-	-
1979	M	-	1	-	-	1
	F	1	-	-	-	1

In 1976, there were three genuine cases of tetanus. In 1977, all reported were three cases, two real tetanus and the third was clinically suspected in casualty but turned out not to be a real tetanus case. In 1978, cases reported were six, five genuine and one was not tetanus.

The figures mentioned were slightly different from other source of information, particularly in 1974 and 1978 where all reported cases were 15 and 13 (Crawford 1982). Out of these, eight were genuine in 1974 as mentioned above but only two genuine cases were in 1978. There is no further information since 1978. Therefore, although the above data is useful, yet the national distribution in the United Kingdom may not bear any relationship to reality. The discrepancy between the two different sources of information may also show the unreliability of the Scottish data.

Death in immunised : Golla (1917) (cited by Baker and Grounds 1964) compared the mortality in men from the 1914-18 War unprotected by tetanus toxoid with the pre-serum mortality. The average pre-serum mortality was 84% while in 52 unprotected men the mortality was 75% in spite of serum therapy.

Cooper (1917) (cited by Baker and Grounds (ibid)) gives an account of tetanus treated in different ways in Bombay. Of 41 patients given ATS 29% died, while amongst 32 receiving no ATS 59% died. Boyd (1946) reported that of the 18 patients treated, 5 died and of the 20 untreated

14 died (cited by Baker and Grounds (ibid)).

Brown et al. (1960) published a series of 79 cases of tetanus in which 41 were treated with ATS and 38 received none. The mortalities in the two groups were 49% and 76% respectively.

Development of tetanus and death in passively and actively immunised subjects was mentioned by Martin-Bouyer and Gavrilov (1975) that the majority of tetanus cases that appeared (70%) have never had anti-toxin administered. None of the patients who developed tetanus were vaccinated correctly in the period of 10 years before the incident.

Nevertheless, 11 patients who were vaccinated over ten years developed tetanus and the death among this group was only 10%.

Those patients who developed the disease and were vaccinated 20 years before the incident had a death incidence of 33%.

5.2.2 Review of the problem of tetanus in the Sudan

The two main aims of this part of the research were to detect and determine the levels of immunity to tetanus in the Sudanese blood donor population and secondly study the feasibility of recruiting donors for plasmapheresis in the near future.

The most recent study about the problem of tetanus in

TABLE 5.3

Number of Cases and Incidence Rate per million population
of Tetanus by Province 1970-1974

Province	1970			1971			1972			1973			1974		
	New cases	Incidence Rate	New cases	New cases	Incidence Rate	New cases	New cases	Incidence Rate	New cases	New cases	Incidence Rate	New cases	New cases	Incidence Rate	New cases
Khartoum	5	5	4	4	4	15	8	13	15	8	7	19	19	16	16
Northern	10	11	18	19	19	32	15	33	32	15	15	2	2	2	2
Kassala	30	20	27	18	18	26	15	17	26	15	9	27	27	17	17
Blue Nile	178	50	184	50	50	227	225	61	227	225	59	216	216	55	55
Kordofan	51	24	56	26	26	89	54	41	89	54	25	51	51	23	23
Darfur	121	59	58	28	28	40	23	19	40	23	11	14	14	6	6
Upper Nile	30	40	22	29	29	32	19	41	32	19	24	9	9	11	11
Bahr El Ghazal	58	44	33	24	24	42	58	31	42	58	42	-	-	-	-
Equatoria	15	21	17	23	23	70	53	94	70	53	70	66	66	85	85
Total	498	36	419	29	29	573	470	39	573	470	32	404	404	27	27

Incidence Rate = $\frac{\text{New cases}}{\text{No. of population}} \times 10^6$

(Elhassan 1976)

the Sudan was done by Elhassan (1976) (Graph 5.1).

Elhassan (1976) showed beyond any doubt that tetanus is common in the Sudan. The incidence rate of tetanus ranges between 27 and 39 per million population (Table 5.3).

The highest incidence rate was reported in Equatoria Province (94 per million).

In the Blue Nile Province the incidence never fell below 50, while in Khartoum, where the survey was carried out, the incidence rate was the lowest with the maximum of 16 reported in 1974.

The incidence rate was also noted to be low in the Northern Province compared to the other Provinces with a maximum of 33 reported in 1972 and a minimum of 2 in 1974. The number of new cases in the whole country ranges between 404 and 573 per annum as shown in Table 5.3.

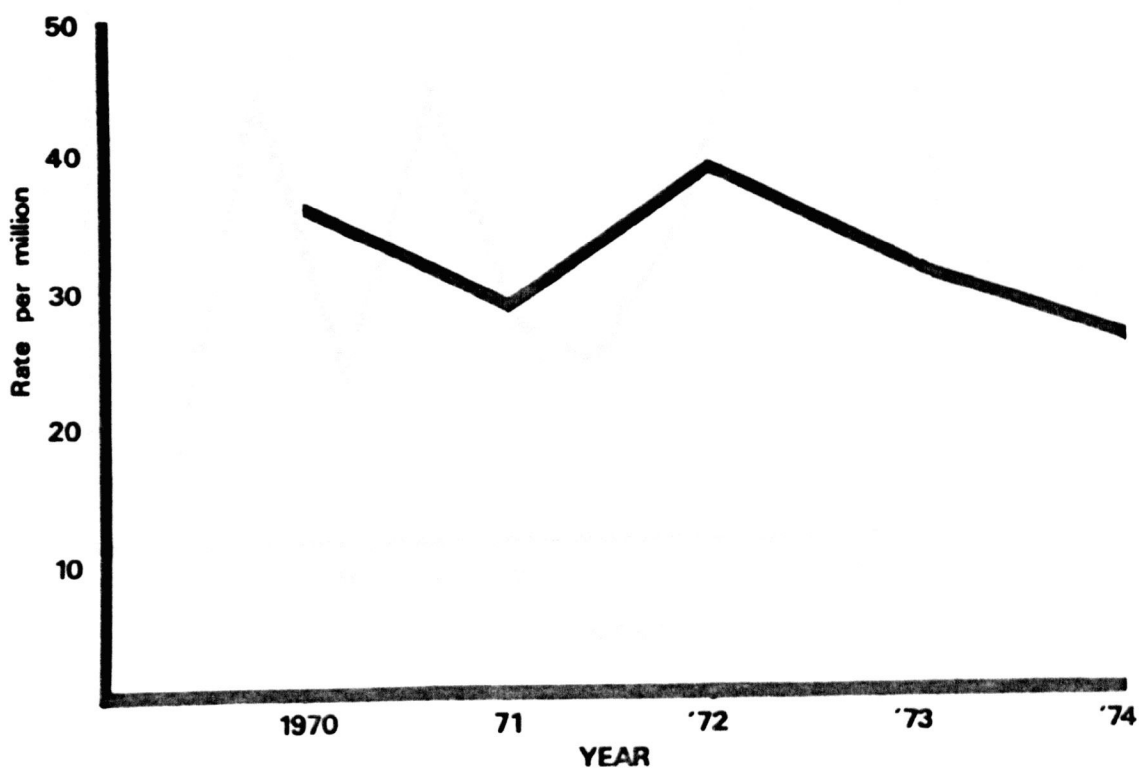
The above conclusions and facts indicate that the problem of tetanus in the Sudan varies between different parts of the country according to geographical and socioeconomic factors which are quite marked between the different Provinces.

Studying the seasonal occurrence of tetanus in the Sudan, shows that tetanus occurred in the Sudan all the year round with some fluctuations from one month to another (Graph 5.2).

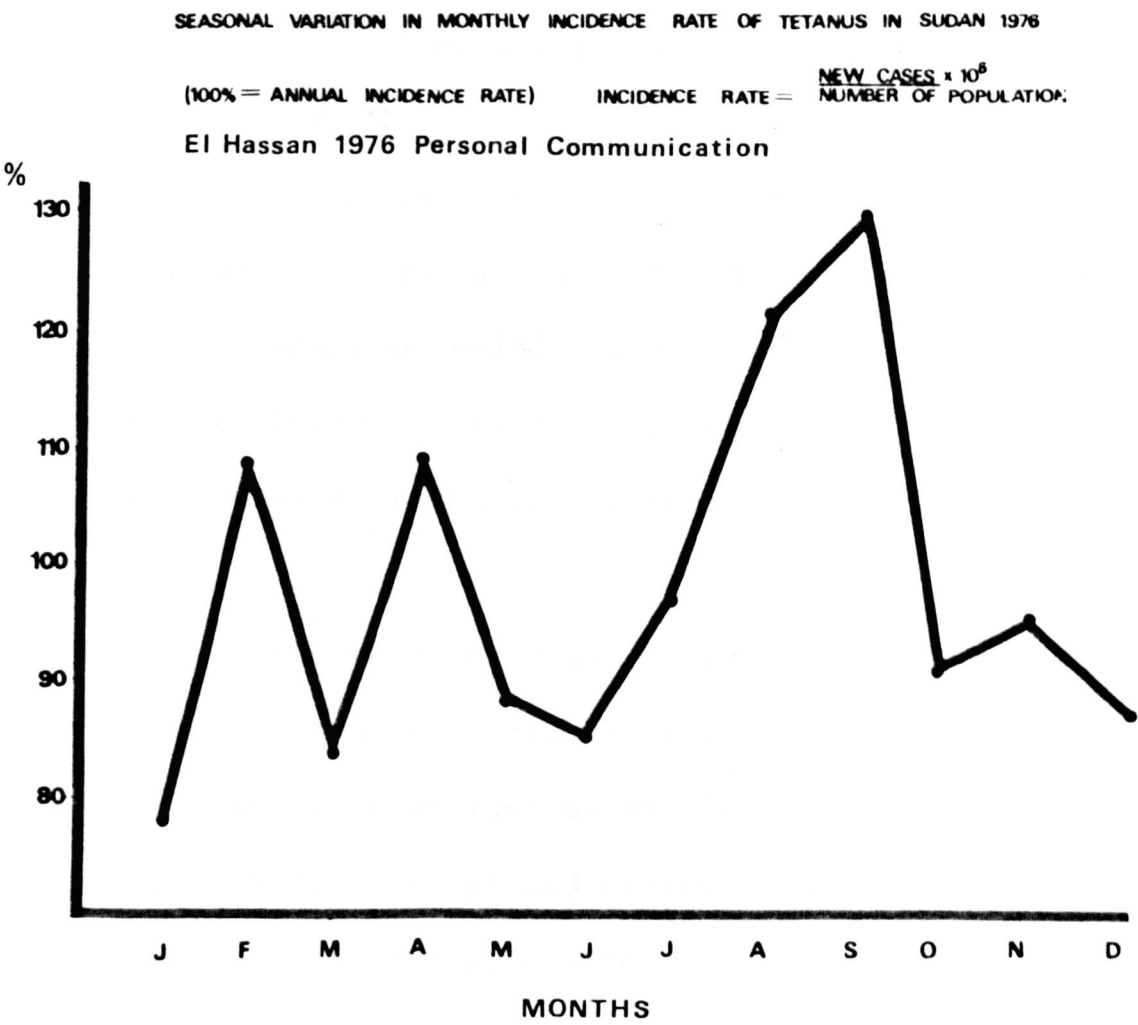
Graph 5.1

INCIDENCE RATE OF TETANUS PER MILLION IN TOTAL POPULATION 1970-74
(EL HASSAN, 1976 PERSONAL COMMUNICATION)

$$\text{INCIDENCE RATE} = \frac{\text{NEW CASES}}{\text{No. of population}} \times 10^6$$



Graph 5.2



Fatality rate:

Studying the fatality rate for tetanus (Table 5.4) shows that tetanus fatality rate per 1000 cases in the Sudan was high in the range between 158 and 209 per 1000 cases (Histogram 5.3).

The provincial distribution shows that the fatality rate was generally high in the Southern Province (Upper Nile, Bahr El Ghazal and Equatoria). The highest fatality rate was in Bahr El Ghazal in which it reached 379 (Table 5.5). The highest fatality rates in Khartoum (Histogram 5.4) was in 1971.

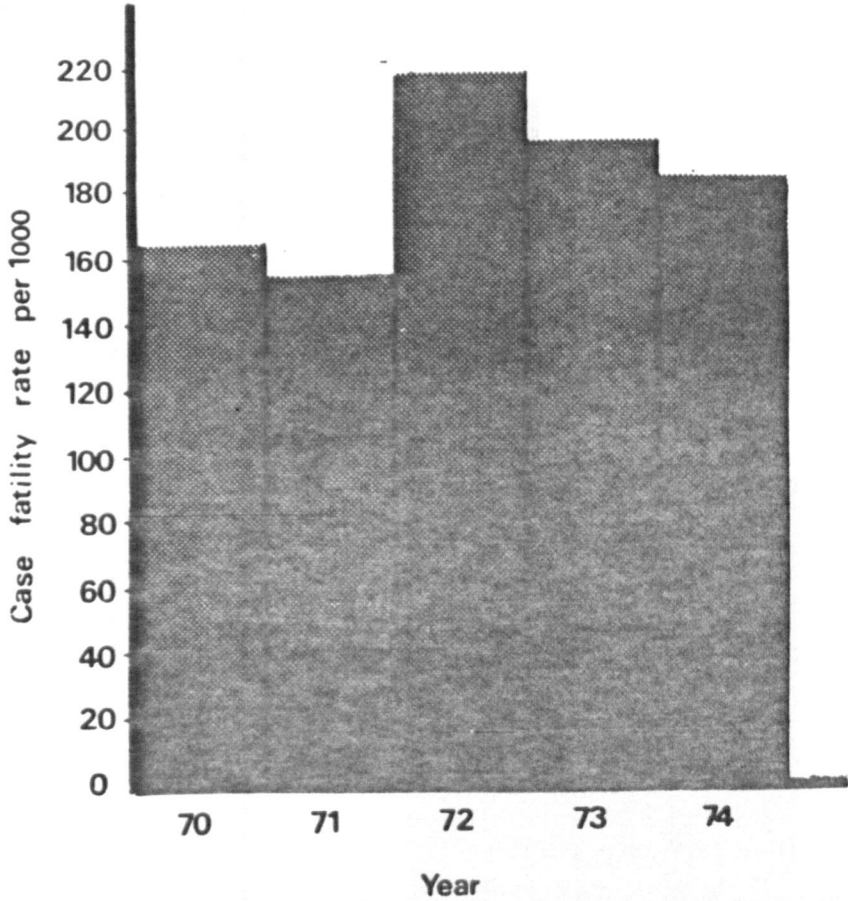
In comparison to Nigeria the incidence was found to be 48 in 1971 and it was less for the rest of the years. So it is nearly the same as that of the Sudan. It is cited by Elhassan (1976) that Top and others (1955) reported that the disease is found throughout the World.

As for the seasonal occurrence which showed no seasonal variations, it accords with the occurrence of tetanus in Nigeria in which no seasonal variations were observed during the same period.

In regard to fatality per 1000 cases which was high, reaching 379 in Bahr El Ghazal it accords with statement given by Carl et al. (ibid) that one of the unique characteristics of the disease has been the relatively high case fatality rates (Carl et al. (ibid)).

HISTOGRAM 5.3

CASE FATALITY RATE OF TETANUS PER 1000 IN TOTAL POPULATION (SUDAN) 1970-74
(EL HASSAN 1976 PERSONAL COMMUNICATION)



HISTOGRAM 5.4
CASE FATALITY RATE OF TETANUS PER 1000 IN
(KHARTOUM) 1970—1974.
(EL HASSAN, 1976 PERSONAL COMMUNICATION)

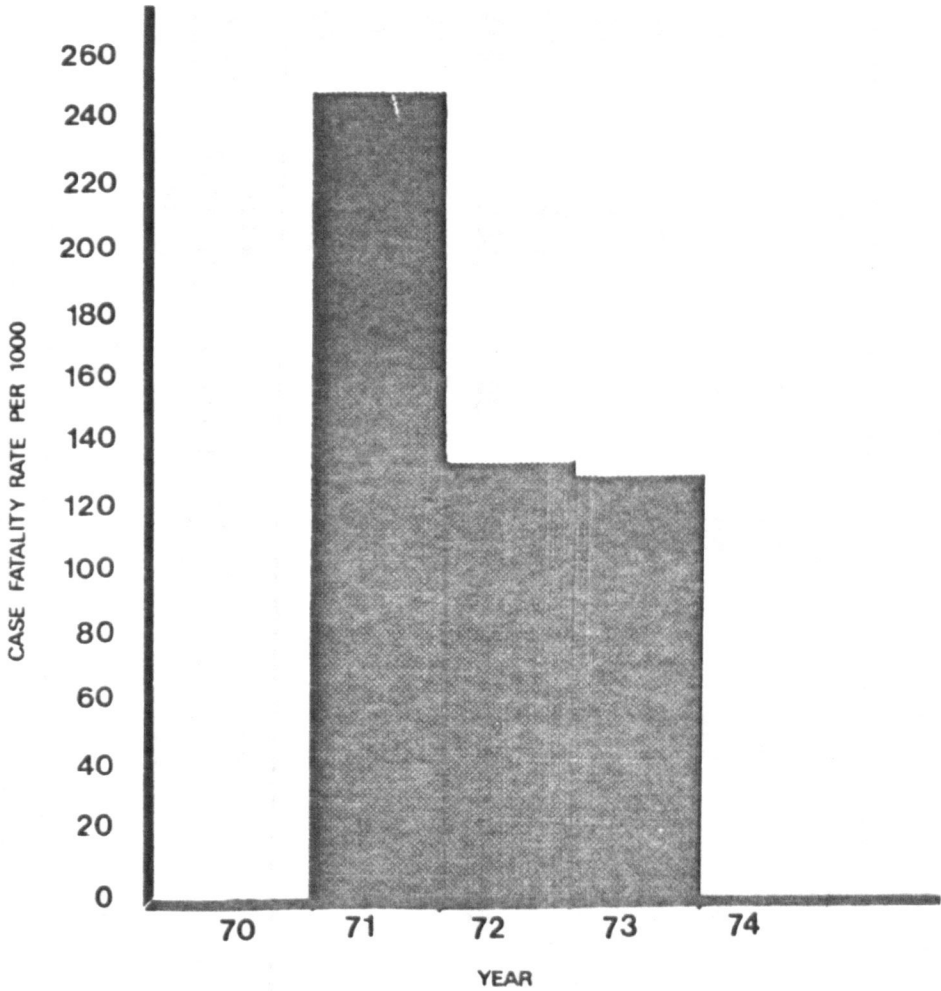


TABLE 5.4
Number of Cases, Deaths and Case Fatality Rate per 1000
for Tetanus by Province 1970-1972

Province	1970			1971			1972		
	New cases	Deaths	Case Fatality Rate	New cases	Deaths	Case Fatality Rate	New cases	Deaths	Case Fatality Rate
Khartoum	5	-	-	4	1	250	15	2	133
Northern	10	1	100	18	2	111	32	5	156
Kassala	30	3	100	27	-	-	26	4	154
Blue Nile	178	35	197	184	38	207	227	62	273
Kordofan	51	8	157	56	7	125	89	6	67
Darfur	121	7	58	58	3	52	40	3	75
Upper Nile	30	7	233	22	4	182	32	4	125
Bahr El Ghazal	58	16	276	33	10	303	42	14	333
Equatoria	15	3	200	17	1	59	70	20	286
Total	498	80	161	419	66	158	573	120	209

Case Fatality Rate = $\frac{D}{\overline{NC}} \times 1000$

TABLE 5.4
Number of Cases, Deaths and Case Fatality Rate per 1000
for Tetanus by Province 1973/1974

Province	1973			1974		
	New cases	Deaths	Case Fatality Rate	New cases	Deaths	Case Fatality Rate
Khartoum	8	1	125	19	-	-
Northern	15	1	67	2	-	-
Kassala	15	2	133	27	2	74
Blue Nile	225	39	173	216	38	176
Kordofan	54	6	111	51	11	216
Darfur	23	5	217	14	1	71
Upper Nile	19	1	53	9	-	-
Bahr El Ghazal	58	22	379	-	-	-
Equatoria	53	13	245	66	22	333
Total	470	90	192	404	74	183

$$\text{Case Fatality Rate} = \frac{D}{-} \times 1000$$

NC

TABLE 5.5

The highest incidence in each Province between 1970-1974			The highest number of deaths in each Province between 1970-1974			The highest number of new cases in a Province between 1970-1974		
Incidence Rate			Deaths			New Cases		
Province	No.	Year	No.	Year	Year	No.	Year	Year
Khartoum	16	1974	2	1972	1974	19	1974	1974
Northern	33	1972	5	1972	1972	32	1972	1972
Kassala	20	1970	4	1972	1972	30	1970	1970
Blue Nile	61	1972	62	1972	1972	277	1972	1972
Kordofan	41	1972	11	1974	1974	89	1972	1972
Darfur	59	1970	7	1970	1970	121	1970	1970
Upper Nile	41	1972	7	1970	1970	32	1972	1972
Bahr El Ghazal	44	1970	22	1973	1973	58	1970-73	1970-73
Equatoria	94	1972	22	1974	1974	70	1972	1972

The total population: Highest Rate of Incidence 39,
Deaths 120 New Cases 573 (1972)

TABLE 5.5

The highest Case Fatality Rate in a Province between 1970-1974		
Province	Case Fatality Rate	Year
Khartoum	250	1971
Northern	156	1972
Kassala	154	1972
Blue Nile	273	1972
Kordofan	216	1974
Darfur	217	1973
Upper Nile	233	1970
Bahr El Ghazal	379	1973
Equatoria	333	1974

The total population: Highest Case
Fatality Rate was 209 in 1972

5.3 Active and Passive Immunisation and other Clinical Measures in Prophylaxis

Man does not develop clinically significant natural immunity to tetanus, although Dastur et al. (ibid) have published evidence that low levels less than those required for immunity may be found in rural Indian population. Active immunisation is the corner-stone of prevention. The disease could be eliminated by ensuring that everyone is properly immunised. Children should be vaccinated against tetanus, unprotected adults should also be given toxoid injections. This will be discussed later in the Chapter.

The tetanus toxoid is one of the most effective and best tolerated vaccines. It has been claimed that if correctly administered, this vaccine can guarantee nearly 100% protection for at least 10 years (Edsall 1976; Gateff and Rey 1975; Rey 1976; Rey et al. 1975; Turpin and Bizzini 1974).

Tetanus vaccine can be used effectively on pregnant women to prevent neonatal tetanus. The immunity given to pregnant women passes transplacentally to the baby and this meets the high risk time during which babies may encounter with the disease.

Therefore, vaccination is the only way to guarantee complete protection, provided that it is carried out correctly and that immunity is maintained throughout life

(Rey et al. 1978).

In developing countries where the disease is highly endemic and the resources are limited it is important to confine oneself to protection of the most highly exposed groups of the society.

The newborn should have priority as the risk for them is the highest (Debroise and Ledecq 1975).

The usual course of tetanus immunisation consists of three intramuscular injections of adsorbed toxoid, at intervals of six weeks and six to twelve months.

The first dose of adsorbed toxoid is usually regarded as insufficient to give protection. The second dose, about six weeks later, does induce adequate immunity but it may not last long, perhaps about two years. The third injection at six to twelve months will give an immunity lasting almost certainly more than five years and may last for more than 20 years. A reinforcing dose five to ten years after the basic course of three injections ensures protection for many years (Smith 1975). Infants are preferably given combined vaccines, eg diphtheria and tetanus.

A complete basic course comprises the injection of three doses of toxoid, spaced about six weeks between the first and second doses and six to twelve months between the second and third. Booster doses are recommended at 10 year intervals unless the patient has received a booster dose before that. There is good evidence that after the three

basic injections of a potent toxoid containing aluminium adjuvant, immunity can last for at least 10 years (Scheibel et al. 1966) and there is the possibility that it may last for very much longer (Rubbo 1966; Gottlieb et al. 1967; Trinca 1967). Current recommendations concerning the frequency of booster injections, therefore, vary between one every 10 years (Laurence et al. 1966) to their not being required at all (Rubbo (ibid)).

Parish (1968, p.46) reported that in 1890 Behring and Kitasato published a joint paper on the protective and curative effects of the blood serum of animals immunised artificially with small progressively increasing doses of tetanus toxin.

The serum they used rendered the tetanus toxin inert both in vivo and in vitro and was described as having an anti-toxic action.

This anti-toxic action was not present in serum from non-immunised animals. These observations became the basis of the sero therapy of tetanus.

The first anti-toxic sera to be used in the treatment of human tetanus were prepared in rabbits (Germany) or in dogs (Italy) (Parish (ibid) p.55).

Parish (ibid) reported that in 1891 Baginsky recorded

the first case of tetanus in man to be treated with anti-toxin (1.5 ml of rabbit serum) prepared by Kitasato, but unfortunately the patient did not recover. A number of apparently selected cases of tetanus treated with dried dog anti-toxin by Schwartz in Italy towards the end of the same year (1891) did recover.

Behring in 1892 obtained anti-toxin in larger quantities from sheep and horses (Parish (ibid)).

Records of injuries received during Independence Day celebrations in the USA illustrates the success of anti-toxin which was extensively used in 1904 (Parish (ibid)) p.69).

Injuries received in 1903 and 1904 were comparable but the number of deaths from tetanus per 1000 injuries fell from 102 to 23 and further decreased to only 17 per 1000 injuries in 1905. The records suggest that patients who received a timely prophylactic dose of anti-toxin did not develop tetanus.

The incidence of tetanus among battle casualties was very high. For the British Army in the 1914-1918 War, fighting in France and Belgium produced approximately 2500 cases of tetanus with a case mortality of about 43.2%. On the Western Front during the four years of War the average incidence was 1.47 per 1000 wounded. It was estimated that of those 8 per 1000 some 85% died (Parish (ibid) p.70). At the outbreak of the War only small amounts of anti-toxin were available but immediate steps were taken to obtain

further supplies and hurry them to the Front. This enabled the prophylactic treatment of all wounded and the incidence of tetanus fell to about 1 per 1000 with a mortality of less than half.

By 1918 it was about 0.6 per 1000. It is estimated that during the 1914-1918 War there were 2500 cases of tetanus in the British Army with 550 deaths, without serum there might have been 25,000 cases with 20,000 deaths (Parish (ibid)).

It must be remembered, however, that surgical standards changed markedly in the course of the War, in particular wound irrigation and drainage were introduced.

During the second World War it was seen that the incidence of the disease tended to become lower as the War went on (Bruce 1920). It was probable that this was due after the middle of 1917 to more thorough surgical treatment. It was stated in the second analysis of cases of tetanus in 1915 that "if thorough surgical treatment was carried out on wounds from the beginning so as not to allow the presence of necrotic tissue or foreign bodies, the number of cases of tetanus should have sensibly diminished had it not altogether disappeared". The surgeons took a long time to learn how to do this but in the introduction of primary excision and primary or delayed primary suture the most remarkable results were obtained and if it had not been for the sudden

cessation of the War it is probable that tetanus would have become almost extinct among the British wounded.

Knowledge acquired through research on diphtheria in the 1920s led to further investigations on tetanus. In 1927, G. Ramon and C. Zoeller of the Pasteur Institute in Paris were the first to immunise a man with a new vaccine consisting of tetanus toxoid (Parish (ibid) p.117). The subjects used for the trial were soldiers because of the high incidence of tetanus in the Armed Forces and also the inoculated soldiers could be kept under observations more readily than civilians. In Britain in 1938, Brigadier Sir John Boyd, collaborated with Glenney and M.F. Stevens in a study of the tetanus anti-toxin responses in the blood stream of British soldiers inoculated with toxoid. It was established that two injections of 1 ml at an interval of six weeks apart produced protective amounts of tetanus anti-toxin in the circulation. The incidence of reactions was very low and was used for about two years before it came to light that a small number of anaphylactic reactions were associated with toxoid.

Investigations revealed that a protein constituent (Witte peptone) of the broth used to culture the bacilli was the cause of the anaphylactic reactions and alternative forms of culture media were used (Parish (ibid) p.118).

Boyd's research was well timed as active immunisation

against tetanus became official policy for the British Army in 1938, one year before outbreak of the second World War (Parish (ibid) p.118).

In the United Kingdom only in the 1950s the civilians had the chance for prophylaxis against tetanus which was widely available for the Armed Forces.

Two lessons were learned from previous experiences, the first was the appreciation of the value of active immunisation with tetanus toxoid, which had proved to be so safe and effective for the Armed Forces in the second World War. This led to the inclusion of tetanus vaccine among the routine immunisations of childhood. The second important lesson was the recognition that side-effects commonly followed the injection of horse anti-toxin and that this could sometimes be eliminated from the body too rapidly to confer any protective benefit. In consequence, the use of horse anti-toxin tended to become restricted to patients with more severe injuries in whom the hazards of its injection could be justified and more attention was given to surgical debridements and to chemoprophylaxis in place of anti-toxin prophylaxis. During the last few years there has been a further important advance in regard to the general availability in a commercial scale of human tetanus immunoglobulin, that is, tetanus anti-toxin prepared from human plasma. In contrast to horse anti-toxin, the human

material is virtually free from side-effects and is only slowly eliminated from the blood stream; it is therefore both safe and reliably effective (Smith 1975).

Tetanus anti-toxin was not discontinued immediately because of its proven effectiveness and it was still used as a prophylaxis measure in patients with incomplete records of immunisation with toxoid (Laurence et al. (ibid)).

Passive immunoprophylaxis is an important temporary way of protection. This is achieved by giving the injured either heterologous serum or specific human immunoglobulins which although costly is safer, more effective and better tolerated. The WHO recommends 1500 to 3000 iu of heterologous serum, or 500 to 1000 iu of human immunoglobulins (Rey et al. 1978).

It is true that passive immunoprophylaxis cannot guarantee a 100% protection but still it can considerably reduce the risks of tetanus. Only 3% of the cases mentioned in the paper by Rey (1976) developed in patients who already were found to have had passive immunoprophylaxis.

Adequate antibody levels for full immunity are rarely obtained following the first dose and not usually until after the second. Accordingly, the need often arises in the patient of non-immune or unknown immune status with a tetanus prone wound, for immediate protection against the disease to cover the initial period between the first two

doses of vaccine. This is best provided by the administration of readily formed antibodies (tetanus anti-toxin), ie passive immunisation simultaneously with the first dose of toxoid. Tetanus anti-toxin of human origin provides the ideal material for passive immunisation (Shirkey 1965). It has now superseded heterologous (animal) anti-toxins, serum, as the best agent for this purpose, giving better protection with none of their disadvantages (Willis 1975). It was reported by Ungar (1967) that it is a much more satisfactory drug, having practically none of the disadvantages of anti-toxin of animal origin.

Being a natural human protein, there is virtually no risk of anaphylaxis or other serious hypersensitivity reactions and since it does not cause sensitisation and is eliminated very slowly, the level of protection remains high for a long period up to four weeks which is important in that the tetanus incubation period can last this long (Smith et al. 1975).

Human tetanus immunoglobulin is essentially immune globulin (gamma globulin) standardised for its tetanus anti-toxin content. The product is obtained from plasma of human donors. The previously hyperimmunised donors with tetanus toxoids are plasmapheresed. Another source of human tetanus immunoglobulin is from placentas of mothers immunised against tetanus prior to their expected delivery.

The material prepared by Wellcome (1980) is mentioned in the quotation from the data sheets. It describes the preparation commonly used.

It is a purified immunoglobulin obtained from the sera of healthy human donors known to have high levels of tetanus anti-toxin following active immunisation with tetanus vaccine. It is a clear colourless, semi-viscous liquid containing thiomersal 0.01% as a preservative and glycine 2.25%. Each vial contains 250 iu tetanus anti-toxin in 1.0 ml solution.

The use of immunoglobulins is advocated in the wounded when the wound is more than six hours old, not clean, penetrating and with a considerable tissue damage. If such a patient has had a complete course of toxoid or a booster dose more than 10 years ago he should be given one dose of toxoid plus human tetanus immunoglobulin. If the patient has not had a complete course of toxoid or immunity status is unknown he or she should be given a complete course of toxoid plus human tetanus immunoglobulin (Smith et al. 1975).

The effects from the passage of the toxin through the blood and the onset of the clinical disease can be prevented by ensuring that the individual has an adequate amount of circulating anti-toxin. Approximately ≥ 0.01 unit of anti-toxin per ml of serum is often regarded as the concentration necessary to give a significant degree of

immunity (Smith 1969).

Administration of immunoglobulin does not obviate the need for debridement and wound cleansing, nor does it contra-indicate the use of antibiotics.

A possible alternative to the use of immunoglobulin is to infuse the frozen plasma of hyperimmune donors. This will be particularly useful in the Sudan due to the lack of "fractionation facilities".

5.4 Prevention and Management of

Clinical Tetanus in General

When we look at the everyday natural risk of tetanus, we can see that the most important measure to be taken is prevention (Rey et al. 1979).

It has always been said prevention is better than cure. The distribution of its portal of entry of tetanus has recently been studied. According to this, traumatic wounds represents the commonest (30-45% of cases) and best known type of contamination but there are other ways of contracting tetanus, such as secondary infected leg ulcers and chronic otitis media (up to 15 or or 18% in India and Iran) (Vakil and Dalal (ibid)).

Neonatal tetanus is associated with traditional childbirth and the ritual practices which go with it.

Puerperal tetanus is twice or three times less common (Vakil and Dalal (ibid)).

Certain traditional practices particularly such as circumcision, excision and ear-piercing, add a supplementary risk of contamination, but medical and surgical treatment (intramuscular injections, vaccinations and surgery in general) are not risk free (Vakil and Dalal (ibid)).

In 10 to 30% of cases, the portal of entry is not located. This is used as an argument by some authors as to whether or not the infection is digestive in origin (Vakil and Dalal (ibid)).

The group at risk in an unvaccinated population with a traditional way of life may be defined, by age : the newborn child is by far the most exposed to risk : as many as 1 to 10 cases, sometimes more, per 100 live births. Children between one month and 15 years of age account for half of all cases, this is because they often represent half of the population (Bytchenko et al. (ibid); Cvjetanovic 1972; Cvjetanovic et al. (ibid); Debroise and Ledecq (ibid); Rey 1976). By sex : females are traditionally less affected (1.5 to 3 times less) than males. Although men have a higher risk of receiving contaminated wounds than women the sex difference is more marked than would be expected.

In certain conditions, the distribution by sex is distorted by traditional practices (eg ear-piercing of Senegalese girls) (Bytchenko et al. (ibid); Cvjetanovic (ibid); Cvjetanovic et al. (ibid); Debroise and Ledecq (ibid); Rey 1976).

By way of life rural areas are more exposed to risk than city dwellers (Bytchenko et al. (ibid); Cvjetanovic (ibid); Cvjetanovic et al. (ibid); Debroise and Ledecq (ibid); Rey 1976).

Risk factors. The risk is universal, but it is influenced by numerous factors which combine to determine the outcome of the infection.

These are socioeconomic factors, and include frequency of septic injuries, urbanisation, medical services and immunisation which is a very important factor.

The environmental factors also play a great role, for instance, the contamination of wounds by *Clostridium tetani* is related to the frequency of the bacillus in the soil (Rey et al. 1978).

The climate and season also affects the risk of tetanus disease. It is greatest in tropical countries and less in temperate climate (Rey et al. 1978).

Hygiene is the most important factor in prevention of tetanus.

Hygienic measures should be taken in everyday life particularly in potentially septic conditions ie childbirth, circumcision and other surgical procedures. The aim should be to reduce the number of highly resistant spores in the general environment and specially in operating theatres, and central sterile supplies department (CSSD) and to eliminate

them completely if possible. Spores must be destroyed in surgical instruments and dressings by gamma irradiation or autoclaving at 240°F (115°C) for 20 minutes. Heat-sensitive instruments can be decontaminated by being soaked for 15 minutes in a mixture of 50% methanol and sodium hypochlorite in distilled water, sufficient to provide 2000 parts per million available chlorine. Povidone-iodine (Betadine) is the most effective agent for skin decontamination (Warrell (ibid) p.291). Care of the wounds : Any wound, however trivial, can cause tetanus in the unimmunised subject. Therefore, wounds must be well cleaned, any foreign body should be removed and the necrotic tissue debrided.

Anti-microbials may be given to deal with sepsis or to prevent it in the case of some perianal and orthopaedic operations.

5.5 Use of immunoglobulins in treatment

General medical care for tetanus cases and special care for vital function (intensive care). As the aim of this part of the thesis is the emphasis of the importance of the use of immunoglobulins in the prophylaxis and treatment of tetanus disease other aspects of general and special medical treatment are not dealt with here. For details please refer to the paper about "Intensive care in tetanus : management, complications and mortality in 100 cases"

(Edmondson and Flowers 1979) and their follow-up paper (Flowers and Edmondson 1980) "Long-term recovery from tetanus : a study of 50 survivors".

Although his plans for the future in the Sudan will be the procurement of human plasma of high titre anti-tetanus for fractionation and use in the treatment of tetanus patients, the author gives a brief account about the use of equine anti-toxin. Equine anti-toxin has been used for many decades but its efficacy is still doubtful (Blake et al. 1976).

In the past 15 years three prospective controlled studies found equine tetanus anti-toxin effective in preventing death (Brown et al. (ibid).

According to results from those trials the mortality rate was 49% among patients receiving 200,000 iu of anti-toxin and 76% in those not receiving anti-toxin. The probability of this result arising by chance is less than 1 in 20. After correction for a chance allocation which favoured the group receiving anti-toxin, there was still a substantially lower mortality among patients in this group.

Therefore, it could be said that tetanus anti-toxin is a valuable remedy in clinical tetanus (Baker and Grounds (ibid) Athavale and Pai 1966). While two other studies found no significant difference in case fatality ratios

between the treated and untreated groups (Vaishnava et al. 1966; Srivastava and Gulati 1965).

A blind controlled trial was undertaken in 470 patients with proven tetanus. Patients were randomly allotted into various treatment groups - namely, group 1 (no ATS), group 2 (10,000 units of ATS), group 3 (30,000 units) and group 4 (60,000 units).

The survival rate was 54.4%, 59.0%, 50.4% and 52.3% in groups 1, 2, 3 and 4 respectively. This difference was not significant.

There was no difference in the course of the disease during the first week of hospital stay in the four groups. The development of complications, such as laryngeal spasms and pyrexia was comparable in the various groups.

The length of survival in fatal cases and the length of hospital stay in the cured patients was not significantly different in the various groups.

These results, therefore, indicate that antiserum has little value in the treatment of clinical tetanus (Vaishnava et al. (ibid)). At that time although the used anti-toxin was equine the trials done were not to differentiate between different sera, but to test the effect of the anti-toxin on the treatment of tetanus, which according to this trial it could be useless.

One very important reason that human tetanus

immunoglobulin is preferred to equine ATS is the fact that equine anti-tetanus serum causes allergic reactions when used in human beings. These reactions are sometimes very severe anaphylactic ones which might result in sudden death.

A special committee of the London Academy of Medicine, Ontario, recommended mass immunisation with tetanus toxoid not to reduce the incidence of tetanus, which was negligible, but to lower the morbidity and mortality of tetanus anti-toxin allergy which was considerable (Toogood 1960).

The idea of using homologous human anti-toxin has been suggested by some workers (Turner et al. 1954), but in the absence of any information on the dosage and the duration of passive immunity homologous serum has never been seriously considered. In a study by Suri and Rubbo (1961) it was shown by animal experiment that homologous serum was at least one hundred times more effective than the heterologous type. Further, it was found that a dose of 200 units of homologous anti-toxin produced serum levels of 0.02 unit/ml in five out of seven individual patients for at least 21 days. This concentration of anti-toxin, if maintained throughout the incubation period, has been estimated by Bruce (*ibid*) to be protective.

Another important reason for the use of homologous tetanus anti-toxin is that the concentration of circulating anti-toxin is predictably constant whereas the levels of

horse serum anti-toxin are variable (Suri and Rubbo (1961)).

A third reason in contrast to heterologous anti-toxin, homologous serum gives protective and persistently high levels of circulating anti-toxin at much lower doses than is possible with heterologous serum.

In 1974, human tetanus immunoglobulin became generally available, consequently equine, bovine and other animal anti-toxins may now be regarded as obsolete for tetanus prevention in United Kingdom and anti-microbials may no longer be considered to have a primary role (Smith et al. 1975).

Human tetanus immunoglobulin has the advantages over heterologous anti-toxin. Firstly, because it is a natural human protein, so that there is virtually no risk of anaphylactic shock, serum sickness or other serious hypersensitivity reactions.

Human tetanus immunoglobulin does not cause sensitisation, with the risk of early immune elimination and short-lived effect. It is eliminated very slowly and consequently the level of protection remains high for up to four weeks (Greenberg 1966).

As the period of incubation of tetanus may last up to several weeks, the long protection provided by human tetanus immunoglobulin is a particularly important factor.

The incidence of local reactions is low.

Treatment of the tetanus attack.

Human tetanus immunoglobulin is used both in prophylaxis and treatment of an acute attack of the disease. When it is used in combination with thorough surgical toilet of the wound the anti-toxin prevents the absorption of further toxin and neutralising the toxin circulating in the blood and other tissues (Willis (ibid)). Dosage of human tetanus immunoglobulins applicable to both adults and children is between 30-300 iu per kilogram bodyweight given intramuscularly. Following recovery from the attack, the patient should receive a full course of active immunisation with tetanus adsorbed toxoid, since the natural immunity conferred by the disease may be short-lived.

Human tetanus immunoglobulin is usually given intramuscularly but this route has its disadvantages. Firstly, because it takes some time to be absorbed and secondly, the quantity given is rather big and this is inconvenient to be given intramuscularly in the gluteal muscle.

Intravenous administration is usually unsuitable, since commercial preparations contain thiomersal which may cause allergic reaction. The Scottish product is given intravenously since it does not contain such a preservative (Crawford (ibid)). The intrathecal administration of TAT for treatment of tetanus begun early in the 20th Century. The

first trial was in 1901 by Von Leyden Sedaghatian (1979).

Horse and human anti-tetanus immunoglobulin :

Sheirington's studies for the Tetanus Committee (1917) and Smith (1966) suggested that anti-tetanus serum given intrathecally ought to be effective in the clinical condition. However, there was some reluctance to inject foreign (equine) protein into the human central nervous system and it is only in the past few years that evidence from controlled trials has been forthcoming.

Sanders et al. (1977) recorded encouraging results with intrathecal ATS (horse) under steroid cover, but when workers at the Irwin Hospital in New Delhi (Gupta and Kapoor 1980) investigated the human preparation they were unsuccessful. In Bombay, also, the addition of 250 iu human tetanus immune globulin intracisternally to a regimen that included equine anti-toxin did not affect case fatality rates in a sequentially designed controlled trial (Vakil et al. 1979); a larger dose is now being tried. Both these negative trials were in severe tetanus when spasms had already developed. However, recent reports of the use of intrathecal ATS in tetanus are encouraging. Ildirim (1970) treated 28 cases of neonatal tetanus with intrathecal ATS and prednisolone mixture and had a low mortality rate of 10.7%. In another clinical trial on 322 cases of adult type tetanus, 200 units intrathecal ATS (horse) was found to be

an effective adjuvant in reducing the mortality rate from 14.5 to 4.5% (Sanders et al. (ibid)).

Gupta et al. (1980) reported that in mild tetanus intrathecal anti-tetanus immunoglobulin was useful. Tetanus toxin, once bound to its neural receptors, retains the ability to fix with and be neutralised by anti-toxin without being split from the receptors. They concluded that the efficacy of intrathecal anti-tetanus immunoglobulin can be explained on this basis and that intramuscular TIG was not as effective, probably because it fails to reach the CNS quickly in the required concentration.

They emphasised that intrathecal injections did not pose any problem, the patients being relaxed after intravenous diazepam and no patient showed evidence of any neurological deficit during their hospital stay or on follow-up.

It was finally concluded by them that in patients with tetanus treated before the onset of spasms intrathecal human tetanus immunoglobulin can help to arrest the progress of a disease that is often fatal.

5.6 Summary of evidence that passive immunisation has a role in prophylaxis and treatment

It is true that passive immunoprophylaxis cannot guarantee a 100% protection but still it has a great role in prophylaxis and treatment. It has been proved by many

TABLE 5.6

Population of Sudan (in millions) according to the
Distribution in Different Provinces 1975-1980

	1975	1976	1977	1978	1979	1980
Khartoum	1.13	1.17	1.21	1.25	1.29	1.33
Northern Province	1.07	1.11	1.14	1.18	1.22	1.26
Kassala	1.78	1.84	1.90	1.96	2.016	2.079
Blue Nile	4.234	4.365	4.501	4.641	4.785	4.934
Kordofan	2.526	2.605	2.686	2.770	2.856	2.945
Darfur	2.764	2.850	2.939	3.030	3.124	3.221
Upper Nile	0.890	0.917	0.945	0.974	1.005	1.036
Bahr El Ghazal	1.568	1.617	1.667	1.719	1.772	1.827
Equatoria	0.861	0.888	0.909	0.937	0.966	0.9904
Total	16.85	17.362	17.897	18.461	19.034	19.6224

researchers that it greatly reduces the risk of tetanus. Parish (ibid, p.70) reported that the effectiveness of tetanus anti-toxin in the British Army during the World War of 1914-1918 decreased the incidence of tetanus (from 8 to 1 per 1000 wounded). A report by Bruce (ibid) stated that the introduction of prophylactic injections of anti-tetanic serum decreased the incidence of tetanus from 9 per 1000 to 1.4 per 1000 in 1914 among the British wounded. The results published by Cummings and Gibson (1919); Wainwright (1926); Patterson (1930) and Boyd (1946) (cited by Baker and Grounds (ibid) suggest that ATS was of value in the treatment of the disease. A report by Brown et al. (ibid) showed that in Nigeria patients given 200,000 units of horse serum anti-toxin fared better than those given none. Blake et al. (ibid) reported that in the past 15 years three prospective controlled studies found equine tetanus anti-toxin effective in preventing death. Hitchens (1910) (cited by Perry 1966) in 1910 protected horses against spore-induced tetanus with doses of 250 units of homologous anti-toxin.

Equine anti-toxin appears to be less efficacious than tetanus anti-toxin of human origin. Human anti-toxin was highly recommended to be used instead of animal anti-toxin as it is free of complications and worth its high costs.

Human anti-toxin, which has become commercially available, possesses undeniable advantages over equine or

bovine anti-toxin, (a) for its lack of complications and (b) for its efficacy in preventing tetanus.

. Most specific immunoglobulin has been produced to replace animal antisera particularly horse tetanus anti-toxin to avoid hypersensitivity reactions to which foreign serum may give rise. It is strongly supported by McComb (1964) (cited by Perry (*ibid*)). A report by Brown et al. (*ibid*) emphasised its beneficial effect in clinical tetanus; it reduced the mortality rate to 49% in comparison to 76% in those not receiving anti-toxin. A report by Rey (1976) that only 3% of the cases mentioned in his paper were found to have already had passive immunoprophylaxis. Passive immunisation is recommended for developing countries where neonatal tetanus is common and resources for treatment are limited. It is therefore of practical importance to establish the optimum dose and route of administration of tetanus anti-toxin which is one of the few therapeutic tools available in all countries.

Tetanus anti-toxin is a valuable remedy in clinical tetanus (Brown et al. (*ibid*)). It was reported by Cook et al. (*ibid*) that human anti-tetanus immunoglobulin (ATIG) is gaining widespread acceptance. The main advantage is that ATIG is free of the anaphylactic reactions resulting from horse anti-toxin.

5.7 The present study

Survey of tetanus in the Sudan and tetanus immunity in Sudanese Blood Donors.

The first part of the work is based on two sections, the first section is data collected in the Sudan between 1970-1974 (Elhassan 1976) and completed by the author from 1975-1979. Elhassan's findings have already been reported in a previous section (see the review of the problem of tetanus in the Sudan). The source of data collection is the Research and Statistics Department, Ministry of Health, Khartoum.

The second part is the collection of specimens of serum in the Sudan by the author between July and October 1980. Table 5.6 shows the breakdown of Sudanese population by Provinces 1975-1980.

The data collected by the author reflects the situation of tetanus disease in the Sudan between 1975-1979.

It shows that tetanus is a common disease in the Sudan. This supports the study by Elhassan in the Sudan (Elhassan 1976). There has been no improvement since then.

The highest incidence rate in the period between 1975 and 1979 was reported in 1976 (25) and the lowest (16) in 1977 (Table 5.7) (Graph 5.5).

The provincial distribution shows that the highest incidence rate was in Khartoum in 1977 in which it reached

Graph 5.5

INCIDENCE RATE OF TETANUS PER MILLION IN TOTAL POPULATION 1970—79
(EL HASSAN, 1976, PERSONAL COMMUNICATION) PRESENT STUDY 1975-79
1970 - 74

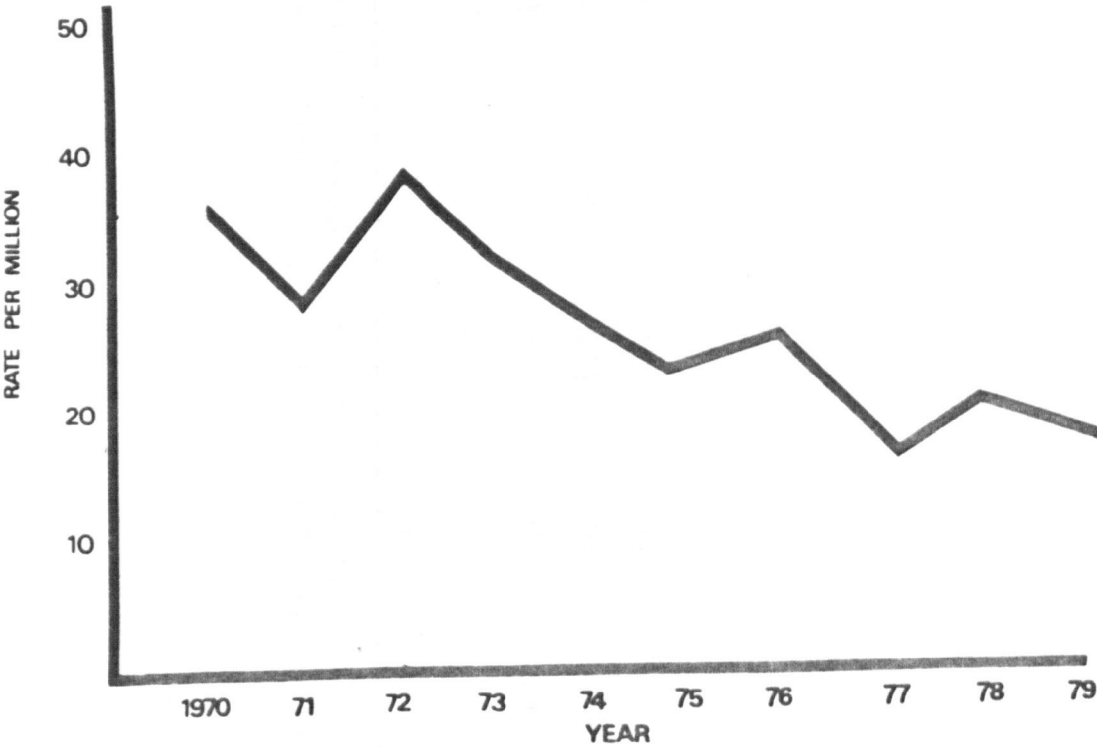


TABLE 5.7

Number of Cases and Incidence Rate per million population of

Tetanus by Province 1975-1979

Provinces	1975			1976			1977			1978			1979		
	New cases	Incidence Rate	New cases	Incidence Rate	New cases	Incidence Rate	New cases	Incidence Rate	New cases	Incidence Rate	New cases	Incidence Rate	New cases	Incidence Rate	New cases
Khartoum	44	39	13	11	54	45	38	30	65	50					
Northern	5	5	1	0.9	3	3	20	17	6	5					
Kassala	10	6	18	10	4	2	18	9	31	15					
Blue Nile	129	30	244	56	118	26	198	43	191	40					
Kordofan	53	21	89	34	41	15	69	25	13	5					
Darfur	27	10	19	7	19	6	25	8	34	11					
Upper Nile	16	18	4	4	-	-	-	-	1	0.9					
Bahr El Ghazal	56	36	28	17	42	25	2	1.2	27	15					
Equatoria	34	39	11	12	-	-	3	3	8	8					
Total	379	22	427	25	281	16	373	20	376	20					

$$\text{Incidence Rate} = \frac{\text{New cases}}{\text{No. of population}} \times 10^6$$

44.

From the trend of occurrence of tetanus in the Sudan it appears that the number of new cases fluctuated between 281 in 1977 and 427 in 1976.

Fatality rate

The fatality rate between 1975-1979 was high in the range of 112 in 1975 and 185 in 1977 (Histogram 5.6).

If we consider the fatality rate per Province the highest fatality rate in 1975 was in Equatoria followed by Kordofan and Blue Nile (Table 5.8).

In 1976, the highest fatality rate was in Equatoria, which was 818, followed by Upper Nile which was 250 and then Kordofan with 245 (Table 5.8).

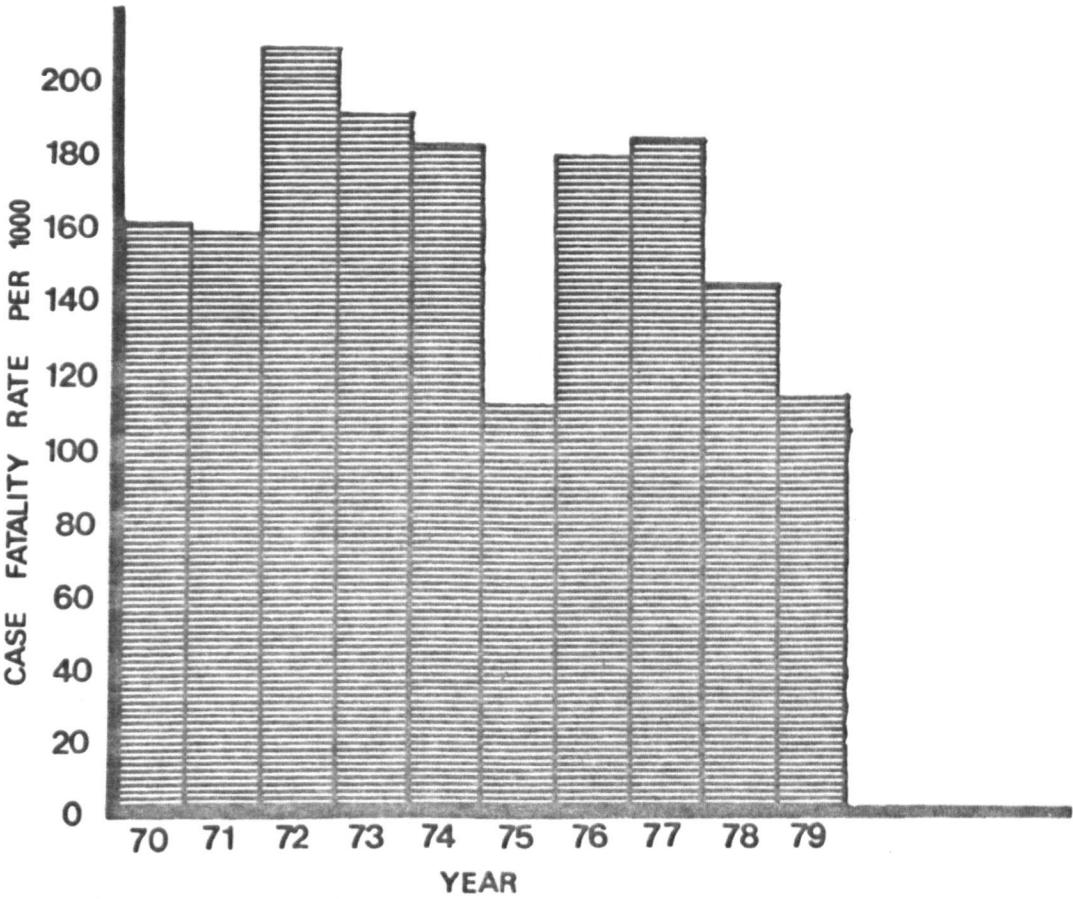
In 1977, the highest fatality rate was in Kordofan which was 341, then Northern Province with 333 and then the next highest fatality rate was in Darfur with 263 and the Blue Nile with 237 respectively.

In 1978, the highest mortality rate was in Bahr El Ghazal (Table 5.8). Nevertheless, here we should take into consideration the small number of the new cases which was only 2. Next to Bahr El Ghazal was Kordofan which had a mortality rate of 246 per 1000 cases, then Kassala which was 167.

In 1979, the highest fatality rate was in Upper Nile Province which was 1000 per 1000 cases, again the number of the new cases was only 1. Next highest mortality rate

Histogram 5.6

CASE FATALITY RATE OF TETANUS PER 1000 IN TOTAL
POPULATION :(SUDAN) 1970-79 PRESENT STUDY 1975-79



CASE FATALITY RATE = $\frac{\text{DEATH}}{\text{NEW CASES}}$

TABLE 5.8

Number of Cases, Deaths and Case Fatality Rate per 1000
for Tetanus by Province 1975-1977

Province	1975			1976			1977		
	New cases	Deaths	Case Fatality Rate	New cases	Deaths	Case Fatality Rate	New cases	Deaths	Case Fatality Rate
Khartoum	44	2	23	13	-	-	54	2	37
Northern	5	-	-	1	-	-	3	1	333
Kassala	10	-	-	18	1	56	4	-	-
Blue Nile	129	16	124	244	38	156	118	28	237
Kordofan	53	8	151	89	20	245	41	14	341
Darfur	27	3	111	19	3	158	19	5	263
Upper Nile	16	1	63	4	1	250	-	-	-
Bahr El Ghazal	56	5	89	28	5	179	42	2	48
Equatoria	34	7	206	11	9	818	-	-	-
Total	374	42	112	427	77	180	281	52	185

Case Fatality Rate = $\frac{D}{NC} \times 1000$

TABLE 5.8
Number of Cases, Deaths and Case Fatality Rate per 1000
for Tetanus by Province 1978/1979

Province	1978			1979		
	New cases	Deaths	Case Fatality Rate	New cases	Deaths	Case Fatality Rate
Khartoum	38	5	132	65	4	62
Northern	20	-	-	6	1	167
Kassala	18	3	167	31	5	161
Blue Nile	198	24	121	191	25	131
Kordofan	69	17	246	13	1	77
Darfur	25	3	120	34	-	-
Upper Nile	-	-	-	1	1	1000
Bahr El Ghazal	2	2	1000	27	5	185
Equatoria	3	-	-	8	1	125
Total	373	54	145	376	43	114

Case Fatality Rate = $\frac{D}{-} \times 1000$
NC

was in Bahr El Ghazal with 185, following that was Northern Province with 167 and Kassala with 161 (Table 5.8).

If we look at the results (Table 5.9), Khartoum, Northern and Kassala Provinces separately from 1975-1979 we notice that the highest fatality rate was 333 per 1000 cases in the Northern Province in 1977.

In the Blue Nile Province the highest fatality rate was reported to be 237 per 1000 cases in 1977.

The highest fatality rate was 341 in Kordofan and 263 in Darfur, both in 1977.

The highest fatality rate in Khartoum between 1975-1979 was in 1978 (Histogram 5.7).

In Southern Provinces the highest mortality rate was as follows:

		<u>No. of Cases</u>
In Equatoria	818 in 1976	11
In Bahr El Ghazal	1000 in 1978	2
In Upper Nile	1000 in 1979	1

The average total reported new cases in the whole country per annum between 1975-1979 was 366.

5.7.1 Results

The methods used in this study are recorded in Appendix 2. 694 samples were received from the Sudan. These consisted of 675 from blood donors (Methods, Chapter 2) and 19 from school children. A total of 102 (101 blood donors +

TABLE 5.9

The highest incidence in each Province between 1975-1979			The highest number of deaths in each Province between 1975-1979		The highest number of new cases in a Province between 1975-1979	
Incidence Rate			Deaths		New Cases	
Province	No.	Year	No.	Year	No.	Year
Khartoum	50	1977	5	1978	65	1979
Northern	17	1978	1	1977-79	20	1978
Kassala	15	1979	5	1979	31	1979
Blue Nile	56	1976	38	1976	244	1976
Kordofan	34	1976	20	1976	89	1976
Darfur	11	1979	5	1977	34	1979
Upper Nile	18	1975	1	1975/76/79	16	1975
Bahr El Ghazal	36	1975	5	1975/76/79	56	1975
Equatoria	39	1975	9	1976	34	1975

In each Province: Highest Rate of Incidence 56

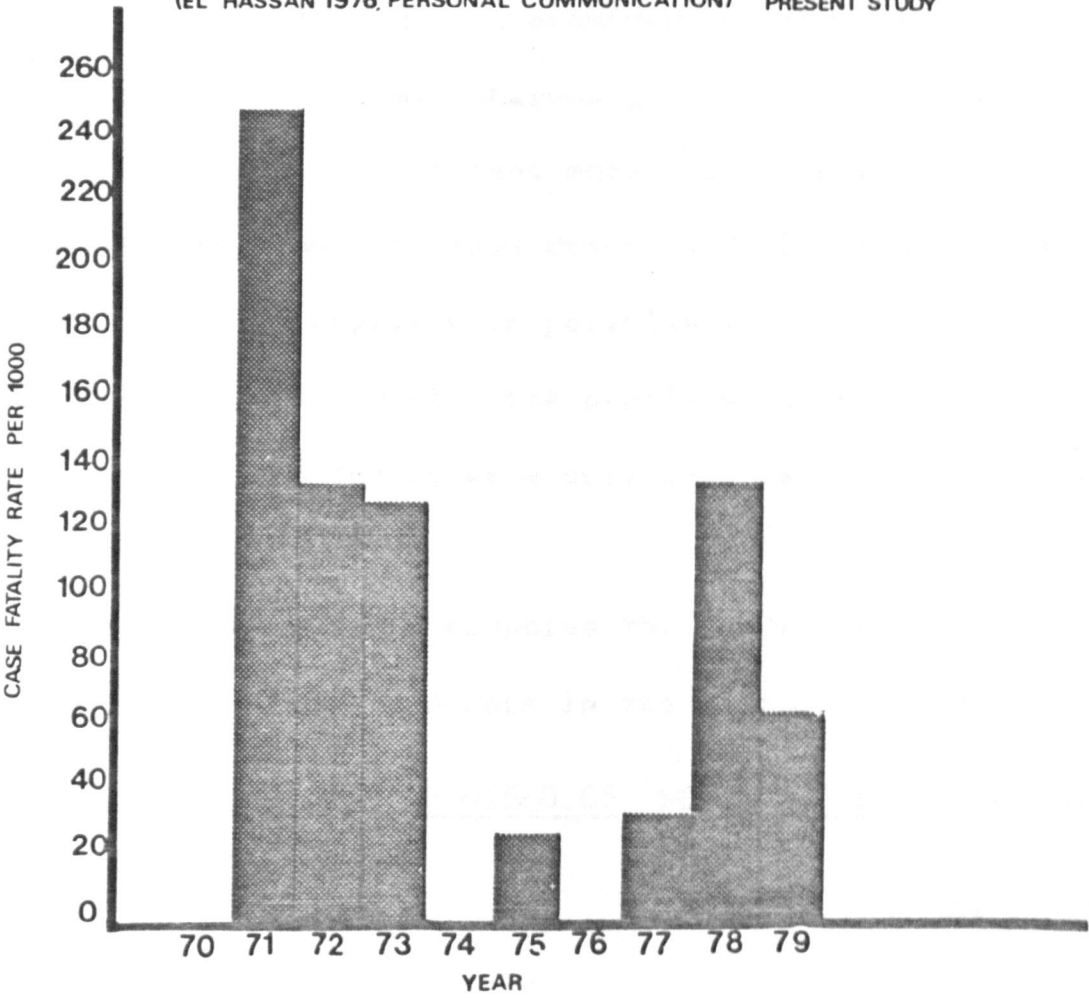
Deaths 38 New Cases 244 (1976)

TABLE 5.9

The highest Case Fatality Rate in a Province between 1975-1979		
Province	Case Fatality Rate	Year
Khartoum	132	1978
Northern	333	1977
Kassala	167	1978
Blue Nile	237	1977
Kordofan	341	1977
Darfur	263	1977
Upper Nile	1000	1979
Bahr El Ghazal	1000	1978
Equatoria	818	1976

Highest Rate of Case Fatality was 1000 in
1979 (Upper Nile) and 1000 in 1978
(Bahr El Ghazal).

HISTOGRAM 5-7
CASE FATALITY RATE OF TETANUS PER 1000 IN
(KHARTOUM) 1970-79.
(EL HASSAN 1976, PERSONAL COMMUNICATION) PRESENT STUDY



1 child) were excluded from CIEP testing for tetanus antibodies due to presence of HBsAg as determined by RIA (Hepatitis B section) while a further 5 samples had insufficient sera for testing. Therefore, the final total tested by CIEP was 587, ie 569 blood donors and 18 children.

Of the 587 blood donors examined by CIEP, no donor showed levels ≥ 10 iu/ml, whereas 2 out of 18 children had levels ≥ 10 iu/ml. Sufficient material for RIA testing was only available from 524 blood donors and 15 school children.

13 out of 15 pupils were positive with levels of ≥ 0.01 iu/ml, ie 86.6% of these pupils were immune.

13 out of 524 donors were positive, ie 2.5% of the donors were immune.

The following table compares the above results with similar survey of blood donors in the West of Scotland.

	<u>$\geq 0.01 < 0.025$</u>	<u>$\geq 0.025 < 0.05$</u>	<u>≥ 0.05 iu/ml</u>	<u>Total</u>	<u>Basal</u>
West of Scotland Donors	1	4	66	89	2
Sudanese Donors	3	1	9	524	8

For a further comparison of the levels of the tetanus antibodies in Sudanese samples with the West of Scotland blood donors see Final Conclusion(p. 403).

5.7.2 Discussion

It is really sad to see a country suffering from a

high fatality rate caused by this preventable disease. The most important problem is to devise operational methods which will actually get the vaccine into the people.

This will ensure active immunisation and consequently the production of immunoglobulins for passive immunisation and treatment.

In comparing Sudanese blood donors levels of tetanus antibodies with the West of Scotland donors, we can see the great difference between the two levels as it is shown in the Results.

The results reflects the difference between a country with scheduled scheme for triple vaccination which has been applied regularly at least for a number of years and a country without a proper triple vaccination programme.

The West of Scotland sample is a random one from the donor population.

The paper by Dastur et al. (ibid) raises two points namely, natural immunity and basal levels of antibodies at levels below the protective level of 0.01 iu/ml.

The question of naturally acquired immunity is impossible to ascertain unless a full health record is available to show that no artificial immunisations had been administered. On the other hand, the Indian paper would suggest that naturally acquired immunity is possible, eg *Clostridium tetani* contamination of the small bowel stimulating B and T cells in Peyer's patches.

The 524 samples of blood donors are presumed to be reasonably representative of the Sudanese population because of urban immigration. Only 2.5% of this number have this level of immunity. This very low level of immunity in the population against tetanus explains very easily the high number of cases and incidences of tetanus published in Khartoum by Elhassan before 1975 and reviewed by the author up to 1979 (Tables 5,3 and 5.7).

Both active and passive protection of the population is required as well as the treatment of patients. From these findings it is clear that in the treatment of wounds, it will be desirable to use immunoglobulins or immune plasma preparations. The response to a primary dose of tetanus toxoid is not sufficiently rapid to prevent tetanus in previously unimmunised patients. These results, with a poorly immune population, should be a strong drive to plan a mass vaccination programme of a wide range to cover the majority of the population particularly most susceptible groups.

eg children : risk of outdoor sports and
circumcision

Army people, Farmers, pregnant women

If we compare the cost of mass vaccination programme and the cost of treatment, the cost of treatment will be far greater than vaccination. In fact, the end result of

mass vaccination programmes can prove to be a sort of financial saving (Cvjetanovic (ibid)).

Firstly, the economist should take into account the costs needed to take care of the patient in hospital, this includes Doctors, Nursing Staff, Midwives. Moreover, and most important, the human cost should not be forgotten (suffering, infirmity and death) and its cost in money terms, the treatment of a case in an Intensive Care Unit is very expensive (Rey et al. 1972).

In a country like Sudan there is perhaps one Intensive Care Unit in the Capital and this is not very efficient; moreover not every patient can have access to it. Therefore, although Intensive Care Unit costs would not be reduced by prevention of tetanus, intensive care beds would be available for patients suffering from other disorders.

Cost benefit studies, show that regardless of the country and standard of living concerned, the expenditure on treatment is not less than the cost of vaccination. The important thing, however, is that vaccination achieves its goal when it prevents suffering and save human lives (Rey et al. 1976).

Moreover, it provides future production of immunoglobulins that could be utilised for passive

prophylaxis and treatment (Rey et al. 1978).

Secondly, he should bear in mind that usually a significant percentage of the tetanus patients are occupational who are of most use to the economy of a country like the Sudan; these are farmers, veterinary people, cattle breeders and Army. Being convinced that the only adequate solution for immunisation and future production of immunoglobulins in the Sudan, is the active mass vaccination, one should proceed to put this into action.

One thing which can help towards a rather selective active immunisation is the administration of the toxoid to the high risk injured at the same time when he is passively immunised. If this is done systematically and the injured person given an identification card, this will automatically be a part of the scheme of the active immunisation and will reduce the pressure upon those programmes at other times.

Therefore, the use of immunoglobulins can start as soon as the vaccinated population will be able to produce immunoglobulins. In adequately immunised people a booster dose will produce high titre antibodies in three weeks (Cook et al. (ibid)). However, when volunteers are recruited who have not been previously immunised the antibody response

will be delayed until at least two doses of toxoid have been given (Letley et al. 1975).

The excess of the plasma can be stored and when there is enough suitable for fractionation it could be sent to a neighbouring country for fractionation.

No doubt the production of immunoglobulins will be a step forward towards thinking seriously to establish a fractionation centre.

Therefore, to control this common disease in the Sudan, passive immunisation should be started as soon as possible whatever the source is for prophylaxis and treatment of high risk injuries and patients. The material needed for passive immunisation for prophylaxis and treatment can be bought from the market until there will be a donor panel with adequate levels of immunity and large enough to produce at least part of the required quantity; then the use of plasma intravenously as mentioned earlier (section about passive immunisation) can be a temporary solution until fractionation facilities will be available.

A programme for vaccination of children should be implemented and active mass vaccination programme should be scheduled to cover as much as possible of the population.

Most of these points will be discussed later in the Chapter under the heading "Approach to the Problem".

5.8 Approach to the Problem

5.8.1 Mass vaccination

In the Sudan, the idea of a properly scheduled programme for active immunisation of children against tetanus in particular started in the 1970s (Ministry of Health 1980).

This has partly coincided with a move among Sudanese Doctors towards a greater degree of interest in Public Health (Salih 1980). Another factor which helped the establishment of tetanus vaccination programmes are the steps taken by the Ministry of Health, Public Health and Preventive Medicine towards starting many Child Care Health Centres all over the country (Ministry of Health (ibid)).

This programme, although has been very useful particularly in establishing the importance of active immunisation against tetanus and other diseases, has yet not been able to fulfil the aim of immunising the majority of children in the whole population (Ministry of Health (ibid)).

The reasons are multiple mainly due to shortage of financial resources; health care education is another important reason, its lack in many parts of the country, and the deficiency of basic Health Services both play a great role in being the cause of missing the available chances of immunisation.

The majority of children, teenagers, middle-aged and elderly have never had the chance of being actively immunised

against tetanus. Those wounded might have been given horse serum anti-toxin if available in some of the hospitals. It is quite seldom followed by toxoid (Ministry of Health (ibid)).

The problem of non-immunised population should be considered and probably the aim of vaccinating the vulnerable groups at least could be achieved. This may lead to the drop of morbidity of children and young adults (Masar 1975).

A decision was taken in 1966 at the Second International Conference on Tetanus in Bern to simplify the anti-tetanus vaccination. It was accepted that the double injection of an effective toxoid, preferably adsorbed and followed by a booster injection, was sufficient to bring about adequate immunity (Rey et al 1966).

Standard schedules of immunisation recommended in some of the Western countries are rather complicated and too expensive to be applicable in developing countries because of the financial difficulties, shortage of staff and lack of transport facilities. Therefore, it is very difficult to reach special groups who are particularly in need of immunisation with the conventional full schedule of injections (Edsall (ibid)).

A report by Larrieu et al. (1973) indicates that in 1965-66 the incidence of tetanus, especially in children, has decreased after the mass vaccination program undertaken in Southern Puerto Rico from 64 cases per year to 19 patients per year.

Edsall (ibid) suggested a simplified immunisation schedule specially for pregnant women and agricultural workers who are in greater than average need of tetanus immunisation, yet they may be specially difficult to reach with the conventional full schedule of injections.

Several trials of a single injection of toxoid have been successfully carried out in providing rapid and effective protection in animals (Heinig 1954 and Smith 1964 both are cited and supported by Rey et al. 1966).

The subject has also been investigated by Veronesi (1966) in Brazil who used a peanut oil type of adjuvant. In Sengal Rey et al. (1968) used highly concentrated fluid toxoids with several hundred LF units per dose. Cabau et al. (1970) used calcium phosphate as an adjuvant with 25 to 50 LF of toxoid. All these three groups were cited by Edsall (ibid) who used the maximum amount of aluminium phosphate permitted by US regulations with 25 LF per dose. All these groups achieved promising results with a single dose.

Numerous combinations are possible, particularly with live vaccines already used in mass campaigns (smallpox, measles, yellow fever, BCG). Toxoid can even be used as a solvent for lyophilised vaccines.

It was concluded that although single-shot vaccination gives partial protection only, the introduction of tetanus

toxoid in mass campaigns will permit gradual immunisation of the population.

The following paragraphs will give a brief account of trials of mass vaccination done in Sengal with the help of Merieux Institute and in other places as well.

The trials, the results of which have already been published were conducted on the following basis.

- (1) The use of toxoids of various concentrations with or without an adjuvant (aluminium hydroxide); and the selection of a toxoid that would be as efficient as possible while being satisfactorily tolerated.
- (2) Jet-injector inoculation, either intradermal or deeper, of adequate doses, and the selection of the best method of inoculation to be applied in mass campaigns.
- (3) Association of the toxoid (if possible by mixing) with the various vaccines already in use in mass programs in Africa.
- (4) Vaccination during pregnancy (Rey et al. 1966).

Ten trials were carried out from 1965 to 1969 involving 519 people. Except in the case of two trials involving pregnant women, the subjects under study were children aged from 6 months to 12 years, living either in urban areas or

in rural areas. Theoretically, the immunisation was primary in all subjects. However, it sometimes proved impossible to reject categorically the possibility of a previous toxoid inoculation that the subjects family failed to remember or identify. This is a possibility only in urban areas where individual vaccination is occasionally done. In any case, only initially seronegative subjects were taken into consideration in the study of the serologic response.

Four types of concentrated purified toxoid devised by the Merieux Institute were used.

- (1) Purified toxoid concentrated 50 times (after detoxification by formaldehyde.
- (2) Purified toxoid (concentration 400). Same process as for the preparation of commercial toxoid, diluted 120 times before conditioning.
- (3) Purified toxoid (concentration 400). The concentration being obtained through counter-dialysis.
- (4) Purified toxoid (concentration 2000). Culture of *C. tetani* in a dialysis bag.

Considering the heavy toll of tetanus in the City of Dakar at that time in the early 1970s and on the other hand the possibility of including tetanus vaccination in existing mass programs. Such a campaign was useful in

verifying the epidemiologic efficacy of single-shot vaccination. The mass vaccination schedule was as follows.

. A pilot study was done to check the tolerance and efficacy of the vaccine in similar conditions to those of the vaccine.

The first campaign was restricted to children aged between six months and four years.

The quadruple vaccination consisted of three separate inoculations by Podojet of a tetanus smallpox combination, a measles vaccine reserved for cases presumed susceptible and a yellow fever vaccine (for children over one year of age). A total of 55,000 children were vaccinated in a period of 4 months. The coverage was about 60%.

The second mass campaign embraced the whole age group six months - twenty years, which accounted for 50% of the population. The overlapping of the two successive campaigns in the age group up to four years is designed to ensure the complete and lasting immunisation of these children.

It is stated by Dastur et al. (ibid) that the past decade has shown that tetanus anti-toxin can be found in individuals who have neither been artificially immunised against tetanus nor had the disease. Protective levels of tetanus anti-toxin (≥ 0.01 iu/ml) have been found in people living in rural areas and in domestic and farm animals in Brazil (Veronesi 1973 and Veronesi et al. 1975).

In India, 410 not artificially immunised were screened for tetanus antibodies and 80% had measurable anti-toxin. They were given single doses of 100 LF or 250 LF of a potent tetanus toxoid. This dose produced on average a ten-fold rise in antibody level, and a 250 LF dose produced a twenty-fold rise.

In adults who had been artificially immunised, a 5 LF dose produced a four-fold to ten-fold rise in antibody level. In infants, three doses of triple vaccine produced satisfactory anti-toxin concentration (Dastur et al. (ibid)). The authors suggested that the levels of antibody achieved after a single 250 LF dose should protect for five years. They suggest that single-dose vaccination may be more suitable than the routine three-dose scheme for a population that is unlikely to comply with a three-dose regimen and in whom naturally acquired anti-toxin is associated with partial tolerance to tetanus toxoid.

They suggest that acquired anti-toxin in Indians is probably the result of chronic clostridial contamination of the small bowel and this can induce immune tolerance in the gut and systemically and may be the reason for the poor responses to vaccination in all except infants.

From the above trials, it seems that mass vaccination programmes with its deficiencies and problems is still useful in developing countries.

Although this thesis does not propose to deal in detail with future immunisation policy a suitable scheme could be divided into six phases.

- (1) Pilot study
- (2) Immunisation of pregnant women
- (3) Immunisation of newborns
- (4) A programme immunising children aged
between six months and four years
against a variety of infection
- (5) Immunisation of children attending
school or bible class (Koran School)
- (6) General adult immunisation

5.8.2 Anti-tetanus supply for prophylaxis and treatment, calculation of doses of anti-toxin for prophylaxis and treatment based on the incidence and fatality rate in the Sudan

Requirements of tetanus immunoglobulin to manage actual cases of tetanus in Khartoum Province.

Since the highest number of tetanus cases between 1970-1979 in Khartoum was 65 in 1979, the requirement for management will be based on that number. The recommended dose of human tetanus immunoglobulin applicable to both adults and children is between 30-300 iu per kilogram body weight given intramuscularly (Wellcome 1980, p.55).

Thus, if a dose of 10.000 iu (at least)/per case is needed, the quantity required will be $10.000 \times 65 = 650,000$ iu.

The suitable level accepted for plasmapheresis in West of Scotland is 10 iu/ml.

During a double plasmapheresis procedure the donor donates 500 ml of plasma, that means each donation provides $10 \times 500 = 5000$ iu if the donor is plasmapheresed once only per annum. Since about 80% of immunoglobulin is lost during processing (Crawford (ibid)) each donor will provide only 20% of the quantity, ie 1000 iu. Therefore, donors required to cover the need for one dose of immunoglobulin for treatment will be $10,000 \text{ iu} \div 1000 \text{ iu} = 10$ donors/case.

According to the above calculation these 65 cases of tetanus in Khartoum area will require material obtained from $65 \times 10 = 650$ donors provided the donors are plasmapheresed only once a year.

Anti-tetanus donors are usually suitable for plasmapheresis only for a limited period before the titre drops (Crawford (ibid)) and it is just conceivable that the nutritional status will not allow extensive plasmapheresis programmes.

To estimate doses of immunoglobulin required for prophylaxis in Khartoum area assuming that Khartoum Province is 3 million, perhaps this number is slightly exceeding the real number of the population, but taken as a round figure

for convenience and for a reserve in case of emergencies, this estimation for prevention will be based on the calculation for Scotland.

In Scotland, 1000 doses per annum per million is used and there is still one case of tetanus per million.

One has to administer a very large number of doses of immunoglobulin to prevent one case of tetanus (Crawford (ibid)).

Therefore, in a country like Sudan where the vaccination programme is inadequate almost every injured patient with an open out-door wound will be a candidate for immunoglobulin.

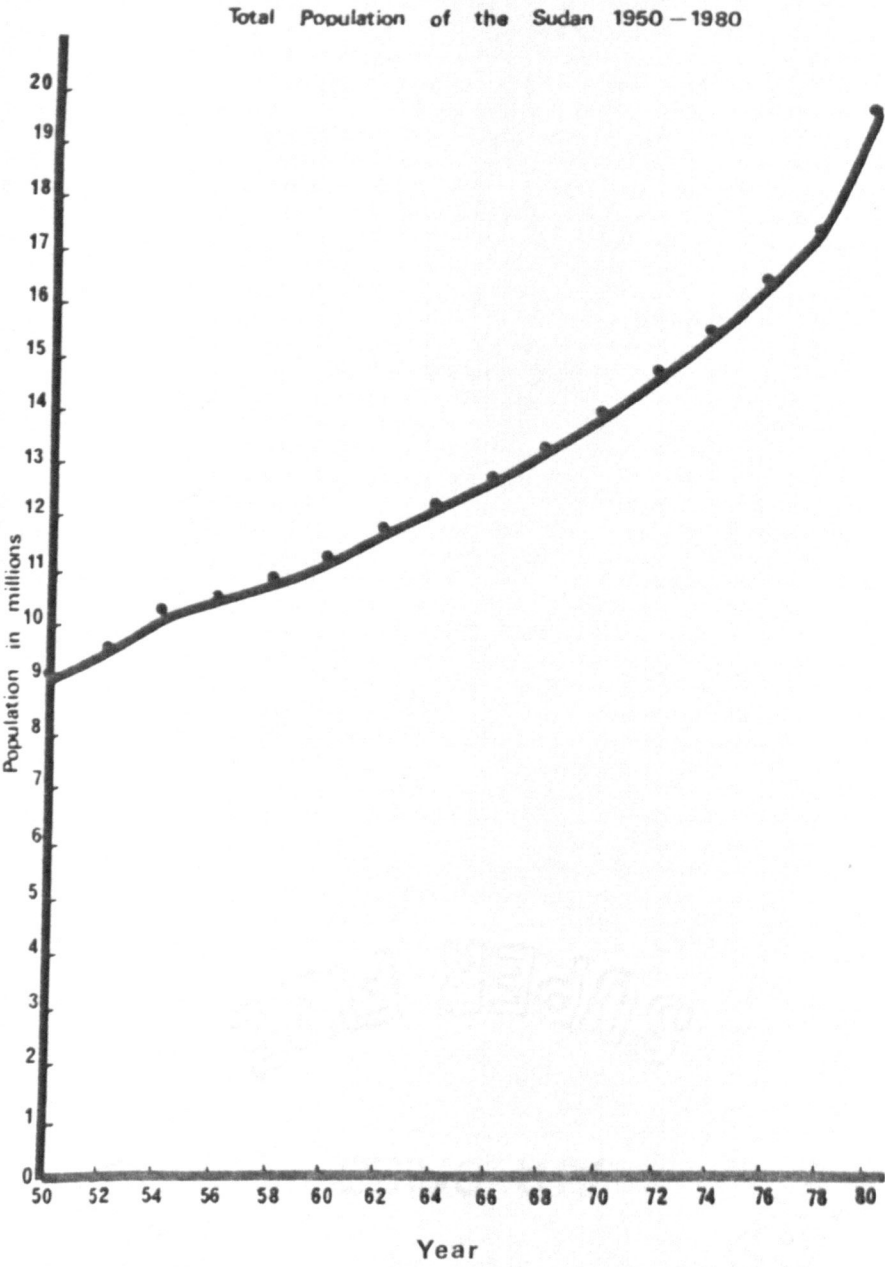
To achieve adequate cover of any population in such countries (Graph 5.8), one would suspect that he will need several thousand doses per million population per annum. At the present time, it is very difficult to estimate the need of doses for prevention in a country like Sudan; firstly there is no immunity and secondly due to the way of life.

For example, due to bare footed children playing outdoors, and bare footed farmers and horses dragging carts along the main streets, the risk of dirty wounds is more than in Scotland.

One obviously does not have to emphasise the other aspects of preventive measures of wounds etc (Warrell (ibid)).

Supposing that conditions were like Scotland the doses required for prevention in Khartoum per annum, taking

Graph 5.8



that 1000 doses are needed per million per annum, will be $3 \times 1000 = 3000$ doses per annum. The dose required for prevention is 1.0 ml (250 iu) for all ages. It is given when previous record of receiving tetanus vaccine is unavailable or unknown, when one dose was given during the previous six weeks or when one dose was given more than six weeks previously.

One donor can yield $500 \text{ ml} \times 10 \text{ iu} = 5000 \text{ iu}$
 1 dose = 250 iu. Number of doses provided by one donor is $5000 \text{ iu} \div 250 = 20$ doses per donor. More than 80% is lost during processing. Therefore every donor gives $20 - \frac{20}{100} \times 80 = 4$ doses.

The number of donors required to cover Khartoum for prophylaxis will be:

$$3000 \text{ (number of doses)} \div 4 = 750 \text{ donors per year}$$

Therefore, the number of donors required per annum for management and prophylaxis in Khartoum will be 650 (management) + 750 (prophylaxis) = 1400 on the assumption that every donor gives only once per year due to the lack of adequate nutrition for the average. Although the results of tetanus immunisation in the malnourished is not yet sorted out (Edsall (ibid)). In addition to that is the drop of the level of immunoglobulin which will decrease the number of donors suitable for plasmapheresis.

Here again comes the importance of mass vaccination, it may provide the Blood Transfusion Service with donors who could after booster doses yield plasma with high titre of immunoglobulins.

If donors will be able to donate twice per annum only half the number of donors will be required per annum, ie 700 which is $\frac{700}{50} = 14$ donors per week approximately.

Due to the lack of fractionation facilities at the present time in the Sudan the requirements of immunoglobulin for prophylaxis and treatment can be met as plasma to be given intravenously and the volume to be administered can be calculated according to the titre of the anti-tetanus in the material collected. For example, plasma similar to what is collected in West of Scotland at a titre of 10 iu/ml could be administered intravenously as one litre of plasma to provide the conventional treatment dose of 10.000 iu of homologous anti-toxin.

Another suggestion for the Sudan will be the use of dried plasma with high titre anti-tetanus which will presumably be easier to process and with more convenient storage characteristics, this product can be prepared from small plasma pools of 11 donations, around 2 litres. It will also overcome the problem of administration of the ABO group homologous plasma for the patients because mixing

of selected group O, A and B will neutralise the anti-A and anti-B activities, and the 80% loss in the immunoglobulin preparation. Drying facilities are available in the Sudan and such a procedure could be adopted as a short term solution and until such arrangement for the final immunoglobulin product by fractionation is made available in a neighbouring country or in the Sudan.

5.8.3 Plasmapheresis for procurement of high titre anti-tetanus

One of the aims to approach the problem of tetanus in the Sudan is by the initiation of plasmapheresis for procurement of high titre anti-tetanus. This is very crucial, particularly in a country where there is no proper schedule for vaccination against tetanus as well as other diseases, like some developed countries where good levels of tetanus antibody are found in the unselected donors.

Previous data showed that less than 5% of unselected donors had an anti-toxin concentration above 10 iu/ml (Cook et al. (ibid)).

It was reported that 1.5% of East Anglian donors had more than 10 iu/ml (Entwistle and Eldridge 1973).

A percentage of 12.1 of the donors in Melbourne were found to have levels above 3 iu/ml (Nelson 1973).

Other workers have shown the value of boosting previously immunised donors followed by plasmapheresis.

It was observed that after a second booster of toxoid 25-35% of Swiss Army recruits had concentrations over 5 iu/ml (Hassig 1966).

In Sweden, it was observed that approximately the same concentration was produced by each booster injection so that the same group of selected donors could be a source of plasma for many years (Billaudelle 1966).

Similar observations were made again in Switzerland where it was reported that previously vaccinated individuals in the Swiss Army responded to booster doses of adsorbed tetanus toxoid (Fischlewitz and Sturm 1967).

As it has been mentioned earlier in this Chapter it was possible by the use of plasmapheresis to collect 100 litres of high titre anti-tetanus plasma from 33 donors within 14 weeks of a single booster injection (Cook et al. (ibid)).

Thus, it seems that booster doses yield adequate levels of anti-tetanus immunoglobulin which will be suitable for plasmapheresis and fractionation.

This shows how the mass vaccination is important since it may help the Blood Transfusion Service to have selected donors from among the population who will accept the idea of being boosted and plasmapheresed; here comes the role of the Blood Bank staff to try to recruit more specific type of donors for the more specific and valuable blood products.

(See Introduction - the survey done to see the plasmapheresis donor primary characteristics and how to motivate and recruit him (secondary characteristics)).

Thus, the role of plasmapheresis for procurement of high titre anti-tetanus is evident. By means of this process valuable plasma could be obtained from selected donors without depriving them from their red cells. Usually a unit of blood is obtained, centrifuged in order to separate and retain the plasma fraction. The donor's red cells are re-transfused.

In West of Scotland, donors are plasmapheresed at 6 weekly intervals obtaining 500 ml of plasma per session, giving about 4 litres per annum/donor. This is reasonable compared to the quantity of plasma taken from a donor per year in Europe which is 10-15 litres.

In the United States, up to 50 litres per annum of plasma may be obtained from a single donor. One should be careful because such intensive plasmapheresis can exhaust the extravascular reserves of albumin. Usually the loss of albumin in 500 ml plasmas which is 20 gm is replaced within 24 hours by the net influx from the extra cellular space, but weekly plasmapheresis of 500 ml plasma will cause protein levels to decrease (World Health Organisation 1981). Therefore, it is recommended:

- (1) that not more than 10-15 litres of plasma

per year should be taken

(2) not more than 500 ml plasma at one time

should be taken

(3) the intervals between such sessions

should not be less than two weeks

To make the intervals long enough within reasonable limits and at the same time satisfy the requirements more donors should be recruited. In Glasgow and West of Scotland the number of donors bled has increased from 297 in 1973 to 1880 in 1978 and the intake in 1978 was 3056 donations.

5.9 Final Conclusion

Tetanus is a disease with a high mortality rate, particularly in developing countries. It is easily prevented and difficult to treat. A mass vaccination programme is the only realistic solution.

As the primary immune response is slow and unreliable immunoglobulin is necessary for passive immunisation of previously unimmunised and for trauma victims treatment of clinical tetanus. An efficient Blood Transfusion Service must cater for the procurement of high titre tetanus antibodies.

This possibility must be studied and detailed plans made for plasma procurement programme in addition to the mass vaccination programme which is also needed.

This study has dealt so far with the immunity of the

Sudanese population to tetanus, use of immunoglobulins and hence the importance of future establishment of plasmapheresis. In fact, the aim of this study was partially to reflect the importance of a plasmapheresis centre to the Blood Transfusion Service in the Sudan. That is why a survey was done in the West of Scotland to document the characteristics of these special donors. The information is available on computer data sheet for future use.

The results of this study of immunity to tetanus in Sudanese blood donor population has indicated the need for further survey to be carried out in the Sudan. This should concentrate on the epidemiology of tetanus and on the distribution of immunity in the population.

The treatment of patients with tetanus is lengthy and costly with a considerable mortality rate. The tragedy is that it is a disease which is so easily avoidable by paying greater attention to immunisation.

Even today, tetanus is still a problem in the United Kingdom. Most young children are immunised but most people over 50 are at risk. In the Tetanus Unit at Leeds General Infirmary, 59 patients have been treated between February 1966 and February 1967, over half of these were aged 50. The male:female ratio was about 8:1 and the youngest patient was 11 years old while the oldest was a man of 87. Of these 59 patients, 8 died - a mortality rate of about 13%. The

Leeds Survey suggests that there are, on average, 25 cases per year in England and Wales and that there has been a decline in the incidence of tetanus in young people, indicative of the effectiveness of immunisation.

CHAPTER 6

HEPATITIS MARKERS IN THE SUDANESE

DONOR POPULATION

6.1 HEPATITIS TYPE B

6.1.1 Background

The discovery by Blumberg et al. (1965) of the Australia Antigen and the subsequent realisation that this antigen was a specific marker of the agent of viral hepatitis type B (Prince 1968) provided the key to our understanding of a disease which is worldwide and highly prevalent in many underdeveloped regions (Sobeslavsky 1978). The nomenclature of this antigen has been varied with terms such as 'Serum Hepatitis Antigen' and 'Hepatitis Associated Antigen' being used, but now it is universally known as the Hepatitis B surface antigen (HBsAg) (World Health Organisation 1977).

Electron microscopy has shown that in serum HBsAg is constantly present on the three particles associated with the virus. Morphologically, these particles consist of small spheres 20-25 nm in diameter, longer filaments with similar diameter but variable in length, and larger complex spheres approximately 42 nm in diameter. The predominant form is the small spherical particle, followed by the rod-like particles and finally the large spherical particle, often called the 'Dane' particle (Dane et al. 1970). The 'Dane' particle is thought to be the Hepatitis B virus (HBV) containing circular double-stranded deoxyribonucleic acid (Overby et al. 1975), while the other forms probably represent excess viral coat lipoprotein released from

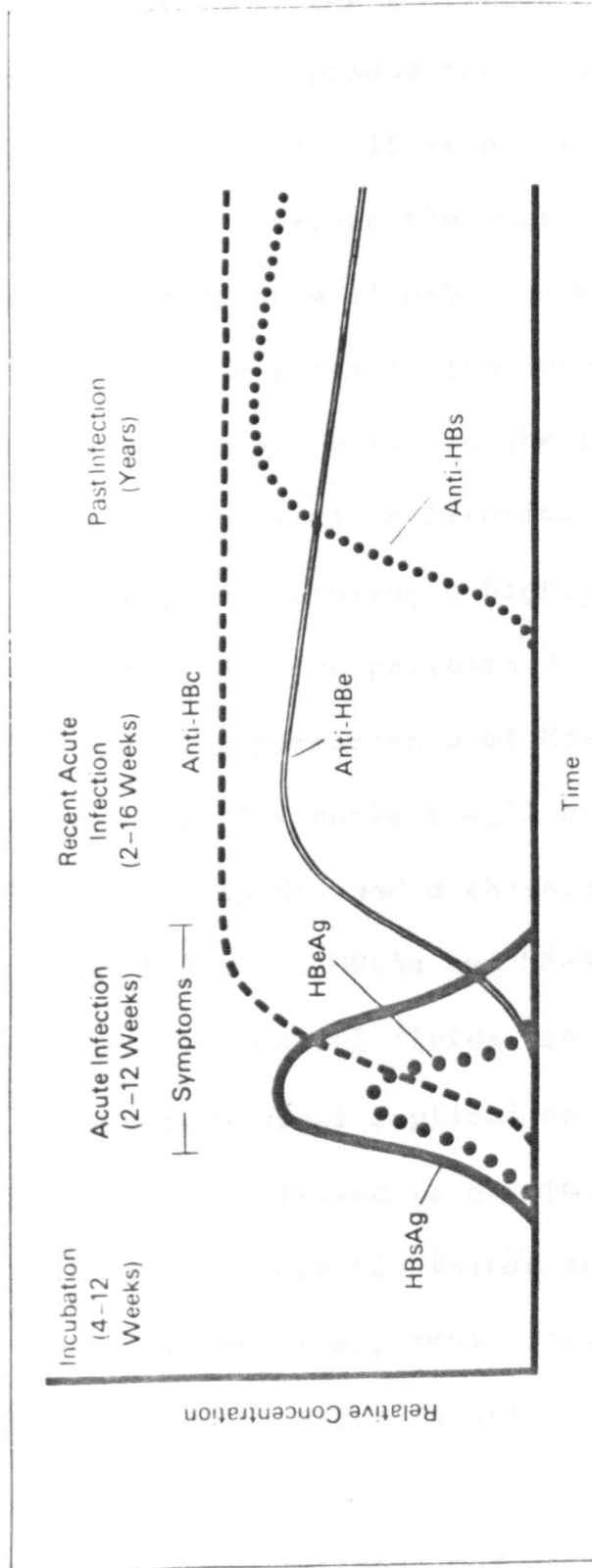
infected cells.

Within this broad classification of the particles associated with the HBV, there are three main diverse antigenic specificities. Hepatitis B surface antigen (HBsAg) is present on all three types of particle and the screening of blood donors depends upon the detection of HBsAg. On the other hand, the Hepatitis B core antigen (HBcAg) appears as the inner capsid protein of the 'Dane' particle while the third antigen specificity Hepatitis B e antigen (HBeAg) thought to be marker of infectivity is found associated with 'Dane' particle or 'free' in the serum. Antibodies to all the HBV markers, ie anti-HBs, anti-HBc and anti-HBe can be detected in several groups of patients and healthy individuals. All the markers with the exception of HBcAg can now be readily detected with sensitive serological techniques (Abbott Laboratories).

The various markers of HBV infection are present at different times and in varying combinations throughout the course of an acute infection. A typical case is illustrated in Fig. 6.1.

HBsAg usually appears in the serum after an incubation period of 1 to 6 months and peaks shortly after onset of symptoms. It typically disappears within 1 to 3 months. In most cases a "window period" will then occur in which both HBsAg and anti-HBs - antibody to the surface antigen

Fig. 6.1 Hepatitis B Virus Markers in Acute Hepatitis B Infection.



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are not detectable. The duration of the window period is typically 2 to 16 weeks. Subsequent appearance of anti-HBs signals recovery from and probable immunity to hepatitis B infection. At this time, the individual is considered immune. Anti-HBc appears around the time symptoms appear and rapidly rises in titre. It is present during the window period and is therefore the most reliable indicator of infection in the absence of other markers. HBeAg appears concurrently with HBsAg prior to the onset of symptoms, and, in acute cases, disappears prior to the loss of HBsAg. HBeAg indicates active viral replication and high DNA polymerase activity representing a highly infectious state.

On the other hand, some patients do not show the typical picture (Fig. 6.1) and persistence of HBsAg and HBeAg for 8 to 10 weeks indicates the patient will probably not resolve the viral infection rapidly and a chronic carrier state will occur (Fig. 6.2). If HBsAg and HBeAg are positive, then the patient's biological fluids are likely to be highly infectious with active viral replication still occurring. These patients can be followed to determine their infectivity status and possible future seroconversion to anti-HBe. In the latter case, these individuals most likely will not develop severe chronic liver disease (Fig. 6.3).

By detecting these antigens and antibodies, it is possible not only to diagnose the type of hepatitis but also

Fig.6.2 Chronic carrier (HBsAg): No Seroconversion

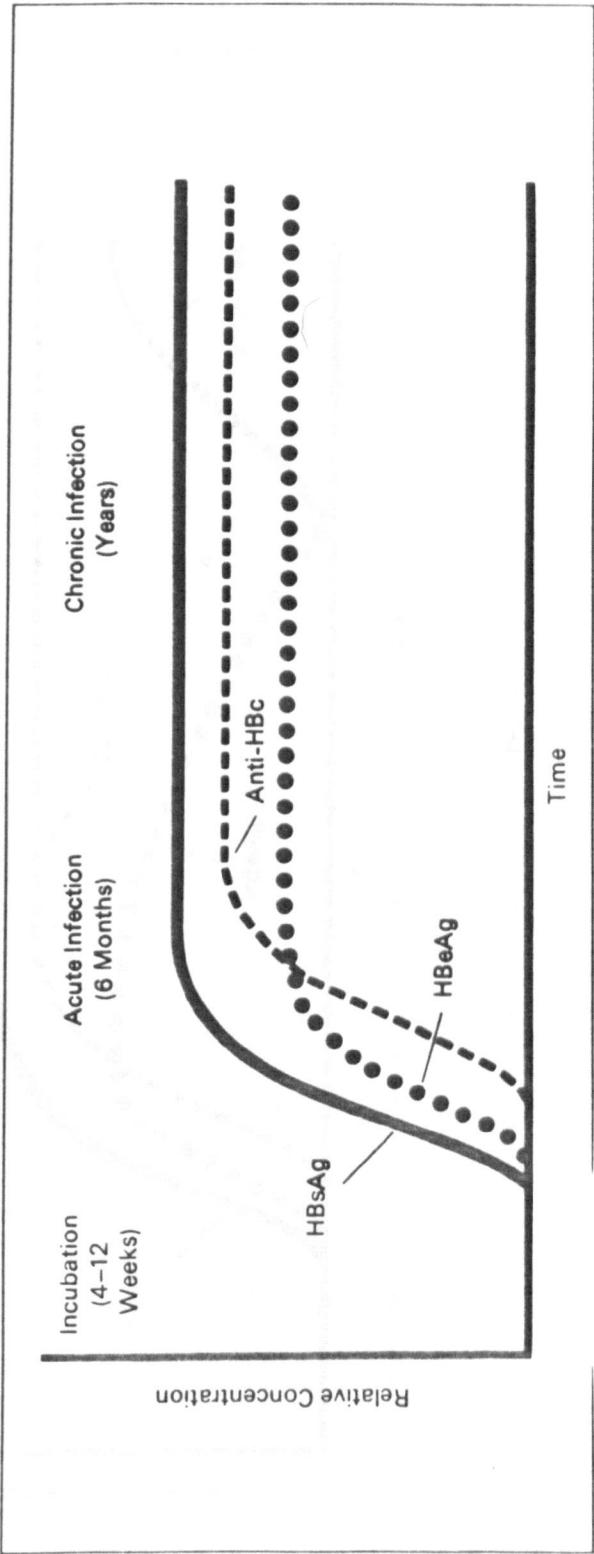
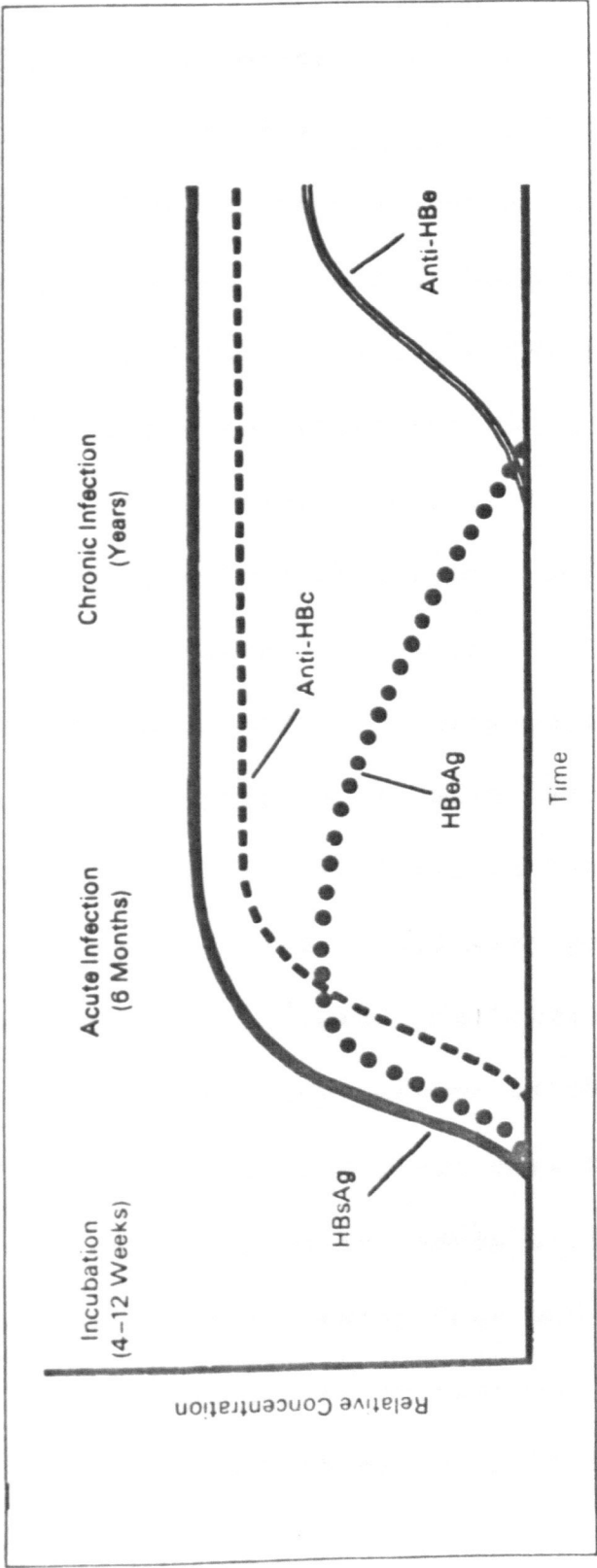


Fig.6.3 Chronic carrier (HBsAg): Late Seroconversion



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to determine the stage of the infection and probable prognosis as well. Table 6.1 indicates the diagnostic value of the markers.

The HBV markers offer practical advantages to Blood Transfusion Services (Barr et al. 1981). The World Health Organisation (WHO) recommends that all blood donors should be screened for HBsAg and blood found to contain HBsAg should not be used for transfusion (World Health Organisation (*ibid*)). Sensitive screening for HBsAg should prevent most cases of post-transfusion hepatitis B. Anti-HBs found in the serum of donors indicates a past infection and likely immunity to the disease. Screening for high titre anti-HBs (≥ 10 iu/ml) should allow the preparation of a specific immunoglobulin for passive immunisation. Selective screening for anti-HBc, which when detected in the absence of HBsAg and anti-HBs has been implicated with post-transfusion hepatitis (Barr et al. (*ibid*); Hoofnagle et al. 1974; Katchaki et al. 1978), may prevent introduction of HBV into 'at risk' areas such as renal dialysis and transplant units. Finally, determination of the HBeAg status of HBsAg carrier may be helpful in their reassurance and health care and at the same time assist in the evaluation of the risk from inoculation incidents with blood or biological material from such donors.

TABLE 6.1
Serologic Markers for HBV

Marker	Description
HBsAg	Earliest indicator of the presence of acute infection. Also indicative of chronic infection.
Anti-HBs	Indicator of clinical recovery and subsequent immunity to hepatitis B virus. Appearance is generally 1 to 4 months following onset of symptoms but may be delayed much longer.
Anti-HBc	Early indicator of acute infection. It is also a lifelong marker which represents past exposure as well as active infection in the acute/chronic period. In the absence of HBsAg and anti-HBs, the hepatitis B core antibody is an important serological marker to identify recent infection.
HBeAg	Early indicator of acute active infection, representing the most infectious period. Usually short-lived (3-6 weeks). Persistence of e antigen beyond 10 weeks is indicative of progression to chronic carrier state and probable chronic liver disease.
Anti-HBe	Seroconversion from e antigen to e antibody during acute stage is prognostic for resolution of infection. Its presence along with anti-HBc can also confirm the convalescence state in the absence of HBsAg and anti-HBs.

6.1.2 Present Study

Introduction

Epidemiologically, HBsAg shows an unusually large variation in different geographical areas of the World (Fig. 6.1). In Western Europe, North America and Australia, HBsAg is detected in less than 1% of the normal healthy population whereas in South and East Europe, Central and South America, Africa, Asia, Oceania, South and West Pacific, prevalences generally range from 2-10%. Within the latter group, prevalences greater than 15% have also been reported (Sobeslavsky 1978).

Unlike Scotland where hepatitis screening of blood donors has been performed for over 10 years and well defined data has been published (Barr et al. 1979; Barr et al. 1981), no figures are available for Sudan except for an unpublished survey (Phrykian et al. 1978).

This chapter attempts to ascertain the incidence of the various HBV markers in Sudan and make a comparison with the well defined data of the West of Scotland where the tests included in this study were carried out.

Where possible, the samples were examined for the presence of HBsAg, anti-HBs and anti-HBc (Chapter 2). Those positive for HBsAg were further investigated for the presence of HBeAg and anti-HBe. Commercially available solid phase radioimmunoassay methods were used for all markers, for detailed descriptions of testing procedures

refer to (Abbott Laboratories (ibid)).

Results

HBsAg testing:

Serum from 675 Sudanese blood donors were tested. HBsAg was detected and confirmed in 101. As 33 HBsAg positive samples had been found positive in Sudan, this suggested an incidence of 18.9% carriers, ie 134/708.

However, an apparent 'carry-over' problem was identified during this exercise. Several groups of sequential sera showed declining count rates (cpm) (Table 6.2), indicating probable contamination from the initial strong positive test. Such problems are not rare, particularly when one pipette is used to separate several sera and a sensitive method of detecting HBsAg is performed. Such problems can normally be overcome by immediately requesting a rebleed of the donor for further investigation. Unfortunately, such a follow-up was not practicable in this study and an attempt to clarify the situation was made by examining the positive specimens according to the ratio of their count rate to the negative mean count rate ($\frac{\text{positive cpm}}{\text{negative mean cpm}}$) and the sequence of the sample numbers.

The 'positive' results were therefore divided into 3 groups (Table 6.2):

(a) True HBsAg positives - samples which either

TABLE 6.2Example of the "Carry-over" Problem

Test Number	CPM	HBsAg Status
K3500	112	Negative
K3501	11277	Positive (a)
K3502	7660	Positive (b)
K3503	672	Positive (c)
K3504	1873	Positive (b)
K3505	24673	Positive (a)
K3506	1781	Positive (c)
K3507	126	Negative

were isolated from other samples or were the initial positive sample within a group.

- . (b) Possible 'true' HBsAg positives - samples with ratios greater than 20 and following a group (a) sample.
- (c) Probable 'carry-over' samples with ratios less than 20 and following a group (a) or (b) sample.

These results are shown in Table 6.3. In group (a) a total of 79 (ie 33 (Sudan) + 46 (Scotland)) HBsAg positive samples were found giving a possible incidence of 11.2%, while in group (b) 16 possible HBsAg positive samples were detected (2.2%). This indicates in the group of donors tested the prevalence of HBsAg ranged from 11.2%-13.4%. On the other hand, there appeared to be a minimum 'carry-over' rate of 5.5% (group (c)).

HBeAg/Anti-HBe testing:

Of the 101 HBsAg positive samples, only 94 had sufficient sera to determine their HBe status. Results are shown in Table 6.4.

A total of 7 HBeAg were detected - 6 in group (a) and 1 in group (b) and 37 anti-HBe - 30 in group (a), 5 in group (b) and 2 in group (c). 50 samples failed to show the presence of either marker, 34 of which were confirmed to group (c), whilst there was a higher than normal absence

TABLE 6.3

Grouping of HBsAg Positive Samples
According to Likelihood of Contamination

Testing Method	Number tested	Number HBsAg positive	(a)	Group (b)	(c)
CIEP (Sudan)	708	33	33	0	0
RIA (Scotland)	675	101	46	16	39
TOTAL	708	134	79	16	39
HBsAg prevalence		18.9%	11.2%	2.2%	5.5%

TABLE 6.4

HBe Status of HBsAg Positive Samples
According to their Allocated Groups

HBe Status	Group			(a)+(b)	Total
	(a)	(b)	(c)		
HBeAg	6 (13.9)	1 (6.7)	0	7 (12.1)	7 (7.4)
Anti-HBe	30 (69.8)	5 (33.3)	2 (5.6)	35 (60.3)	37 (39.4)
Neither	7 (16.3)	9 (60.0)	34 (94.4)	16 (27.6)	50 (53.2)
TOTAL	43	15	36	58	94

Percentage shown in brackets

of the markers in groups (a) and (b).

These results suggest that HBe antigen was present in 12.1%-13.9% of the likely HBsAg positive samples. The lack of HBe markers in group (c) samples reinforces the probability that they are not true HBsAg positives, but are indeed result of contamination by 'carry-over'.

Anti-HBc testing:

The 94 sera tested for HBe status were further tested for anti-HBc. The results are shown in Table 6.5. 93.0% and 80.0% of groups (a) and (b) samples showed evidence of anti-HBc, while the marker was only detected in 58.3% of group (c). These results again indicate that group (c) samples are unlikely to have come from true HBsAg positive carriers.

Of the 574 HBsAg negative samples only 560 were available for testing. Overall, anti-HBc was detected in 52.1% of these samples (Table 6.6). The vast majority of this group also had evidence of anti-HBs (see below) whilst anti-HBc was detected as a sole marker in only 24.

Anti-HBs testing:

The 560 samples mentioned above were tested for anti-HBs, 335 (59.8%) samples showed the presence of the marker and 268 (47.8%) of these samples were also positive for anti-HBc.

Unfortunately, the "carry-over" phenomenon was very

TABLE 6.5

Anti-HBc Status of HBsAg Positive Samples
According to their Allocated Groups

Anti-HBc Status	(a)	Group (b)	(c)	Total
Anti-HBc positive	40 (93.0)	12 (80.0)	21 (58.3)	73 (77.7)
Anti-HBc negative	3 (7.0)	3 (20.0)	15 (41.7)	21 (22.3)
Total	43	15	36	94

Percentage shown in brackets

TABLE 6.6

Results of Testing HBsAg Negative Samples
for Anti-HBc and Anti-HBs

	Anti-HBc		Anti-HBs		Anti-HBc +
	Total	Alone	Total	Alone	anti-HBs
Number positive	292	24	335	67	268
Number tested	560	560	560	560	560
Percentage positive	(52.1)	(4.3)	(59.8)	(12.0)	(47.8)

evident and made accurate analysis very difficult. Careful examination of the results indicated that 46 (26%) had ratios greater than 50 and could be considered true.

Because of the conservative manner of interpreting results 26% is likely to be an underestimate of the true prevalence of this antibody in the Sudanese population.

Comparison between West of Scotland and Sudanese Blood Donors

A comparison between the prevalence of the various HBV markers in Sudanese and West of Scotland blood donors is shown in Table 6.7.

In order to give a comparison with the donors in this study, the West of Scotland figures for the prevalences of HBsAg, anti-HBs and anti-HBc relate to male donors. The rate of detection of HBsAg is higher for males than for females in the West of Scotland donor population.

As the 33 donors found positive in Sudan by the CIEP method could not be brought to Scotland for further testing the Sudanese figures for HBe markers relate specifically to the subset of HBsAg positive donors who have under 1 ug/ml of surface antigen. The Scottish data has been corrected accordingly.

In spite of the degree of uncertainty in the data produced by the carry-over problem the pattern of hepatitis B markers in Sudan can be contrasted with the

TABLE 6.7

Comparison of HBV Marker Prevalences in
Sudanese and West of Scotland Male Blood Donors

	Sudan %	West of Scotland %
HBsAg	11.2-13.4	0.16
HBsAg positive donors (less than 1 ug/ml HBsAg concentration)		
HBeAg	12.1-13.9	13.7
anti-HBe	60.3-69.8	82.4
neither	16.3-27.6	3.9
anti-HBc	89.6-93.0	86.3
HBsAg negative donors		
anti-HBc	52.1	1.0
anti-HBs	26.0-59.8	2.0

Scottish data.

Discussion of the Present Study

HBV infection is highly prevalent in many under-developed regions. Unfortunately, no precise incidences can be expressed for the various HBV markers due to the phenomenon of "carry-over".

This phenomenon is marked when sensitive methods of testing are used. The RIA used in this study is capable of detecting a concentration of 0.3 ng/ml HBsAg whereas CIEP methods normally detect approximately greater than 1 ug/ml (Barr and Dow 1981). It is therefore imperative when using such sensitive techniques that carry-over is eliminated. However, the testing of the various markers suggest that the samples regarded as group (a) are in fact true HBsAg positive samples.

The problems of carry-over raise two other strictly technical points. One is the difficulty in obtaining and maintaining technical standards in a community where well educated staff are scarce. The other is the well known issue of "appropriate technology". The CIEP test (as used in the Sudan) is some thousand fold less sensitive than the radioimmunoassay used in Scotland. The use of disposable pipette tips is mandatory in Scotland but is wasteful when less sensitive test methods are used.

The incidence of HBsAg in the population of Sudanese

blood donors was found to be 4.6% by CIEP. This compares favourably with a previously unpublished study (Phrykian et al. (ibid)) conducted in Soba University Hospital where the incidence was found to be 4% by CIEP.

In Sudan it appears from this study that HBsAg has an incidence of 11.2-13.4%, similar to that found in its surrounding countries (Sobeslavsky (ibid)) and is in marked contrast to that in Scotland. This high prevalence is believed to be representative of HBV infection occurring by perinatal or childhood transmission and so maintained through many generations. In addition, customs and practices such as tattooing, scarification, ear-piercing and circumcision which are common in Sudan can contribute considerably to the transmission of HBV.

When a comparison is made between RIA and CIEP for HBsAg detection in Sudanese blood donors, RIA detected 139% (group (a)) more HBsAg carriers than CIEP. This figure would result in an exclusion of 2.4 times as many potentially infective donors than the technique presently used in Sudan.

In this study, there was an unexplained high percentage of HBsAg positive donors whose HBe status could not be determined. It should be noted that the proportion increased progressively from 16.3% (group a) to 94.4% (group c). This high absence in group (c) samples is an

indirect indication that the HBsAg positivity in the group was a result of carry-over.

. However, the prevalence of HBeAg among the HBsAg positive samples tested in Scotland was similar to that found in a Scottish population of HBsAg carriers with similar antigen concentrations.

In Scotland, there is a higher prevalence of HBeAg among donors with higher concentrations of HBsAg (Dow et al. 1980). It would require a further survey to determine whether Sudanese blood donors show the same phenomenon. In view of the restrictions on transporting known pathogenic material by air such a survey should include RIA tests in Sudan.

The value of anti-HBc testing of blood donors is still debatable. In the Scottish population of HBsAg negative male donors less than 1% possessed anti-HBc alone (Barr and Dow (ibid)). On the other hand, 4.3% of the Sudanese population tested showed anti-HBc as the sole HBV marker. Once again, this is in marked contrast with the Scottish population and emphasises the high prevalence of HBV markers in the Sudanese population. The IgM status of these antibodies was not investigated but a number of these donors are likely to be potentially infective.

Anti-HBc is normally found in HBsAg positive carriers. In group (c) the marker was detected in only 58.3%. This

is similar to the incidence of the marker in the HBsAg negative samples (52.1%) and again indicate that group (c) are unlikely to be true HBsAg positive samples.

Although this study did not measure the concentration of anti-HBs in the donor sera the high prevalence of anti-HBs (26-59.8%) suggests that the provision of high titre plasma for the production of anti-hepatitis B immunoglobulin should be fairly easy. If necessary, fresh frozen (or dried) plasma from high titre anti-HBs donors (over 10 iu/ml) could be used (see also Chapter on Tetanus for a discussion of this method).



Figure 1. World Distribution of HBsAg (1)

Sobeslavsky, 1978. ■ The Sudan. NOTE—Previously No Data For Sudan. Present Work Shows Above 10%

6.2 HEPATITIS TYPE A

6.2.1 Background

In 1973, Feinstone et al. (1973) first reported the association of a specific 27 nm virus-like particle found in human faeces with Hepatitis A infection. This particle is now accepted as the Hepatitis A virus (HAV) and is completely distinct from and unrelated to the Hepatitis B virus (HBV). These viruses give rise to separate diseases with no cross-immunity. Hepatitis A has a shorter incubation period usually between 28-45 days.

Prior to the onset of symptoms a brief viraemia can occur followed by faecal excretion of the virus, which cannot usually be detected after the onset of jaundice (Deinhardt 1980). The limited period of viraemia, the lack of any evidence for a long term carrier state (Mosley 1978) and the generally high herd immunity make HAV an uncommon cause of post transfusion hepatitis. The disease is transmitted via the faecal-oral route or from a common oral source such as contaminated food or water.

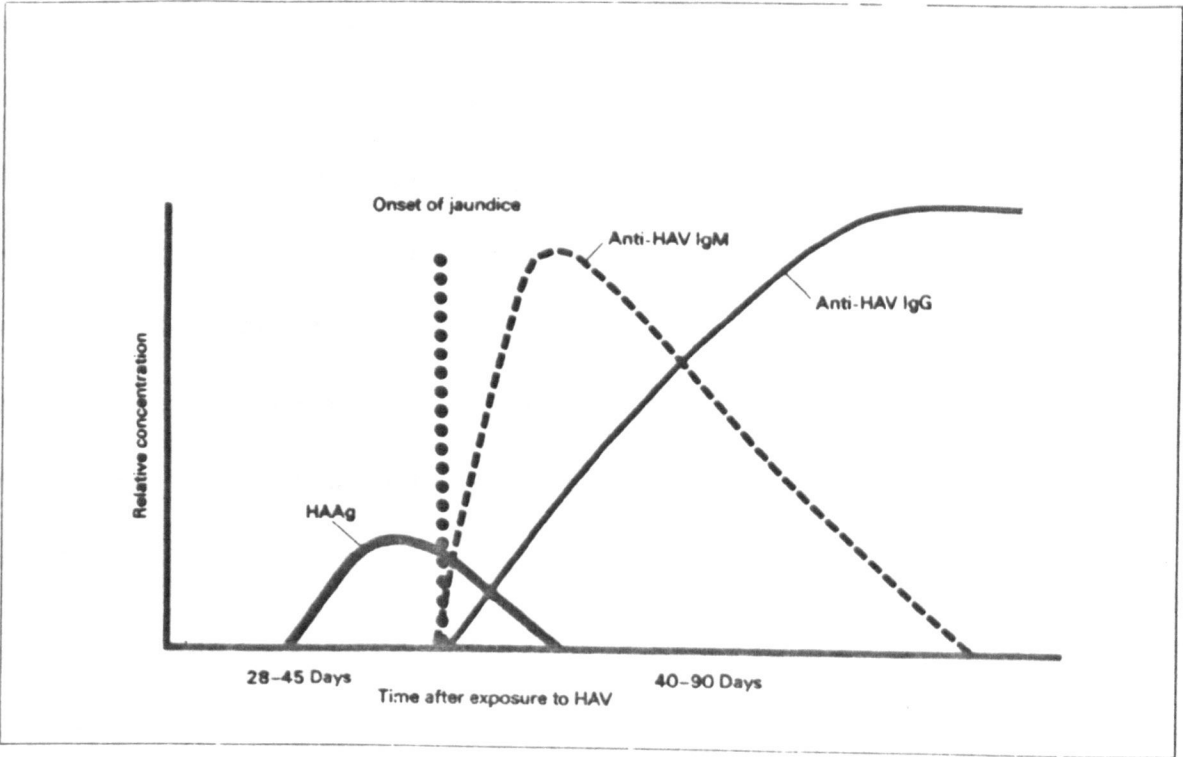
Antibodies to HAV rise very rapidly early in the acute phase and are always present at the onset of clinical disease. Initially, IgM antibody is readily detectable lasting for 3-12 weeks, and its presence in serum is indicative of recent or current infection. IgG antibody appears following the acute period and is usually

detectable for a lifetime. The presence of this IgG marker indicates a previous exposure to HAV with immunity to further HAV infection. Fig. 6.4 shows the serological characteristics in a typical acute case of hepatitis A (Abbott Laboratories).

Testing for anti-HAV in contrast to the HBV markers has limited uses for Blood Transfusion Services. These are:

- 1) Investigation of the cause of a post transfusion hepatitis incident to confirm or eliminate HAV. Elimination of HAV and HBV would indicate the possible involvement of other viruses such as non-A non-B etc.
- 2) Where there is poor immunity in the donor population, it would be beneficial to screen for high titre IgG antibodies to provide either a specific or normal immunoglobulin.
- 3) Epidemiological investigations of donor populations.

Fig.6.4 Anti-HAV in acute Hepatitis A infection



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6.2.2 Present Study

Introduction

. Hepatitis A occurs most frequently in children and young adults. Its endemic and epidemic occurrence is, however, largely determined by environmental and socioeconomic factors. The disease is now considered one of the major Public Health problems in Africa.

Although sensitive tests are now available to detect antibody to HAV, there have been little data on the prevalence of antibody in Sudan. This study attempts to determine the prevalence of anti-HAV in the population surveyed.

Materials and Methods

Samples:

A total of 574 serum samples were examined. The samples consisted of 557 blood donors, previously tested and found HBsAg negative in the hepatitis B study and 17 children between 11-15 years of age.

Technique:

The samples were tested using a commercially available solid phase radioimmunoassay (Abbott Laboratories).

Detailed description of testing is recorded in Appendix 2.

Results

The results of testing are shown in Table 6.8. Of the

TABLE 6.8

Results of Testing HBsAg Negative
Samples for Anti-HAV

	Donors	Children
Number positive	542	14
Number tested	557	17
Percentage positive	(97.3)	(82.3)

557 blood donors, 542 (97.3%) had detectable anti-HAV and 14 (82.3%) of the 17 children were found to possess the antibody. Results of the donors should be interpreted with caution as "carry-over" problems noticed in the Hepatitis B study will influence the findings. On the other hand, the children's sera were separated using individual pipettes and therefore is unaffected with this phenomenon.

Discussion of the Present Study

Unlike the HBV study, it was difficult to determine the influence of "carry-over" on the prevalence of anti-HAV. However, the finding of 82.3% of anti-HAV in the small group of children examined, suggests that if the age-related pattern reported by other workers (Follett et al. 1980 and Gust et al. 1978) is maintained, the prevalence in the group of male donors studied is likely to be in the order of 90%.

These results confirm that HAV infections are common in Sudan. The prevalence of the antibody is greater than that found in Western Europe where reports have varied from 13% (Sweden) (Banatvala and Thorogood 1980), 17% (Norway) (Banatvala and Thorogood (ibid)), 39% (Switzerland) (Banatvala and Thorogood (ibid)) to 75% (France) (Banatvala and Thorogood (ibid)). In the West of Scotland it varied with age from 57% to 83% (Follett et al. (ibid)).

The findings of the survey suggest quite clearly that a normal immunoglobulin product produced from the plasma

from the donor population in the Sudan, should provide material suitable for passive protection from the disease.

The Implication of this Study in the Sudan

It is clear from the results of the Sudanese samples of blood donors tested for HBsAg by Counterimmuno-electrophoresis in the Sudan and retested by Radioimmunoassay in Scotland that there is a difference of 6.6-8.8% of increased incidence.

Therefore, it means that among every 100 recipients there is 7.8 who are transfused with infected whole blood. The risk may be doubled or tripled if component therapy were to be used. The risk remains still high even if we expect the HBsAg positive (13%) and/or anti-HBs positive (26%) recipients are excluded from the calculations.

When looking at such a problem from a humane point of view it is an obvious considerable risk which should be urgently dealt with but economic restrictions always impose priorities. In the Sudan, at the present time, there may be more important aspects of health care that need attention. Nevertheless this, in my mind, should be considered a problem with high priority. Would the elimination of this extra 8 units per 100 be tolerated by the limited transfusion service in the Sudan?

Admittedly, it is difficult for the conditions in the Sudan to tolerate such high rate rejection but, on the other

hand, the risk described above is even more difficult to accept. It is unethical and criminal to transfuse such blood to patients at a time when there is a method to detect the virus. Prospects for the Sudan will require more effort to motivate more donors and this is in a way should compensate for the high rejection rate that will result from the more sensitive technique as discussed in the Chapter earlier.

Which technique to choose

When choosing any technique for a routine screening of blood donors one should choose a simple, specific, sensitive, reliable and cheap one.

In comparing the three commonly used tests, that is to say, Counterimmunoelectrophoresis (CIEP), Radioimmunoassay (RIA) and Reverse passive haemoagglutination (RPHA) in relation to the above criteria the outcome is summarised as follows:

	<u>CIEP</u>	<u>RIA</u>	<u>RPHA</u>
Simplicity	+ + +	+ +	+ +
Specificity	+ + +	+ + +	+ +
Sensitivity	+	+ + +	+ +
Cost	+	+ + +	+ +

The most expensive of the three methods is RIA, however has the advantages of being a relatively simple test. It has also got extremely good specificity and sensitivity.

CIEP, on the other hand, is probably the cheapest test available today. It has good specificity but with the disadvantage of poor sensitivity. RPHA is placed midway between CIEP and RIA. This technique is simple, of fairly good specificity and is of greater sensitivity than CIEP.

To improve the sensitivity over the CIEP with the least increasing cost, that means both the equipment and cost per test, RPHA could be recommended.

Another technique which may be as efficient as RIA is the enzyme-linked immunosorbent assay (ELISA). The principle of this test is similar to RIA except enzyme label is used instead of radiolabel.

A substrate is added which changes colour to indicate positivity and the result is read in spectrophotometer or visually. It is slightly more complicated than RIA, although equally sensitive and specific.

The important advantages of ELISA technique are that the kits are stable for one year and that there are no special precautions to be taken as is the case for radioactive labelled material.

It is not as widely used as RPHA and that is why RPHA remains the first choice for a country like Sudan that needs a simple, sensitive, specific, reliable screening technique.

Anti-HBsAg positive donors screening could help to identify a number of potential plasmapheresis donors for the

preparation of anti-HBs immunoglobulin along the same lines of anti-tetanus immunoglobulins discussed in more detail in Chapter 5.

CHAPTER 7

FINAL CONCLUSIONS AND COMPARISONS

(A SUMMARY)

The principal aim behind this comparative study is to bring up the Blood Transfusion Service in the Sudan, if not to the same level of Glasgow and West of Scotland (Blood Bank) then at least to an acceptable standard.

The Glasgow and West of Scotland Blood Transfusion Service covers an area from Oban in the North to Dumfries in the South and to Grangemouth in the East, in other words half of Scotland (Map 2.1, Chapter 2).

The Khartoum Central Blood Bank covers an area of Khartoum between the two Niles, East of the Nile and West of the Nile.

In order to maintain a sufficient supply of blood to ensure that calls from Hospitals in Glasgow and the West of Scotland are answered, the Organising Secretary prepares a programme of visits by three traditional Mobile Teams and two Mobile Donating buses. These programmes are made up two to three months in advance and at all times the Organising Secretary keeps a copy of these programmes making changes as appropriate from day to day and once she knows a visit has been confirmed, either by letter or a telephone call, she sets in motion the publicity which is required. In the case of a town or a factory which they have previously visited, this entails checking the type of publicity sent when they last paid a visit to the particular town or factory and adding in any details which

may further publicise their visit and perhaps choosing a particular poster relative to where the withdrawal session is being paid.

The principal basis of the plan of action for Khartoum Central Blood Bank is to change the present system in which only representatives of the Ministry of Health are responsible for all aspects of the Blood Transfusion Service. This is to be changed to a National System in which the door is left open to all volunteers who have an interest to help the Blood Transfusion Service.

Although regular blood donations represent the greatest support for the Blood Transfusion Service, support may also be given to the Service in other ways. For example, by recruiting voluntary blood donors, by raising funds to help the Service in all aspects which could otherwise not be supported by Government funds, by providing transportation for the donors from their communities to the bleeding sessions and back, by providing accommodation or hostessing the donors coming to these sessions or by offering professional experience as Honorary Secretaries, Honorary Treasurers, Honorary Auditors, etc.

Any achievements to bring up the Blood Bank of Khartoum to an acceptable standard will be difficult unless all the obstacles which are facing it are solved and these

are:

1. Recruiting voluntary blood donors.
2. Raising funds to help the Service.
3. Involve female donors in participating in blood donation.
4. Preparation for mobile bleeding sessions.
5. Keeping donor records up to date.
6. Continuous communication with the donors and their local community organiser appreciating their role and encouraging them to continue their ever needed help.
7. Medical examination of blood donors and blood withdrawal in the Transfusion Centre as well as in the mobile sessions.
8. Plasmapheresis both for the purpose of supplying suitable blood fractions or reagents and for therapeutic purposes.

This survey presented findings from two studies concerned with the recruitment of voluntary blood donors in Glasgow and West of Scotland and Khartoum central area. Such studies as these are important for the development of a new Volunteer Blood Transfusion System.

In interpreting these results of the Scottish and the Sudanese Surveys, a distinction should be made between what Scottish and Sudanese donor report was the major motive for

giving blood and what was the main reason for not giving.

The results of these studies suggest the following:

. The primary motivations expressed by donors of the Scottish Survey included expressions of general altruism.

65% of the respondents gave their blood for
a desire to help

16% of the respondents gave their blood
influenced by a friend

11% of the respondents gave their blood in
response to an appeal

10% of the respondents gave their blood to
repay a transfusion

2% of the respondents gave their blood witnessing
an accident

The Sudanese donor responded with 80% to help
relatives.

The reasons for not giving blood as expressed by
donors of the two surveys are quoted according to its
importance.

i	Fear of the needle	64%
ii	Fear of adverse reactions	28%
iii	Unaware of the need	19%
iv	Indifference to the need of the community	9%

According to the results of the Sudanese survey:

i	Adverse reactions	68%
ii	Future health risks	65%
iii	Unaware of the need	54%
iv	Fear of the needle	26%
v	Religious reasons	7%

There is no obvious difference between the Scottish donors and the Sudanese one who were not socially involved and still come to donate. 79% responded to the Scottish Survey and 77% responded to the Sudanese Survey. This group might have altruistic behaviour if the other reasons for their donation had been known. 96% of the respondents of both Surveys were against the idea of payment. This shows that both donors of the two Surveys support the voluntary organised system.

To call our attention to the fact which attract donors to come and give blood, an attempt was made to see if mass media and advertisement could play a part in attracting donors.

School education appeared to be the most important factor to motivate donors in the Scottish Survey. 44% of the donors responded positively to it, while Radio appear to be the most important means of motivation in the Sudan. Both donors of the Sudanese and Scottish Surveys supported television to be second of its importance in recruiting

donors.

Radio, television and newspapers appeared to be third of importance according to the results of the Scottish Survey and school education according to the results of the Sudanese Survey.

Finally, the profiles produced represent a composite of the most relevant characteristics found in each of the two societies. This does not mean that other types of people cannot be found. Since approximately equal number of males and females donate blood in West of Scotland the average profile tends to be in the case of males from the younger age group; live in town; married; technically trained; from Social Class III and the major reason for their donation is altruism. In the case of females, tends to be from the younger age group; live in town; single; school-leavers; from Social Class III and the major reason for their donation is altruism.

In contrast, the Sudanese donor tends to be male; from the younger age group; live in the city; single; with lower education; from Social Class IV and the major reason for his donation is humanitarian. It is important to note that female donors do not exist in the Sudan except for the odd ones who appeared in the survey.

The immunity to tetanus in Sudanese blood donors is very poor, only 13 (2.5%) out of 524 have levels of ≥ 0.01 iu/ml. On the other hand, immunity against tetanus

in vaccinated subjects (school girls and boys) is high, 13 (86.7%) out of 15 pupils have immunity levels. 2 out of 15 with levels ≥ 10 iu/ml and 11 out of 13 with levels ≥ 0.01 iu/ml.

The difference between the immunity of the Sudanese Blood Donors and Scottish Blood Donors to tetanus is quite high. This is clearly seen when comparing the results of Sudanese blood donor population with the results of the West of Scotland blood donors screened in Glasgow and West of Scotland Blood Transfusion Service (Dow et al. 1982) as shown below.

	Number tested	Number >0.01 iu/ml	Percentage
Sudanese Blood Donors	524	13	2.5
West of Scotland Blood Donors	319	217	68.0

The poor immunity of Sudanese blood donors reflects the lack of active immunisation in the Sudanese population and consequently this explains the high morbidity and mortality of tetanus among Sudanese.

This emphasises the need for a panel of donors with high titre to produce plasma rich in anti-tetanus immunoglobulins. Passive immunisation is a necessity to protect high risk injuries in a country where comprehensive mass vaccination programme, which is the ultimate goal, may take many years to be started.

Actively vaccinated subjects like the school boys

mentioned in the tetanus chapter could be followed up, boosted and plasmapheresed. Others from the Meat Market, Agricultural and other high risk areas could be requested from a health care point of view to be vaccinated and to be the base for a voluntary donation of plasma.

The screening of Sudanese blood donors for HBsAg by Radioimmunoassay (RIA) reveals a greater percentage of 11.2-13.4 in contrast to the 4.6% of positives detected by counterimmunoelectrophoresis (CIEP).

The results of screening of Sudanese samples for HBsAg by a more sensitive technique than by counterimmuno-electrophoresis used in the Sudan reveals a higher percentage of infected blood than is really detected at the moment in the Sudan.

From a humane point of view, a more sensitive technique for screening blood donors in the Sudan is a must.

Certain habits such as scarification, cauterization and ear piercing should be abandoned. Circumcision, deliveries etc. should be done under strict hygienic measures.

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VOLUME TWO

BLOOD DONOR MOTIVATION AND RECRUITMENT.

A COMPARATIVE STUDY IN WEST OF SCOTLAND AND THE SUDAN

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APPENDIX 1

TABLE 1.1.1Khartoum Teaching HospitalCentral Blood Bank - Annual Report

Total Collection, Stock and Issues
and Exchange with other banks

	A+	A-	O+	O-	B+	B-	AB+	AB-	Total
Remaining stock	6	1	10	2	2	-	4	-	25
Total collection	1556	93	2462	110	886	66	278	30	5481
Obtained from other Banks	133	31	138	22	61	14	34	9	442
Total units available	1695	125	2610	134	949	80	316	39	5948
Total issues	1574	109	2465	107	862	73	284	35	5519
Remainder	121	16	135	27	87	7	32	4	429
Returned to other Banks	92	16	89	24	75	5	27	4	332
Remaining stock	29	-	46	3	12	2	5	-	97

TABLE 1.1.2Activity of the Omdurman Civil Hospital Blood Bank 1980

Blood Group	O		A		B		AB		Total
Month	-	+	+	-	-	+	-	+	
January	67	4	64	1	39	1	5	-	190
February	116	1	88	-	42	1	5	-	253
March	15	2	87	1	36	-	9	1	151
April	64	4	47	5	31	2	6	-	159
May	73	8	457	4	36	-	1	-	179
June	87	2	77	-	32	3	9	1	210
July	67	4	44	4	23	-	6	-	148
August	75	2	42	1	30	-	7	-	157
September	117	4	69	4	58	-	10	-	262
October	11	6	71	3	52	6	7	3	159
November	11	3	64	3	51	1	10	-	143
December	84	4	61	3	45	-	3	-	200
Total	791	44	771	39	475	14	78	4	2211

TABLE 1.1.3Donors (Khartoum - North Bahary)Annual Report

Intake during 1980 according to blood groups
and profession of donors

Blood Groups and Occupation	O		A		B		AB		Total		Over- all Total
	-	+	-	+	-	+	-	+	-	+	
Industrial Workers	14	347	10	189	3	150	1	19	28	705	733
Soldiers	5	109	2	64	1	33	1	10	9	216	225
Officials	5	88	3	52	1	29	-	6	9	175	184
Agricultural Workers	4	49	1	23	-	7	-	2	7	81	88
Other Occupation	6	155	3	85	-	48	2	8	11	296	309
Total	34	948	19	413	5	267	4	45	64	1473	1537

TABLE 1.2

Distribution of blood groups of ABO system and
of Rhesus Factor in donors and patients

Haematology Department, Soba University Hospital

No.	Distribution of blood groups (%)				Distribution of Rhesus Factor	
		O	A	B	AB	Rh+ Rh-
Donors	1144	505 44.1%	326 28.49%	246 21.5%	67 5.85%	1076 94.05% 63 5.5%
Patients	1943	868 44.67%	583 30%	400 20.58%	92 4.73%	1808 93.05% 135 6.94%
Total	3087	1373 44.47%	909 29.44%	646 20.92%	159 5.15%	2884 93.42% 198 6.41%

TABLE 1.3

The Distribution of the Human Blood Groups: Sudan

Place	Population	Authors	Number	O	A	B	AB
4587							
Khartoum and Omdurman		Medulla 1931 ⁶⁴⁶	35 (c)	15 42.86	9 25.71	10 28.57	1 2.86
		Brooks et al 1952 ¹²⁰	133	64 48.12	33 24.81	27 20.30	9 6.77
	(s) Bani 'Amer	Corkill 1949 ¹⁸⁶	89	37 41.57	20 22.47	23 25.84	9 10.11
	(s) Danaglia	Corkill 1949 ¹⁸⁶	63	27 42.86	18 28.57	14 22.22	4 6.35
	(s) Dinka	Corkill 1949 ¹⁸⁶	56	27 48.21	16 28.57	8 14.29	5 8.93
Southern Sudan	(s) Dinka	Rife, D.C. 1952 ⁷⁸⁹	121 (c)	64 52.89	34 28.10	18 14.88	5 4.13
	(s) Fur	Corkill 1949 ¹⁸⁶	77	36 46.75	19 24.67	19 24.67	3 3.90

TABLE 1.3 (cont'd.)

Place	Population	Authors	Number	O	A	B	AB
	(s) Ja' Aliyin	Corkill 1949 ¹⁸⁶	206	105 50.97	55 26.70	38 18.45	8 3.88
Dilling area	(s) Nuba	Corkill 1949 ¹⁸⁶	380	168 44.21	130 34.21	66 17.37	16 4.21
Southern Sudan	Nuer	Rife, D.C. 1952 ⁷⁸⁹	100 (c)	52 52.00	28 28.00	17 17.00	3 3.00
	Shaigiya	Corkill 1949 ¹⁸⁶	432	192 44.44	111 25.69	106 24.54	23 5.32
Southern Sudan	Shilluk	Rife, D.C. 1952 ⁷⁸⁹	91 (c)	48 52.75	18 19.78	22 24.17	3 3.30
	Ta' Aisha	Corkill 1949 ¹⁸⁶	77	33 42.86	24 31.17	14 18.18	6 7.99

(Mourant et al. 1976)

TABLE 1.4

Ministry of HealthDepartment of Medical Statistics and ResearchDistribution of Hospitals according toDistricts of Administration 1980

	Name of Hospital	Number of Beds	Observations
Between the two Niles	Khartoum	865	Different specialities
	Chest (El-Shaab)	207	Chest diseases, cardiology and neurosurgery
	Eye	125	Ophthalmology
	Soba	400	Different specialists
	Radio therapy	44	Radio therapy
	Gabal El Awlia	56	
	Dental	20	Dental surgery
	El-Sahafa-East	-	Different specialists
	El-Sahafa-West	12	
	Paediatrics (Khartoum)	158	Diseases of children
East of the Nile	Khartoum North (Bahary)	411	Different specialists
	Hag-El Saafi	-	
	Abu-Dleig	40	
	Um-Doan-Ban	21	
West of the Nile	Omdurman	486	Different specialists
	Maternity Omdurman	95	Obstetrics
	El Buluk	96	Gynaecology, obstetrics and paediatrics
	Abu-Anga	213	Chest Hospital (Sanatorium for TB)
	El Tigani El Mahi	95	Psychiatry and neurology
	Tropical Diseases	132	Tropical Diseases
	Awad Hussain	-	
	El Daw Omdurman	52	
Total	22	3528	Total number of beds in Capital

TABLE 1.5

Ministry of HealthDepartment of Medical Statistics and ResearchDistribution of beds according to Medical Specialities Khartoum Province 1980

	Medical	Surgical	Emergency	Gynaecology & Obstetrics	Paediatrics	Chest	Neurology & Psychiatry	Orthopaedics	Ophthalmology	Ear, nose and throat Skin	Radio-therapy	Urology	Infectious diseases	South Block	Others Beds	Total	
1. Khartoum	218	183	-	141	-	-	32	110	-	56	36	-	35	33	31	-	875
2. Chest (El Shaab)	-	-	-	-	-	207	-	-	-	-	-	-	-	-	-	-	207
3. Eye	-	-	-	-	-	-	-	-	125	-	-	-	-	-	-	-	125
4. Soba	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	400	400
5. Radio therapy	-	-	-	-	-	-	-	-	-	-	44	-	-	-	-	-	44
6. Gabal-Awlia	34	-	-	12	10	-	-	-	-	-	-	-	-	-	-	-	56
7. Dental (Khartoum)	-	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20

TABLE 1.5 (cont'd.)

	Medical	Surgical	Emergency	Gynaecology & Obstetrics	Paediatrics	Chest	Neurology & Psychiatry	Orthopaedics	Ophthalmology	Ear, nose and throat	Skin	Radio-therapy	Urology	Infectious diseases	South Block	Others Beds	Total
8. El-Sahafa-East	-	-	-	-	NO BEDS IN THE HOSPITAL	-	-	-	-	-	-	-	-	-	-	-	12
9. El-Sahafa-West	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	158
10. Paediatrics (Khartoum)	-	-	97	-	61	-	-	-	-	-	-	-	-	-	-	-	411
11. Bahary	94	100	-	71	43	-	-	10	40	-	17	-	14	22	-	-	411
12. Hag-El Saafi					NO BEDS IN THE HOSPITAL												
13. Abu-Dleig	13	12	-	5	5	-	-	-	-	-	-	-	-	5	-	-	40
14. Uh-Daw-An-Ban	14	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	21
15. Omdurman	148	173	-	53	-	-	-	-	42	15	-	-	-	55	-	-	486

TABLE 1.5 (cont'd.)

	Medical	Surgical	Emergency	Gynaecology & Obstetrics	Paediatrics	Chest	Neurology & Psychiatry	Orthopaedics	Ophthalmology	Ear, nose and throat	Skin	Radio-therapy	Urology	Infectious Diseases	South Block	Others Beds	Total
16. Maternity Omdurman	-	-	-	95	-	-	-	-	-	-	-	-	-	-	-	-	95
17. El Buluk	-	-	-	36	60	-	-	-	-	-	-	-	-	-	-	-	96
18. Abu Anga	-	-	-	-	-	213	-	-	-	-	-	-	-	-	-	-	213
19. El Tigani Elmahi	-	-	-	-	-	-	95	-	-	-	-	-	-	-	-	-	95
20. Tropical Diseases	48	-	-	-	12	-	-	-	-	-	-	-	-	72	-	-	132
21. Awad Hussain	NO BEDS IN HOSPITAL																
22. El-Daw Omdurman	39	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-	52
Total	620	478	97	413	211	420	127	120	207	71	53	44	49	187	31	400	3528

TABLE 1.6.1Khartoum Teaching HospitalCentral Blood Bank

Monthly intake according to blood groups and
profession of donors for 1980

Occupations	A+	A-	O+	O-	B+	B-	AB+	AB-	Total	%
Soldiers	346	27	549	37	223	8	71	6	1267	23.1
Industrial Workers	553	29	760	29	296	21	71	9	1768	32.3
Officials	316	17	508	25	191	23	64	10	1154	21.1
Agricultural Workers	75	6	182	-	63	6	22	5	358	6.5
Self- employed	266	14	463	19	113	9	50	-	934	17
Total	1556	93	2462	110	886	66	278	30	5481	100

TABLE 1.6.2Khartoum Teaching HospitalCentral Blood Bank - Annual Report

Table to show blood obtained from other Banks

Blood Banks	A+	A-	O+	O-	B+	B-	AB+	AB-	Total
Omdurman	45	20	31	4	20	1	14	7	142
Bahary (Khartoum - N)	31	11	32	7	16	6	5	2	110
Military	27	-	36	6	13	3	9	-	94
Soba	30	-	39	5	12	4	6	-	96
Others	-	-	-	-	-	-	-	-	-
Total	133	31	138	22	61	14	34	9	442

TABLE 1.6.3Khartoum Teaching HospitalCentral Blood Bank

Blood collected by Khartoum Blood Bank
on behalf of other hospitals

Blood Banks	A+	A-	O+	O-	B+	B-	AB+	AB-	Total	%
Omdurman	80	5	30	4	31	2	5	-	127	38.3
Khartoum-N	24	5	28	12	24	1	11	2	107	32.2
Military	15	2	14	7	13	1	5	2	59	17.8
Soba	3	4	17	1	7	1	6	-	39	11.8
Total	92	16	89	24	75	5	27	4	332	100

TABLE 1.6.4Khartoum Teaching HospitalCentral Blood Bank - Annual ReportIssues to Gynaecology and Obstetrics Breakdown
by Age and Blood Group

Ages	A+	A-	O+	O-	B+	B-	AB+	AB-	Total
15-24	142	6	200	3	99	3	20	-	473
25-44	226	30	339	21	92	16	34	3	761
45+	57	3	69	-	37	1	5	-	172
Total	425	39	608	24	228	20	59	3	1406

TABLE 1.6.5Khartoum Teaching HospitalCentral Blood Bank

Blood used during 1980 by speciality and by group

Sections	A+	A-	O+	O-	B+	B-	AB+	AB-	Total	%
Gynaecology	425	39	608	24	188	20	59	3	1366	24.8
Surgery	288	13	660	23	175	8	64	9	1240	22.5
Medical	364	30	647	24	268	22	73	17	1445	26.2
Radio therapy	61	5	83	5	32	11	15	4	216	3.9
Ear, Nose and throat	71	5	98	5	28	4	9	4	224	4.0
Paediatrics	161	9	188	17	86	7	33	-	201	9.1
Chest (El Shaab)	117	4	104	5	41	1	15	-	287	5.2
South Block	70	4	71	4	34	-	13	-	196	3.6
Others	17	-	16	-	10	-	3	-	146	8.0
Total	1574	109	2475	107	862	73	284	37	5519	100

TABLE 1.7Khartoum North (Bahary)Annual Report 1980

Blood used during 1980 in Khartoum North Hospital
broken down by speciality and blood group

Blood Groups	O		A		B		AB		Total		Over- all Total
	-	+	-	+	-	+	-	+	-	+	
<u>Ward</u>	.										
Surgical	10	254	6	143	-	98	-	12	16	507	523
Obstetrics	15	141	10	66	-	47	2	4	27	258	285
Gynaecology	2	93	-	42	-	30	-	3	2	168	170
Medical	3	131	2	91	-	46	1	7	6	275	281
Paediatrics	1	74	2	45	-	24	1	7	4	150	154
Quarantine	-	12	-	4	-	7	-	-	-	23	23
Skin	-	1	-	1	-	-	-	-	-	2	2
Fistula	1	20	-	11	1	10	-	-	2	41	43
Life Hospital	2	22	-	19	-	11	-	-	2	52	54
Total	34	748	20	422	1	273	4	33	59	1476	1535

XIVth Congress
Of the International Society of Blood Transfusion
"Voluntary Non-Remunerated Donation of Blood"

The General Assembly
of the International Society of Blood Transfusion

being aware of the importance to transfusion of the resolution
unanimously adopted at the 28th World Health Assembly;

bearing in mind the resolution of the XXIInd International
Conference of the Red Cross;

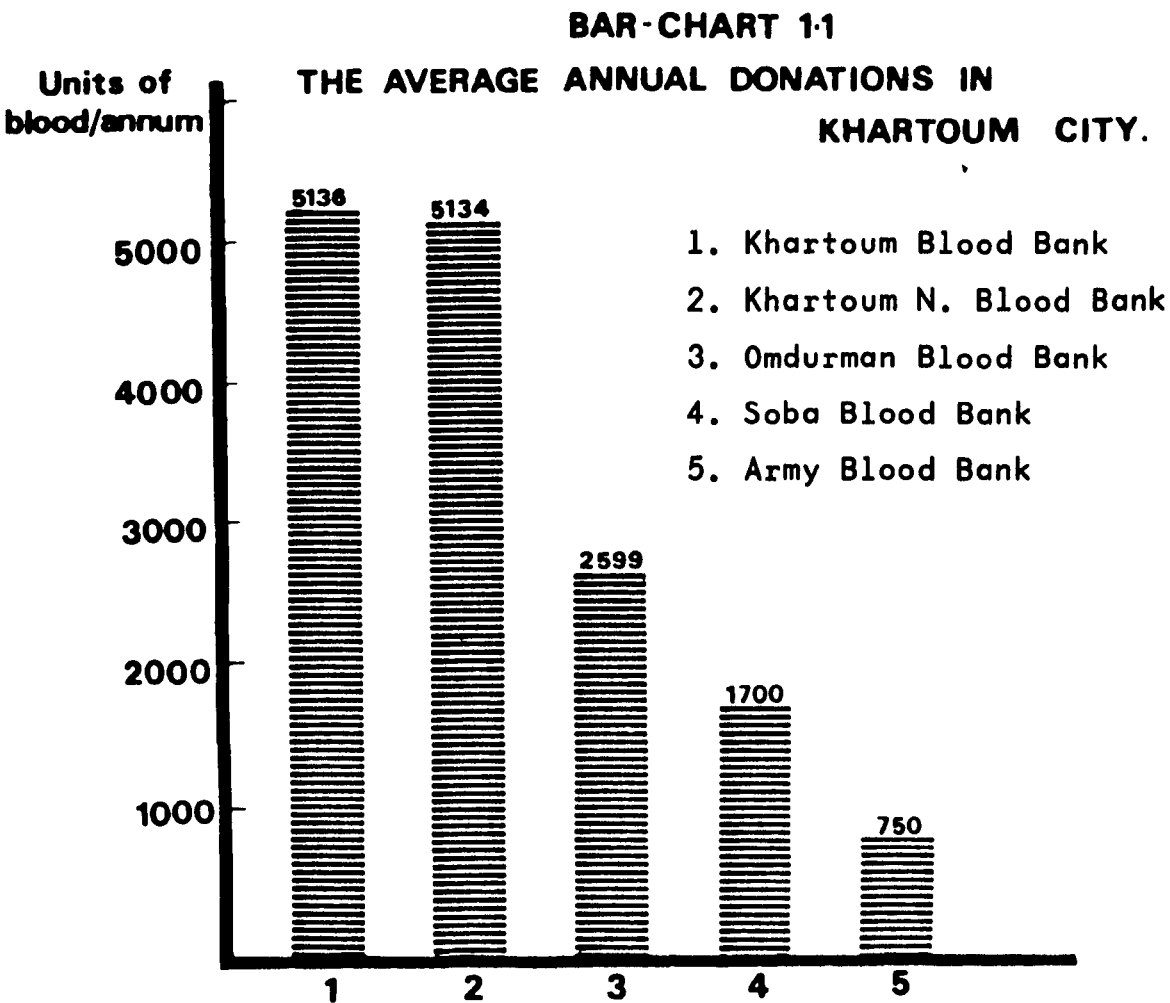
taking note of the recommended measures of the Council of
Europe Subcommittee of Specialists on Blood Problems in 1973;

reaffirms its support for the development of national blood
services based on voluntary non-remunerated donation of
blood;

urges all Governments, when appropriate in collaboration
with the League of Red Cross Societies

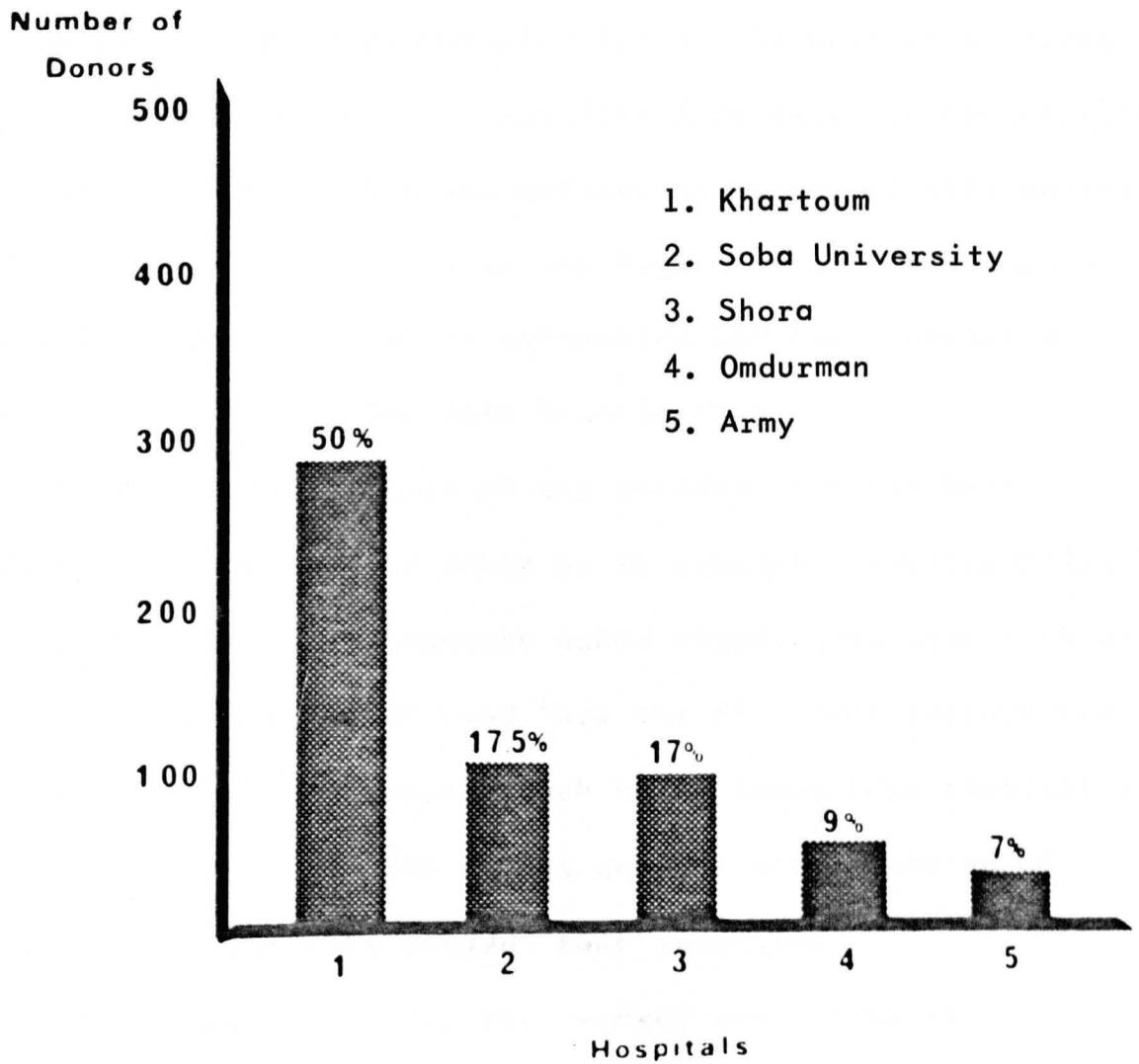
- (a) to develop a safe blood transfusion service sufficient
for the needs of all their citizens;
- (b) so to plan that blood services with sufficient donors
for their national needs make available a surplus of
blood and blood components for distribution to the
transfusion service of any country in need.

Helsinki, July 30th, 1975



NOTE: Khartoum N Civil Hospital not included in the survey.

APPENDIX 2

Bar Chart 2.1. Sample Size in Different Hospitals

PILOT STUDY

This pilot study was initially carried out on behalf of the author by Crawford Ross, a student of Edinburgh University, since the main part of this thesis is concerned with donor motivation. It was apparent though that Dr. Mitchell, the Regional Director of the West of Scotland Blood Transfusion Service, was also interested in the results of such a survey. This was because no survey of this nature had ever been carried out in the Region before, although an in-depth analysis of donor motivation had been completed by Professor Titmuss, "The Gift Relationship".

At the initial stages it was decided that the best approach to the subject would be to compile a questionnaire to answer. The questionnaire asked simple questions such as "why do you give blood?" and "how the BTS can encourage more donors", to try and compile such basic ideas into statistics which could help the BTS in its general understanding of donors and maybe even produce some surprises.

The method chosen for this survey was a compact questionnaire containing thirteen short, simple, impersonal questions. It was decided that the majority of the survey would be done at the St. Vincent Street Donating Centre, for a wide variety of ordinary "off the street" donors.

At the same time, a survey was carried out at four town sessions, Easterhouse, Drumchapel, Milngavie and Clarkston.

These sections would give us a comparison between two more middle-class owner-occupier areas and two working class areas and their attitudes towards donor motivation.

At St. Vincent Street, the Centre averaged round 60-70 donors per day. The pilot study surveyor interviewed 1 in 4 donors and sometimes had to interview groups of donors together.

At the town sessions, which averaged around 180 donors, the Centres were usually full. The surveyor interviewed mostly housewives, since he attended sessions until 5.30 pm, missing the working husbands who attended in the evening.

Results of this study revealed that:

- (a) At St. Vincent Street, the younger age groups of 18-20 and 21-30 were much more prominent.

At town sessions, Milngavie and Drumchapel surveys showed that more middle-aged women, elderly people attended. The Easterhouse survey was in general accordance with the St. Vincent Street age group distributions.

- (b) From the nine alternative reasons "for giving blood" which were set in the questionnaire, the highest response was "helping people", 27% at St. Vincent Street, 40% at Drumchapel, 30% at Easterhouse.

- (c) 41% of the donors response was to television as

the best "way of encouraging more donors".

Second of importance was radio - 12% of the respondent. Lectures and newspapers finished with 10% and 11% of the answers respectively.

Television was the popular choice of all three questions.

- (d) From the result most people give blood twice a year (41%) or more (39%).

People who only give yearly or less, tend to agree that it is not frequent enough; yearly 89% and less 64%.

- (e) More than one-third of the donors (37%) were in favour of regular compulsory donations.

- (f) 66% said that it would make no difference if transport was arranged.

55% of the donors belong to a voluntary organisation.

The town sessions were of no great value overall. No overall pattern from the sessions arose.

There were no Clarkston results and Drumchapel and Easterhouse are not similar as it was expected. So no comparison with Milngavie could be made. That was due to the random selection that was necessary. Finally, although this survey and subsequent report has not been as detailed and conclusive as one might have hoped, some of its failures and successes will be considered when compiling the main study.

TESTING FOR ANTI-HAV

This was performed using the commercially available radioimmunoassay test, Havab (Abbott Laboratories Ltd.). Basically, the technique involves competitive inhibition of radiolabelled anti-HAV. Test sera is mixed with radiolabelled anti-HAV and a HAV Ag coated bead is dropped into the mixture. If no anti-HAV is present in the test sample a high count will result. However, if anti-HAV is present in the test sample this will compete with the radiolabelled anti-HAV for the sites on the solid phase and thus a low count will result.

Assay Procedure

A worksheet is prepared for the samples to be tested.

10 ul of test serum is dispensed into the appropriate well of a reaction tray.

Controls are also set-up - 3 negative controls and 3 positive controls.

After all sera have been dispensed 0.2 ml of radiolabelled anti-HAV is added to each well and the reaction tray is gently tapped. HAV Ag coated beads are then dispensed (one bead per well) and the plate is sealed with a cover tapped gently and left at room temperature (18-22°C) overnight (16-20 hours).

The cover is then removed and the wells are aspirated and washed with 5 ml distilled water (ie 5 ml per well)

using the washing system previously described (HBsAg test Assay Procedure). The process of washing and aspiration is repeated 3 times. The beads are then transferred to labelled counting tubes, which are then counted for one minute on the NE1600 gamma counter.

The cut-off point for the test is obtained by taking the mean of the 6 control results, ie

$$\frac{\text{mean of the negative controls} + \text{mean of the positive controls}}{2}$$

2

Any sample with a count below the cut-off point is regarded as positive for anti-HAV. Any sample with a count above the cut-off point is regarded as negative for anti-HAV.

All materials used are discarded in the appropriate manner. The amount of radiolabel used is recorded.

SOLID PHASE RADIOIMMUNOASSAY TEST FOR THE
DETECTION OF TETANUS ANTIBODIES (TETAB RIA)

MATERIALS AND METHODS

Preparation of beads coated
with tetanus toxoid

Quarter inch (6.4 mm) diameter polystyrene beads (Precision Ball Co., Chicago, USA, or Euramatic Ltd., Brentford, Middlesex, UK), were coated with tetanus toxoid (1000 LF/ml) (XT09) (Wellcome Reagents Ltd., Beckenham, UK) at a 1 in 1000 dilution (ie 1 LF/ml) in coating buffer (0.05M carbonate bicarbonate buffer pH 9.6 containing 0.01% sodium azide) by immersion for three days at room temperature. The beads were then washed twice with phosphate buffered saline (PBS) containing 0.05% Tween 20 air dried on paper towels, and stored at 4°C for a maximum of two months.

Preparation of radiolabelled
tetanus toxoid

Tetanus toxoid (40 LF/ml, Wellcome Tetanus vaccine BP in simple solution) was radiolabelled by the chloramine-T method of Hunter and Greenwood (1962). Free iodide was removed by gel filtration on Sephadex G-25. The labelled toxoid was stored at 4°C in PBS containing 10% BSA. Prior to use the radiolabelled toxoid was diluted in PBS

containing 30% normal rabbit serum (SAPU) to produce counts of approximately 40,000 to 50,000 cpm per test.

The Tetab test

For maximum sensitivity neat sera should be used in the test. However, the test can also be used for quantitation of tetanus antibody levels and for this procedure sera should be tested at various dilutions using PBS containing 10% normal rabbit sera as diluent.

Ausria-II (Abbott Laboratories Ltd., Chicago, USA) reaction trays which have been used once, treated with Decon 90 and washed thoroughly with water, are suitable for use in this test system. Another alternative is the 25 well immunoassay tray (Northumbria Biologicals Ltd., Northumberland, UK).

Tetanus toxoid coated beads are dispensed into a reaction tray and 200 μ l of each test serum is pipetted into a reaction well. A clean tip is used for each specimen. Controls are also set-up. These include three negative controls and a range of known concentrations of tetanus antibodies (5 iu/ml to 0.005 iu/ml). The plate is sealed, tapped gently and incubated at 45°C for 1 hour in a water bath. Tests are aspirated and washed four times with 5 ml distilled water using a washing system devised by this laboratory. This washing system consists of Pentawash (Abbott Laboratories Ltd.), dispensing device

(Jencons Ltd. accuramatic dispenser), pressure vessel (Millipore Ltd.) and vacuum pump (Edwards Ltd.). After adding 200 μ l of ^{125}I -labelled tetanus toxoid to each bead, the plate is sealed with a fresh cover and incubated for a further 30 minutes at 45°C . After this second incubation period, the tests are again washed four times with 5 ml distilled water and the beads are vacuum transferred to counting tubes. Each tube is counted for 1 minute in a gamma counter and the ratio of test cpm/negative mean cpm is determined.

All tests producing ratios greater than 2.1 times the negative mean are regarded as having tetanus antibodies. In the case of determining whether a person is immune or not, 0.01 iu/ml positive control should be used for a cut-off point. A person is considered to be immune to tetanus if his test ratio is greater or equal to the 0.01 iu/ml positive control, and non-immune if his test ratio is less than the 0.01 iu/ml control. All tests producing ratios less than 2.1 times the negative mean are regarded as having no detectable tetanus antibodies.

A SUMMARY OF THE 4TH ANNUAL SYMPOSIUM -
RED CROSS BLOOD BANK, GRONINGEN, DRENTHE

5th - 6th October, 1979

Donor Management

This is a short report about the Symposium on Donor Management which was held in October 1979.

Groningen is a beautiful town in the North of the Netherlands. It is characterised by its cleanliness and its beautiful houses and farms with tulips everywhere.

The Regional Blood Bank in Groningen, from the donor point of view, is characterised by:

1. Good organisation

I was impressed by how well the staff work together.

2. They made the donor feel important

3. They were very concerned about the safety of the donor as well as the safety of the patient

Most of the topics of the Symposium were about different techniques used in different parts of the world to motivate donors.

The social programme was very entertaining; two thousand donors attended the donor festival which is regularly held in Groningen. The first speaker:

Hermien Bazuin, from Medical Sociology Department, University of Groningen. Her paper was on Donor Motivation Studies. She wanted to disclose the motives why people donate.

The result of her study was that donors are motivated by altruism (90%) personal health care (70%). She deduces that this has a crossover with altruism and realisation of the social importance of donorship. She could also deduce from this study that the groups which require effort to be motivated are:

1. Females
2. Middle Class
3. Church (religious) communities

The second speaker: Norman Krueckeberg, Community Blood Center, Dayton, Ohio. He gave an interesting talk about Donor Recruitment Techniques used in their Centre and other Centres in USA.

Their Centre is 15 years old, medium size one which draws and processed about 60,000 pints per year and it covers 43 hospitals.

They use different types of techniques for this recruitment, eg awards system, give the donors tee-shirts, key chains, coffee mugs and squeeze balls. He emphasised that these gifts should not be expensive like some Centres where they give wrist watches, otherwise altruism loses value.

Other things they do are celebrating donors birthdays, they offer them tickets for free hamburgers, they also give donors roses - they have rose forests to provide them with roses.

They colour the interior and exterior of the Blood Centre with relaxing colours.

In order that children should not be a deterrent for their mothers to come, they keep them busy painting, playing with toys and giving them juice, pudding etc.

They also use different public media - some of the staff announce this in the television themselves.

His talk although is interesting but is out of tune in the conservative British Society and certainly will not also fit Sudan.

The third speaker: Ann Hunter, Edinburgh and South-East Scotland Blood Transfusion Service. An attractive young lady with a typical Scottish accent, even I could pick up every word she said. She talked about Organisation of Mobile Teams and how to reach community. She explained how 50 years ago they started with five donors. In 1930, wives of blood donors raised funds to establish Blood Transfusion in Edinburgh. She stressed on the importance of the local voluntary donor organisers.

They have roughly 100 such donor organisers. Donors sessions programmes are sent to the representatives and these are sent to donors three weeks before the session.

Timing is discussed to avoid clashing with local activities. Then she talked about letters of thanks to voluntary donors - personal letters much appreciated. Another stimulant is the session anniversary. They also have Lord Mayor 25 donations presentation. I think this is very motivating.

The fourth speaker: O. Akerblom, MD, Karolinska Hospital, Stockholm. The lecture by Akerblom from Sweden was most interesting for people working in donor recruitment and motivation for he managed to impress the audience with the importance and the value of computer assistance in blood transfusion without losing many of the personal touches of the manual techniques.

Seven major Centres in Sweden and fifteen minor Centres are served by the computer in Stockholm.

Three main files carry most of the functions:

- (1) A donor file
- (2) A blood component and inventory file
- (3) A patient file

Although computer science is dry, the system used by Akerblom seems to benefit a lot by building in it personal touches, like for instance the passive donor file.

This is a national donor file that carries information about the donors who do not turn up when recalled for a number of times during one year.

The donors are contacted by a personal letter. It was evident from his lecture that donor recruitment and motivation can benefit from computer assistance in many ways, particularly statistical studies performed on donor characteristics as collected from computer files; for instance donors on the passive files constitute a population of donors who can be potentially recruited by specially designed programme of secondary recruitment where the factors involved in motivation are different from those considered in any primary recruitment programme.

The fifth speaker: W.L. Bayer, MD, Greater Kansas City Community Blood Bank, Kansas City, Mississippi. He talked about Transmissible Disease and Donor Selection. Bayer included many interesting aspects in his talk about the transmission of disease by blood transfusion. To me the most interesting part of his talk was the comparative study they did in two different closed societies. The incidence of antigenaemia in Seminarians who accepted the Church and lived in Monasteries in that area were no different from the low risk donors; while it was high in prisoners.

So it was not the function of closed society within a prison, it was who went into the prison.

The sixth speaker: T.D. Eastlund, MD, Albany Red Cross Blood Bank, Albany, New York. He gave an interesting talk about Motivation and Recruitment of Pheresis Donors. He

showed how fast this subject has developed in the last few years. There has been almost sixfold increase in pheresis collection over four years. There have been 43,122 procedures in 36 Centres in two years (1978-1979). He explained how pheresis now is not a research in Hospitals but is a community service and that responsibility for donor recruitment shifted to the community at large.

He divided the pheresis into single platelet and granulocyte cytopheresis donors (hot products) and plasmapheresis (cold products).

They cover 31 hospitals in 1.1 million. He explained how motivation and donor characteristics of pheresis donors are different from whole blood donors. The details of which can be very interesting to follow when he publishes his paper.

The process itself could be risky as it requires heparin hydroxyethyl starch (HES), protamine, steroids, citrate etc. Demands for labile products are very intermittent. One is faced with problems of staffing, donor recruitment and donor scheduling. I also think that this is one of the very few reports in the literature about special donor characteristics, their recruitment and motivation and, in fact, it is mainly a study of cytopheresis rather than plasmapheresis donors.

The last group of papers were very well presented by a group of specialist speakers. They dealt mainly with

plasmapheresis and its application in clinical problems.

Ch. A. Schiffer, MD, Cell Component Therapy Section,
Baltimore Cancer Research Center, Baltimore, gave elegant
talk on Platelets and Granulocytes Collection and
Transfusion.

The seventh speaker: C.M. Lockwood, MD, Royal
Postgraduate Medical School, London, UK. Covered
Plasmapheresis in Clinical Immunology and the rest of the
speakers covered most of the important aspects related to
plasmapheresis starting from the choice of the donors,
transfusion indications for platelets and granulocytes
preparation. They discussed the fluids used for replacement
etc. I have found these last papers very interesting but
not all that relevant at least in part to the main theme
of my research.

I enclose a copy of the final programme which details
the speakers and topics covered during the whole meeting.

Symposium on Donor Management, Medical Criteria and Collection procedures with a Seminar on Pheresis Programs.

October 5th : Programme

10.00 Opening Address -
 Brig.-Gen. J.W. Hartman on behalf of the
 Dutch Red Cross

1. DONOR MOTIVATION AND RECRUITMENT

Moderator : J. Meilof

10.15-12.00 Donor motivation studies -
 Hermien Basuin

 Donor recruitment techniques -
 Norman F. Krueckeberg

2. DONOR SESSION ORGANISATION

Moderator : N.F. Krueckeberg

14.00-16.00 Mobile team organisation, how to reach
 a community -
 Ann Hunter

 Donor room procedures, how to make the
 donor feel at home -
 Leny Achterof

 Donor administration, a concept of
 automation -
 O. Akerblom

 Discussion

3. DONOR SELECTION CRITERIA

Moderator : H.A. Perkins

16.30-18.00 Medical criteria for accepting
the donor -

C. Th. Smit Sibinga

Transmissible disease and
donor selection -

W.L. Bayer

Discussion

October 6th

4. SEMINAR ON PHERESIS PROGRAMS

Moderator : J. Meilof

08.00-09.00 Motivation and recruitment of
pheresis donors -

T. Eastlund

Protection of pheresis donors :
ethics and legal aspects -

H.A. Perkins

Discussion

09.00-10.00 Plasmapheresis programs in
clinical immunology -

C.M. Lockwood - co-referent P.C. Das

Cell separation programs in
clinical oncology -

Ch. A. Schiffer - co-referent C. Th. Smit Sibinga

Discussion

5. COLLECTION PROCEDURES

Moderator : P.C. Das

10.30-12.00 A bottle or a bag : open vs
closed systems -

J.D. Cash

Plastics and plasticizers in
blood transfusion -

T. Nusselder

Discussion

6. CONCLUSIVE REMARKS

12.30-14.00 Lunch and Exposition

VOLUNTEER BLOOD DONORS SURVEY 1980WHOLE BLOOD DONORSAnalysis for Dr. I.A. Khalil
on GUC ICL 2976 Computer

The questionnaires were punched on either punched cards or paper tape and converted by me into a condensed internal format independent of the medium used. This raw data file has been processed through the computer package SPSS and the processed data is now accessible very simply through that package. The processed data is in file GOIVØ1.SAVE.FIRST and the listing of the processing run, which also contains complete frequency analysis and histogram chart for every question in the survey, is in :GOIVØ1.SAVE.FIRSTLIST. It would be advisable to have a copy of this listing to hand when reading what follows.

Variable names

QØ1 refers to Question 1 on the survey and so on. QØ51 is subquestion 1 of Question 5, and so on. AREA is the location where the interview took place and CASE the case number at that location. YEAR is the last two digits of the year of birth, or 8Ø if no answer. AGE has been calculated to group respondents in five year age ranges, with those born before 1905, and those "born" in 1980 combined as missing cases. EDUC has been calculated from

Question 29. Dr. Khalil has provided labels for all variables and values, which should make most results self-explanatory.

Sample size

The initial sample size was 1080. At Dr. Khalil's request, I have cleaned the sample during processing to remove all cases with invalid answers to any question. This has reduced the sample size to 1015. The other 65 cases, with valid answers to most questions, could be resurrected if necessary, but would then require specific exclusion in analysis of their particular 'bad' question.

Processing so far

The listing of the processing session contains a frequency count of the responses to each question, in tabular and histogram form, and also a few cross-tabulations that Dr. Khalil specifically requested. These are:

How long a donor by area

Occupation by how long a donor by sex

Occupation by regular donor? by sex

Occupation by kidney card ownership by sex

Occupation by education by sex

Kidney card ownership by regular donor?

Further processing

Anyone with knowledge of the SPSS package* should be

able easily to provide any further analyses Dr. Khalil requires, using a pack of the form:

JOB(:G~)

SPSS(GET=SAVE.FIRST)

GET FILE FIRST

~

~

FINISH

++++

EJ

Rod Ackland
January 1981

* as described in SPSS Introductory Guide

VOLUNTEER BLOOD DONORS SURVEY 1980

SPECIAL DONORS

Analysis for Dr. I.A. Khalil on GUC ICL 2976 Computer

The questionnaires were punched on paper tape and converted by me into a condensed internal format independent of the medium used. This raw data file has been processed through the computer package SPSS and the processed data is now accessible very simply through that package. The processed data is in file GOIVØ1.SAVE.SECOND and the listing of the processing run, which also contains complete frequency analysis and histogram chart for every question in the survey, is in :GOIVØ1.SAVE.SECONDLIST . It would be advisable to have a copy of this listing to hand when reading what follows.

Variable names

QØ1 refers to Question 1 on the survey and so on. QØ81 is subquestion 1 of Question 8, and so on. AREA is the location where the interview took place and CASE the case number at that location. YEAR is the last two digits of the year of birth, or 8Ø if no answer. AGE has been calculated to group respondents in five year age ranges, with those born before 1905, and those "born" in 1980 combined as missing cases. EDUC has been calculated from

Questions 6, 7 and 8. Dr. Khalil has provided labels for all variables and values, which should make most results self-explanatory.

Sample size

The initial sample size was 228. Since this was small, all 'bad' values have been traced and corrected where possible, or marked as 'MISSING'.

Processing so far

The listing of the processing session contains a frequency count of the responses to each question, in tabular and histogram form, and also a few cross-tabulations that Dr. Khalil specifically requested. These are:

How long a donor by area

Occupation by how long a donor by sex

Occupation by kidney card ownership by sex

Occupation by education by sex

Further processing

Anyone with knowledge of the SPSS package* should be able easily to provide any further analyses Dr. Khalil requires, using a pack of the form:

```
JOB(:G~)
SPSS(GET=SAVE.SECOND)
----
GET FILE SECOND
```



· FINISH

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EJ

Rod Ackland
April 1981

* as described in SPSS Introductory Guide

VOLUNTEER BLOOD DONORS SURVEY 1980SUDANESE SURVEYAnalysis for Dr. I.A. Khalil
on GUC ICL 2976 Computer

The questionnaires were punched on paper tape and converted by me into a condensed internal format independent of the medium used. This raw data file has been processed through the computer package SPSS and the processed data is now accessible very simply through that package. The processed data is in file GOIVØ1.SAVE.SUDAN and the listing of the processing run, which also contains complete frequency analysis and histogram chart for every question in the survey, is in :GOIVØ1.SAVE.SUDANLIST. It would be advisable to have a copy of this listing to hand when reading what follows.

Variable names

QØ3 refers to Question 3 on the survey and so on. QØ11 is subquestion 1 of Question 1, and so on. AREA is the location where the interview took place and CASE the case number at that location. AGERANGE has been calculated from QØ5 to group respondents in five year age ranges. Dr. Khalil has provided labels for all variables and values, which should make most results self-explanatory.

Sample size

The initial sample size was 577. Since this was

relatively small, all 'bad' values have been traced and corrected where possible, or marked as 'MISSING'.

Processing so far

The listing of the processing session contains a frequency count of the response to each question, in tabular form.

Further processing

Anyone with knowledge of the SPSS package* should be able easily to provide any further analyses Dr. Khalil requires, using a pack of the form:

JOB(:G~)

SPSS(GET=SAVE.SUDAN)

GET FILE SUDAN

~

~

FINISH

++++

EJ

Rod Ackland
October 1981

* as described in SPSS Introductory Guide

CIEP METHOD FOR TESTING SERA FOR TETANUS ANTIBODIES

MATERIALS

Buffer solution:	Michaelis Buffer pH 8.2
Agarose:	Litex LSA (International Enzymes Ltd.)
Plates:	Sterilin disposable square petri dishes (100 mm x 100 mm x 18 mm) with lid as supplied by Sterilin Ltd.
Capillary Pipettes:	Disposable haematocrit tubes (BRIS (PLAIN) Camlab, Cambridge).
Wicks:	Chromatography Paper - Whatman No. 3 in two sizes: (1) 100 mm x 15 mm for insertion in agarose plates (2) 50 mm x 90 mm for electrophoresis tank.
Template:	Prepared from transparent Perspex Sheet 125 mm x 125 mm x 13 mm with 3 mm diameter holes drilled 7 mm apart (centre to centre). The template allows for 30 tests along with controls at each end of bottom row. A 125 mm rim is cut around the 100 mm x 100 mm area to allow the template to sit firmly into the

petri dish and to bring the surface as near as possible to the agarose gel.

Cutting Needle: A needle (3 mm diameter) cut to 6 cm length and the cutting edge sharpened.

Electrophoresis: Shandon Vokam Power Packs and Model '77 electrophoresis tanks with polarity switch are used.

Viewing Lamps: Plates are read using oblique spot lighting from a microscope lamp or a Dark Ground Viewer.

TEST REAGENTS

Antigen: Tetanus Toxoid. Two preparations are used: (1) 30 LF/ml Tetanus Toxoid (made up by adding 1 ml saline to 3 ml Wellcome Tetanus Vaccine in Simple Solution (40 LF/ml)); (2) 8 LF/ml Tetanus Toxoid (made up by adding 4 ml saline to 1 ml Wellcome Tetanus Vaccine in Simple Solution (40 LF/ml)).

Antibody: Tetanus Antitoxin. Two preparations are used: (1) 10 iu/ml Tetanus Antitoxin (made up by adding 1.2 ml saline to 0.05 ml of Humotet (250 iu/ml); (2) 5 iu/ml Tetanus Antitoxin (made up by adding 0.5 ml saline to 0.5 ml of the 10 iu/ml control.

ALL TEST REAGENTS ARE KEPT AT 4°C IN STOPPERED GLASS TUBES

CIEP

Method

LITEX LSA Agarose (1 g/100 ml) is dissolved in buffer by either steaming in an autoclave or by boiling in a beaker of water. After mixing well, 15 ml (minimum) of the hot agarose is dispensed into a square petri dish which is supported on a levelling table (or level bench), to give a depth of approximately 1.5 mm of gel.

Before solidification of the gel two 100 mm x 15 mm filter paper wicks are inserted lengthwise into the gel and against opposite walls of the petri dish. After solidification the plates are covered and stored at 4°C until required. Storage should not be longer than 10 days. Prior to use the pattern of wells is cut using the template and needle, the latter being attached to a water vacuum pump to remove the gel.

Addition of test sera and reagents

Test sera (approximately 7 ul) are set-up against both levels of tetanus toxoid (8 LF/ml and 30 LF/ml). Sera are added using a microhaematocrit capillary tube (one capillary tube per specimen). Tetanus toxoid (8 LF/ml) and (30 LF/ml) is added to the wells in the top row.

As with the test sera, the two tetanus antitoxin preparations are tested against both preparations of tetanus toxoid.

The electrophoresis tank is filled with buffer (750 ml) in which the 50 mm x 90 mm filter paper wicks are soaked. The plates are then placed in the tank so that the tests are on the anodic side of the tank (tetanus toxoid to the cathodic side (negative side)). The wicks in the tank are applied to those on the walls of the plate to complete the circuit. The lid is then placed on the tank, ensuring that the wicks remain in position. Constant current is applied at 40 mA per tank for 30 minutes when 30 LF/ml tetanus toxoid is used as antigen and 60 minutes when 8 LF/ml tetanus toxoid is used as antigen.

Tank buffer is renewed weekly and polarity reversed daily. Tanks are soaked overnight in 2% glutaraldehyde (Cidex) prior to washing in distilled water and renewing buffer. The work is carried out in the Hepatitis Laboratory and Personnel follow the rules and guidelines of this laboratory.

An example of the results is as follows:

8 LF/ml				TETANUS TOXOID	30 LF/ml				
o	o	o		o		o	o	o	o
o	o	o		o		o	o	o	o
Test 1	2	5 iu/ml	10 iu/ml	Test 1	2	5 iu/ml	10 iu/ml		
Test 1	≥ 10 iu/ml			Test 2	> 5 iu/ml < 10 iu/ml				

TETANUS CONTROLS

Tetanus Toxoid

- 30 LF/ml - tetanus toxoid is made up by adding 1 ml
saline to 3 ml of Wellcome tetanus
vaccine in simple solution (40 LF/ml)
- 8 LF/ml - tetanus toxoid is made up by adding 4 ml
saline to 1 ml of Wellcome tetanus vaccine
in simple solution (40 LF/ml)

Tetanus Antitoxin

- 10 iu/ml - tetanus antitoxin is made up by adding 1.2 ml
saline to 0.05 ml of Humotet (human tetanus
immunoglobulin) (250 iu/ml)
- 5 iu/ml - tetanus antitoxin is made up by adding 0.5 ml
saline to 0.5 ml of the 10 iu/ml control

ALL SOLUTIONS SHOULD BE KEPT AT 4°C IN STOPPERED GLASS TUBES

BTS REF. NO.

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STUDY OF VOLUNTEER BLOOD DONORS

Donors of Blood Products and Plasma (SPECIAL DONORS)

Conducted by the West of Scotland Blood Transfusion Service
in cooperation with the Department of Community Medicine,
University of Glasgow.

Dear Donor,

This study is to determine the attitude and motivation of
people donating their plasma or other blood products. You
are not obliged to fill in the following questionnaire, but
we would be very grateful if you would. The answers you
give will be entirely confidential, used only for the
purpose of the study. Your cooperation is gratefully
acknowledged.

Dr. I.A. Khalil

FOR OFFICIAL USE

Q.1 Where do you live?

- (1) City () (2) Town ()
(3) Village () (4) Hamlet () ()
(5) Others ()

Q.2 Sex:

- (1) Male () (2) Female () ()

Q.3 Marital Status:

- (1) Married () (2) Single () ()
(3) Widowed () (4) Other ()

FOR OFFICIAL USE

Q.4 Are you the chief wage earner
in the family?

()

(1) Yes () (2) No ()

Q.5 What is your occupation (please be as
detailed as possible)?

()

Q.6 How old were you when you left school?

(1) 14 or less () (2) 15 ()

()

(3) 16 () (4) 17 or more ()

Q.7 Have you had any further education
or training?

()

(1) Yes () (2) No ()

Q.8 If Yes what/where?

(1) University ()

(2) Training College ()

(3) Technical College ()

()

(4) Secretarial ()

(5) Apprenticeship ()

(6) Other (specify) ()

Q.9 Do you know your blood group?

()

(1) Yes () (2) No ()

FOR OFFICIAL USE

Q.10 Is your blood group usual?

- (1) Yes () (2) No () ()
(3) Do not know ()
-

Q.11 How long have you been an ordinary blood donor?

- (1) One to six months ()
(2) Six months to one year ()
(3) One to two years () ()
(4) More than two years ()
(5) Have not been an ordinary blood donor ()
-

Q.12 Has any family member or close relative given blood, blood cells or plasma?

- (1) Yes () (2) No () ()
-

Q.13 Has any family member or close relative received treatment with blood or blood products?

- (1) Yes () (2) No () ()
-

Q.14 If your answer to questions 12 or 13 is Yes do you think that has affected your recruitment as a donor?

- (1) Yes () (2) No () ()
-

FOR OFFICIAL USE

Q.15 Who has approached you about becoming a plasma donor?

(1) A friend ()

(2) A relative ()

(3) Your treating Doctor ()

(4) A member of the Transfusion Service () ()

(5) Advertisement in the media ()

Q.16 Did you feel uneasy when you came the first time to donate plasma?

(1) Yes () (2) No () ()

Q.17 Were you totally convinced to give plasma when you came the first time to donate?

(1) Yes () (2) No () ()

Can you tell me why you became a special donor?

Q.18 To repay in some way a transfusion given to you () () or to somebody you know

Q.19 General desire to help people () ()

Q.20 In response to an appeal for:

(1) Rare antibodies () ()

(2) Red cells () (3) White cells ()

FOR OFFICIAL USE

Q.21 Having witnessed an accident () ()

Q.22 Curiosity () ()

Q.23 Influenced by friends, relatives,
neighbours, workmates etc. () ()

Q.24 On seeing a television
commercial for blood donors () ()

Q.25 On hearing a radio commercial () ()

Q.26 On seeing an advertisement
in the Cinema () ()

Q.27 By public advertisement
in the Newspapers () ()

Q.28 On seeing a poster () ()

Q.29 Other reasons () ()

Q.30 In your view which of the following
are the most effective methods to
recruit donors for plasmapheresis?
Please select the three you view
most effective and number the
corresponding squares 1, 2, 3,
according to their importance.

(1) Television () (2) Radio ()

FOR OFFICIAL USE

- (3) Cinema () (4) Newspapers ()
- . (5) School Education ()
- (6) Advertisement on
hoardings () ()
- (7) Lectures ()
- (8) Television, Radio
and Newspapers ()
- (9) Lectures, School Education ()
and Hoardings

Q.31 Do you attend plasmapheresis for:

- (1) Plasma () (2) White cells ()
- (3) Platelets () ()

Q.32 What is the valuable antibody in your blood?

- (1) Anti-D ()
- (2) Non-red cell antibodies eg
anti-chickenpox, anti- () ()
Hepatitis
- (3) Other (Red Cell)
antibodies ()

Q.33 How many times have you given blood by pheresis?

- (1) Less than ten times ()
- (2) Ten to twenty times () ()
- (3) More than twenty times ()

Q.34 How often are you requested to donate by pheresis?

- (1) Every six weeks ()
- (2) Every three months () ()
- (3) Irregular ()

Q.35 Do you think this is:

- (1) Too frequent ()
- (2) About right () ()
- (3) Not frequent enough ()
- (4) Do not know ()

Q.36 How long are you away from work when you come for pheresis?

- (1) One hour() (2) Two hours()
- (3) Three hours () ()
- (4) More than three hours ()

Q.37 Would it be easier if the time spent for pheresis was shorter?

- (1) Yes() (2) No () ()
- (3) Not important ()

Q.38 Do you think it would be easier to donate if you have transport provided by the Blood Transfusion Service?

- (1) Yes() (2) No () ()
-

FOR OFFICIAL USE

Q.39 Do you think it should be compulsory for all healthy people to give blood?

- (1) Yes () (2) No () ()
 (3) Do not know ()
-

Q.40 Do you think a plasmapheresis donor should be paid?

- (1) Yes () (2) No () ()
 (3) Do not know ()
-

Q.41 Do you smoke?

- (1) Yes () (2) No () ()
 (3) No, but used to ()
-

Q.42 Are you or have you ever been a member of a voluntary organisation? eg

- (1) Boy Scouts () (2) Boys Brigade ()
 (3) Girl Guides () ()
 (4) Women Voluntary Service (WVS) ()
 (5) Church groups () (6) Others ()
 (7) None ()
-

Q.43 Do you have a Kidney Card?

- (1) Yes () (2) No () ()
-

Please check that you have answered all the questions.
 Thank you for your help.

BTS REF. NO.

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STUDY OF VOLUNTEER BLOOD DONORS

DONORS OF WHOLE BLOOD

Conducted by the West of Scotland Blood Transfusion Service
in cooperation with the Department of Community Medicine,
University of Glasgow.

Dear Donor,

This study is to determine the attitudes and motivations of
these people donating their blood for use in emergencies.
You are not obliged to fill in the following questionnaire,
but we would be very grateful if you would. The answers
you give will be entirely confidential, used only for the
purpose of the study. Your cooperation is gratefully
acknowledged.

Dr. I.A. Khalil

FOR OFFICIAL USE

Q.1 Where do you live?

- (1) City() (2) Town ()
(3) Village ()(4) Hamlet () ()
(5) Others ()

Q.2 Do you know your blood group?

- (1) Yes () (2) No () ()

Q.3 If the answer in question 2 is Yes,
what group are you?

- (1) A+ () (2) B+ () (3) AB+ ()
(4) O+ () (5) A- () (6) B- ()

FOR OFFICIAL USE

(7) AB- () (8) O- () ()

Q.4 Do you think this is a usual group?

(1) Yes () (2) No () ()
(3) Do not know ()

Q.5 Are you or have you ever been a member of a Voluntary Organisation? eg

(1) Boy Scouts () (2) Boys Brigade () ()
(3) Girl Guides ()
(4) Woman Voluntary Service (WVS) ()
(5) Church groups ()
eg Dorcas Society
(6) Others () (7) None ()

Q.6 How long have you been a blood donor?

(1) One to six months ()
(2) Six months to one year () ()
(3) One to two years ()
(4) Two to three years ()
(5) More than three years ()

Q.7 Do you give blood regularly?

(1) Yes () (2) No () ()

Q.8 If the answer to question 7 is No, is it because

(1) Time of session is unsuitable ()

FOR OFFICIAL USE

- (2) You miss the appointment () ()
 - (3) You do not know ()
-

Q.9 How many times have you given blood?

- (1) Less than ten times()
 - (2) Ten to twenty times() ()
 - (3) More than twenty times()
-

Q.10 How often do you come to donate blood?

- (1) Yearly() (2) Twice yearly () ()
 - (3) More than twice yearly ()
 - (4) Irregularly ()
-

Q.11 Do you think this is:

- (1) Too frequent ()
 - (2) About right () ()
 - (3) Not frequent enough ()
 - (4) Do not know ()
-

Q.12 Where do you usually give blood?

- (1) Town session ()
 - (2) Place of work () ()
 - (3) Mobile Bus ()
 - (4) Varies from time to time ()
-

FOR OFFICIAL USE

Q.13 Has any member of your family
given blood? ()

(1) Yes () (2) No ()

Q.14 Has any member of your family needed
blood? ()

(1) Yes () (2) No ()

Q.15 If a member of your family has
received blood, was it

(1) in connection with
childbirth, etc. ()

(2) after an operation ()

(3) following an accident () ()

(4) for the treatment of a
bleeding ()

(5) for the treatment of
anaemia ()

Q.16 Originally, did anyone approach
you about giving blood? ()

(1) Yes () (2) No ()

(3) Cannot remember ()

Q.17 Can you tell me why you became a
blood donor?

(1) To repay in some way a
transfusion given to
you or to somebody
you know ()

FOR OFFICIAL USE

(2) Desire to help people ()

(3) Having witnessed ()
an accident

(4) Influenced by friends,
relatives, neighbours() ()
etc.

(5) In response to an appeal
through television, radio,
newspapers etc. ()

Q.18 Do you have to leave work in order
to give blood?

(1) Yes() (2) No() ()

Q.19 If the answer in question 18 is Yes,
do you face any difficulties?

(1) Yes() (2) No() ()
(3) Sometimes()

Q.20 If you give blood in working time,
how long are you away from work?

(1) Half an hour() (2) One hour()
(3) Two hours() (4) More than ()
two hours()

Q.21 Through what means do you think we
can recruit new donors?

(1) television() (2) radio ()
(3) cinema() (4) newspapers () ()
(5) School Education ()

FOR OFFICIAL USE

(6) Advertisement on
hoardings ()

(7) Lectures ()

(8) television, radio and
newspapers () ()

(9) Lectures, school education
and hoardings ()

Q.22 Why do you think some people do not
like giving blood?

(1) Indifference to the need
of the community ()

(2) Fear of any adverse
results during donations ()

(3) Unaware of the need for
blood () ()

(4) Fear of the needle ()

Q.23 Were you anxious when you came
the first time?

(1) Yes () (2) No () ()

Q.24 Do you think that it would be
easier to give blood if you have
transport provided by the Blood
Transfusion Service?

(1) Yes () (2) No () ()

Q.25 Sex:

(1) Male () (2) Female () ()

FOR OFFICIAL USE

Q.26 Marital Status:

(1) Married () (2) Single ()

()

(3) Widowed () (4) Other ()

Q.27 Are you the chief wage earner
in the family?

()

(1) Yes () (2) No ()

Q.28 What is your occupation (please be
as detailed as possible)?

()

Q.29 How old were you when you left school?

(1) 14 or less () (2) 15 ()

()

(3) 16 () (4) 17 or more ()

Have you had any further education
or training?

(1) Yes () (2) No ()

If Yes, what/where?

University ()

Training College ()

Technical College ()

Secretarial ()

Apprenticeship ()

Other (specify) ()

FOR OFFICIAL USE

Q.30 Do you think it should be compulsory
for all healthy people to give blood?

(1) Yes () (2) No ()

(3) Do not know () ()

Q.31 Do you think a donor should be paid?

(1) Yes () (2) No ()

(3) Do not know () ()

Q.32 Do you smoke?

(1) Yes () (2) No ()

(3) No, but used to () ()

Q.33 Do you have a Kidney Card?

(1) Yes () (2) No () ()

Study of Volunteer Blood Doners

Conducted by the West of Scotland blood Transfusion service in cooperation with the Department of Community Medicine, University of Glas-Gow, Department of Pathology, Soba Blood Bank, University of Khartoum, Department of Blood Transfusion, Sudanese National Public Health laboratory and the Department of Community Medicine University of Khartoum.

دراسة حول ظروف المتبرعين بالدم

يقوم بهذه الدراسة مركز خدمات الدم الاقليمي لضرب الاسكتلندي بالتعاون مع قسم الطب الاجتماعي جامعة جلاسجو قسم الامراض - بنك الدم بمستشفى سوبا الجامعي وجامعة الخرطوم المعمل القومي الصحي السوداني وقسم الطب الاجتماعي - جامعة الخرطوم •

Dear Donor,

This study is to Determine the attitudes and motivations of these people donating their Blood for use in emergencies. You are not obliged to fill in the following questionnaire but we would be very grateful if you would. The answers you give will be entirely confidential, used only for the purpose of the study. Your cooperation is gratefully acknowledged.

وضعت Dr. I. A. Khalil

وضعت هذه الاسئلة للاجابة عليها من المتبرعين بدمهم خدمة للانسانية لمعرفة ظروفهم ولساعدة الحائطين ببنوك الدم بالسودان في اداء رسالتهم •
واننا بهذا نضع القيد في القام الاول من الناحية الانسانية ذلك لانه يوجد باعلى ماعنده وهو دمه •

Q. 1/ Where do you live?

اين مكان اقامتك؟

Q. 2/ What is your original home and region?

ما هو موطنك الاصلى والاقليم الذى تنتمى اليه؟

Q. 3/ What is your religion?

ما هى ديانتيك؟

1/ Muslim. مسلم

2/ Christian. مسيحى

☐

Q. 4/ Sex. الجنس

1. Male.

2/ Female.

☐

Q. 5/ Age. العمر

☐

Q. 6/ Marital. الحالة الاجتماعية

1. Married. متزوج

2. Single. غير متزوج

3. Children. هل لديك اطفال

☐
☐

Q. 7/ What is your occupation? ما هى وظيفتك؟

1. Civil servant موظف

2. Military. قوات نظامية

3. Self employed. اعمال حرة

4. Farmer. مزارع

5. Labourer. عامل

6. Student. طالب

7. Unemployed. عاطل

☐

8. What type of educations have you received? ما هو تعليمك الذي تلقيته ؟

1. Preliminary

المرحلة الاولى

2. Intermediate

المرحلة للوسطى

3. Secondary

المرحلة الثانوية

4. Institute

معهد

5. University

الجامعة

6. Post graduate studies

دراسات فوق الجامعة

9. Do you know your blood group? هل تعرف فصيلة دمك

1/ Yes

2/ No

10. Are you or have you ever been a member of a voluntary organisation

هل كنت ابدا عضوا في جمعية خيرية ؟

1/ Yes

2/ No

11. Do you think that it is of help to donate blood for emergencies?

هل تعتقد ان تطورك بالدم للحوادث منقذ للحياة

1/ Yes

2/ No

12. Has any member of your family or friends needed blood?

هل سبق ان احتاج احد افراد اسرتك او اصدقائك لنقل دم ؟

1/ Yes

2/ No

13. If a member of your family or friends has received blood was it? :

اذا احتاج احد افراد اسرتك او اصدقائك الى نقل دم كان ذلك ؟

1/ In connection with childbirth

لحالات ولادة

2/ For an operation

ام لاجراء عملية

3/ Following an accident

ام بعد حدوث حادث

4/ For treatment of anemia.

ام لعلاج فقر دم

14. Would you volunteer to give blood to the bank to cover emergencies only?

هل تحب ان تتطوع بدمك لتغطية حالات الحوادث فقط؟

1/ Yes

2/ No

☐

15. Would you give blood to someone who is not your relative?

هل يمكنك اعطاء دمك لاحد غير اقاربك او اصدقائك ؟

1/ Yes

2/ No

☐

16. Suppose you need blood would you take blood from someone who is not your relative?

اذا فرض واضطرت لنقل دم هل لديك مانع من سحب الدم من اى شخص غير اقربائك ؟

1/ Yes

2/ No

☐

17. If you are asked to give blood on regular basis once or twice a year would you agree?

هل توافق على اعطاء دمك بانتظام مرة او مرتين فى السنة ؟

1/ Yes

2/ No

☐

18. Were you anxious when you donated blood for the first time?

هل كنت قلقا عند تبرعك بالدم لاول مرة

1/ Yes

2/ No

☐

19. Can you tell me why you come to donate?

ماهو السبب فى تبرعك بالدم ؟

1/ To help your relatives, friends etc...?

Yes

No

☐

لمساعدة اقاربك ، اصدقائك الخ

2/ To repay in some way a transfusion given to you or somebody you know?

you know?

هل ذلك لرد جميل قدم اليك او لاحد معارفك

1/ Yes

2/ No

☐

3. Having witnessed an accident ?

هل لشاهدة حادث

1/ Yes

2/ No

☐

4. Influenced by friends relatives, neighbours, etc..?

هل ذلك لتأثير الاصدقاء او الاقرباء عليك ؟

1/ Yes

2/ No

☐

5. In response to an appeal, ^{through} TV, Radio cinema Advertisement etc. ?
 مل الاستجابة لمداء بواسطة سبل الاعلام

1/ Yes

2/ No

☐

20. Through what media do you think we can start to educate people and motivate them to donate their blood?

ما من الطرق التي تعتقد خلالها يمكن توعية الناس بمشروع التبرع بالدم (يمكن اختيار اكثر من طريقة)

1/ TV. تلفزيون

1/ Yes

2/ No

☐

2/ Radio الراديو

1/ Yes

2/ NO

☐

3/ Cinema السينما

1/ Yes

2/ No

☐

4/ School education? التعليم المدرسي

1/ Yes

2/ No

☐

5/ News papers الصحف اليومية

1/ Yes

2/ No

☐

6/ Advertisements on hoardings الاعلانات الحائطية

1/ Yes

2/ No

☐

7/ Lectures المحاضرات

1/ Yes

2/ No

☐

8/ Contacting people in mosques, churches, clubs, schools, hospital, (visitors) other firms.

الاتصال مع الناس في الجوامع والكنائس والالدية والمدارس ووزار المستشفيات والمرافق العامة .

1/ Yes

2/ No

☐

9/ Personal contact

او عن طريق الاتصال بشخص

1/ Yes

2/ No

☐

21/ Why do you think that some people do not like to give their blood?
 ما هي الاسباب في رايك التي تدعو الناس لعدم الاستجابة لنداء التطوع بالدم ؟

1/ Fear of adverse reactions during donations?

هل ذلك نتيجة لخوف من اي اضرار تعتقد حدوثها عند اعطاء الدم ؟

1/ Yes

2/ No

☐

2/ Belief that donations of blood may affect health in the future?

هل يظنون ان التبرع بالدم يؤثر على الصحة في المستقبل ؟

1/ Yes

2/ No

☐

3/ Due to religious reasons.

لا سباب دينية

1/ Yes

2/ No

☐

4/ Fear of the needle?

خوفا من وخذ الابرة

1/ Yes

2/ No

☐

5/ Not aware that blood is in short supply?

لا نهم لا يدركون عدم كفاية الدم

1/ Yes

2/ No

☐

22. Did you donate your blood before?

هل تتداولت بدمك من قبل

1/ Yes

2/ No

☐

23. Do you think a donor should be paid

هل تعتقد ان يكافأ المتداول نقدا

1/ Yes

2/ No

☐

24. Or to be given symbolic presents

او يحظى هدايا رمزية

1/ Yes

2/ No

☐

25. Or should he give his blood for nothing?

ام يستحسن ان يعطى دمه بدون مقابل

1/ Yes

2/ No

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26. Do you use any of:

هل تتعاطى اى شئ من ؟

1/ Cigarettes السجاير

2/ Snuff (التبناك) النعمود

3/ Others مكيفات اخرى

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