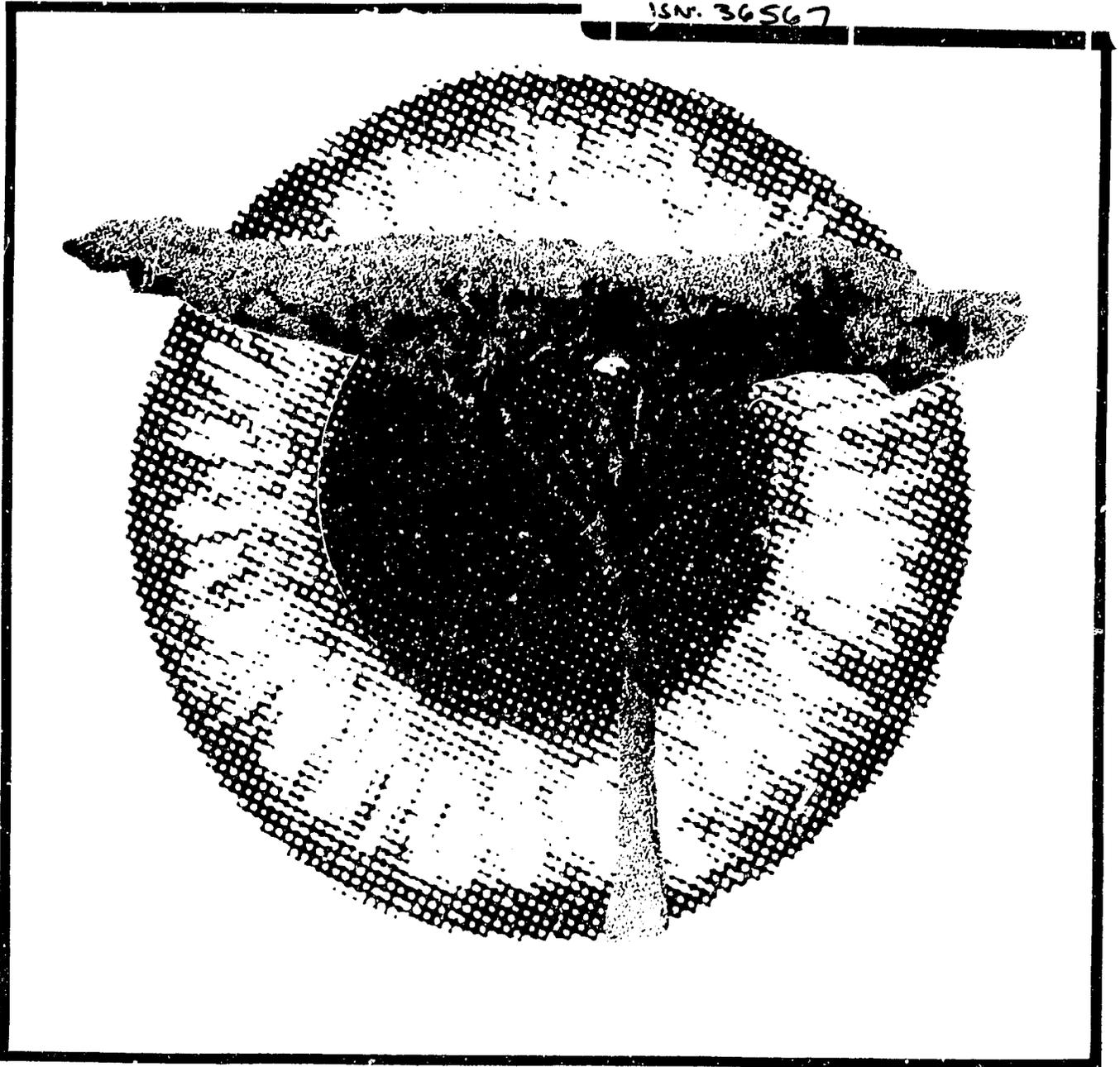


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MAIYEU NA MODOOKU

I don't want to be a blind man

(from a Masai song)

EXPERIENCES OF THE KENYA RURAL BLINDNESS PREVENTION PROJECT

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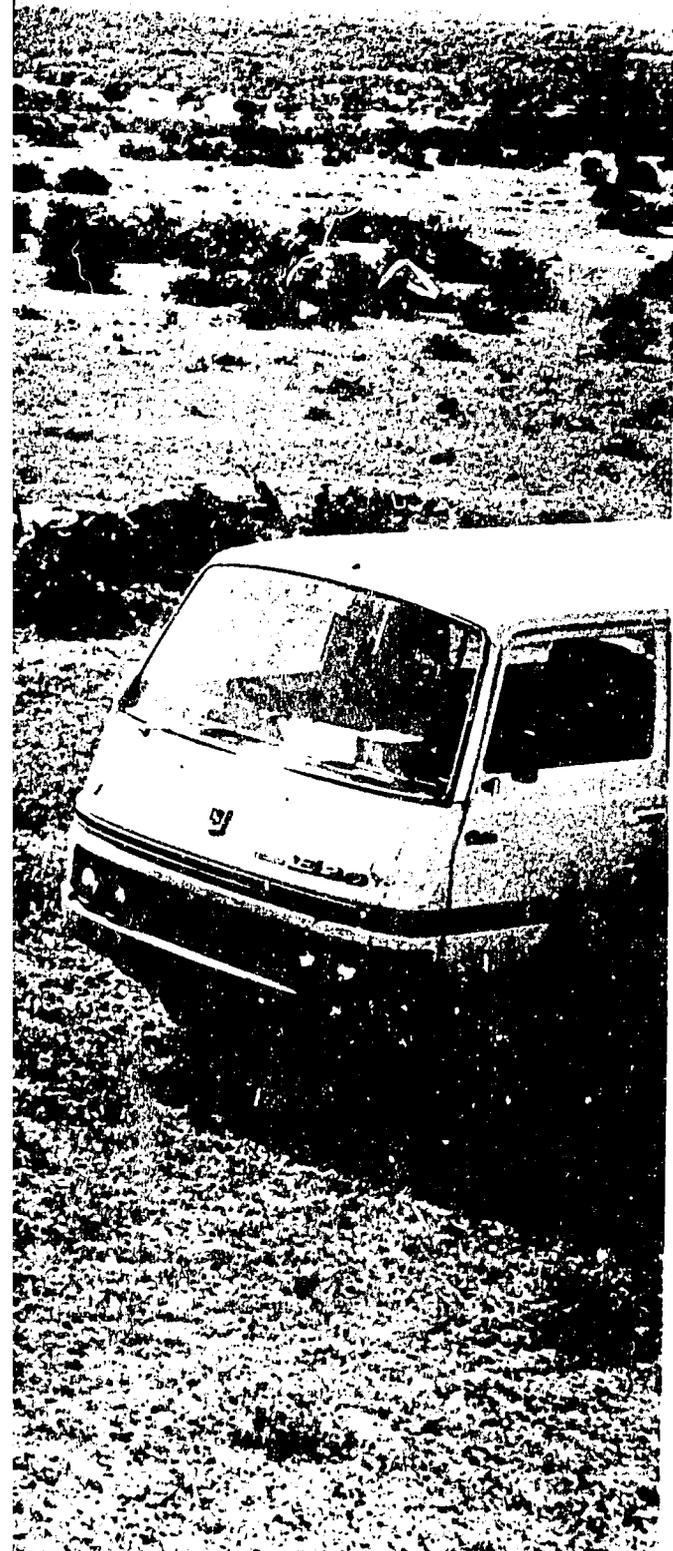
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PREFACE

AND

ACKNOWLEDGEMENTS

This paper describes the activities of the first phase of the Rural Blindness Prevention Project sponsored by the International Eye Foundation during the period October, 1976 to March, 1980. This project is a collaborative effort, involving the close cooperation and support of the Kenya Ministry of Health, the Kenya Society for the Blind and a number of other local and international organizations. By describing in some detail the background, objectives, activities and achievements of this innovative project, it is hoped that this report will serve as:

- 1) A stimulus for the development of similar national or regional programs for the prevention and treatment of ocular disease and blindness where such programs do not exist; and
- 2) A resource, practical reference and guide for the implementation of such programs.

We wish to acknowledge a debt of gratitude to the countless individuals and organizations who have contributed to the growth of the Kenya Ophthalmic Program, and to the innovative network of services it offers to the people of rural Kenya. The Kenya Rural Blindness Prevention Project, as one component of this larger scheme, would not have come into being or enjoyed the success it has had without the dedicated efforts of many toward the elimination of blindness.

The dedicated and enthusiastic work of three individuals has been critically important to the development of the Kenya Ophthalmic Program.

Dr. William R. Burkitt, Medical Advisor to the Kenya Society for the Blind, assumed responsibility for the field activities of the first Mobile Eye Unit in 1963 and, until 1973, oversaw the early development and expansion of the Ophthalmic Program, providing

support and supervision for the initial Ophthalmic Clinical Officers in charge of the mobile and static eye clinics in the rural areas.

Mr. Alexander Mackay, founding Executive Officer of the Kenya Society for the Blind, directed the activities of that organization for more than a quarter of a century and, during the early years of the Ophthalmic Program, saw to it that the mobile eye units received the financial and material support so necessary to their operation. Mr. Mackay also served as Fiscal Officer and Advisor to the Kenya Rural Blindness Prevention Project and has been the source of continued and invaluable advice on how to work most effectively to combat blindness in Kenya.

Dr. G. G. Bisley, Senior Consultant in Ophthalmology in Kenya for more than twenty years, first served in the Colonial Administration and subsequently for the Ministry of Health in the Republic of Kenya. Dr. Bisley trained the first Ophthalmic Clinical Officer, developed the training program for Ophthalmic Clinical Officers and the Department of Ophthalmology at Kenyatta National Hospital. The first enthusiastic supporter of the idea of a Rural Blindness Prevention Project in Kenya, Dr. Bisley was Chief Advisor to the Project from the Ministry of Health.

Final acknowledgement must go to the Government of Kenya and its Ministry of Health for commitment to the welfare of all its people and for willingness to develop innovative approaches towards this end, and to the United States Agency for International Development who provided the major financial support for the Project.

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I. BACKGROUND

A. Demography and Geography

Kenya is a land of extraordinary geographical and cultural diversity. Situated astride the equator between Somalia and Tanzania on the East African Coast, the country extends north and west from the lush tropical coastal strip across slowly rising arid plains to the highlands of central and western Kenya. The country is bordered to the north by Ethiopia and the Sudan, and to the west by Uganda.

The most striking geographical feature of the country is the Great Rift Valley, which courses down from Ethiopia through the dry northern plains, on through the central highlands and then into Tanzania. Extending westward from the coast, the arid bush country of northern and eastern Kenya ends at the foothills which mark the beginning of the eastern highlands of Mt. Kenya and the Nyandarua mountains. These fertile highlands terminate sharply at the eastern escarpment of the Rift Valley. The opposite wall of the Rift Valley rises less sharply to the vast western highlands which reach as high as 3,000 meters in altitude as they extend over 150 miles to the north and west before dropping down 2,000 meters to the hot and humid plains surrounding Lake Nyanza. The lake is situated in the floor of the Rift Valley in the extreme west of the country (*see Map 1*).

The total land area of Kenya is 225,000 square miles, about the size of France. Its present population of well over fifteen million has a phenomenal annual growth rate of over 4%, the highest in the world. Over 98% of the population is African, comprised of thirty major and forty minor tribes, each having its own history, language or dialect, and cultural traditions. The remaining two percent is composed of Asian immigrants, most of whom are Kenyan citizens; Europeans, largely expatriates; and Arabs, almost all of whom are Kenya nationals.

Less than 10% of the population live in the large urban centers of Nairobi, Kisumu, Mombasa and

Nakuru. The rural population, estimated at 14,000,000, lives largely outside the money economy by subsistence farming, herding livestock and fishing. The vast bulk of this rural population is concentrated in three relatively small yet geographically distinct zones (*see Map 2*):

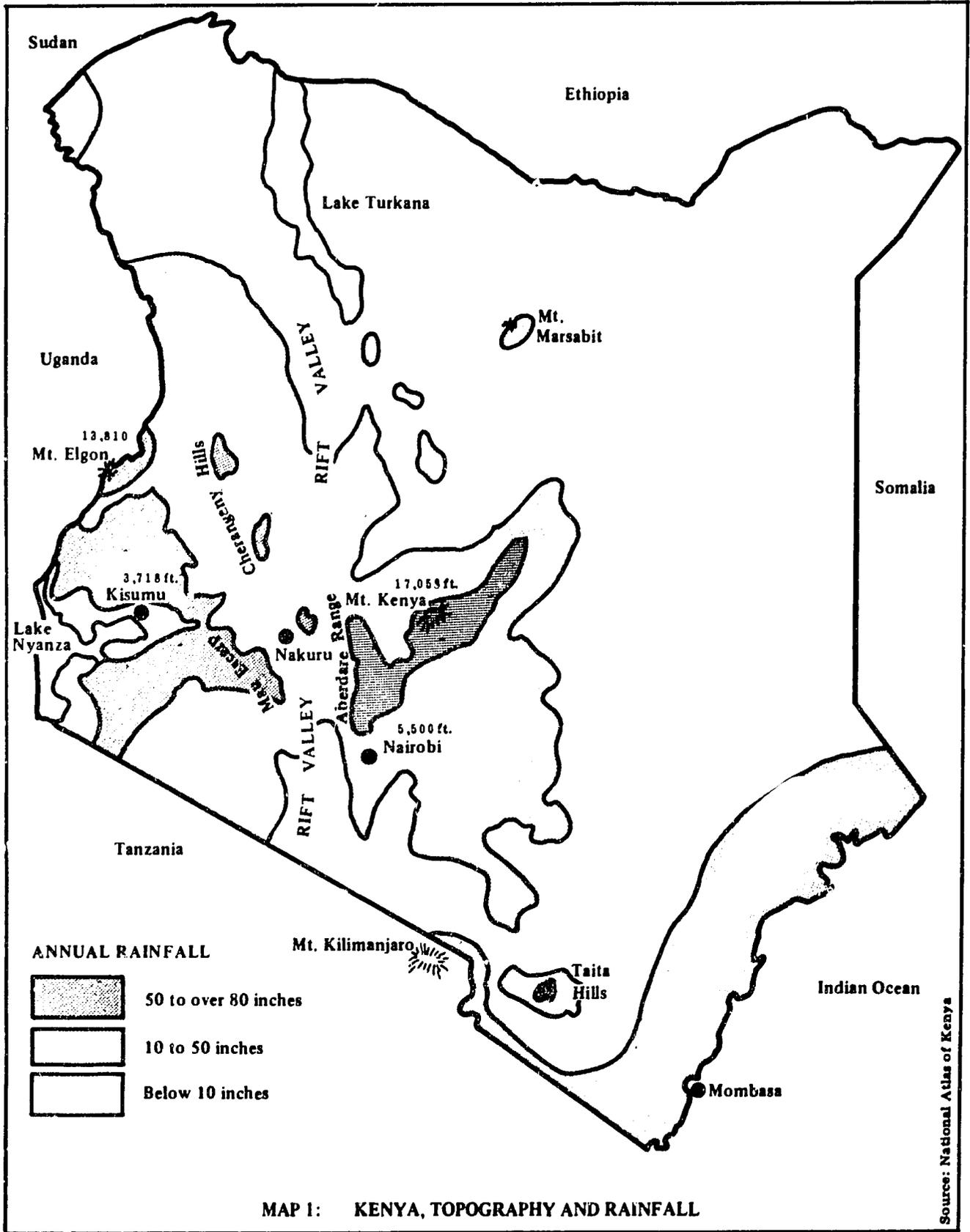
1) The highland areas around Mt. Kenya and the Nyandarua mountains in the Central and Eastern Provinces, and the highlands west of the Rift Valley. These highlands have a temperate climate, moderate to high rainfall and a high agricultural potential.

2) The low plains surrounding the lake in Nyanza Province and the coastal strip in Coast Province. These areas have tropical temperatures and a usually high rainfall. The Lake Nyanza plain has greater agricultural potential because of a more reliable rainfall.

3) The hilly areas of Eastern Province southeast of Nairobi. These are less valuable agriculturally due to very unreliable rainfall. In recent years, population pressure has forced more and more people to move into this marginal zone.

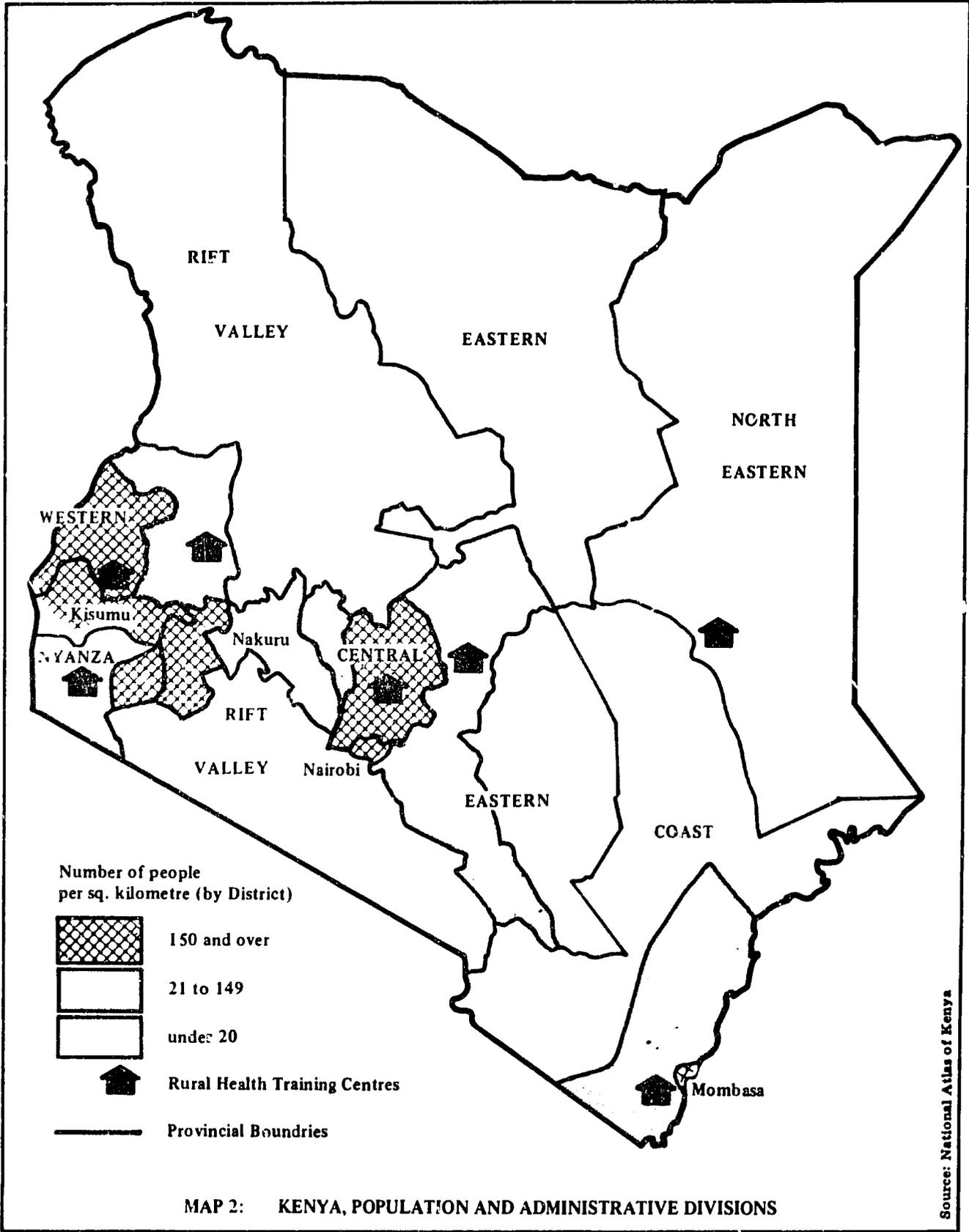
Zones of high agricultural potential comprise under 12% of the total land area of the country. Thus, including the coastal strip and the more marginal agricultural areas, 12.6 million people (or 82% of the total population) are crowded into about 15% of the total land area. The remaining 85% of the land, which is semi-desert and arid bush country, has a population of only 1.4 million people (9% of the total population) almost all of whom are members of nomadic and pastoral tribes.

In line with this enormous geographical and cultural diversity, the health problems encountered by Kenyans are quite varied. Most of these problems share as a component in their genesis the uncertain availability of water. The varied terrain and lack of developed



MAP 1: KENYA, TOPOGRAPHY AND RAINFALL

Source: National Atlas of Kenya



Source: National Atlas of Kenya

public transportation limit the access of the rural population to health care and other social services.

B. The Health Care System

The rural health care delivery system in Kenya today is structured along the lines of the political administration. Excluding Nairobi, there are seven rural provinces, each of which is composed of several districts (*Map 2*). Each district has two or more divisions. Each division is composed of several locations, which are themselves divided into sublocations, the smallest political and administrative unit. Each province has its own provincial medical center, each district its own district hospital, and in some cases sub-district hospitals. Each district also has at least one health center, several dispensaries, and mobile health facilities all of which were, until recently, under the supervision of the local county councils. The various councils obtained advice and support from the Medical Officer of Health at the district or provincial level.

With the rapid growth in population and a concomitant increase in need for health services in the rural areas, it became clear that substantial changes were needed, and in 1970, the central government took over responsibility for the operation and development of all rural health services.

In 1971, a major health project was begun with the assistance of the World Health Organization (WHO)

and the Norwegian Government Foreign Assistance Agency (NORAD). Its aims were to examine the existing rural health facilities, manpower and resources; to determine the actual need for services at that time; and to project what the needs would be in the near future. A detailed proposal was assembled, suggesting specific measures for the improvement of rural health services. This proposal was accepted by the Government of Kenya and the Rural Health Project was begun in 1973. In addition to calling for the construction and staffing of many new health centers and dispensaries, the proposal recommended that rural health services be reorganized along the lines of Rural Health Units at the most peripheral level. A Rural Health Unit was to be a well-defined geographical entity, encompassing a population of 50,000 to 70,000 people (*see Table 1*). It was also proposed that the medical workers who were to staff the new facilities be chosen from experienced paramedical personnel and be trained to work as members of a Rural Health Unit Team. Their training would take place at one of six Rural Health Training Centers: Maragua in Central Province; Chulaimbo in Nyanza Province; Mbale in Western Province; Musoriot in Rift Valley Province; Karurumo in Eastern Province; and Tiwi in Coast Province.

Although the Rural Health Units have been defined and a few Rural Health Unit Teams have been trained and are on the job, the plans for upgrading the existing rural system have been slow in implementation.

Eye patients waiting for treatment at rural health centre in North Meru



OBJECTIVES

- 1: To orient rural health services toward the most important rectifiable health problems.
 - subsequent changes in existing pattern of health services or training schemes should be based on their contribution to the achievement of these objectives.
- 2: To provide quantified estimates as to the benefits expected to be achieved from the proposed services.
- 3: To provide Ministry of Health with a basis for evaluating the effectiveness of the services and the training schemes and restructure them if actual accomplishments vary appreciably from the targets set.

IDENTIFIED HEALTH PROBLEMS:

- * Maternal and child health
- * Malnutrition and undernutrition
- * Communicable diseases
- * U.R.T.I./Gastro-entecitis
- * Diseases and conditions resulting from or provoked by inadequate environmental sanitation.

PLANNING CRITERIA

POPULATION BASIS:

Rural Health Unit/Population ratio 1:50,000–70,000 (variations may occur with subsequent adjustment in number of staff.)

SERVICE CENTRE CONCEPT:

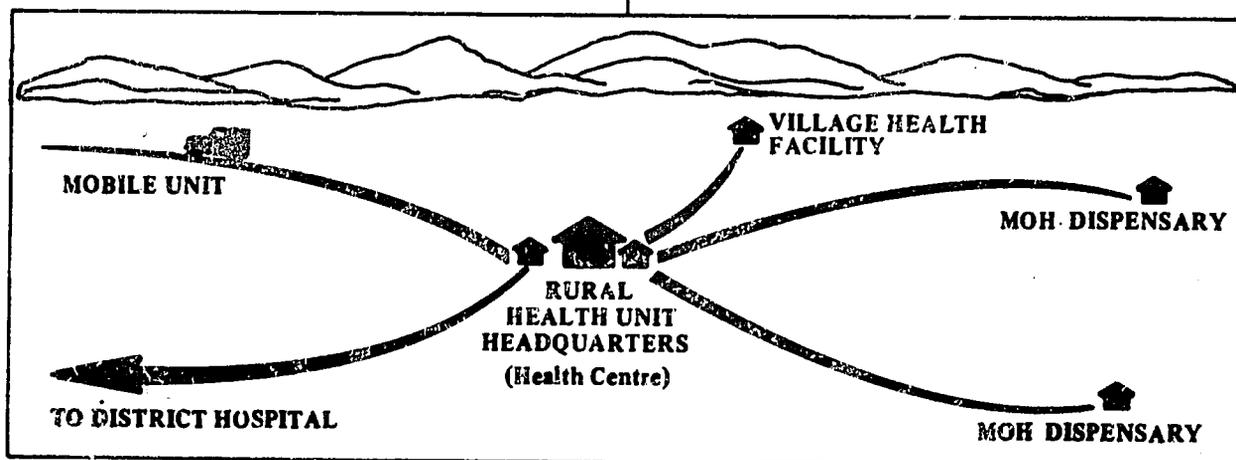
Local centre serving 5,000 people
 Market centre serving 15,000 people
 Rural centre serving 40,000 people
 Urban centre serving 120,000 people

CATCHMENT AREA:

Planning of RHU's should as far as possible conform with this pattern, i.e. achievement of optimal accessibility in short and long-terms.

Reflect preferred patterns of movement. (Community network, topography).

Define the area to be covered by the outgoing services of each RHU.

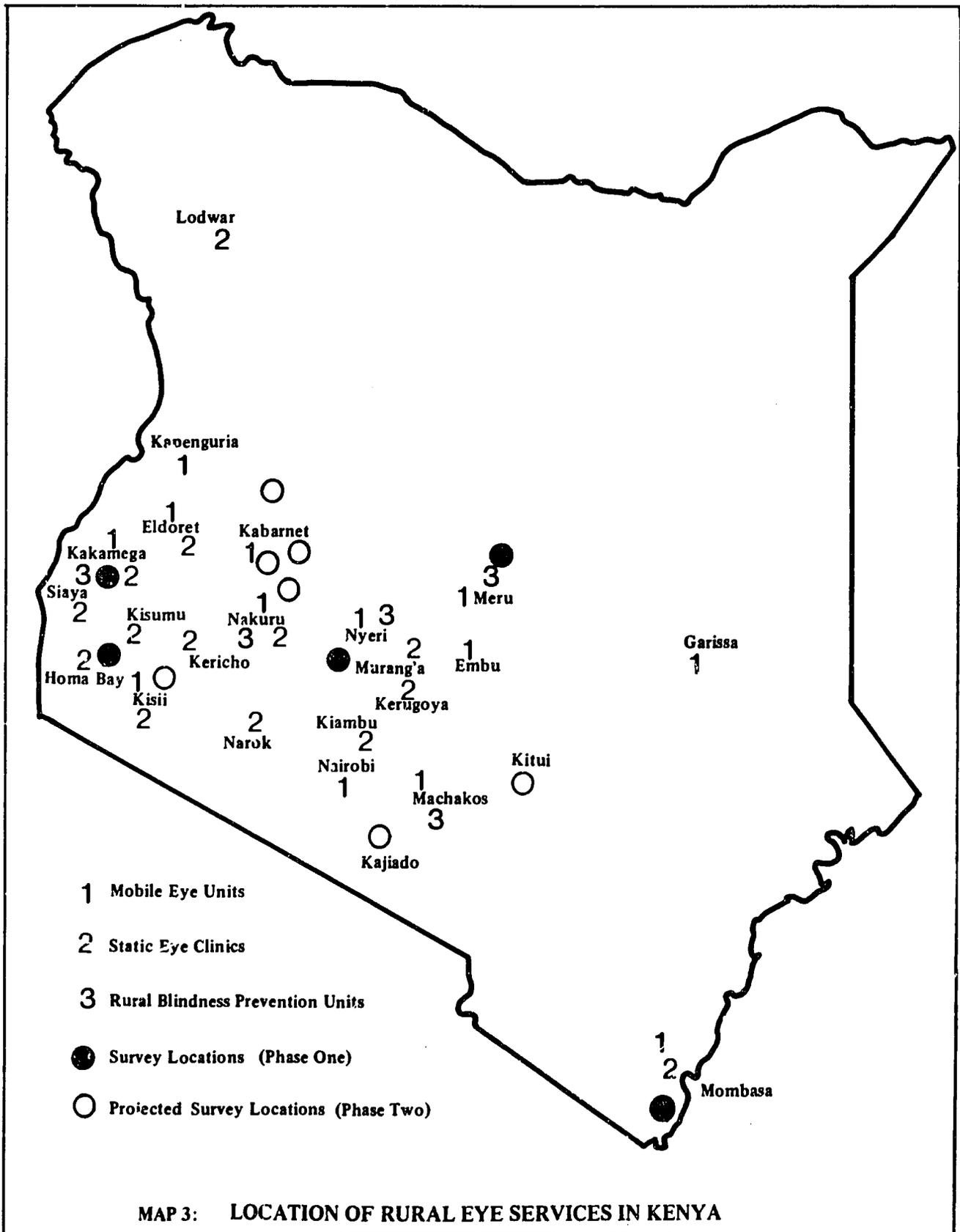


THE RURAL HEALTH UNIT

The rural health unit will be served by one RHU-headquarter (health centre) and a number of supporting facilities (dispensaries). When the number of supporting facilities exceed 4, one supporting facility will be upgraded to health sub-centre. This implies Add. Room and staff.

The RHU-headquarter will provide technical leadership for supporting facilities and will provide them with administrative and logistic support. The district team (Ministry of Health) will provide similar support to the RHU-headquarter. Campaigns and mobile clinics are planned from the RHU-headquarter, and this is also the referral institution for the subordinate institutions.

TABLE 1: THE KENYA RURAL HEALTH UNIT CONCEPT



II. DEVELOPMENT OF THE KENYA OPHTHALMIC PROGRAM

A. History of Rural Eye Care in Kenya

In 1952, the first society for the blind was established in Kenya and was known as the Kenya Branch of the British Empire Society for the Blind. In 1956, an ordinance establishing the Kenya Society for the Blind (KSB) was passed by the Kenya Legislative Council and placed under the jurisdiction of the Ministry of Education. During the first few years of its existence, the KSB devoted its time, energy and limited finances to increasing the number of primary schools for blind children, establishing the first Trade Training Center for the blind, providing braille equipment, introducing a Talking Book Service and providing other support services to the blind.

It was not until 1960, following the release of a study* on rural blindness commissioned by the Society for the Blind and the Kenya Ministry of Health (MOH), which estimated that at least 60% of the blindness in Kenya was preventable or curable, that the Council of the KSB decided to venture into a completely new field, the prevention and treatment of blindness in rural areas. As a result, the KSB approached the MOH and requested that a qualified Medical Assistant with several years of experience in the field, be trained in ophthalmology by the Department of Ophthalmology, Kenyatta National Hospital, Nairobi, and then be seconded to the KSB to work in rural areas. This was approved by the MOH, and the first Ophthalmic Clinical Officer began training under the Senior Ophthalmic Consultant for the MOH. On completion of his training, the KSB provided the Ophthalmic Clinical Officer with a motorcycle fitted with panniers to carry drugs and supplies, and he was posted to work in Machakos District, some 40 miles from Nairobi.

This single Ophthalmic Clinical Officer and his

motorcycle in less than one year examined 36,380 school children and treated 9% for trachoma or other eye infections. The success of this experimental project indicated the great need for rural eye care. It soon became evident that a lone eye worker on a motorcycle was not the answer. In 1963, the Flying Doctor Service handed over to the KSB a new Landrover, donated by R.C.S.B., and the same Ophthalmic Clinical Officer, assisted by a driver and ungraded nurse, took command of the vehicle forming the first Mobile Eye Unit (MEU). Although the home base of this first MEU was the Government Eye Department in Nairobi, it spent over half its time on safari in various provinces throughout rural Kenya.

During the following years, the rural Ophthalmic Program was expanded and by 1976, when the Kenya Rural Blindness Prevention Project was begun, there were seven MEUs, each working out of a provincial, district or mission hospital. In addition, eight static eye clinics had been established, also located at government and mission hospitals. Both the MEUs and the static clinics were staffed by Ophthalmic Clinical Officers, trained at Kenyatta National Hospital (KNH) in a special one year ophthalmic program developed by the Chief Ophthalmic Consultant to the MOH.

In 1966, the KSB together with the MOH established a Prevention of Blindness Committee to oversee the activities of the expanding MEU program. Chaired by a senior officer of the MOH, this committee initially confined itself to the activities of the MEUs. With the establishment of the ophthalmic training program at KNH, and the subsequent development and expansion of the Ophthalmic Program, as well as the concomitant development of other non-government rural eye care efforts, the committee came to represent all parties involved in the delivery of eye care to rural Kenyans. The Prevention of Blindness Committee has

*R.D. Calcott, *Blindness in Kenya*, published by the British Empire Society for the Blind, London, 1956

come to play an important role in the administration and coordination of all such activities. It meets quarterly to review current efforts in eye care, and to make recommendations to the MOH and the KSB regarding future developments.

B. Selection, Training and Supervision of Ophthalmic Clinical Officers

As late as 1975 there were but two ophthalmologists working outside the cities of Nairobi, Kisumu and Mombasa. Recently, however, the number of government ophthalmologists has greatly increased, and now six are located at the Provincial Hospitals in Nakuru, Kakamega, Kisumu, Nyeri, Machakos and Mombasa in addition to those working at KNH. Despite this improvement in the number and distribution of ophthalmologists, there is still a great need for specialized eye care in the rural areas. This can only be rectified in the near future by the training of skilled paramedical personnel and their assignment to the rural areas in need. It was for this purpose that the Ophthalmic Training Program for Clinical Officers was initiated. The key to the success of Kenya's rural Ophthalmic Program has been the work of the Ophthalmic Clinical Officers trained in this special course, for it is the Ophthalmic Clinical Officer upon whom the great majority of clinical work falls. Experience has shown that for the Ophthalmic Program to be successful, the assessment and selection of each candidate must be undertaken with great care. After he is trained and assigned to the field, considerable time must be devoted to his regular and careful supervision by an ophthalmologist. All instances of failure have been due to either poor selection or lack of supervision of the Ophthalmic Clinical Officers.

The training of the Ophthalmic Clinical Officer includes at least four years of formal instruction in the health sciences. After an initial three years of training at either the Nairobi or the Nakuru Medical Training Center, he is qualified as a general Clinical Officer and then serves in the government health system in this capacity for several years. Only after he has proven himself to be a capable and responsible medical worker is he selected to return to KNH to take an additional one year specialty course in ophthalmology.

This ophthalmic training program for Clinical Officers stresses practical skills and clinical experience. The candidates are instructed, as often as possible, by an ophthalmologist and this is best done by the apprenticeship method—each officer being taught by working with the ophthalmologist in surgery and in

the clinic. Formal didactic teaching is useful, but less emphasis is placed on this, usually one hour per week being allocated for such instruction. During the year's training, each candidate spends time in the surgical theater learning the essentials of sterilization, surgical technique and care of instruments. During the last six months, the candidates spend two one-month periods working in the field with established MEUs.

Upon successful completion of this postgraduate course, the candidate becomes qualified as an Ophthalmic Clinical Officer and is assigned to work, for at least one year, in a static clinic under the supervision of an ophthalmologist. It has proven to be helpful if this assignment is made to an area where his own language is spoken in order to enhance his ability to communicate well with his patients and to maximize his effectiveness as a teacher. If his interests and work are of sufficient quality, he is asked to run his own MEU. This team ranges over a wide area seeing patients in government and mission health facilities where there are no established eye programs.

The specific activities of the Ophthalmic Clinical Officer in the field depend upon the local conditions and the priorities of the specific ophthalmic outreach program. In Kenya, the Ophthalmic Clinical Officer has, with proper continuing instructions and supervision, been able to act in the place of an ophthalmologist, diagnosing and treating the great majority of ocular problems he faces in the clinic and successfully performing minor ophthalmic surgical procedures. Those patients needing more advanced care are either referred to the nearest ophthalmologist or asked to return when the supervising ophthalmologist makes his visit to the clinic. In addition, several Ophthalmic Clinical Officers have become skillful intraocular surgeons under this program. Selection for this advanced training has depended upon the abilities and interest of the individual Ophthalmic Clinical Officer.

It cannot be overemphasized that adequate supervision by an ophthalmologist is critically important to a sustained high level of performance on the part of the Ophthalmic Clinical Officer. In addition to regular visits for consultation clinics and surgery, the ophthalmologist must take and maintain an active personal interest in each Ophthalmic Clinical Officer under his supervision, giving him individual support and encouragement and when necessary taking an active interest in his personal problems. Important also is the promotion of the Ophthalmic Clinical Officer to a higher salary scale than the general Clinical Officer and giving him a title which reflects his specialist status.

III. THE I.E.F. KENYA RURAL BLINDNESS PREVENTION PROJECT

A. Origins and Goals of the Project

The International Eye Foundation first became involved in the Kenya Ophthalmic Program in 1972 through its sponsorship, with the MOH, of a Provincial Ophthalmologist for Central Province. As the IEF ophthalmologist became familiar with the problems involved in the delivery of rural eye care in Kenya, two facts became apparent. First, although the MEU program was delivering an invaluable service to rural Kenyans and performing a significant amount of curative work, because of the limited resources of the program and the very great unmet need, it was clear that the problems of rural eye care for most of the people were not being addressed effectively. Second, given the available evidence that two-thirds of the blindness in Kenya is either preventable or curable, it appeared that it would be most valuable to institute a Kenya-wide program focussed on blindness prevention and the elimination of avoidable blindness through the development of appropriate clinical and educational strategies.

Part of the rationale for this focus is that the elimination of avoidable blindness is substantially more valuable and effective than the treatment of those already blind. Not only is the therapy for those already blinded often prohibitively expensive, especially for developing countries such as Kenya, but it is also too often ineffective. Blindness has long been recognized as one of the most costly of all forms of serious disability. Not only does blindness result in the loss of the individual from the labor force, but it also requires continued support of the disabled by the community.

Since resources available for the more advanced forms of medical and surgical care are severely limited in developing countries, health education and prevention have particular appeal, especially in light of the importance of knowledge, attitudes and practices of the people in determining the health of a community.

With these factors in mind, in 1974 the IEF began a

pilot prevention project in the Nyambene Hills, a densely populated area to the north of Mt. Kenya whose inhabitants have a high incidence of blinding trachoma. With the support of the MOH, the KSB and Operation Eyesight Universal of Calgary, Canada a small local project was initiated and carried out by an Ophthalmic Clinical Officer working out of nearby Meru District Hospital. The project's goal was the prevention of blindness from trachoma through health education, mass screening and early treatment with tetracycline eye ointment of those having active disease, and referral for surgical correction of those with entropion. The initial target was the primary school child, especially those in the first two grades. The project was enthusiastically received by students and teachers alike, thus insuring their active participation. As a result, in the designated target areas, the prevalence of active trachoma among the students in the first two grades fell from an average of over 30% to less than 10% over a period of three terms. With this experience as a stimulus, the IEF and the MOH, with the approval of KSB, approached the United States Agency for International Development (USAID) with a proposal for a Kenya-wide Rural Blindness Prevention Project. This project was funded, and it began operation in October, 1976.

The project has had from its inception three major objectives, all linked under the common goal of the elimination of preventable and curable blindness among the rural poor of Kenya. The first objective was to define accurately the prevalence and causes of blindness among rural Kenyans. With this information on the magnitude, type and distribution of avoidable blindness, the government of Kenya would be able to establish realistic priorities in ophthalmic care, mobilize appropriate support and plan active and appropriate interventions.

The project's second objective has been to strengthen



Foto: Flying Doctors

Surgery in the field

and extend the capabilities of the already established system of therapeutic rural eye care (both static eye clinics and MEUs), and to indicate to them the areas and problems most in need of their services. This is a critically important part of the project, as no purely preventive intervention has any chance of popular acceptance unless it is integrated with and backed up by an effective therapeutic capability.

The third major objective has been to steer the main emphasis in rural eye care away from the purely

therapeutic approach and towards blindness prevention. Three strategies were developed to achieve this goal. The first has been to increase the capabilities for health education, mass screening and early referral of eye patients through the development of five Rural Blindness Prevention Units (RBPU's). These units, similar in basic structure to the MEUs, deliver preventive and educational services to groups of rural people in many settings: schools, barazas, MCH/FP Clinics, Agricultural Fairs and so on. The RBPU's play a

primary role in the delivery of ocular health information, in preliminary mass screening for avoidable and curable eye disease, in the education of health workers in early diagnosis and treatment of ocular disorders, and in the early referral to therapeutic centers of patients needing more definitive or sophisticated care. In order to reach a maximal number of people, they utilize, wherever possible, established and ongoing health and educational programs in the area to which they are assigned.

The second strategy has been the development of educational curricula stressing the importance and the techniques of primary eye care and blindness prevention activities for use not only by the RBPU's, but also by primary and secondary school teachers, health educators, health workers at all levels, and by the teaching staffs of the Rural Health Training Centers, nursing and Clinical Officer training schools.

As an integral part of the above, the third strategy has been the development of teaching and promotional materials which again stress the importance of primary eye care and blindness prevention. Also included in this strategy has been the training of eye workers and health educators in the use of educational and promotional materials developed by the project.

B. Development of Mobile and Static Eye Units

As discussed above, a unique system of mobile eye medicine has existed in Kenya since 1963. From its modest beginnings of one health worker on a motorcycle, the MEU program has expanded to the present thirteen MEUs.* Each mobile unit consists of an Ophthalmic Clinical Officer, a driver, an ungraded assistant, a rugged four wheel drive vehicle and instruments and supplies. When it travels to one of the peripheral health delivery points in its area, the team examines and treats outpatients, performs extraocular surgery and, in many cases, intraocular surgery is performed on in-patients by the Ophthalmic Clinical Officer.

Because there is frequently no electricity, running water or medical supplies at the clinic location, each MEU must be completely self-sufficient. It carries its own medicines, diagnostic and surgical instruments, camping gas sterilizer, sterile drapes, gowns and dressings, water, and its own light source for surgery—

a spotlight run from the vehicle's battery. In addition, it carries food and camping gear for its team, when necessary. Medical supplies and instruments are packed into sturdy dustproof wooden boxes and unpacked at each clinic location, the boxes often serving conveniently as tables. If there are no indoor facilities for surgery, the floor of the vehicle serves well as an operating table with the surgeon seated on a stool outside the rear of the vehicle.

Although the aseptic conditions for intraocular surgery are less than optimum and surgical gloves not used simply because they are not available, postoperative results have been excellent and easily comparable to those of ophthalmologists working under similar conditions.

The role of the IEF in increasing the effectiveness of the therapeutic program has been one of support and supervision. The Kenya Rural Blindness Prevention Project has made major contributions of diagnostic and surgical equipment to each of the thirteen MEUs. Four of the therapeutic MEUs are under the direct supervision of the Project ophthalmologists who, in addition to their duties directly related to the Project, also serve as Provincial Eye Surgeons in Central and Rift Valley Provinces. The Project also has equipped the thirteen peripheral static eye clinics with surgical and diagnostic equipment, and provides supervision for five of the Ophthalmic Clinical Officers in charge of these clinics.

In order to monitor and coordinate the network of rural eye care delivery units, the Project has developed a standardized form for monthly reporting of clinic activities by each of the Ophthalmic Clinical Officers in the field, and is developing a computerized system for ongoing evaluation of the information reported. This system will greatly increase knowledge about the coverage of eye care in the country, will help determine seasonal or geographic variations in patterns of ocular disease, and will form a part of the planning and evaluation process for the Ophthalmic Program in Kenya.

Certain factors have proven to be of great importance to the continued success of the MEU program. Foremost is the need for reliable and consistent delivery of services. Despite the great unmet need for rural eye care, because of the conservative nature of the rural population, the initiation of an eye clinic in a new location is quite difficult, and regular visits are essential for acceptance. Not only is the sense of responsibility of the Ophthalmic Clinical Officer a key factor but also the adequate preventive maintenance of the MEU vehicle. Since the vehicles are supplied and maintained

*See Map 3 for the present distribution of all rural eye services in Kenya

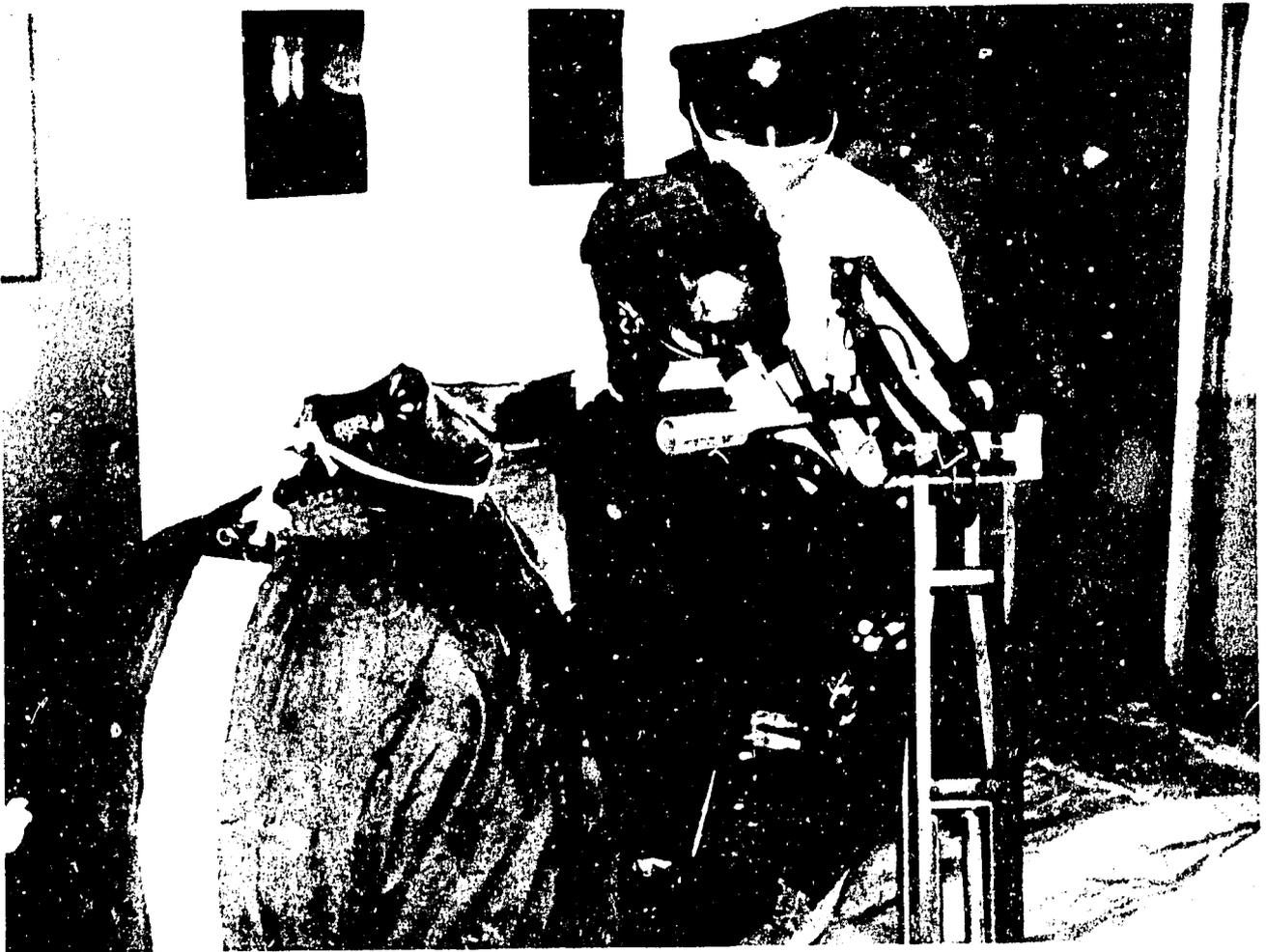
through the KSB, it has been possible to ensure that they operate on a much more regular basis than would be possible through government channels. In addition to the need for dependability, the MEU must be able to provide the necessary treatment in order to maintain public confidence. Thus, a dependable supply of necessary pharmaceuticals must be consistently available to every MEU. Because of frequent and critical shortages of necessary drugs in the government stores in most developing countries, this has often meant provision of needed supplies through the KSB using international donors.

One of the most significant achievements of the Ophthalmic Program in Kenya has been the coordination of support from a large number of quite disparate local and international agencies and organizations into an ongoing and effective cooperative effort to

deliver sight saving services to the rural poor of the country. The cooperation of the MOH with both the KSB and the Prevention of Blindness Committee has been of greatest importance in bringing this about.

The reality of financial support for medical programs in the developing world is that blindness prevention is a relatively favourable issue around which to generate funds. Donors are generally very responsive in the fight against such a tragic disability, perhaps to a greater extent than in response to other equally serious but less dramatic health problems. Because of this, it becomes incumbent upon blindness prevention programs to integrate their resources into broader programs of primary health care. In particular, the rugged vehicles have proven themselves to be a tremendous resource for the delivery of primary health care in general in areas where such vehicles are

*Ophthalmic Clinical Officer performing
Cataract Extraction*





*Post operative exam Cataract Patient
by IEF Ophthalmologist*

necessary for transport but not available except through the Ophthalmic Program. The Kenya MEC program is beginning to attempt integration of ocular care with other health services, following the lead of the RBPU's. Occasionally the Ophthalmic Clinical Officers have been reluctant to share their vehicles with other health personnel, but continuing education about the intersectoral nature of eye diseases and the need to attack them on a broad basis will help alleviate this concern.

A final comment is necessary about the future use of mobile units and on the future activities of Ophthalmic Clinical Officers in the delivery of rural eye care. In view of the explosive rise in capital and operating costs for vehicles, the use of mobile units is undesirable when it becomes feasible to do without. As the MOH trains more Ophthalmic Clinical Officers and builds more peripheral facilities in which they can work, the supervising ophthalmologist can assume the mobile

role visiting the peripheral static eye units in turn on a regular basis. Because of the wide variation in the rate of rural development throughout Kenya, this will of necessity take place irregularly and on a local basis. Also, as more ophthalmologists are trained and become available for work in the periphery there will be less demand for Ophthalmic Clinical Officers to act in the place of ophthalmologists. Thus with an eye to the future, it is vital to develop alternative uses for mobile eye units and alternative activities for Ophthalmic Clinical Officers.

C. Promotion, Prevention and Training

The single major thrust of the Kenya Rural Blindness Prevention Project has been to increase emphasis within the Kenya Ophthalmic Program on blindness prevention activities. These services include both those directed at the early diagnosis and treatment of

potentially blinding conditions and those which aim at widespread dissemination of information about ocular health. In line with this dual focus, efforts have been made to reach both front-line health workers and the broader audience of rural Kenyans.

As the keystone to this system of prevention, the KRBPP has established, equipped and helped to supervise five mobile Rural Blindness Prevention Units (RBPU's) targetted at five areas of significant population density in Kenya. (see map 3). The concept of ocular health education and blindness prevention by individual mobile units is a natural outgrowth of the mobile therapeutic system, building on the successful model of the MEUs, but reorienting it towards the specific educational needs of the people.

Each RBPU consists of an Ophthalmic Clinical Officer, especially chosen and trained in blindness prevention and primary eye care educational tech-

niques, a driver, a sturdy vehicle and appropriate ophthalmic equipment and teaching aids. Although part of his time is spent in the clinical operations of the static eye clinic, the main thrust of his work is in providing blindness prevention services and education. He screens primary school children, infants and mothers in MCH/FP Clinics, and village elders at Chief's meetings treating and, when indicated, referring those needing surgery or more advanced medical care. He also gives lectures and demonstrations to the above groups about primary eye care and blindness prevention. In addition he teaches nurses in training and other health workers, both on the job and during in service training sessions, using appropriate curricula. Close cooperation and regular collaboration with the six Provincial Rural Health Training Centers will be of particular importance.

*Ophthalmic Clinical Officer from Blindness
Prevention Unit Training Future Colleagues*





Early referral for treatment can save sight and lives

When possible, the RBPU utilizes the educational and promotional materials developed by the HEF staff. He also engages in various promotional activities when the opportunities present themselves. The RBPU's have regularly participated in the rural Agricultural Fairs held annually in small towns and provincial centers throughout rural Kenya, and posters, slides shows and other promotional materials have been produced by the project for use in these fairs. They have also participated in health education programs for radio and television.

There have been no problems of acceptance of the RBPU's within the five district in which they work because the therapeutic activities of the MEU's have already been active in these areas for some years and their services warmly appreciated by the people in the local communities. Once again the importance of therapeutic backup for educational and preventive activities is seen to be critically important, especially in providing prompt and adequate care for those referred by screening clinics. In addition, it is most important that the promotional messages and educational materials must not only be acceptable to the

local culture, but also effective in stimulating blindness prevention activities.

The Ophthalmic Clinical Officers assigned to the RBPU's have proven themselves highly effective in their new role as promoters and teachers although they have required a bit more stimulation and supervision by the ophthalmologist because of the increased need for imagination and initiative. Some also continue to be interested in performing intraocular surgery, which is a high status activity, but as more ophthalmologists become available for rural work intraocular surgery will no longer be performed by the Ophthalmic Clinical Officers, and the preventive role would seem an ideal one to replace the advanced therapeutic role, in the Kenyan context.

In order to extend the promotion of ocular health beyond the confines of the formal health system, much effort has been devoted to the creation of educational materials for use not only by the RBPU's but also by teachers in the classroom and by the mass media for the general public. While it is known that health education has a great potential for having a positive impact on knowledge, attitudes and practices, it has

often proven difficult in practice to develop comprehensible, relevant and effective educational messages appropriate to the audiences involved. For this reason, the IEF has carried out extensive field experimentation and testing of materials in order to maximize their effectiveness. A full listing of the materials developed for health workers, school teachers and the general public is provided in *Appendix A*. As their use broadens, there will be ongoing evaluation of the effectiveness of the materials and revisions made as needed.

Experience in Kenya has indicated that, in general, the materials initially produced proved to be too long and too complex when tested in the field. Also, given the difficulties involved in having materials correctly printed in a developing country and the general level of sophistication of the audience, it is highly desirable to keep all materials as simple and as direct as possible. Finally, promotional and educational materials in themselves have been of little value if explicit teaching

of their messages has not been sensitive and of high calibre. The development of materials and methods must be an iterative and self-critical process.

Essential to successful integration and institutionalization of blindness prevention activities in Kenya is the training of health workers at all levels. This has been a major contribution of the Kenya Rural Blindness Prevention Project to the ongoing health care system. Through the training of indigenous health workers, it has been possible to transfer eye care technology and the fundamental concepts of primary eye care and blindness prevention to enrolled and community nurses, registered nurses, medical students and physicians.

The initial training of Ophthalmic Clinical Officers and their utilization in static and mobile units has been described above. Through the Provincial Ophthalmologists in Central and Rift Valley provinces, supplied and funded by the IEF Project, continuing on

At work on Ocular Status Survey



the job education has been provided to the Ophthalmic Clinical Officers under their supervision. Also, each annual class of Ophthalmic Clinical Officers at KNH receive both didactic and field training by Project staff in the activities of primary eye care and blindness prevention as part of their regular curriculum. Finally, the IEF Project staff contribute significantly to the intermittent post-graduate seminars for upgrading the skills of the Ophthalmic Clinical Officers in the field, held at KNH.

As another Project activity, the registered Clinical Officer students at the Nakuru Medical Training Center received a 15 hour course in Ophthalmology as part of their basic training. In addition, all students spend rotations on the eye ward, in surgery, and in the eye clinics learning the basic clinical skills of ophthalmic diagnosis and therapy.

Community nursing students at Nyeri and Nakuru Provincial Hospitals receive regular courses in Ophthalmology which stress not only basic medical knowledge and clinical skills but also the essentials of primary eye care and blindness prevention.

Medical students worked with each of the five ocular and nutritional status surveys learning the principles and practice of field epidemiology. Arrangements were made with the Department of Community Health in the Faculty of Medicine at the University of Nairobi for further field placements of medical students in components of the Rural Blindness Prevention Project.

In addition, the groundwork was laid for the teaching of basic clinical and preventive ophthalmic skills in the Rural Health Training Centers to all Rural Health Teams. In this way, preventive and curative ophthalmic skills will be made available at the most peripheral levels of the rural health care system.

One of the major difficulties encountered by the Project in establishing the various teaching blocks on ophthalmic care was the lack of standardization of curricula in each of the training programs. Although the curriculum for all of the Community Nursing Schools is, in principle, standardized by government authority, in fact it varies from school to school and hospital to hospital, as does the person with the authority to approve changes and additions to the curriculum. Thus it has been necessary to tailor each teaching block to each of the schools approached as well as to locate, each time, the authority necessary to have to have the block implemented. With a more standardized curricula and a more centralized authority for course organization, the task of institutionalization would be greatly simplified. Problems such as these



limit the pace with which training in blindness prevention can be disseminated throughout the health training system.

D. Support Activities of the IEF Headquarters

The headquarters of the IEF in Bethesda, Maryland, has provided, throughout the life of the project, a range of backstopping and support activities which have facilitated smooth project operations. These activities can be divided into several categories: personnel management; procurement and supply; education and training; and coordination with other agencies, both governmental and non-governmental.

Personnel management has included the selection and posting of project staff, management of salaries and fringe benefits, shipping and storage of personal effects, and arrangement of international travel for project staff. The IEF headquarters has also assisted Project staff in such areas as banking, personal insur-

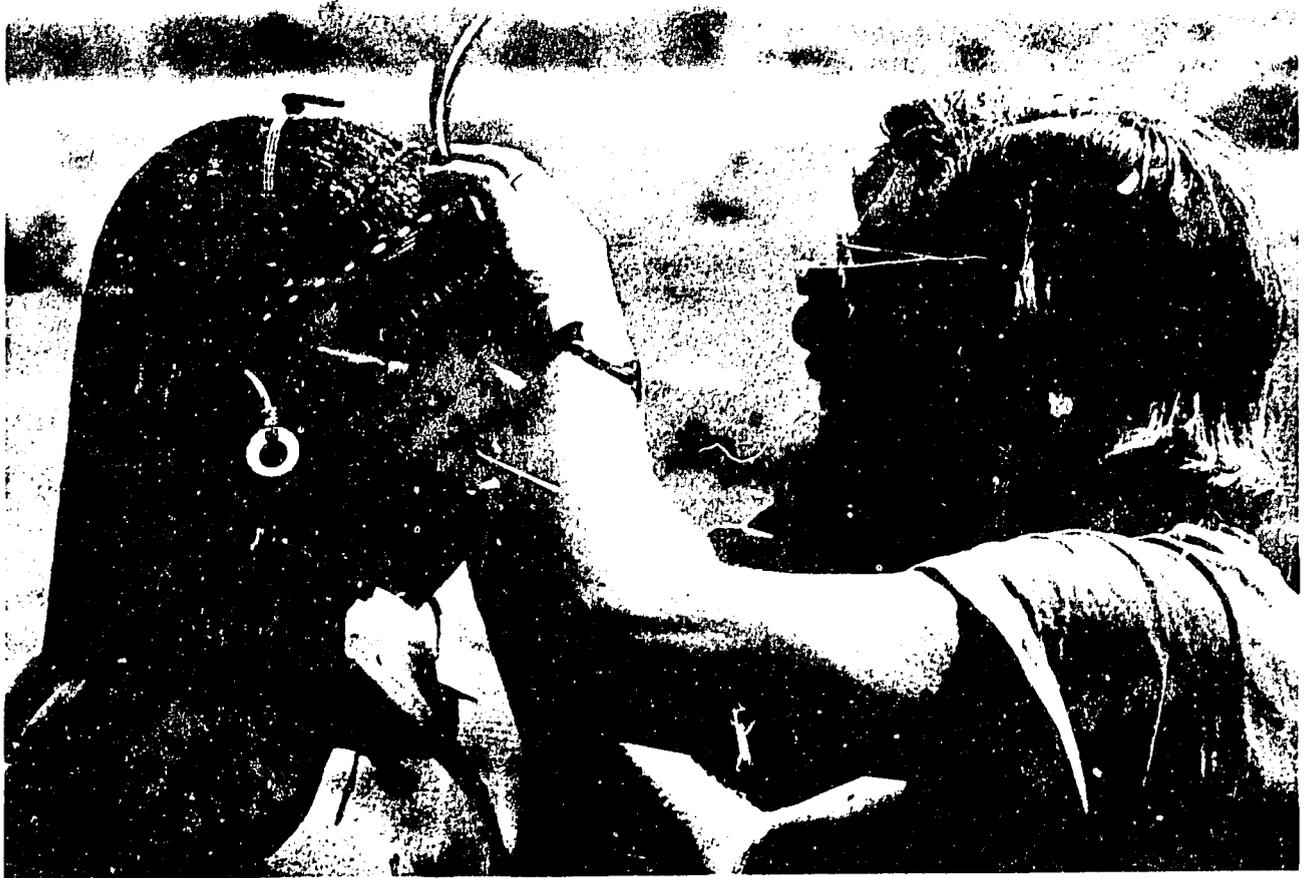
ance, and handling of personal mail.

Procurement and supply of medical equipment and pharmaceuticals has been one of the most significant support activities of the headquarters in terms of facilitation of project activities. As pointed out earlier, supplies of drugs and equipment through normal MOH channels are at best irregular, and almost non-existent in the Kenya Ophthalmic Program. Essential ophthalmic drugs such as tetracycline ointment, and surgical and examination equipment provided by the headquarters when local supplies have failed, have made it possible for Project work to continue when it would otherwise have ground to a halt.

Education and training activities organized by the headquarters have been another valuable area of support. By arranging the translation and dissemination of educational materials developed by Project staff members, the headquarters has been able to provide Project staff with critical feedback on these materials thus contributing to their improvement and further development. IEF headquarters has also

been active in providing Project personnel with continuing medical education and opportunities to interface with others working in blindness prevention projects throughout the world by participation in relevant international and professional association meetings.

The area of coordination with other agencies has included liason with USAID/Washington for grant negotiations, yearly grant renewals, and fiscal accountability, and to ensure compliance with the overall policies, procedures, and regulations of USAID. In addition, the headquarters has worked to coordinate its activities and thus those of the KRBPP, with those of WHO, the Pan-American Health Organization (PAHO), and other voluntary agencies and academic institutions involved in blindness prevention around the world. Finally, the headquarters has negotiated with various international funding sources for assistance in collaborative project activities, supplies, and financial inputs, all of which have been valuable to the operations of the KRBPP.



IV. THE PREVALENCE AND CAUSES OF VISUAL LOSS IN KENYA

A. Nutritional and Ocular Status Survey Methods and Issues

A major aspect of the Rural Blindness Prevention Project has been the estimation of the prevalence and entiology of visual loss in rural areas. With this information, Kenya will be better able to optimize the distribution of ophthalmic services in terms of both geographical location and balance between preventive and curative activities. Locations in which blindness is more prevalent should become priority targets for the program as will conditions which account for major proportions of visual loss.

A modification of a multi-stage random stratified cluster sampling technique was applied to identify the groups examined. As it was physically and financially unrealistic to attempt a country-wide or provincial grid-survey, it was decided instead to stratify the rural population of Kenya on the basis of cultural and geographic homogeneity, and to conduct small sub-population surveys on these groups. Although this procedure makes the derivation of statistically valid population-wide estimates impossible, it was felt that detailed information about groups in particular habitats and with similar life styles was more important for planning in a country so diverse as Kenya.

Five surveys having both ocular and nutritional components were completed in major population zones during the first phase of the Project, in the Districts of Meru, Nyeri, Kwale, Kakamega and South Nyanza (*see Map 3*). Of critical importance to the success of each survey was the time spent in advance field work. Each area was chosen only after extensive demographic review and consultations with local authorities. In order to ensure local support and cooperation, all relevant Provincial, District and local administrative officers and medical personnel, as well as educational and public information officials were contacted at least once prior to field work. There were also carefully timed releases to the radio and press, so that the people themselves were made aware

of the timing, activities and purposes of the impending survey.

In each population group sampled, specific areas felt to be representative of the group were selected in consultation with local officials. A representative area was composed of one to three Locations, each containing several sublocations. Clusters were chosen from each sublocation in proportion to its population, so that a total of 30 clusters would be included in the survey. Index households, randomly selected starting points for each cluster, were identified from tax lists, land registration records or village headman records, whichever was the most accurate and comprehensive source available. Succeeding houses to be sampled were those geographically nearest the preceding household, and clusters were continued until a minimum of 60 survey members per cluster were identified and registered; the entire household from which the sixtieth cluster member came was included in the sample.

The examination protocol (*Appendix B*) was designed to accomplish two purposes: first, to register visual acuity classification according to criteria standardized by WHO, and to collect detailed information on ocular findings; and second, to gather data on the nutritional status of all children under 5 years of age for determination of the relationship between the nutritional status and ocular health. The primary impact of malnutrition on ocular health is of course the development of xerophthalmia due to Vitamin A deficient diets. More generally, however, malnutrition in an individual or in a community is one indication of risk of disease or of social deterioration. A high prevalence of certain eye diseases may correspond closely to levels of malnutrition, in which case one might serve as a proxy indicator for the other in identifying areas in special need of intervention. Nutrition information was also collected, therefore,

to examine this linkage and its potential for enhancing planning of services.

There were major problems in the use of the biochemical tests and supra-vital stains which were part of the protocol; these two issues will be reviewed before the major survey results are presented. The use of supra-vital stains (i.e. rose bengal and lissamine green) as an adjunct to clinical examination for the determination of xerophthalmia had been highly recommended by certain experts in the field of nutritional blindness. For this reason the staining procedure was included in the original examination for all children under six and any person over six suspected to be at risk of xerophthalmia in order to corroborate clinical findings and to determine if the procedure by itself might prove a useful screening tool for nutritional blindness in Kenya. This was considered especially important in light of Sauter's contention that vitamin A deficiency represents the main cause of blindness among Kenyan children.* Findings in the first survey tended to support critics of these tests, however, in that only a small percentage of those with clinical indications of xerophthalmia were identified by positive stains (15% by Rose bengal, 38% by lissamine green) while a substantial proportion of the vast majority who had no clinical signs of xerophthalmia also stained positive (5% by Rose bengal, 8% by lissamine green).

The collection of serological samples for biochemical analysis adds considerably to the cost and difficulty of conducting field surveys of this type. Biochemical information promised, however, to be invaluable in identifying sub-clinical pathology and in clarifying the relationship between general malnutrition and ocular disease in children. Blood samples were therefore collected during the five surveys from all children aged six to sixty months; hematocrit levels were determined on the spot and the remainder of the samples were frozen for shipment to Letterman Army Institute of Research in California for extensive analysis. Unfortunately the analyses were never performed as promised by the Letterman Institute except for serum retinol determination on serum samples drawn during the Kakamega survey. Although serum retinol levels were felt to be the most important and relevant tests to be performed, the validity of even these minimal results was called into question by results of comparison tests on a control batch of serum performed by three laboratories which revealed

both bias and striking lack of precision in determining retinol levels both inter- and intra- laboratory. Consequently, except for the hematocrit levels which were determined at the survey sites, no biochemical analyses are available.

B. Distribution and Causes of Blindness in Survey Areas

A distinction must be drawn in analysis between visual loss to individual eyes, and visual loss to people (i.e. to the better eye); statistics on the former are revealing in that they indicate what conditions a practitioner may be called upon to treat, but it is the latter which is of public health importance and which blindness programs should address. Another distinction should be made among visual loss which is *blinding* such that it renders normal functioning impossible,

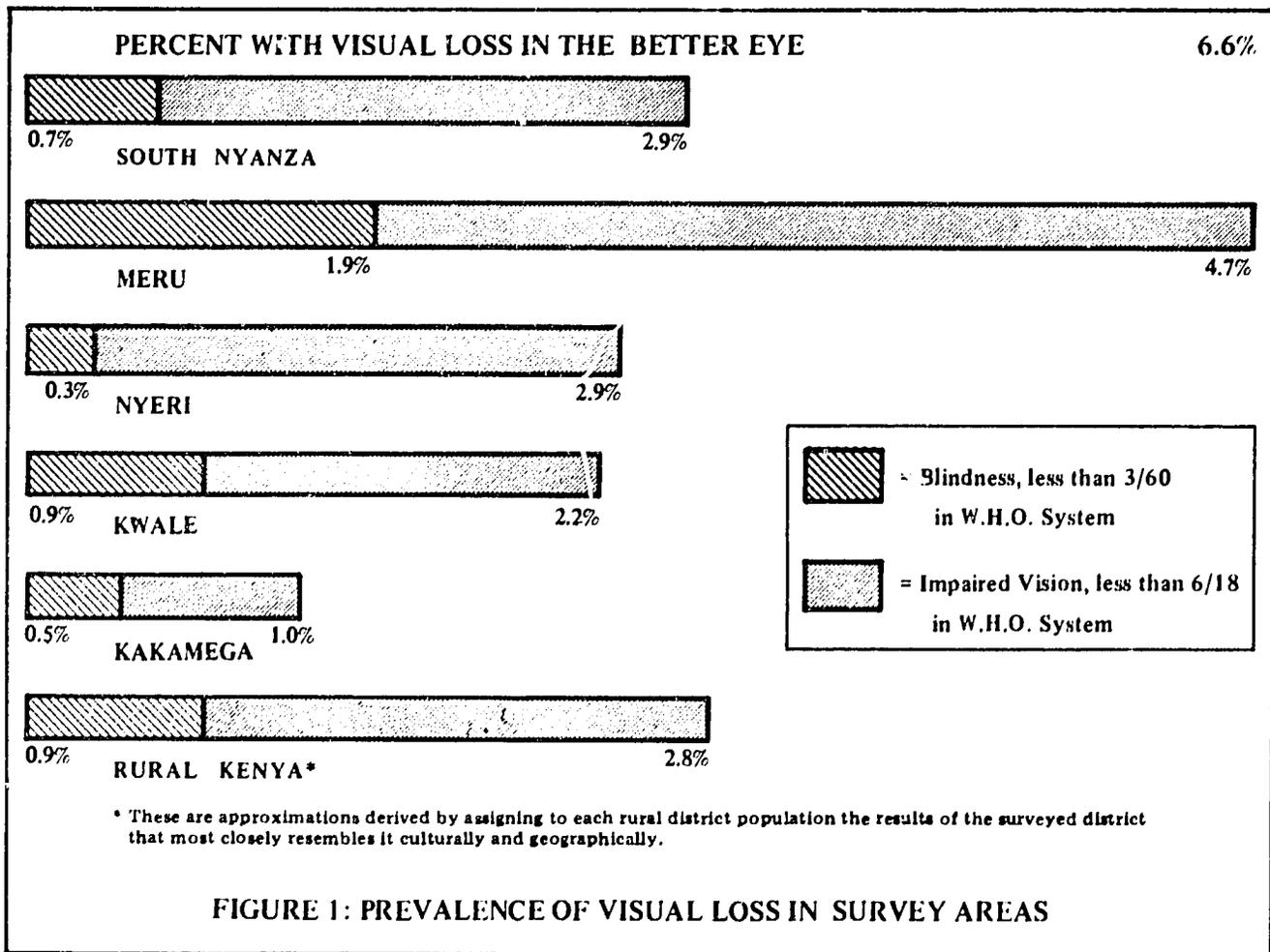
Categories of Visual impairment	Visual acuity with best correction ^a				
	Decimal notation	Snellen notation ^b			
Low Vision	1	<0.3	<6/18	<1/3	
	2	<0.1	<6/60	<1/10	
	3	<0.05	<3/60	<1/20	Visual acuity less than ability to count fingers at 3 m (3/60) or visual field constricted to less than 10°
Virtual Blindness	4	<0.02	<1/60	<1/50	Visual acuity less than ability to count fingers at 1 m (1/60) or visual field constricted to less than 5°
	5	No light perception			

^aEach subject should be assigned to the highest group applicable. Categories 3 to 5 are considered *blind*; 2 to 5 *severely impaired*; and 1 to 5 *significantly impaired*.

^bThe numerator in the Snellen notation is the distance at which the test is performed

TABLE 2: W.H.O. NOTATION FOR VISUAL ACUITY CLASSIFICATION

*Jules J. M. Sauter, Xerophthalmia and Measles in Kenya. University of Groningen, Netherlands, 1976. This contention will be discussed in the section on survey results.



loss which is *severely impairing* because it prohibits economic activity although still allowing some social activity, and that which simply *impairs* sight by decreasing visual acuity below some arbitrary level. It is the first and last which are emphasized here, coded using the classification system promulgated by the WHO (Table 2).

In Figure 1, the proportions of the population in the five survey areas showing visual loss according to this classification are presented.* Rates of impaired vision vary considerably among the areas surveyed, from 6.5% of the north Meru people to only 1.5% of the Kakamega population. Likewise, rates of blindness vary from Meru's 1.9% to Nyeri's 0.3%, using

*The estimation of true prevalence of any characteristic in a population on the basis of a sample proportion is subject to error inherent in the sampling procedure. It is correct to specify a range within which the true prevalence lies with a certain probability; this range varies with sample size and homogeneity of sample clusters. For simplicity of this presentation, only raw sample proportions are used - anyone interested in more detail can contact the KRBPP.

W.H.O.'s criteria, or 3.2% to 1.2% using the broader United States criteria for blindness. By comparison, these rates are six to sixteen times those found in the U.S.

Because of the limitations of sampling design, it is not strictly warranted to derive national prevalence figures for blindness or visual impairment. However, for purposes of discussion, it is possible to derive crude estimates by allocating to each rural district of Kenya the results of the survey which is most nearly representative of the district geographically. One of the major weaknesses of this procedure is that the results from Meru, the area with the most severe visual problems, must be applied to all the semi-arid or arid districts. Although there is reason to believe that visual loss is at least as severe in these areas as in the Nyambene Hills, there is at present no hard proof for this assumption.**

**During Phase II of the KRBPP, three of the four scheduled surveys are planned for arid districts in Rift Valley and Eastern Provinces.

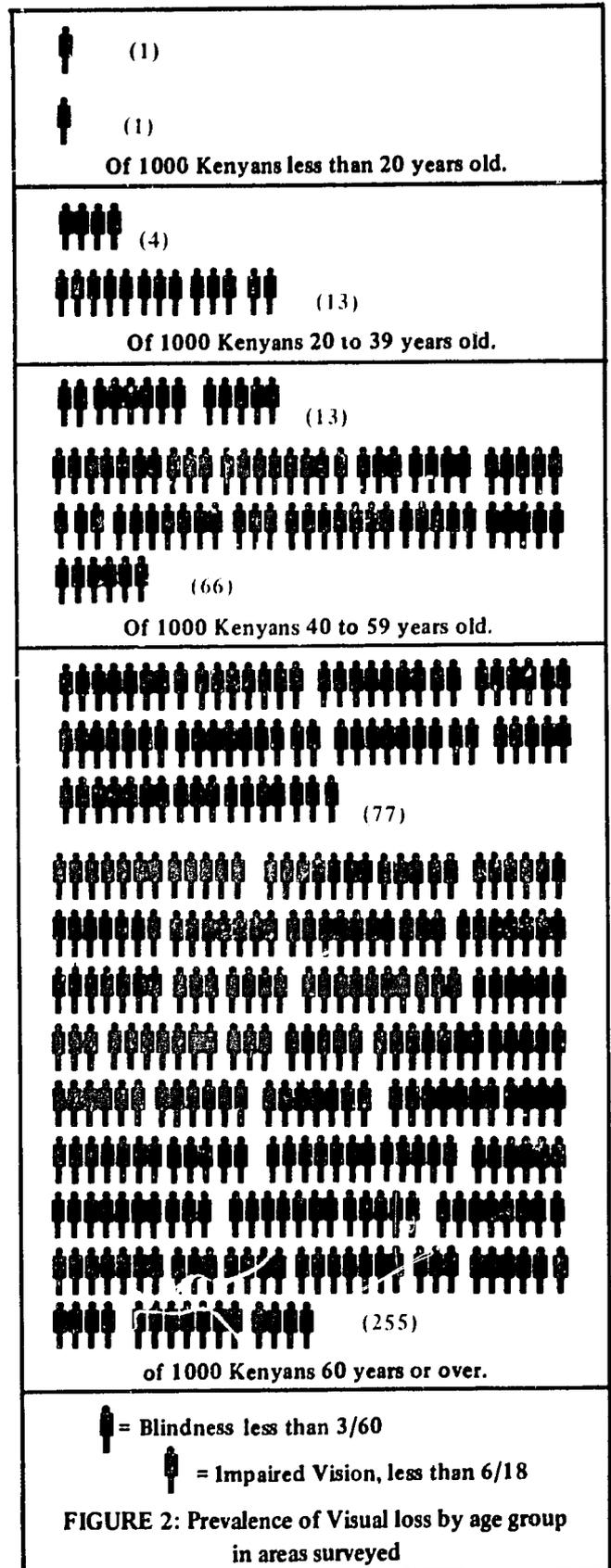
Acknowledging the tentative nature of the numbers, the overall prevalence of visual impairment in rural Kenya is estimated to be 3.7%, or about 520,000 people with vision less than 6/18. Of these, 135,000 are estimated to be blind (less than 3/60) for a national blindness prevalence of 0.9%.

Rates of visual loss are strongly related to age in the populations surveyed (Figure 2). Only 0.1% of those less than twenty suffer some visual impairment, compared to 1.7% of people twenty to thirty-nine, 8.1% of the forty to fifty-nine year-olds, and fully one-third of those over sixty. Similarly, rates of blindness in these twenty-year cohorts rise from 0.1% to 0.4%, to 1.4%, and reach 7.7% among the elderly. There were no notable differences in visual acuity found between the men and women who live in these rural communities (i.e. those who were there to be surveyed), although if the group of presumably healthy young men who have gone to cities for work were included in these totals it is conceivable that women would show slightly higher rates of impaired vision.

Cataract is very clearly the major cause of both visual loss and of blindness among the populations examined in the five surveys. (Figure 3) This one condition accounts for 43% of all blindness, causing significant visual loss in 14 out of every thousand survey members. Since it is a degenerative disease, visual loss due to cataract rises precipitously with age, having a prevalence of 8.2% in those over 40, and 17.4% in those sixty and over. Not all cataracts cause visual loss; in fact over twice as many people have some evidence of cataract than suffer visual loss from them. Very few of those who have evidence of cataract ever receive surgical treatment, since only about one in twenty of those with cataracts in the groups surveyed were aphakic.

The sequelae of trachoma represent the second leading cause of blindness in the study areas (16% of the total) while glaucoma accounts for the third highest share (14%). With cataract, these two conditions cause 73% of all blindness in Kenya; significantly all three conditions are either curable or preventable. Of one thousand people in the areas of Kenya studied, in addition to the three who will be blind from cataract and the one each from trachoma and glaucoma, another will be blind from senile degeneration of the macula (SMD) and two more from various other causes.

As important causes of impaired vision rather than of blindness, trachoma and glaucoma are superceded by SMD and refractive errors. This is because the





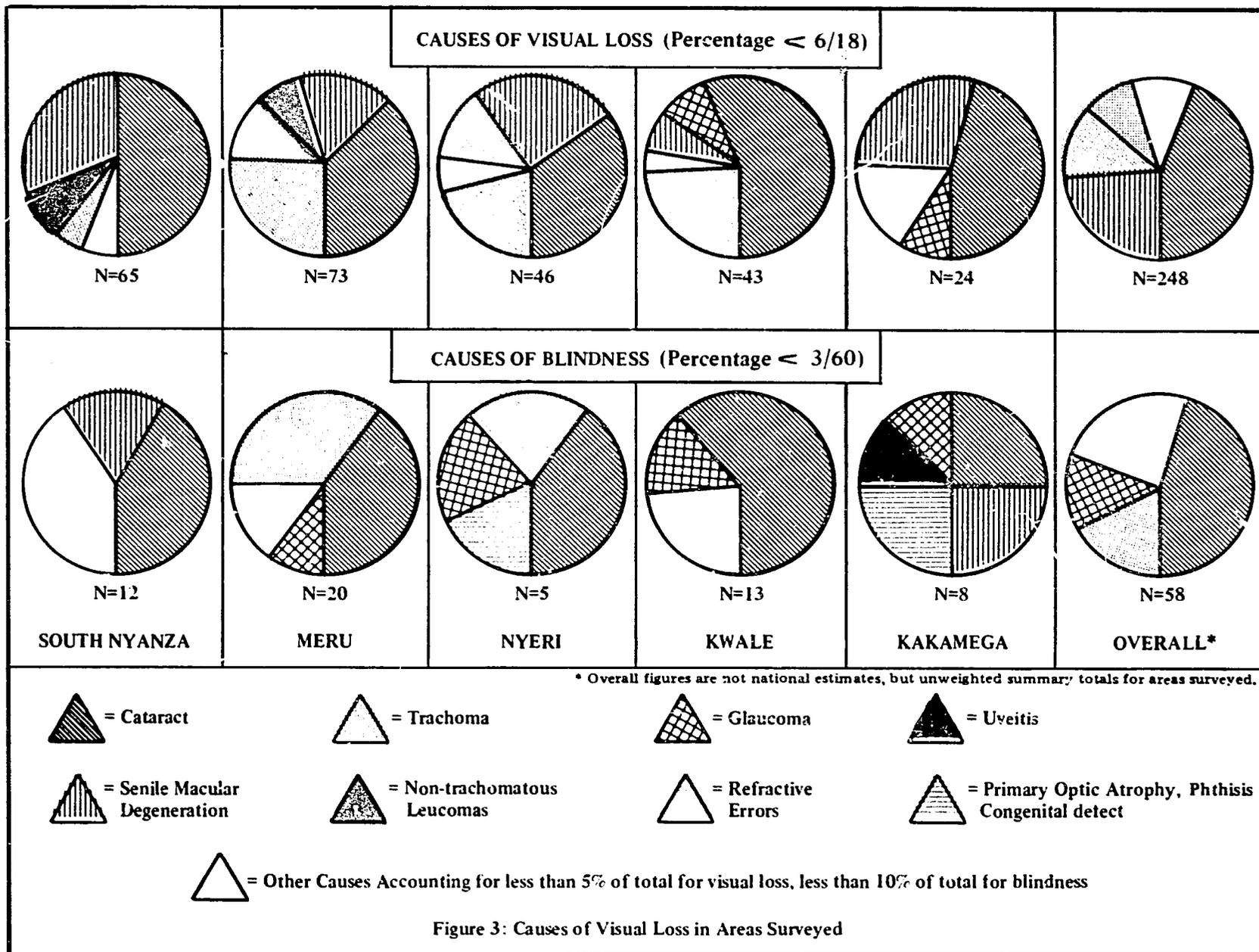
latter two tend to reduce visual acuity rather than to blind entirely, as do trachoma and especially glaucoma.

Similar to cataract, the prevalence of most reasons for visual impairment climbs consistently with increasing age. Among the under-twenty group, refractive errors account for most visual loss; during the next twenty-years, they are again the leading cause with trachoma damage, as a result of its often early onset, becoming a strong second. For the forty to fifty-nines, cataract and SMD have emerged as sources of visual loss with trachoma dropping to third; for those over sixty, cataract is the overwhelming cause, and with SMD accounts for three-quarters of all visual impairment in this group.

In the five survey areas there are clear differences in the prevalence of specific diseases even beyond those accounted for by differences in age structure; the most important variation occurs with respect to trachoma. Nearly two percent of the Meru sample have visual loss due entirely to trachomatous leucoma or keratitis; when the people are included who have trachoma as a contributing cause this figure rises to over 7%. In Nyeri, the only other locus of trachoma, a drastically reduced proportion are so afflicted, while in the other three areas, trachoma damage is negligible or non-existent.

Since trachoma is the major preventable cause of blindness in Kenya, a longer look into the pattern of its occurrence is justified. Not all cases of trachoma result in visual damage; it is due rather to repeated exposure to active disease, especially if combined with bacterial infection. This means that a large reservoir of active trachoma in a community geometrically increases the likelihood of blinding sequelae. At the time of the survey, 62% of the Meru people had active disease, while 28% showed evidence of past episodes. In contrast, only 12% in Nyeri had active trachoma, although 18% showed evidence of prior disease. In the other survey areas, less than 1% were actively infected. Not surprisingly, Meru and Nyeri also had the highest prevalence of active conjunctivitis.

Apparently, active trachoma and its resulting visual impairment have been on a decline in Nyeri, making it much less severe as a current health problem than in Meru. There were no visual effects traceable to trachoma in any Nyeri survey member less than twenty years of age, and only in those over 60 does the prevalence of visual loss exceed that of Meru children less than nine. In both areas, trachoma appears to occur more in women than in men; in Meru 3% of the males have some visual loss due to trachoma compared to 6% of the females, while in Nyeri these



This supports the idea that vitamin A deficiency in Kenya is more a problem of general lack of food than a specific lack of food containing retinol precursors, which makes sense considering the normal well-balanced diet of most Kenyans when food is available to them. These levels of moderate to severe malnutrition found in the survey areas tend to agree quite closely with the most recent Government of Kenya national nutrition survey conducted in 1978/79.

There are major differences among survey areas in the final nutritional measure, the hematocrit level of children under five, that clearly point to the debilitating role of malarial and other parasites in low-lying areas. Because of developmental variation in hematocrit among young children, it is difficult to pin-point a value that can be considered normal; in adults, any level below 35 ml. per 100 ml. is unacceptable. In Meru, Nyeri and Kakamega, a small percentage of children had levels below 30 ml., certainly a dangerously low value, but in Kwale and South Nyanza 26.1% and 34.9%, respectively were below this level. In the latter two areas, iron malnutrition can definitely be considered a public health problem.

There is no simple correspondence between levels of malnutrition and eye disease that can be deduced from the survey results thus far. Certainly the high prevalence of malnutrition in Meru and Kwale, particularly of stunting or long-term malnutrition, seem to account for the slightly higher prevalence of signs of xerophthalmia in these areas. Northern Meru, with the highest level of communicable eye diseases like trachoma and conjunctivitis, as well as of malnutrition, can be targeted for interdisciplinary intervention. The fact that the Nyeri area has the second highest rate

of communicable eye disease, but relatively low levels of current malnutrition, tends to support the notion that eye disease there is more the residuum of a past public health problem. In both these areas, however, there is no tendency for malnourished children to be more susceptible to either trachoma or conjunctivitis, so there seems to be no indirect causal pathway linking them.



V. FUTURE DIRECTIONS OF THE I.E.F. RURAL BLINDNESS PREVENTION PROJECT

The Kenya Ophthalmic Program has proven itself successful during the course of its development at working with a wide variety of donors and operating agencies, and at helping to shape the pattern of eye services to meet the needs of the majority of Kenyans. The IEF, through the first phase of the Rural Blindness Prevention Project, has been a major contributor both to the strategy of the Ophthalmic Program and to the actual delivery of services. The IEF contributions which have been outlined above have helped to instill a positive attitude toward preventive care in those working in the rural health care delivery system, while also helping to maintain and improve the quality of clinical eye services. In addition, the ocular survey activities of the past three years have helped establish a reliable data base for planning future services.

Because of the demonstrated success of the Kenya Ophthalmic Program and its component Rural Blindness Prevention Project in meeting their combined objectives, USAID has decided to continue funding the latter for a second three year period. During this period, the teaching, training and service delivery activities of the first phase will be continued, and additional activities will be carried out to extend the delivery of preventive and curative eye care to the most peripheral levels of the health system, particularly in high priority areas. In addition, there will be a major emphasis on training Kenyans to assume control of the on-going activities of the Project both during and after this second phase of operation, especially in the area of training rural health personnel.

Some of the specific additional activities planned over the next three years are:

A. Expansion of baseline data on the prevalence of visual loss and its causes through the completion of four additional field surveys among sub-groups not examined in Phase One, including at least two among the

peoples living in the drier areas of the Rift Valley.

B. Organization of seminars for health workers in all districts and provinces of rural Kenya. A series of seminars on the intersectoral nature of blindness prevention will be held at the provincial level with the support of the Provincial Medical Officer and Provincial Matron, involving such personnel as District Health Teams, Public Health Officers and Nurses, Community Development, Education and Public Information Officers from the province and each of its districts. Follow up seminars, conducted in part by the Rural Blindness Prevention Units, will be held at the district, division and location levels for Clinical Officers, for Community and Enrolled Nurses, and other health workers. These sessions will stress the diagnosis and treatment of common eye problems, measurement of visual acuity, recognition of conditions requiring referral to an eye specialist, and principles of blindness prevention.

C. Establishment of a teaching block on primary eye care and blindness prevention in the curriculum of the six Rural Health Training Centers, covering the interrelationships between proper nutrition, good water supply, proper waste disposal and personal hygiene and the prevention of eye disease. The RHTCs will be training the Rural Health Unit Teams whose responsibility will be to train community health workers and provide technical support and supervision at the village level, thus their curriculum is an ideal vehicle for introducing the concepts of primary eye care and blindness prevention to the community.

D. Establishment of two model community-based primary eye care projects, involving an intersectoral approach to solving the community's health problems as determined through the active participation of the local population, but organized around the issue of

blindness prevention. The projects will seek to initiate and provide primary eye and general health care services, and measure longitudinally the use and effectiveness of these services, capitalizing fully on the health educational materials developed during Phase One, and on other resources of the Rural Blindness Prevention Project.

APPENDIX A:

Educational Materials Developed

A. For Health Workers

1. Curricula

- a) Unit on public health, blindness prevention, and nutrition for ophthalmic clinical officers-in-training
- b) Unit on the diagnosis and therapy of ocular emergencies for general medical officers and clinical officers
- c) Intensive course on ophthalmology for third year clinical officers in training
- d) General course on clinical ophthalmology for community nurses-in-training

2. Audiovisual Materials

a) *The Red Eye Chart*

A 25 x 36 inch chart in 4-colors on heavy, coated paper was developed over a two year period. It describes the causes and treatment of the painful red eye and illustrates each in both color photographs and schematic drawings. Distribution is primarily through teaching seminars where health workers will be taught to use it in diagnosis and treatment or referral.

b) *The Primary Eye Care Booklets*

An 8 page booklet in black and white on heavy paper, the covers of which are varnished. The booklet details the responsibilities of health workers in the areas of blindness prevention and primary eye care and describes causes and treatments of the major blinding diseases in Kenya. Illustrated sections provide detailed instructions on simple examination and treatment



techniques and a full section on taking and recording visual acuity.

c) *The Landolt C Chart*

On light board, varnished front and back, this chart visualizes examination and treatment techniques as well as full instructions on taking and recording visual acuity. The C Chart also is provided with 2 holes for wall hanging.

(The three units described above are seen as aids to all levels of health care personnel in improving the recognition and management of eye disease, injury and assessment of visual acuity. Used together in hospitals and health centers, they will both lessen the dangers of improper diagnosis and treatment and

enable marginally trained workers to manage the great majority of presenting eye problems. By encouraging preventive and promotive activities, as well as standardizing VA evaluation countrywide, these education units have the potential to improve overall eye care in Kenya. Their distribution will be made through a series of nationwide seminars at Provincial and District level and will be installed along with courses in ocular disease at all Rural Health Training Centers.)

- d) *Slide films* with accompanying scripts have been developed on *trachoma* and *nutritional blindness* and are being used to teach clinical officers and nurses at the Medical Training Centers in Nairobi and Nakuru and in all the teacher training colleges in the country. These presentations are designed with room to shift emphasis so they can be used at various levels by a wide range of teaching personnel.
- e) *Flannel graphs* for use by the Rural Blindness Prevention Unit officers have sets of cut-out flannel figures to aid these officers in talking to mothers in MCH/FP clinics and to primary school children. The large boards fold in half for ease in transport and feature items (fruits, vegetables, soap, clean cloth, milk, good and bad eyes, flies, etc) seen as most helpful in illustrating talks.

B. For School and Teachers

- 1) *Macho ya Kenya (The Eyes of Kenya)*
Thirty thousand copies of a 4-color magazine have been produced for distribution to Standard 7 children by RBPU Clinical Officers. The magazine features entertaining educational and occupational material, as well as a game, cartoons, and articles on various aspects of the eyes and vision, e.g., sight, light, animals' eyes, etc.
The full magazine contents have been made available to *Rainbow Magazine*, a local childrens' weekly with a circulation of over 10,000.
- 2) *The Teachers' Guide to Macho ya Kenya* details every section and article and suggests various activities for classroom use. Attached to the teachers' guide is a stamped return postcard with which to obtain teacher comment on content, features, language, etc.

- 3) *Curriculum radio programming* on the day-long educational channel has been developed and 2 scripts, each 20 minutes long, are being run for students and teachers. Both presentations discuss preventive and promotive aspects of ocular health as well as the causes of visual loss.
- 4) *A 4-color poster* with cartoons depicting preventive eye measures was distributed to all schools in the country to accompany the radio curricula by the Kenya Institute of Education.
- 5) *Four musical jingles* in Kiswahili (30 seconds each) are also being run as breaks on curricula radio. They are professionally produced and feature simple messages on eyes in an up-beat musical format.
- 6) *Slide films and scripts* have been distributed to all 28 Teachers' Colleges in Kenya for use in their 4th year curricula on health. These presentations feature the essentiality of teachers in promoting eye health, describe the major causes of blindness in the country and make suggestion on specific actions to be taken by school teachers.

C. For Public Information

- 1) *Television appearances* have twice been made by eye personnel on Mambo Leo, the local news-commentary program. Participants have discussed the history and continuing efforts in eye care in Kenya, and the development and dissemination of health education materials.
- 2) *Exhibits* of an educational nature have been created for use at the Agricultural Fairs which are great public attractions in all areas of Kenya. These exhibits are selected, set up and run by Ophthalmic Clinical Officers in the Ministry of Health's display facilities. Slide projections (or rear screens), visual acuity testing and question answering are the principal attractions of many of these eye exhibits.
- 3) *Newspaper articles* on the activities of IEF personnel (including eye surveys) have appeared in both the English and Kiswahili press. Articles on IEF activities and health education materials have appeared in the Ministry of Health Newsletter.

RE LE

40 | 41

Pannus: 0) nl.; 1) 0-2mm above; 2) 2-4mm above; 3) over 4mm above;
4) 0-2mm 380; 5) 2-4mm 380; 6) over 4mm 380

42 | 43

Ant. Seg.: 0) nl.; 1) signs of old uveitis, NOT affecting VA; 2) as in (1) but affecting VA; 3) ant. synch., describe; 4) shallow or flat AC, descr.; 5) flare &/or cells, descr.; 6) cong. abnorm., descr.; 7) sequellae of cat. surgery, descr.

44 | 45

Lens: 0) normal; 1) aphakia; 2) cat. NOT affecting VA; 3) cat. affecting VA, senile; 4) cong./develop. cat. affecting VA; 5) disloc. lens

46 | 47

Vitreous: 0) nl.; 1) Abnl. not affecting VA; 2) abnormal affecting VA; descr.

48 | 49

Disc: 0) nl.; 1) temporal pallor; 2) 2^o atrophy, flat & pallor; 3) 1^o atrophy, pallor & cupping; 4) glaucomatous cupping; 5) papilledema; 6) congen. abnorm., descr.; 7) papillitis;

50 | 51

Macula: 0) nl.; 1) SMD; 2) Abnrm., NOT affecting VA; 3) Abn. affect. VA descr

52 | 53

Retina: 0) nl.; 1) Abnrm. NOT affecting VA; 2) pigmentary degeneration; 3) other abnormality affecting VA, describe

RE LE

54 | 55 | 56 | 57

Intraocular pressure in mm Hg., to nearest mm Hg.

58 | 59 | 60 | 61

Principal cause of visual loss
0) nl.; 1) leucoma from trichiasis; 2) leuc. 2^o to trauma; 3) leuc. 2^o xeroph; 4) leuc. of other aet.; 5) uveitis; 6) cataract; 7) glaucoma; 8) SMD; 9) 1^o optic atrophy; 10) amblyopia; 11) refractive error, descr.; 12) tapetoretinal degen.; 13) phthisis, cause unknown; 14) cong. abn. descr.; 15) trachomatous keratitis; 16) other traumatic seq., descr.; 17) Juv. MD, descr.

RE LE

79 | 80

Anatomical location of visual loss in better eye:
0) nl.; 1) cornea; 2) lens; 3) uvea; 4) macula; 5) retina as whole; 6) optic nerve 7) intracranial pathways; 8) phthisis; 9) others; 10) 1 & 2 11) 2 & 5; 12) 5 & 6

62

Code for nutritional examiner

63

Bilateral pedal edema:
0) absent; 1) trace; 2) very obvious

64

Thyroid: 0) nl.; 1) cretin; 2) deaf mute; 3) visible goiter

65

Subjective eval. of nutr. status:
0) nl.; 1) mildly undernourished 2) severely undernourished

66 | 67 | 68 | 69

Height in centimeters, to nearest 0.1cm.

70 | 71 | 72

Weight to nearest 0.1 kg.

73 | 74

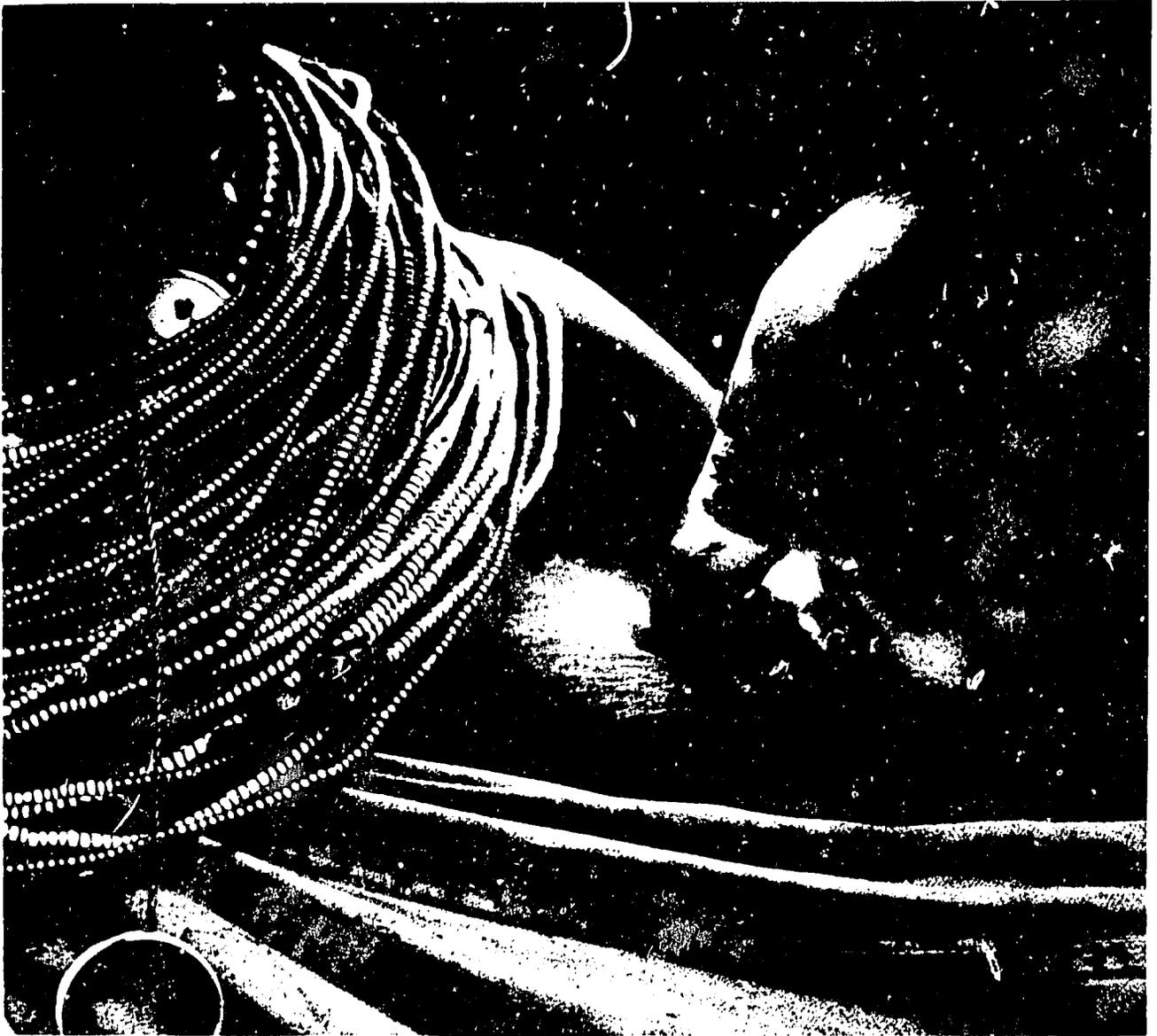
Hematocrit to nearest percent

75 | 76 | 77

Serum retinol in micrograms %, to nearest 0.1mcg.

78

Photograph: 0) none taken; 1) eye photo taken; 2) nutritional status photo taken (emaciation, pedal edema, thyroid signs, etc.); 3) both 1 and 2



*If you restore the sight of one man, you benefit one man;.....
if you teach one man how to restore sight, you benefit many men;
and if you teach many men, you benefit mankind.*

John Harry King Jr. M.D.
Founder and Sr. Medical Director
The International Eye Foundation

FOR COPIES OF THE EDUCATIONAL MATERIALS DISCUSSED IN THIS PUBLICATION,
OR FURTHER INFORMATION ON
THE KENYA RURAL BLINDNESS PREVENTION PROJECT.
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