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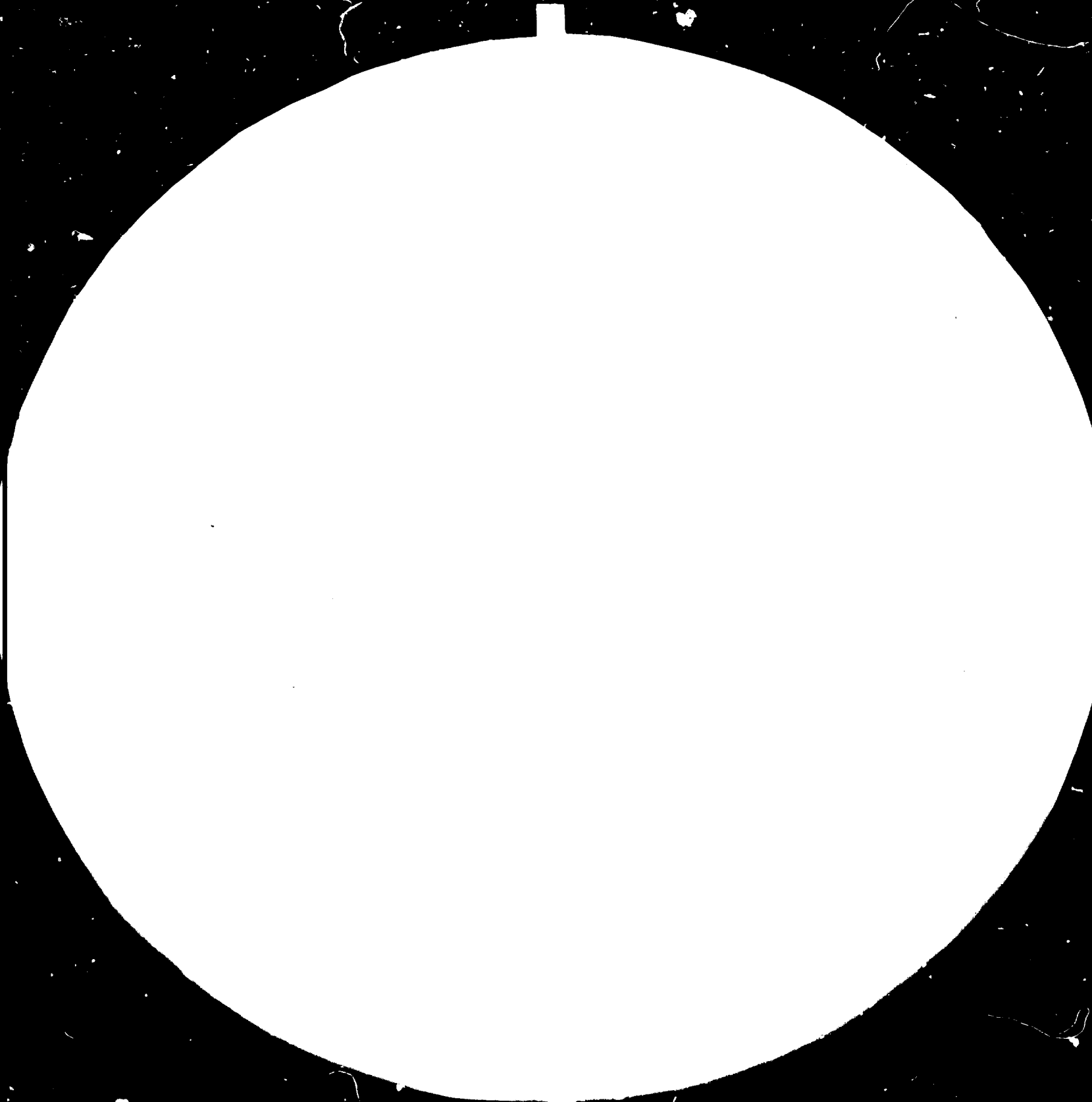

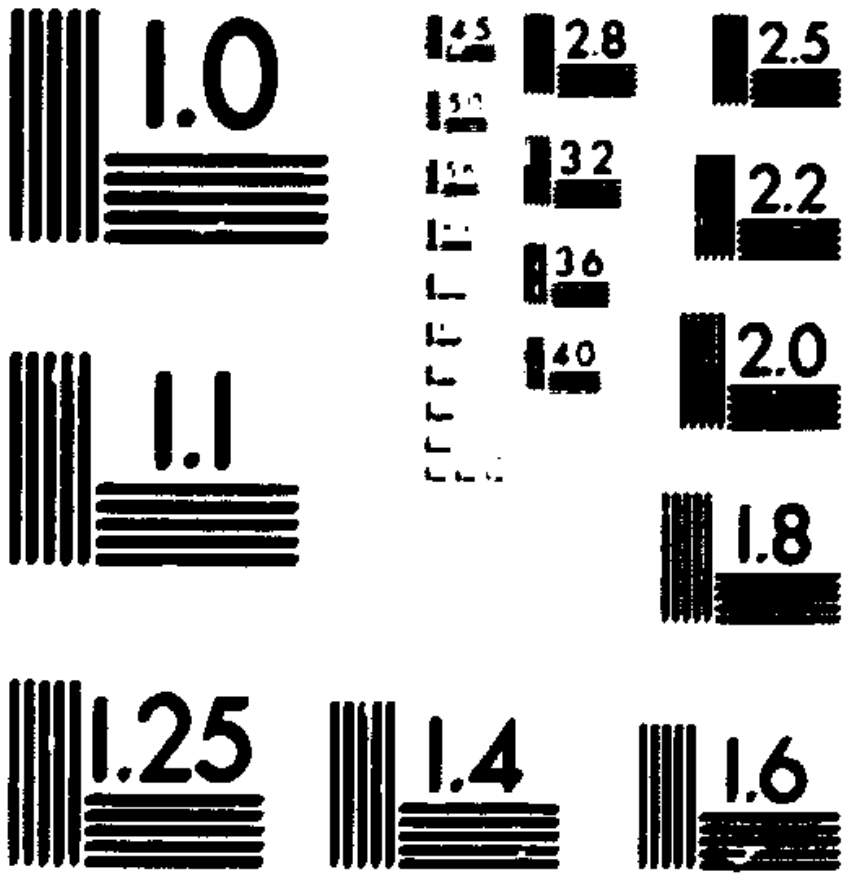

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ASSISTANCE TO THE MINISTRY OF COMMERCE AND INDUSTRY

DP/KEN/80/001

KENYA

Technical report: Development problems of the pharmaceutical industry*

Prepared for the Government of Kenya
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of Emilio Menéses,
consultant on pharmaceutical industries

United Nations Industrial Development Organization
Vienna

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Explanatory notes

Value of the local currency - KENYAN SHILLING (K.Shs.) - during the period of the mission in terms of United States Dollars:

1 US$ = 14.75 K.Shs.

1.356 US$ = 20.00 K.Shs. = 1 K£

Abbreviations

CCCN - Customs Co-operative Council Nomenclature

DFCK - Development and Finance Company of Kenya

ICDC - Industrial and Commercial Development Corporation

O.R.S.- Oral rehydration salts

O.T.C.- Over-the-counter preparations

Special units of measure

MU - Million units)
BU - Billion units) used for quantitative measurements of penicillin and similar pharmaceuticals

ABSTRACT

The consultancy on development problems of the pharmaceutical industry was one of the main activities of project DP/KEN/80/001 - Assistance to Ministry of Commerce and Industry - to be carried out 1984. One short-term consultant, Dr. Emilio Meneses was appointed for three months (July - October 1984) to investigate on the subject and to outline the development of the pharmaceutical industry.

1. Pharmaceutical production in Kenya is undertaken by eighteen manufacturing units. Production is accomplished at formulation level and comprises medicinals for oral, topical and injectable administration. Said forms include production of tablets, capsules, dry and liquid syrups, ointments and creams, effervescent powders, vials and ampoules injectables and infusion fluids.

2. Manufacturing installations of the majority of local laboratories are well equipped to produce high quality medicaments supported by suitable quality control units.

3. Production is highly dependent on imports of raw materials and excipients in above ninety per cent of all requirements. This circumstance indicates that an upwards trend of imports will be expected in the years to come.

4. Installed capacities are far above their utilization therefore no importation of machinery is foreseen as long as production continues confined to formulation activity.

5. Imports of pharmaceuticals could be diminished when the local industry becomes engaged in basic production of active substances.

6. Export of medicinals is sporadic and in modest quantities. With the low percentage of utilized capacities it is expected that manufacturers be urged to promote exports to African countries.

7. Local manufacturing has attained substantial gains during 1980-1983. This production increments will continue to grow at least twenty per cent per annum both in terms of value and number of units.

8. A ~~shallow~~ concise survey of medicinal and aromatic flora was carried out. Local extraction of active substances and cultivation of a number of species has been suggested.

9. The Government officers that acccmpanied the mission in the field work and in all the discussions of pharmaceutical issues have been provided with the basic information on the problematic of the pharmaceutical industry. This period of indoctrination should be pursued.

TABLE OF CONTENTS

		Page
	Explanatory notes	2
	ABSTRACT	3
	TABLE OF CONTENTS	5
	INTRODUCTION	6
	RECOMMENDATIONS	8
1.0	OUTLOOK OF THE KENYAN PHARMACEUTICAL INDUSTRY	11
2.0	INSTALLED CAPACITIES	13
3.0	APPRAISAL OF IMPORTS AND EXPORTS	25
4.0	CONSUMPTION OF MEDICINAL PRODUCTS	27
5.0	LOCAL MANUFACTURING ACHIEVEMENTS	28
6.0	MEDICINAL AND AROMATIC PLANTS	29
	ANNEXES:	
I	PUBLIC HEALTH. EXCERPTS OF REPORTED CASES.	33
II	LIST OF RAW MATERIALS DUTY FREE FOR USE IN THE MANUFACTURE OF MEDICAMENTS (15 JUNE 1982)	34
III	LIST OF RAW MATERIALS DUTY FREE FOR USE IN THE MANUFACTURE OF MEDICAMENTS (8 FEBRUARY 1983)	36
IV	DAWA PHARMACEUTICALS. DESCRIPTION OF SELECTED MANUFACTURING EQUIPMENT AND CAPACITIES.	37
V	TABLETS, CAPSULES MANUFACTURING CAPACITIES.	39
VI	DRY AND LIQUID SYRUS MANUFACTURING CAPACITIES.	40
VII	OINTMENTS AND CREAMS MANUFACTURING CAPACITIES.	41
VIII	MANUFACTURING CAPACITIES INJECTABLES (VIALS AND AMPOULES), ORS OR SIMILAR, LINIMENTS.	42
IX	INFUSION FLUIDS CAPACITIES.	43
IX-A	SUMMARY OF CAPACITIES.	44
X	LOCAL PHARMACEUTICAL MANUFACTURING.	45
XI	PHARMACEUTICAL IMPORTS.	46
XII	PHARMACEUTICALS EXPORTS.	48
XIII	CONSUMPTION OF DRUGS IN THE PUBLIC SECTOR 1983-1984 (TWELVE MONTHS)	49
XIV	ANNUAL DRUG CONSUMPTION OF MAIN PHARMACEUTICAL CATEGORIES BY THE CENTRAL MEDICAL STORES 1983-1984 (12 MONTHS)	61
XV	MEDICINAL PLANTS IDENTIFIED IN KENYA	62
XVI	IDENTIFICATION OF KENYAN FLORA FOR POTENTIAL EXTRACTION OF ESSENTIAL OILS.	63
XVII	TEN-YEAR RECORD OF CINCHONA CROPS.	67

INTRODUCTION

An appraisal of the existing pharmaceutical installations in Kenya has been carried out in compliance with the terms of reference of the mission. All manufacturing units producing medicinals at formulation level have been surveyed and their capacities by pharmaceutical form varified. The available statistical data on drugs imports and exports including what respects to products of vegetable origin has been analysed. The itemized consumption of drugs by the main supplier of medicinals in the public sector reflecting about 50 percent of national consumption of pharmaceuticals has been assessed. The consumption of medicinals and the expected size of the imports during the span of the current Development Plan 1984-1988 has been estimated. The evaluation of collected data nevertheless has provided consistent parameters to identify and to forecast the constituents in the pharmaceutical sector. Likewise a preliminary assessment of the potential resources of the Kenyan flora in respect of medicinal and aromatic plants has been undertaken. The short span of the mission however did not allow enough time to study this subject in depth. The identification of a number of vegetable species that grow wild or could be cultivated is discussed elsewhere in this report and described in the appended annexes.

Considerable time has been devoted in training the assigned officers to this project in respect of the main issues pertaining the pharmaceutical industry. It must be observed however that the field visits of the pharmaceutical team were not restricted to the manufacturing plants where productive discussions were held with the managerial and production cadres. The range of the field work was enlarged to include every source of information which could enrich the data collection required for the accomplishment of this mission. Hence a number of entities in the public sector were contacted such as the Ministry of Health, the Central Medical Stores, the Central Bureau of Statistics, the Kenya Research and Development Institute, the Kenya Sisal Board, the Government Chemists's Department and the Kenya Bureau of Standards. Two institutions in the private sector, EMCO Glass Works Limited and Brooke Bond Kenya Limited were contacted

because of the close links of the former as supplier of containers to the pharmaceutical industry and the later as agricultural harvester of Cinchona species.

In summary most facets in the pharmaceutical sector have been reviewed by focusing all relevant issues from basic data collection techniques or identification of manufacturing equipment to marketing research methods utilized in the appraisal of medicinals consumption and medicaments manufacturing including a review of production of drugs by extraction, synthesis or fermentation.

RECOMMENDATIONS

1. The growth of the pharmaceutical industry has been hampered by uninterrupted imports of duty free medicaments a fact that has originated an unfair competition highly deterrent to the development of the national industry. Hence it is recommended that said imports be avoided and an ordinance be passed establishing custom levies on said products thus turning unatractive their importation. Likewise it is recommended that imports of finished pharmaceuticals by the public sector be discouraged.

2. In average only about 50 per cent of installed capacities are utilized at present. The Government of Kenya is urged to study incentives that contribute to increment local manufacturing. Also utilization for production of pharmaceuticals for veterinary use should be envisaged.

3. A broader enlargement of pharmaceutical production will be attained when the manufacturing activity expands towards basic production of active substances. Hence it is recommended that the Government of Kenya create favourable conditions to encourage the industry to produce bulk drugs by extraction by way of the utilization of medicinal flora or by semi-synthesis and synthesis.

4. Local manufacturers should be urged to promote exports of medicinals not only to nearby neighbouring countries but also to other African areas like Sudan, Zaire, Ethiopia and Somalia where sporadic shipments of medicaments have been made in the past.

5. Local manufacturing will augment during the span of the Development Plan 1984-1988. The increments in production however should not be accurately forecasted at this time because three main factors should have to be viewed:

   a) That imports of finished products which can be produced locally is avoided;
   b) That the industry engages in basic production;
   c) That the execution of bilateral and multilateral agreements provide favourable conditions to expand co-operation in medicinals with other countries.

It could be tentatively estimated nevertheless that local pharmaceutical manufacturing should yield an annual growth of 20 per cent in terms of units and 15 per cent in terms of value. If issues a), b) and c) described above are implemented the percentages of growth will be exceeded.

6. The pharmaceutical industry is strongly dependent on high standards of quality. Whereas a majority of local manufacturers count with suitable laboratories for quality control it is obvious that a system of control at national level should exist. Of all the surveyed institutions the mission was particularly impressed by the modern installation, the quantity and the quality of sophisticated precision instruments and the caliber of the human resources at the Kenya Bureau of Standards. It is therefore recommended that a national system for drugs quality control be established and placed under the administrative and technical direction of said institution in co-operation with the indicated department at the Ministry of Health.

7. Local processing of Cinchona bark is hereby recommended if further studies suggest that said procedure is workable.

8. If the outcome of the experimental extraction of hecogenine from sisal sludge is encouraging, it is recommended that an evaluation of the economics of this project be pursued.

9. The development of further studies on essential oils containing plants as recommended by the Kenyan National Council of Science and Technology on the Aromatic plants lemongrass, dill, fennel, chamomile, mentha, marjoram and ocimum are hereby endorsed.

10. It is recommended that imports of manufacturing equipment and instrument for quality control of drugs by the pharmaceutical manufacturers be treated as capital investment.

11. It is recommended that a two man-months return mission be programmed for early 1985 aimed to provide further assistance to the Ministry of Commerce and Industry in respect of the pursuit of a number of crucial issues discussed in this report

such as assessment of progress of local manufacturing, short range perspectives for exports, outlook of plans for starting basic production and evaluation of the likelihood of local processing of Cinchona bark.

1.0 OUTLOOK OF THE KENYAN PHARMECEUTICAL INDUSTRY

Kenya has established an efficient pharmaceutical industry with capabilities to formulate a broad range of high quality medicinals. Eighteen pharmaceutical manufacturing units are provided with facilities to produce a wide variety of drugs for oral, parenteral or topical use.

Local manufacturers can be grouped in three main categories: Large and well equipped production laboratories comprising some eight factories; about seven medium size companies, and the balance composed by smaller units with modest manufacturing facilities. Except for one company which only produces topical pharmaceuticals besides its engagement in cosmetics manufacturing, and two units producing solely infusion solutions most factories manufacture oral preparations in tablet or capsule form, dry or liquid syrups and ointments. Vials and ampoules are only produced by three laboratories.

A majority of the manufacturing plants are located in the industrial zone of Nairobi which is overcrowded with a broad variety of industrial installations whereas some four drug factories are established in better locations. One of the largest pharmaceutical laboratories is established in the nearby city of Thika. A small drug company operates in an unsuitable location in downtown Nairobi.

The main manufacturing equipment utilized by the large and medium-size companies is imported either from United Kingdom and Germany, Federal Republic of, and to a lesser extent from Italy or India. Some of the smaller manufacturers utilize a variety of pieces of ancillary equipment produced locally such asstainless steel vessels and mixers.

Plant layout of the major producers follows a design similar to drug manufacturing units operating in developed countries although in smaller dimension. A majority of the plants adhere to the stipulations of Good Manufacturing Practice whereas one or two do not. All manufacturing units except two count with either adequate or excellent quality control laboratories equipped with the necessary instruments. The more diversified the companies the better quality control installations they have. Only three manufacturers are equipped to carry out pyrogens testing whereas five producers have facilities for microbiology assays. It should be most desirable the establishment of a quality control system for drugs at national level.

Local pharmaceutical industry is strongly dependent on foreign supply of raw materials in above 90% of the formulation components such as active substances, excipients, emulsifiers, preservatives, flavouring agents etc. likewise all vials and ampoules of neutral glass and rubber caps for the former are imported. The aluminium foil utilized in strip packing of tablets and capsules is also imported. The only raw materials of local origin utilized in pharmaceutical manufacturing are alcohol, maize starch and sugar. Nevertheless a few manufacturers observed that local sugar is unsuitable for pharmaceutical production and so they utilize imported sugar in the production of liquid syrups whereas other laboratories consider that the double refined charcoal free local sugar meet their standards. One or two manufacturers objected the high bacterial count of local maize starch and instead utilize the imported material.

The academic level of the production and quality control managers is above standards as well as what refers to the managerial cadres of the surveyed industries.

The main constraint to the development and the growth of the national pharmaceutical industry refers to large amounts of duty free imports of finished pharmaceuticals that could be manufactured in Kenya by the established producers. These

occurrences are strongly detrimental to the national industry. Likewise a majority of the manufacturers complained that many finished pharmaceuticals are still imported by the public sector .

For a number of years the pharmaceutical industry had to carry the burden of heavy taxation on imports of raw materials. It was not until 1982 that the Government issued a regulation followed by a second ordinance in 1983 listing a selection of raw materials that can be imported duty exempt. Still the industry is struggling to obtain duty remission on excipients. It must be observed nevertheless that imports of pharmaceutical manufacturing equipment and quality control instruments are also subject to customs duties.

Prior to 1982 all drugs could enter the country freely because health registration of pharmaceuticals did not exist. Consequently the market was constantly flooded with finished medicinals from all over the world in detriment of the local manufacturers. This abnormal situation ended after a drug registration ordinance was passed.

As it will be observed through the caption that follows and by reviewing the annexes appended to this report the industry installed capacities are far above their utilization except for the infusion solutions unit operated by the Government. Said excess capacity exists because the local producers had the expectation of conquering neighbouring countries export markets. These expectations vanished after the East African Community collapsed in 1977. Nowadays only sporadic exports of small quantities of national pharmaceuticals are dispatched mainly to Ruanda, Burundi, Zaire, Uganda, Tanzania and Malawi.

2.0 INSTALLED CAPACITIES (based on one 8-hour-shift per day and 250 days/year)

The pharmaceutical industrial installations operating in Kenya have been appraised as explained in the preceding captions. Summarized profiles of all manufacturers are described together with their production capacities in the paragraphs that follow.

DAWA PHARMACEUTICALS LIMITED

This enterprise is the largest pharmaceutical manufacturer

established in Kenya. The company structure is a joint venture with participation of the Industrial and Commercial Development Corporation (ICDC) with 20% ownership; KRKA a leading Yugoslavian drug producer with 40% ownership and 40% owned by Kenyan private investors.

The company manufactures a broad range of high quality medicinals such as antimicrobials, analgesics, anthelmintics, corticosteroids, diuretics, tranquilizers, vitamin preparations and drugs for the treatment of respiratory ailments. This producer also carry out third party manufacture for worldwide recognised firms such as Abbott, Beecham, Biochemie and Merck Sharp Dohme.

Production installations are among the best existing in Kenya. Plant design, quality and variety of manufacturing equipment are of the highest standards. This is one of the three companies producing dry filling vials of antibiotics and the sole manufacturer injectables in ampoule form.

The laboratory for quality control is equipped to carry out all the analyses required by a modern pharmaceutical factory including bacteriological assays but excluding pyrogens testing which is undertaken by third parties. Although they manufacture a broad range of prescription drugs, production of over-the-counter preparations (OTC) represent an important segment of their annual turnover. The dimension of this type of products could be measured by examining the tonnage of imports of active substances utilized in production of analgesic preparations. A large assortment of medicinals in tablet or capsule forms are aluminium strip-sealed packed for preservation against spoilage.

DAWA exports medicaments to about fourteen African Countries. The company is considering to engage in basic production by extraction from medicinal plants. Capacities and listing of selected equipment are described in ANNEX IV.

CHEMAPRIC KENSARA LIMITED

A joint venture between Ambalal Sarabhai Enterprises Limited and Kenyan partners. Sarabhai is one of the largest pharmaceutical manufacturers based in India engaged in basic production of antibiotics and a wide assortment of synthetic drugs.

The company is established in a modern factory located nearby the city of Thika. A large number of drugs are formulated in dry and liquid parenteral form, sterile ophthalmic preparations, capsules, tablets, liquid and dry syrups, and ointments. Production facilities are excellent. The assortment of formulated drugs comprise broad and narrow spectrum antibiotics, sulpha drugs, anti-protozoa and anti-fungal preparations, diuretics, antiinflammatories, local anesthetics, antimalarials and miscellaneous preparations.

The quality control installations are above standards and comprise facilities for chemical, microbiological, biological and sterility testing departments, and animal house for pyrogens and toxicity assays.

This company may consider to start basic production in Kenya in the near future. The capacities of this factory are described below:

Pharmaceutical Form	Annual Installed Capacity	% Utilized Capacity
Tablets		
Compressed	150 million	50-60
Coated	25 "	All over
Capsules	30 "	
Dry and Liquid Syrups	270,000 bottles (50-240 ml.)	
Dry and Liquid Injectable vials	260 thousand	
Ointments	420,000 tubes (3.5-15/20 gm.)	

MAC'S PHARMACEUTICALS LIMITED

A manufacturer of national ownership established in 1977. The premises occupy three adjacent buildings where production areas are installed. One building houses the quality control laboratory, the animal house utilized for pyrogenicity and toxicity assays, and a sterile area for oral liquids. Production of tablets and capsules, areas for packing operations, sterile partitions for parenteral solutions, antibiotics dry vials filling operations, filling of dry and liquid syrups and manufacture of ointments are established in the main building. Production of pharmaceutical aerosols is undertaken in another adjacent construction. Dry and liquid parenterals comprise the main items manufactured by this company.

Production capacities are shown as follows:

Pharmaceutical Form	Annual Installed Capacity	% Utilized Capacity
Tablets (compressed and coated)	250 million	70
Capsules	50 "	(minus or Plus 10)
Syrups	750,000 bottles 60-100 ml.	All Over
Injectables		
Dry Vials	10 million	
Liquid Vials	5 million	
Ointments	8,000 Kg.	
Aerosols	500,000 cans.	

WELCOME KENYA LIMITED

An affiliate of Welcome Foundation a non-profit organization based in England. Plant occupies the best location in Nairobi. Factory layout and type and variety of the machinery, instruments and equipment are above standard. This company is the only producer of biologicals in Kenya. Furthermore they are engaged in production of pharmaceuticals in the form of tablets, oral liquids and topical preparations.

The production area of pharmaceuticals for human use is fully filtrated air conditioned. Tablets granulation and compression departments are superb. The oral liquids production department is unique and perhaps its capacity has been underestimated. The labour force safety precautions are above standard.

A separate production area is devoted to veterinary biologicals where anthrax and enterotoxemia, black quarter and foot-and-mouth vaccines are produced the latter in a joint venture with the Government of Kenya.

The quality control laboratory is equipped with the best assortment of precision instruments. The outstanding laboratory of entomology which is mainly devoted to the study of vectors transmitting cattle diseases has the most sophisticated instruments including a computerized gas chromotograph.

In respect of pharmaceuticals for human use this company produces a variety of cough syrups, antimicrobials, anthelmintics, antimalarials and miscellaneous preparations. The capacities in terms of pharmaceutical forms are described below:

Pharmaceutical Form	Annual Installed Capacity	% Utilized Capacity
Tablets	15 million	60
Oral Liquids	200,000 ltrs.	80
Ointments	10,000 Kg.	25

GLAXO EAST AFRICA LIMITED

A subsidiary of a transnational company based in England which commenced manufacture operations in Kenya some twenty years ago. Their industrial installations are excellent. Although the equipment is very modern the factory is being enlarged and equipped with better and more efficient machines. At present they have in operation four rotary tablet compressing machines, two large granulating drying machines and a huge mixer to process glucose into a dietetic formulation. Furthermore the factory is fully equipped to produce oral liquids and ointments. The strip packing automatic equipment is perhaps the best in the country.

Likewise this company is carrying out third party manufacture for Bristol Myers (USA), May & Baker (England) and GEA (Denmark). Discussions are on the way to manufacture medicinals for two large European drug houses. The orderlines and cleanliness of this factory are remarkable.

This company still imports in finished form about 40% of its annual turn-over. 60% of its year sales revenue is shared by the public sector.

Data on capacities follows:

Pharmaceutical Forms	Annual Installed Capacity	% Utilized Capacity
Tablets	300 million	33
Oral liquids	200,000 Ltrs.	50
Ointments filling (From imported bulk finished)	2 million tubes (15-30 gm) (Average 22.5 gm) 45,000 Kg.	5

THE BOOTS COMPANY (KENYA) LIMITED

A subsidiary of a foreign company based in England engaged in production of over-the-counter drugs and cosmetics and third party manufacture for two drug houses based in Switzerland. Furthermore it markets a number of medicinals such as tablets and injectables which are imported finished.

Local manufacturing comprises analgesics, cough syrups, throat lezenges, liquid multivitamins, ointments, and liniments. Although actual premises are very good a new factory is under construction in the outskirts of Nairobi. Most of the production equipment is modern and fully automatic and comprises one fluid bed dryer and one drying stove for dry and wet granulation, four rotary tablet compressing machines, four strip packing units as well as other automatic equipment for filling, sealing and capping liquids and ointments. The quality control department is well equipped to cope with their needs. Capacities are described below:

Pharmaceutical Forms	Annual Installed Capacity	% Utilized Capacity
Tablets	400 million	60
Oral liquids	200,000 ltrs.	60
Ointments/Creams	60,000 Kg.	40
Liniments	200,000 Ltrs.	40

INFUSION KENYA LIMITED (IKL)

A company established in 1975 as a joint venture of Dr. Fresenius A.G. from West Germany, owner of the technology; Hoechst East Africa Limited; the Industrial and Commercial Development Corporation (ICDC) and the Development and Finance Company of Kenya (DFCK).At present Hoechst holds 70% ownership.

The company started production in 1976, however it was forced to close down the following year due to heavy losses in as much as it did not succeed in obtaining the supply of infusion fluids to the public sector. After a capital injection from Hoechst the plant resumed operations in 1979.

The plant could be described as an admirable production unit of infusion fluids. It is provided with the most modern and sophisticated machines including the equipment to produce all the plastic bottles requirements. The quality control laboratory and the animal house for pyrogenicity testing are among the best.

The water distilling capacity is 300 litres per hour. The installed annual production capacity is 1.2 million bottles of 500 ml of infusion fluids in one shift. At present the plant is utilizing only 30% of its capacity. This factory has provisions to double the installed capacity with additional equipment if necessary.

STERLING PRODUCTS INTERNATIONAL

An affiliate of a large manufacturer of medicinals based in the United States. The marketed lines comprise two groups of products, prescription medicinals marketed under the Winthrop label and over-the-counter products sold under the Sterling name.

The line of products of local manufacture is confined to three pharmaceutical forms: compressed tablets, oral liquids and effervescent powders. In respect of therapeutic categories this company is engaged in local formulation of analgesics, medications for gastric ailments, anthelmintics, antimalarials and cough remedies. The most sophisticated prescription medicinals are imported in finished dosage form.

The factory is well equipped with efficient machines and good quality control department. The capacities are listed below:

Pharmaceutical Forms	Annual Installed Capacity	% Utilized Capacity
Tablets	500 million	60
Oral liquids	3,000,000 bottles x 100 ml (300,000 Ltrs)	50
Effervescent powders.	130 million sachets	90

NICHOLAS LABORATORIES (E.A.) LIMITED

A subsidiary of Nicholas International from Australia. The stronghold of this company is production of consumer goods such as medicated soap and shoe polish which are manufactured in separate premises. Their link to pharmaceutical production is related to over-the-counter analgesic tablets manufacturing.

The production equipment is of the highest standard and the quality control department is suitable to their needs. A separate area of the factory is devoted to cosmetics manufacturing. The factory capacities are the following:

Pharmaceutical Form	Annual Installed Capacity	% Utilized Capacity
Tablets	200 million	35

ELYS CHEMICAL INDUSTRIES LIMITED

A nationals' owned family company established some thirty years ago. Operations in actual premises began in 1982. The new factory is located in one of the best industrial areas of Nairobi. Present installations have been provided with constructed areas to be utilized for future expansion. Manufacturing equipment is excellent and quality control department is adequate. Data on capacities is listed below:

Pharmaceutical Forms	Annual Installed Capacity	% Utilized Capacity
Tablets	325 million	70
Oral liquids	52,000 Ltrs.	80
Capsules	65 million	35
Dry syrups	31,200 Ltrs.	20
Ointments	15,000 Kg	25

PAC LABORATORIES LIMITED

A national enterprise engaged in manufacture of four oral and topical pharmaceutical forms including antibiotics, sulpha drugs, antimalarials, analgesics, anthelmintics, antihestamines, vitamins, cough remedies, and miscellaneous preparations. A large segment of production yield corresponds to prescription medicinals. Plant facilities, production machines and quality control department are modest although efficient. Capacities follows:

Pharmaceutical Forms	Annual Installed Capacity	% Utilized Capacity
Capsules	50 million	30
Liquid Syrups	250,000 Ltrs.	75
Dry Syrups	450,000 Ltrs.	50
Ointments/creams	50,000 Kg.	10

LABORATORY AND ALLIED EQUIPMENT LIMITED

A nationals' owned company manufacturer of analgesics,antibiotics, anti-protozoa, tranquilizer and miscellaneous products in tablets, capsules, oral liquids, powders and ear/nose drops forms. Plant layout and manufacturing equipment are sub-standard. Capacities described below should be taken with reserve:

Pharmaceutical Forms	Annual Installed Capacity	% Utilized Capacity
Tablets		
Compressed	200 million	17
Coated	300 million	4
Capsules	60 million	3.5
Liquid/Dry Syrups	15 million Ltr.	12
Ear/Nose drops	60,000 litres	7
ORS or similar	45 million Sachets	2

REGAL PHARMACEUTICALS LIMITED

This national company was established in 1982. At present formulates analgesics, antimicrobials, anthelmintics, vitamins and cough remedies. Plant layout is very good and cleanliness of the manufacturing areas is above standards. The three tablet compressing machines are in excellent condition. The manual capsule filling machines will be replaced by automatic equipment shortly. The ovens, granulating stove, the mixers for powders and ointments and the stainless steel tanks for mixing/storage liquids are all from local manufacture. The quality control department carries out chemical and microbiological assays. The manufacturing activity will be enlarged to production of dry and liquid vials and ampoules when the factory moves to new premises. Capacities are described as follows:

Pharmaceutical Forms	annual Installed Capacities	% Utilized Capacities
Tablets	200 million	30-40
Capsules	20 million	10

Pharmaceutical Forms	Annual Installed Capacity	% Utilized Capacity
Dry/liquid syrups	1.2 million bottles	30
Ointments	24,000 Kg.	5

COSMOS LIMITED PHARMACEUTICAL MANUFACTURERS

A manufacturing company owned by nationals established in 1970. Like most local manufacturers the production is confined to a similar range of therapeutic categories formulated for oral or topical administration. Manufacturing equipment is good whereas quality control installations are modest. The factory will move to new premises on early 1985. Then production will be diversified to manufacturing of injectables. Data on capacities is listed below:

Pharmaceutical Forms	Annual Installed Capacity	% Utilized Capacity
Tablets		
Compressed	120 million	53
Coated	12 million	10
Capsules	25 million	85
Liquid Syrups	150,000 Ltrs.	30
Dry Syrups	3,000 Kg	30
Ointments/Creams	12,000 Kg	22
Topical powders	12,000 Kg	50

NOVELTY MANUFACTURING LIMITED

A small family-owned company established in 1982 with manufacturing activity confined to oral liquids. Production installations and quality control facilities are very modest. Capacities are listed as follows:

Pharmaceutical Forms	Annual Installed Capacity	% Utilized Capacity
Oral Liquids	250,000 Ltrs	100
Ointments	1,000 Kg	NONE

CUSSONS & CO. LIMITED

A wholly owned local incorporated subsidiary of a company based in England. The main commodities produced by this enterprise are soap and cosmetics. The only pharmaceutical related production is confined to over-the-counter liniments and ointments. Production equipment is semi-automatic and quality control facilities are nil. Capacities follows:

Pharmaceutical Forms	Annual Installed Capacity	% Utilized Capacity
Ointments	31,672 Kg	50
Liniments	2,530 Ltrs	50

DIDY PHARMACEUTICALS LIMITED

A family company owned by nationals manufacturing over-the-counter medicinals and cosmetics. The factory is established in an unsuitable location. Production equipment is very old, principles of Good Manufacturing Practice are not followed. Data on capacities are described below:

Pharmaceutical Forms	Annual Installed Capacity	% Utilized Capacity
Tablets		
Compressed	20 million	100
Coated	10 million	NONE
Oral liquids	45,000 Ltrs	80
Ointments	15,000 Kg	100

INFUSION FLUIDS PRODUCTION UNIT. KENYATTA NATIONAL HOSPITAL

This unit is established in a wing of the Kenyatta National Hospital. Production equipment has been in operation for a number of years. The bottles washing machine is at least twenty years old. Two of the three autoclaves are inoperative. Weighing of solids and preparations of solutions are carried out manually. Bottles filling is undertaken manually one by one. Imported empty glass bottles are recycled. Annual production is estimated in 312,5oo litres which represents 100% of installed capacity.

The unit also produces water for injection in vials of 50 ml and 100 ml. Likewise parenteral solutions of procaine and of atropine are manufactured. Filling of injectable ampoules is manual. Sterile ophthalmic solutions of homatropine and pilocarpine are also produced.

Pyrogens testing of the infusion solutions is carried out by other laboratories. This production unit does not comply with stipulations of Good Manufacturing Practice.

3.0 APPRAISAL OF IMPORTS AND EXPORTS

The evaluation of drugs imports and exports has been acomplished by reviewing the available statistical data. A number of observations, however have been mentioned in the paragraphs that follow aiming to facilitate the understanding of the hurdles encountered in the identification of many pharmaceutical commodities.

The chapter 30 of the Customs and Excise Act 1978 on pharmaceutical products defines medicaments other than foods or beverages such as dietetic, diabetic or fortified foods, tonic water and spa water which are either, products comprising two or more constituents which have been mixed or compounded together for therapeutic or prophylactic uses, or unmixed products for such uses put on in measured doses or in forms or in packings of a kind sold by retail for prophylactic or therapeutic uses. The above stated act also defines the proprietary drugs or medicinal or veterinary preparations. In fact said definitions comprise all pharmaceutical products imported in finished dosage form.

The basic raw materials (active substances, excipients and other components) utilized in local formulation and compounding of pharmaceuticals had to be identified in part, for the objectives of this study, under several Chapters and Schedules. So, antibotics, hormones, vitamins, sulphonamides and sulphones, glycosides, alkaloids, enzymes and the such like are classified, although not individually by chemical entity under Chapter 29 comprising organic chemicals which likewise are grouped under various Schedules. Other pharmaceutical components, however are covered under Chapter 28 which describes inorganic chemicals

whereas a number of raw or packing materials such as crude materials from vegetable origin, neutral glass ampules and vials, rubber caps, aluminium foil utilized in strip-packing, etc., are grouped under different Chapters and Schedules.

This heterogenous array or commodities grouping made it laborious to identify a broad range of pharmaceutical components. Furthermore, a large number of drugs constituents are included under the tariff classification of "Other" which is repeated in every Schedule of the Customs Excise Act. Therefore in order to record a logical structure of imports and exports of medicinals every single statement of the Import Licensing Schedules and of the Annual Trade Reports for 1981 and 1982 had to be examined and still many uncertainties could not be resolved.

The examined statistical data, as explained above, corresponds to the years 1981 and 1982. Imports for 1983 and 1984 as well as during the span of the Plan of Development 1984-1988 have been projected at a cummulative rate of growth of 8% per annum. Statistical data on drugs imports and exports in 1981 and 1982 is shown in ANNEX XI and ANNEX XII.

By taking into consideration the annual population growth and the anticipated increase in social medicine a continued raise in drug consumption is inevitable in the years to come. Being the pharmaceutical sector dependent on imports in above 90% of its components the pharmaceuticals imports upward trend will continue. Nevertheless there are two alternatives to reduce the drugs imports: avoiding the imports of finished pharmaceuticals that can be manufactured locally, and study the feasibility of starting basic manufacture of synthetic or semi-synthetic active substances. Net imports of pharmaceuticals during 1981 and 1982 were as follows:

1982 KShs		1981 KShs	
Imports	Exports	Imports	Exports
342,445,256	66,033,304	343,815,585	81,678,539

Growth of Imports	Net Imports (KShs)	
1981-1982	1982	1981
0.94 %	276,411,952	262,137,046

The largest amount of imported medicinals gross value corresponded to antibiotics:

1982 KShs	% Total	1981 KShs	% Total
196,484,316	56.3	204,394,501	59.44

Due to the unclearness of the recorded statistical data it is not feasible to determine the structure of other commodities by therapeutic class.

In spite of import development 1981 and 1982 we have to assume that the growth of imports remains constant at the rate of 8.0% per annum the estimated value of the imports during 1983-1988 would be the following:

KShs (10^6)

1983	1984	1985	1986	1987	1988
341.2	368.5	398.0	429.9	463.3	500.3

Since exports of medicinals are sporadic a documented estimation of drugs exports in terms of value could not be pursued at this time.

4.0 CONSUMPTION OF MEDICINAL PRODUCTS

Official data on annual consumption of pharmaceuticals is unpublished. Unlike a large number of other developing countries, the private sector has not endeavoured to undertake marketing studies showing the consumption trends and the structure of the demand by pharmaceutical classes. The information furnished by the trade during the accomplishment of this mission has been inaccurate. Furthermore their assessment of the annual consumption of drugs has been often overestimated. With the aim of establishing consistent parameters in the fulfillment of this study the annual drug consumption of the Central Medical Stores during 1983 has been examined. Two other public sector drugs suppliers, the City Councils and the Missionary Hospitals have not been surveyed due to unavailable statistical data. A further drug supplier in the public

sector refers to the Rural Health Kits composed of 15 essential prescription and non-prescription drugs. In respect of the latter, medicines distributed through three types of kits are furnished jointly, free of charge by the Danish International Development Organization (DANIDA), by SIDA a Swedish non-profit organization and through direct imports sponsored by the Government of Kenya. Medicinals contained in another type of Health Kit are supplied by a local manufacturer in an estimated annual value of KShs 30 million. The drugs value of the former health kits are not recorded neither in imports statistical data nor otherwise.

Projection of overall annual drugs consumption has been based on medicinals' consumption by Central Medical Stores, the Ministry of Health supplies of pharmaceuticals. Drug consumption by the latter during 1983 as shown in ANNEX XIII was K£7,013,802- equivalent to KShs 140,276,040 or US$ 10,019,717.[1] Asuming that about 50% of the country's consumption of medicinals is channelled through the public sector and also taking into account the value of the medicines provided by the four types of Rural Health Kits, the annual consumption of pharmaceuticals in 1983 has been estimated in KShs 400 million approximately yielding an annual per capita drug consumption of KShs 22.2. Drugs consumption structure by therapeutic classes is described in ANNEX XIV.

In forecasting the drug consumption for 1984-1988 in terms of value a cummulative annual growth rate of 15% has been estimated as described below:

In KShs Million

1983	1984	1985	1986	1987	1988
400	460	529	608	700	805

5.0 LOCAL MANUFACTURING ACHIEVEMENTS

Drugs manufacturing during the period 1980-1983 in terms of value and by pharmaceutical form is shown in ANNEX X. The annual value of production and the rate of growth through this period are summarized as follows:

---

1) 1983 1 US$ = 14.00 K.Shs.

	Production value in KSHs.thousand	annual growth %
1983	150,431	62.89
1982	94,609	8.76
1981	82,969	7.21
1980	59,861	-

Local production will continue to grow although not at the rate attained during 1982-1983. The growth of the pharmaceutical industry nevertheless will be more steady if the import of competing finished medicinals is restricted.

Based on a specific request of the Government a draft project document entitled "Establishment of a multi-purpose pilot plant unit" was prepared by UNIDO and forwarded in January 1983. If this project is implemented it would result in the transfer of technology and the creation of technical capability to take up basic manufacture of synthetic active substances.

6.0 MEDICINAL AND AROMATIC PLANTS

An outline of medicinal and essential oil containing plants has been appended in NNEX XV and ANNEX XVI. A project proposal KF/KEN/84/223 - Development of Industrial Natural Products from Medicinal and Aromatic Plants in Kenya - was prepared by UNIDO in October 1984 to be financed by general UNIDF, if approved. A number of remarks on a selection of plants are discussed in the captions that follow.

Cinchona Species

Cinchona is mainly cultivated by Brooke Bond Kenya Limited a subsidiary of a company based in England. The parent company is a medium size corporation with a turnover of 0.9 billion sterling pounds in 1983. 6% of its activity is concentrated in agricultural products whereas 8.5% of its annual turnover comes from African countries.

The Kenyan affiliate main commodity is cultivation and export of tea. Exports of Cinchona bark however contribute in about 20% in terms of value to its annual turnover. It should be observed nevertheless that cultivation of Cinchona is carried out in a 50% joint venture with Boehringer Ingelsheim, a pharmaceutical company based in Germany, Federal Republic of. Cinchona bark export data has been detailed in ANNEX XVII.

Brooke Bond is practically the sole grower of Cinchona with a cultivated area of 300 hectares in an estate in Kericho. A small number of growers cultivate some 5-10 hectares of Cinchona.

Cinchona trees take about eight years to be ready for harvesting. When the trees attain full development they are excised and the bark detached. Meanwhile the stumps remain in the ground and thereafter new plants will grow. Alkaloid content of the species cultivated in Kericho is about 9%.

Cinchona crops declined abruptly in 1980 due to a fungus disease that forced the excising of a large number of trees to stop the spreading of the disease. Although the crops yield has improved during the years 1981-1983 as it could be learned from the appended annex the plant disease has not been eradicated so far.

The two main Cinchona alkaloids are quinine and quinidine. The former constituted the only drug utilized in the treatment of malaria until a number of synthetics were discovered. Nowadays large amounts of quinine are utilized by the beverage industry as flavouring agent. Still quinine salts consumption by the public sector in Kenya in 1983 amounted to one million tablets of quinine bisulphate containing a whole of 300 kilograms of active substance worth KShs. 610,000 as finished product.

Catharantus Rosens

Fractionation of this plant yields four dimeric alkaloids: vinblastine, vincristine, vinleurosine and vinroidisine. Vinblastine and vincristine have been extensively studied clinically and their cytotoxic action has been verified. Vinblastine Sulphate and Vincristine Sulphate are used in the treatment of lympho-sarcomas, acute and chronic leukemias, Hodkin disease and related lymphomas. Developed countries import over one thousand tons of Catharantus leaves per annum for extraction and processing in pharmaceutical form.

In Kenya the public sector imported in 1983 some 4,000 ampules of Vincristine Sulphate worth about KShs. 8.3 million equivalent to US$ 592 thousand.

Agave Species

Sisal is mainly harvested in the Coastal area, Thika and Nakuru. Year estimated yield of sisal fiber is about 50,000 tons out of which 80% is exported and the balance used for domestic

consumption. Exports of raw sisal fibre in 1981 were 36 million tons worth KShs. 175 million.

Hecogenine content from sisal sludge is about 10%. In order to carry out the extraction of hecogenine from sisal sludge as a by-product of the sisal fibre industry, the hecogenine content in the sludge should be extracted from the juice yielded by squeezing the leaves prior to the operation of washing the leaves for fibre processing. The obtention of sisal sludge for extraction of hecogenine has been discontined since the operation was considered anti-economical as stated by officers of the Kenya Sisal Board. It was learned however that there is a small experimental unit in Taita Taveta Estate carrying out hecogenine extraction from sisal sludge.

Valeriana Species

Valerian Kilimansharica with 5% alkaloids content grows near mount Kenya at an altitude of 3,000-4,000 meters. Alkaloids are contained in the stem, roots, flowers and leaves of the plant although highest content is found in the leaves and in the rhizoma. The Government of Kenya has offered 200 hectares of land for experimental cultivation of this medicinal plant. "The root of Valeriana species is used, namely in epilepsy, hysteria and other conditions of the nervous system". (Watt and Breyer-Brandwijk).

Aromatic Plants

Essential oils extracted from aromatic plants are mostly utilized in soap, textile, pharmaceutical, cosmetics, food, soft drinks, alcohol and tobacco industries. Imports of essential oils in Kenya during the last five years have been the following:

Year	Quantities KG (000's)	Value KShs. million
1982	539.9	34.2
1981	400.0	35.2
1980	343.0	29.1
1979	395.3	20.7
1978	425.2	20.6

A workshop to study the development of essential oils from plants was convened on 22-23 August 1984 in Nairobi sponsored by the National Council of Science and Technology. The proceedings of this gathering suggested that priority should be granted to the study of the following plants: lemongrass, dill, fennel, chamonile, mentha, marjoram and ocimum. These suggestions will be endorsed in the recommendations of this report.

ANNEX I

PUBLIC HEALTH. EXCERPTS OF REPORTED CASES

	1978	1979	1980	1981	1982
-POLIO		162	455	274	262
-MENINGOCOCCIC MENINGITIS	1640	1613	26	13	6
-DISENTERY	29743	40321		61768	39517
-INFECTIOUS HEPATITIS	1286	2423	2653	2687	2256
-KALA-AZAR	238	544	361	374	279
-LEPROSY	1103	1850	454	518	441
-SCHISOSTOMIASIS	14118	17169	16661	12249	13132
-TETANUS	645	723	835	1038	498
-TRYPANOSOMIASIS	13			31	59
-CHOLERA			4379	1892	4451
-TUBERCULOSIS			652	6328	3779
-MALARIA			50412	60654	116463
-AMOEBIASIS			6982	9605	10339
-DIARRHOEIAS			65134	75327	52229
-GASTROENTERITIS			54463	85438	89669
-GONORRHEA			120657	131709	119263
-TRACHOMA			23385	21585	13735
-SYPHILIS			3146	3114	2028
-SCABIES			5394	10682	19570
-RABIES			3432	5982	291

SOURCE: STATISTICAL ABSTRACT, CENTRAL BUREAU OF STATISTICS-1983.

ANNEX II

LIST OF RAW MATERIALS DUTY FREE FOR USE IN THE MANUFACTURE OF MEDICAMENTS

(CUSTOMS AND EXCISE ACT DATED 15 JUNE 1982)

ACETYLSALICYLIC ACID
ALUMINUM HYDROXIDE
AMODIAQUINE
AMINOPHYLLINE
AMITRIPTYLINE
ANALGIN
ASAFEN GRANULES
BELLADONNA
BENDROFLUAZIDE
BESEROL GRANULES
BETAMETHASONE
BISACODYL
BROMOHEXANE
CAFFEINE
CALCIUM SENNOSIDE
CALCIUM SODIUM LACTATE
CAMPHORATED OPIUM TINCTURE
CAMYOFIN
CAPSICUM TINCTURE
CHLORAL HYDRATE
CHLOROQUINE
CHLORPHENIRAMINE MALEATE
CHLORPROPAMIDE
CLIOQUINOL
CVC MEDICATED OINTMENT
CYANOCOBALAMIN
DAPSONE
DEQUALINIUM CHLORIDE
DEXAMETHASONE
DEXTRAN
DEXTROMETHORPHAN
MERCHUROCHROME
MESULPHEN
DIAZEPAM
DIHYDROSTREPTOMYCIN
DIOXANIDE FUROATE
DIPHENHYDRAMINE
EPHEDRINE
EPSOM SALTS
ERGOTAMINE
ERGOT EXTRACTS
ETHAMBUTOL
FEFFOUS SULPHATE
FLUMETHAZONE
FLUOCINOLONE
FURASOLIDONE
GENTIAN DERIVATIVES
GLYCERINE TRINITRATE
GUAIPHENESINE
HAMMAMELIS EXT./TINCTURE
HEXYLRESORCINOL
HYDROCORTISONE
HYOSCYAMUS EXT./TINCTURE
ICHTHAMMOL
INDOMETHACIN
IPECACUANHA EXT./TINCTURE
ISONIAZID
LEVAMISOLE
MEBENDAZOLE
MAGNESIUM HYDROXIDE
MAGNESIUM TRISILICATE
MECLOZINE
MEDAZEPAM
MEPACRINE
SQUILL TINCT./EXTRACT
STRAMONIUM TINCT./EXTRACT

METHYLDOPA
METHYL NICOTINATE
METHYLSALICYLATE
METODOPHRAMIDE
METRONIDAZOLE
MILK OF MAGNESIA
MIRANOL C2M
NALIDIXIC ACID
NICLOSAMIDE
NITROFURANTOIN
NUX VOMICA EXT./TINCTURE
OXYPHENBUTAZONE
PARACETAMOL
PHENOBARBITONE
PHYNYLBUTAZONE
PILOCARPINE
PIPERAZINE
POTASSIUM GUAIACOL SULPHATE
PREDNISOLONE
PREDNISONE
PROBENECID
PROCHLORPHERAZINE
PROMETHAZINE
PROPANOLOL
PSEUDO EPHEDRINE
PYRIDOXINE
PYRIMETHAMINE
QUININE
RIBOFLAVIN
SALBUTAMOL
SALICYLIC ACID
SALICYLAMINE
SENNA
SODIUM LACTATE.

STRYCHNINE NITRATE
SULPHACETAMIDE
SULPHADIAZINE
SULPHADIMIDINE
SULPHAGUANIDINE
SULPHAMERAZINE
SULPHAMETHOXAZOLE
SULPHANILAMIDE
SULPHAPENAZOLE
THENYLDIAMINE
THEOPHYLLINE
THIACETAZONE
THIAMINE
TOLU BALSAM
TRICLOSAN
TRIMETHOPRIM
TRIPOLIDINE
VALERIAN EXT./TINCTURE
VASAKA EXT./TINCTURE
VICKS INHALER MEDICATION
VICKS VAPORUB MEDICATION
ZINC OXIDE
SINC UNDECENOATE

SOURCE: KENYA SUBSIDIARY LEGISLATION.

ANNEX III

LIST OF RAW MATERIALS DUTY FREE FOR USE IN THE MANUFACTURE OF MEDICAMENTS

SUPPLEMENTARY TO LIST OF 15 JUNE 1982

(CUSTOMS AND EXCISE ACT DATED 8 FEBRUARY 1983)

EMPTY GLASS VIALS
VIAL SEALS
ACETOLAMIDE BP
ACTIVATED ATTAPULGITE
ALLOPURINOL BP
AMPROLIUM HYDROCHLORIDE
ATROPINE BP
BENZETHONIUM CHLORIDE
BENZHEXOL HYDROCHLORIDE BP
BENZYL BENZOATE BP
BEPHENIUM HYDRONAPHTHOATE BP
BITHIONOL SULPHOXIDE
CARBAMAZEPINE BP
CARBIMAZOLE BP
CHLORBUTOL BP
CHLORDIAZEPOXIDE
CHLORPROMAZINE
CHOLINE CHLORIDE
CODEINE PHOSPHATE BP
CYCLOPHOSPHAMIDE BP
DEBRISOQUINE
DESONIDE
DICHLOROPHEN BP
DICYCLOMINE HYDROCHLORIDE BP
DIGZIN BP
FURATALIDONE HYDROCHLORIDE
GRISEOFULVIN BP
GUANETHIDINE SULPHATE BP
HALOPERIDOL BP
HYDROFLUMETHIAZIDE BP
HYOSCINE-N-NUTYLBROMIDE
IBUPROFEN.
LIDOCAINE HYDROCHLORIDE BP
LORAZEPAM
MEPYRAMINE
METHYLTESTOSTERONE BP
METRIPHONATE
MORPHINE HYDROCHLORIDE BP
NITRAZEPAM BP
NITROFURAZONE BPC
PHENYTOIN SODIUM BP
PHTHALYL SULPHATHIAZOLE BP
PRYVAQUINE
PROGUANIL HYDROCHLORIDE BP
PVP IODINE
PYRIZINAMIDE BP
RESERPINE BP
SULPHADIAZINE BP/SILVER
SULPHA QUINOZALINE SOD. BP
SULPHATHIAZOLE BPC
TETRAMIZOLE
TRIFLUOPERAZINE
UNDECENOIC ACID BP
XYLOMETAZOLINE HCL

SOURCE: KENYA SUBSIDIARY LEGISLATION.

ANNEX IV

DAWA PHARMACEUTICALS. DESCRIPTION OF SELECTED MANUFACTURING EQUIPMENT AND CAPACITIES

			%
	COMPRESSED TABLETS	INSTALLED CAPACITY	UTILIZED CAPACITY
3	KILLEN Rotary machines	290,000/hr	33
3	(DRAIS) (PELLEGRINI) Mixers (FITZ MEILI)	385 Kg/8 hr. (1,200 litres)	33
2	AEROMATIC Fruid Bed Dryers	60 Kg/hr	33
5	MEMMERT Ovens	-	20
	COATED TABLETS		
4	PELLEGRINI Coating Pans	120 Kg/hr	5
2	PELLEGRINI Polishing Drums	320 Kg/yr (10 million)	3-5
41	SEITZ High Speed Stirrers	500 litres	33
3	SEITZ Sugar Syrup Pans	1,500 litres	33
	CAPSULES		
1	PELLEGRINI Blender	240 Kg (700 l.)hr	20
1	ZANASI AZ 30 automatic filling/ closing	30,000 pieces/hr	25
	INJECTABLES		
4	SEITZ Pressure Filtration Vessels	500 Lt./hr	20
1	STRUNCK Automatic Ampoule Filling	15,000 amp/hr	20
1	STRUNCK Automatic Ampoule Sealing	-	30
1	STRUNCK Automatic Sterile Vial Dry Filling	15,000/hr	25
2	GETINGE Autoclaves	200 lt/8 hr	25

		INSTALLED CAPACITY	% UTILIZED CAPACITY
	OINTMENTS		
1	OSKAR Steam Jacket Vessel/Stirrer	150 Kg/8 hr	5
1	KRIEGER Homogeneizer	150 Kg/8 hr	5
	DRY/LIQUID SYRUPS		
1	SEITZ Syrup Kettle)		
2	SEITZ Filter Press)		
2	SEITZ Mixing Tanks)	300,000 lt/yr	33
4	SEITZ Stirrers)		
2	SEITZ Storage Tanks)		

ANNEX V

TABLETS MANUFACTURING CAPACITIES

	INSTALLED CAPACITY MILLION/YR	UTILIZED CAPACITY %
DAWA*	1,200	33
STERLING	500	60
LABORATORY & ALLIED EQUIP.*	500	17
NICHOLAS	200	35
GLAXO	300	33
BOOTS	400	60
ELYS	325	70
MAC'S*	250	70
CHEMAFRIC*	175	60
COSMOS*	132	53
REGAL	200	30
WELCOME	15	60
DIDY	20	100

* INCLUDES COATED TABLETS.

CAPSULES MANUFACTURING CAPACITIES

DAWA	120	25
LABORATORY & ALLIED EQUIP.	60	3.5
PAC	0.2	30
ELYS	65	35
MAC'S	50	70
CHEMAFRIC	50	50
COSMOS	25	85
REGAL	20	10

ANNEX VI

DRY AND LIQUID SYRUPS MANUFACTURING CAPACITIES

	INSTALLED CAPACITY (000's) LITRES/YR	UTILIZED CAPACITY %
DAWA	300	33
STERLING	300	50
PAC	360	75
GLAXO	200	50
NOVELTY	250	100
BOOTS	200	60
MAC'S	2,000	70
WELCOME	200	80
COSMOS	150	30
REGAL	1,200	30
CHEMAFRIC	50	50
ELYS	83	80
DIDY	45	80
LABORATORY & ALLIED EQUIP.	15	12

ANNEX VII

OINTMENTS AND CREAMS MANUFACTURING CAPACITIES

	INSTALLED CAPACITY (000's) KG/YR	UTILIZED CAPACITY %
DAWA	65	5
PAC	40	10
GLAXO	45	5
CUSSONS	32	50
DIDY	15	100
BOOTS	60	40
ELYS	15	25
MAC'S	8	70
WELCOME	10	25
CHEMAFRIC	5	50
COSMOS	12	22
REGAL	24	5
NOVELTY	1	0

ANNEX VIII

MANUFACTURING CAPACITIES INJECTABLES (VIALS)

	INSTALLED CAPACITY (000's) UNITS/YR	UTILIZED CAPACITY %
DAWA	10,000	33
MAC'S	10,000	70
CHEMAFRIC	650	50

INJECTABLES (AMPOULES)

	INSTALLED CAPACITY MILLION/YR	UTILIZED CAPACITY %
	12	20

O.R.S. OR SIMILAR

	INSTALLED CAPACITY MILLION SACHETS/YR.	UTILIZED CAPACITY %
STERLING	130	90
LABORATORY & ALLIED EQUIP.	45	2

LINIMENTS

	INSTALLED CAPACITY (000's) LITRES/YR	UTILIZED CAPACITY %
BOOTS	200	40
CUSSONS	2.5	40

ANNEX IX

INFUSION FLUIDS CAPACITIES

	INSTALLED CAPACITY (000's LITRES/YR.	UTILIZED CAPACITY %
INFUSION KENYA LTD (IKL)	650,000 (1)	30
KENYATTA NATIONAL HOSPITAL	312,500 (2)	100

(1) BASED ON ONE EIGHT HOURS SHIFT/DAY

(2) BASED ON THREE SHIFTS PER DAY IN BOTTLES' FILLING AND STERILIZING OPERATIONS. DATA ON INSTALLED CAPACITY IS CONTROVERSIAL.

ANNEX IX-A

SUMMARY OF CAPACITIES

PHARMACEUTICAL FORM	INSTALLED* CAPACITY IN MILLION PER ANNUM	AVERAGE UTILIZED CAPACITY %
INJECTABLES		
VIALS	20.65	51
AMPOULES	12.00	20
TABLETS	4,217.00	52
CAPSULES	390.00	43
SYRUPS	5.35 LITRES	57
EFFERVESCENT POWDERS	175.00 SACHETS	90
OINTMENTS	0.33 KG.	34
LINIMENTS	0.20 LITRES	40
INFUSION FLUIDS	972,000 LITRES	65
	TOTAL AVERAGE	about 50 %

*BASED ON ONE 8 HOURS SHIFT PER DAY, 250 DAYS PER YEAR.

ANNEX X

LOCAL PHARMACEUTICAL MANUFACTURING

YEAR	TABLETS		ORAL LIQUIDS		CAPSULES		OINTMENTS/POWDERS		DRY VIALS	
	(000's)	KShs (000's)	LITRES	KShs (000's)	(000's)	KShs (000's)	KG	KShs (000's)	(000's)	KShs (000's)
1980	114,400	10,900	499,529	18,693	55,400	18,706	233,116	10,646	287	916
1981	280,620	26,804	715,475	21,513	41,801	14,100	321,549	14,684	1,838	5,868
1982	530,518	36,734	458,751	19,596	53,033	17,889	239,395	10,932	3,824	9,458
1983	714,334	53,236	679,433	29,023	83,832	39,048	377,973	20,114	2,947	9,010

SOURCE: CENTRAL BUREAU OF STATISTICS.

ANNEX XI

PHARMACEUTICAL IMPO

SITC	CCCN	
541.109	29.38.009	OTHER PROVITAMINS AND VITAMINS
541.310	29.44.010	PENICILLINS AND THEIR DERIVATIVES
541.320	29.44.020	STREPTOMYCINS AND THEIR DERIVATIVES
541.330	29.44.030	TETRACYCLINES AND THEIR DERIVATIVES
541.350	29.44.040	OTHER ANTIBIOTICS
541.409	29.42.009	OTHER VEGETABLE ALKALOIDS
541.510	29.39.010	INSULIN
541.530	29.39.030	ADRENAL CORTICAL HORMONES
541.590	29.39.040	OTHER HORMONES
541.610	29.41.000	GLYCOSIDES NAT. SYNTH. AND DERIVATIVES
541.620	30.01.000	ORGANO-THERAPEUTICS
541.640	30.02.010	ANTISERA AND BACTERIAL VACCINES
541.650	30.02.020	TOXINS, MICROBIAL CULTURES
541.710	30.03.010	MEDICAMENTS W. ANTIBIOTICS OR DERIVATIVE
541.720	30.03.020	MEDICAMENTS WITH HORMONES
541.730	30.03.030	MEDICAMENTS WITH ALKALOIDS
541.791	30.03.041	MEDICAMENTS, ETC.
541.792	30.03.042	INFUSION SOLUTIONS
541.799	30.03.049	OTHER MEDICINES
541.999	30.05.009	OTHER
515.710	29.36.000	SULPHONAMIDES
515.720	29.37.000	SULPHONES

ORTS

1982		1981	
KG	KShs	KG	KShs
126,985	7,279,510	60,522	4,357,947
39,826	11,239,077	55,169	17,540,690
8,650	1,157,934	1,075	336,236
14,719	3,819,733	47,951	12,213,004
75,779	26,349,607	42,092	20,342,634
13,744	528,833	14,134	1,121,218
		141	28,149
			7,496
233	56,743	284	119,266
6,647	176,001	29,349	850,900
1,074	408,381	104	80,638
8,581	5,204,439	19,058	6,351,576
24,573	7,432,884	21,613	6,739,607
2,027,756	154,317,965	963,345	153,961,937
9,723	2,812,562	18,727	8,001,312
69,789	12,590,748	55,725	6,446,112
410,788	63,415,531	305,037	51,602,870
2,435	439,533	11,102	440,531
654,122	33,367,280	462,306	29,990,717
20,440	7,102,163	42,706	7,186,209
15,498	1,598,297	24,011	2,998,378
84	21,564	59	52,100

SITC	CCCN	
522.560	28.20.020	ALUMINUM HYDROXIDE
523.910	28.54.000	HYDROGEN PEROXIDE
061,901	17.02.001	DEXTROSE MONOHYDRATE
051.902	17.02.002	GLUCOSE
061.903	17.02.003	LACTOSE
292.401	12.07.001	CINCHONA BARK

SOURCE: ANNUAL TRADE REPORTS 1981 AND 1982

1982		1981	
KG.	KShs.	KG	KShs
936.025	2,821,491	4,507,150	10,240,441
287,936	2,487,283	155,991	1,447,981
388,548	2,245,764	159,912	1,001,125
36,663	606,769	28,719	203,914
53,683	965,164	13,657	139,865
-	-	315	12,732
	348,445,256		343,815,585

ANNEX XII

PHARMACEUTICALS EXPORTS

	1982		1981	
	KG	KShs	KG	KShs
OTHER PROVITAMINS AND VITAMINS	600	5,250	777	35,931
PENICILLINS AND DERIVATIVES	-	-	1	130
STREPTOMYCINS AND DERIVATIVES	-	-	-	-
TETRACYCLINES AND DERIVATIVES	-	-	116	33,214
OTHER VEGETABLE ALKALOIDS	105	14,195	-	-
ORGANO-THERAPEUTICS	1,836	359,000	1,100	8,565
ANTI-SERA AND BACTERIAL VACCINES	22,829	10,799,750	41,184	4,769,877
TOXINS, MICROBIAL CULTURES	4,182	416,626	22,585	2,308,120
MEDICAMENTS WITH ANTIBIOTICS OR DERIVATIVES	375,130	33,436,540	544,733	54,003,205
MEDICAMENTS WITH HORMONES	-	-	6,502	416,387
MEDICAMENTS WITH ALKALOIDS	180	46,129	277	22,519
MEDICAMENTS, ETC.	25,130	2,797,423	11,737	1,607,782
INFUSION SOLUTIONS	14,500	124,180	45,000	790,740
OTHER MEDICINES	31,978	1,488,818	90,196	2,253,064
OTHER	46,136	1,256,895	40,115	823,382
GLUCOSE	19,442	506,246	7,740	415,131
CINCHONA BARK	604,200	14,782,304	559,580	14,190,492
		66,033,356		81,678,539

SOURCE: ANNUAL TRADE REPORTS 1981 AND 1982

ANNEX XIII

CONSUMPTION OF DRUGS IN THE PUBLIC SECTOR 1983-1984
(TWELVE MONTHS)

	QUANTITIES (000's)	K£	SUB-TOTAL
ANALGESICS, ANTIPYRETICS, ANTIINFLAMMATORIES.			
ASPRIN TABS. 300 mg	55,051	61,464	
PARACETAMOL TABS. 500 mg	49,085	108,183	
INDOMETHACIN CAPS. 25 mg	5,013	27,005	
PHENYLBUTHAZONE CT. TABS.100mg	145	250	
PHENYLBUTHAZONE CT. TABS.200mg	16,920	49,440	
			246,342
ANALGESICS (NARCOTICS)			
MORPHINE SULPHATE INJECT. 15mg/ml	7	539	
PETHIDINE HCL INJECT.50 mg/ml	51	3,871	
PETHIDINE HCL INJECT.100 mg/ml	30	113,575	
PETHILORPHAN INJECT. 50 mg/ml	38	4,650	
PETHILORPHAN INJECT. 100 mg/ml	32	5,653	
			128,288
ANTICONVULSANTS			
CARBAMAZEPINE TABS. 200 mg	1,985	67,596	
PHENYTOIN SODIUM CT.TABS. 100 mg	2,646	16,509	
PHENYTOIN SODIUM SUSP.30 mg/5 ml	3	1,164	
ETHOSUXIMIDE TABS. 250 mg	2,050	36,951	
			122,220
HYPNOTICS			
PHENOBARBITONE TABS. 30 mg	2,898	1,101	
PARALDEHYDE INJECT. 5 ml/500 ml		69	
			1,170

ANNEX XIII (2)

	QUANTITIES (000's)	K£	SUB-TOTAL
SEDATIVES AND TRANQUILIZERS			
DIAZEPAM INJECT. 10 mg/2 ml	193	8,504	
DIAZEPAM TABS. 5 mg	8,067	47,087	
CHLORPROMAZINE HCL INJECT. 25 mg/ ml	6	1,287	
CHLORPROMAZINE HCL INJECT.50 mg/ml	164	4,592	
CHLORPROMAZINE HCL TABS. 25 mg	1,480	1,648	
CHLORPROMAZINE HCL TABS. 100 mg	670	4,020	
PROCHLORPERAZINE MALEATE TABS. 5 mg.	146	200	
PROCHLORPERAZINE MALEATE INJECT. 12.5 mg/ml	7	923	
HALOPERIDOL CAPS. 0.5 mg	1,952	4,406	
HALOPERIDOL TABS 1.5 mg	1,139	12,053	
HALOPERIDOL INJECT. 5 mg/ml	2,214	110	
TRIFLUOPERAZINE HCL TABS. 1 mg	294	1,172	
TRIFLUOPERAZINE HCL TABS. 5 mg	1,027	13,890	
FLUPHENAZINE DECANOATE INJECT. 25 mg/ml	4	85,752	
			185,644
ANTIDEPRESSANTS			
AMITRIPTYLLINE HCL TABS.10 mg	13	1,640	
AMITRIPTYLLINE HCL TABS.25 mg	2,465	337,701	
			339,341
RIGIDITY AND TREMOR CONTROLLERS			
BENZHEXOLE TABS. 2 mg	2,005	5,583	
BENZHEXOLE TABS. 5 mg	1,550	4,525	
			10,108

ANNEX XIII(3)

	QUANTITIES (000's)	KE	SUB-TOTAL
MUSCLE RELAXANTS			
GALLAMINE TRIETHIOIODIDE INJECT. 40 mg/ml	15	269	
NEOSTIGMINE METHYLSULPHATE INJECT. 2.5 mg/ml	5	347	
PANCURONIUM BROMIDE INJECT. 2 mg/ml	5	2,956	
SUXAMETHONIUM CHLORIDE INJECT. 50 mg/ml	61	6,068	
D-TUBOCURARINE HCL INJECT. 10 mg/ml	8	1,879	
			11,519
ANTIHISTAMINES			
CHLORPHENIRAMINE MALEATE TABS. 4 mg.	23,988	7,436	
CHLORPHENIRAMINE MALEATE SYR. 2 mg/5 ml.	53,815	43,052	
PROMETHAZINE TABS. 10 mg	180	825	
PROMETHAZINE TABS. 25 mg	36	34	
			51,347
DERMATOLOGICAL DRUGS			
BENZYL BENZOATE BOTT	851	999	
BENZOIC ACID COMPOUND OINTMENT GM	560	2,820	
DESONIDE CREAM 15 GM. TUBE	47	19,476	
DESONIDE OINTMENT 15 GM TUBE	55	33,307	
BETAMETHASONE VALERATE CREAM 0.1% 15 GM. TUBE	42	11,568	
BETAMETHASONE VALERATE OINT. 0.1% 15 GM. TUBE	51	13,901	
ZINC UNDECENOATE OINT. PACK/500 GM	13	34,789	
ZINC PASTE PACK/500 GM.		168	
			117,028

ANNEX XIII (4)

	QUANTITIES (000's)	K£	SUB-TOTAL
ANTIBIOTICS			
AMPICILLIN CAPS. 250 mg.	33,577	669,861	
AMPICILLIN INJECT. 250 mg. VIAL	377	47,129	
AMPICILLIN INJECT. 500 mg. VIAL	323	40,552	
AMPICILLIN SYRUP 125 mg/ml BOTT/120 ml.	68	24,758	
AMPICILLIN/CLOXACILLIN CAPS.500 mg	106	4,131	
AMPICILLIN/CLOXACILLIN INJECT. 500 mg. AMP.	73	12,038	
AMPICILLIN/CLOXACILLIN SYRUP 250 mg/5 ml		31	
AMPICILLIN/CLOXACILLIN DROPS NEONATAL	39	4,819	
AMOXICILLIN CAPS. 250 mg	13,133	75,843	
AMOXICILLIN SYRUP 125 mg/5 ml BOTT/120 ml	135	165,220	
BENZATHINE PENICILLIN INJECT. 2.4 MU VIALS	585	84,215	
BENZATHINE PENICILLIN 500,000 UNITS VIALS	1,288	154,584	
BENZYL PENICILLIN 1 MU VIALS	3,300	189,584	
GENTAMYCIN INJECT. 40 mg/2 ml AMP.	7	1,790	
GENTAMYCIN INJECT. 20 mg/2 ml AMP.	60	17,520	
CLOXACILLIN CAPS. 250 mg.	657	15,094	
CLOXACILLIN INJECT.	121	43,847	
CLOXACILLIN SYRUP	12	11,017	
ERYTHROMYCIN STEARATE CT. TABS. 250 mg	1,523	27,779	
CHLORAMPHENICOL CAPS. 250 mg.	205	1,342	
CHLORAMPHENICOL INJECT. 1 G. VIAL	50	8,694	
CLINDAMYCIN HCL CAPS. 150 mg	111	16,480	
CLINDAMYCIN HCL INJECT. 300 mg/ 2 ml. AMP.	33	48,595	
KANAMYCIN SULPHATE INJECT. 500 mg/ 2 ml VIAL	12	5,341	
PENICILLIN V TABS 125 mg	4,915	17,190	
PENICILLIN V TABS 250 mg	5,931	40,330	
PROCAINE PENICILLIN INJECT. 3 MU/ 10 ml VIAL	1,739	322,510	
NEOMYCIN SULPHATE CT. TABS 350,000 UNITS	486	1,166	
STREPTOMYCIN SULPHATE INJECT. 1 GM VIAL	46	2,047	

ANNEX XIII (5)

	QUANTITIES (000's)	K£	SUB-TOTAL
STREPTOMYCIN SULPHATE INJECT. 5 GM VIAL	16	2,360	
TETRACYCLINE HCL CAPS. 250 mg.	21,419	116,497	
TETRACYCLINE HCL INJECT. 250 mg	12	2,890	
TETRACYCLINE HCL OFT. OINT. 1% 2.5 GM TUBE	390	37,701	
TETRACYCLINE HCL SKIN OINT. 3% 3.5 GM TUBE	15	1,264	
			2,214,219
SULPHONAMIDES			
CO-TRIMOXAZOLE TABS. (400:80)	2,047	24,461	
CO-TRIMOXAZOLE SYRUP 200:40/ 5 ml/120 ml	539	339,665	
SULPHADIAZINE TABS. 500 mg.	400	1,050	
PHTHALYLSULPHA THAZOLE TABS. 500 mg	40	19	
			365,195
ANTIFUNGALS			
NYSTATIN DROPS 100,000 UNITS/ml/ 12 ml	33	15,708	
NYSTATIN PESSARIES 100,000 UNITS	128	4,914	
NYSTATIN TABLETS 500,000 UNITS	100	2,100	
CLOTRIMAZOLE CREAM 1% 15 GM TUBE	44	64,416	
TINIDAZOLE PASSARIES 150 mgx14	23	18,589	
GRISEOFULVIN TABS. 125 mg	24	215	
GRISEOFULVIN TABS. 500 mg	88	3,483	
			109,425
OTHER ANTIBACTERIALS			
METRONIDAZOLE 500 mg 100 ml VIALS	4	11,047	
			11,047

ANNEX XIII (6)

	QUANTITIES (000's)	KE	SUB-TOTAL
INSULIN AND ORAL HYPOGLYCEMICS			
CHLORPROPAMIDE TABS. 250 mg	3,255	53,875	
INSULIN INJECT. 40 UNITS VIAL	14	9,382	
INSULIN INJECT. 80 UNITS VIAL	9	12,258	
INSULIN SINC SUSP. 40 UNITS VIAL	26	35,672	
			111,187
THYROID/ANTITHYROID PREPARATIONS			
CARBIMAZOLE TABS. 5 mg	891	2,123	
L-THYROXIN SODIUM TABS. 0.05 mg	970	2,400	
			4,523
VITAMIN PREPARATIONS			
CYANOCOBALAMIN INJECT. 250 mcgm VIAL	81	7,455	
MULTIVITAMIN TABS	21	27,197	
MULTIVITAMIN SYRUP LITRES	29	51,432	
PARENTOVITE INJECT. AMPS	46	16,296	
			102,380
MINERAL NUTRITIONAL ADDITIVES			
CALCIUM GLUCONATE INJECT. 10% AMPS	50	1,616	
PARENTERAL AMINOACIDS 500 ml	11	18,901	
PARENTERAL CARBOHYDRATES AMPS		896	
			21,413
ERYTHROPOYETIC PREPARATIONS			
FERROUS SULPHATE TABS	1,660	1,444	
FOLIC ACID TABS. 5 mg	9,503	6,628	
			8,072

ANNEX XIII (7)

	QUANTITIES (000's)	K£	SUB-TOTAL
ANTICOAGULANTS/PLASMA EXPANDERS			
DEXTRAN 70 INJECT. 6% SALINE x 500 ml	4	9,398	
DEXTRAN 70 INJECT. 6% DEXTROSE x 500 ml	6	11,743	
HEPARIN INJECT. 25,000 UNITS 5 ml VIALS	5	1,668	
PHYTOMENADIONE INJECT. 10 mg/ml AMPS.	24	7,172	
WARFARIN SODIUM TABS. 3 mg	9	40	
			30,021
ANTACIDS			
MAGNESIUM TRISILICATE TABS	12,646	18,621	
			18,621
ANTISPASMODICS			
HYOSCINE N-BUTYLBROMIDE TABS. 10 mg	16,502	283,793	
HYOSCINE N-BUTYLBROMIDE INJECT. 20 mg/ml.	9	1,347	
			285,140
ANTIEMETICS			
PROMETHAZINE HCL TABS. 10 mg		825	
PROMETHAZINE HCL TABS. 25 mg.		34	
			859
ANTIHAEMORRHOIDALS			
ANUSOL WITH HYDROCORTISONE	5	65	
			65
LAXATIVES			
SENNA TABS	9,907	15,950	
			15,950

ANNEX XIII (8)

	QUANTITIES (000's)	KE	SUB-TOTAL
ANTHELMINTICS			
BEPHENIUM HYDRONAPHTHOATE GRANULES KG.	63	6,307	
NICLOSAMIDE TABS 500 mg	6,243	69,815	
PIPERAZINE ADIPATE TABS. 300 mg	4,806	11,882	
			88,004
EXPECTORANTS			
EXPECTORANT MIXTURE, LITRES	61	134,332	
			134,332
BRONCHIAL SPASM RELAXANTS			
ADRENALINE INJECT. 1 mg/ml AMP	117	3,804	
AMINOPHYLLINE INJECT. 500 mg/ 2 ml AMP.	56	867	
AMINOPHYLLINE INJECT. 250 mg/ 10 ml AMP	129	9,205	
FRANOL TABS.	28	78,067	
FRANOL SYRUP BOTTLES	40	17,330	
SALBUTAMOL CAPS.	230	7,035	
SALBUTAMOL SYRUP 2mg/5ml BOTTLE	47	265,641	
			381,649
HORMONES			
DEXAMETHASONE TABS. 500 mcgm	100	4,163	
PREDNICOLONE TABS. 5 mg	3,742	16,418	
ETHINYLOESTRADIOL TABS. 20 mcgm	12	7	
HYDROCORTISONE ACETATE INJECT. 25 mg VIAL	9	2,153	
HYDROCORTISONE ACETATE OFT. OINT. 2.5%/3.5 GM	5	2,395	
HYDROCORTISONE ACETATE OFT. DROPS. 1% bott/3 ml.	66	14,515	
HYDROCORTISONE SUCCINATE INJECT. 125 mg VIAL		110	
HYDROPROGESTERONE CAPRDATE INJECT. 250 mg/ml	12	2,509	

ANNEX XIII (9)

HORMONES(cont.)	QUANTITIES (000's)	K£	SUB-TOTAL
INSULIN INJECT. U-80 VIAL	14	9,382	
INSULIN SINC INJECT.U-80 VIAL	9	12,058	
METHYLPREDNISOLONE SUCCINATE 40 mg VIAL	34	41,931	
NORETHISTERONE TABS. 5 mg	123	1,500	
STILBOESTROL INJECT. 5mg/ml		14	
STILBOESTROL TABS. 5 mg	146	252	
			107,407
ANTIHYPERTENSIVES			
HYDRALAZINE TABS. 25 mg	18	41	
METHYLDOPA TABS. 250 mg	34,865	110,173	
RESERPINE TABS. 0.25 mg		382	
RESERPINE INJECT. 1mg/ml AMPS		41	
			110,637
CARDIAC GLYCOSIDES			
DIGOXIN TABS. 0.25 mg	1,963	2,337	
DIGOXIN INJECT. 0.5 mg/2ml AMPS	2	33	
DIGOXIN ELIXIR 0.05 mg/ml	2	2,379	
			4,749
DIURETICS			
BENDROFLUAZIDE TABS. 5 mg.		449	
CHLORTALIDONE TABS 50 mg	9	271	
FRUSEMIDE TABS. 40 mg	6	12,865	
HYDROFLUMETHIAZIDE TABS. 50 mg	3	31,890	
MANNITOL INJECT. 20%	1	1,661	
SPIRINOLACTONE TABS. 25 mg		6,815	
			53,951
ANESTHETICS			
GENERAL			
ETHER BOTT. x 500 ml	2	3,095	
HALOTHANE BOTT. x 250 ml	2	18,899	
TRICHLOROETHYLENE		1,232	

ANNEX XIII (10)

	QUANTITIES (000's)	K£	SUB-TOTAL
PARENTERAL			
KETAMINE HCL 10 mg/20 ml VIAL	6	11,147	
KETAMINE HCL 50 mg/10 ml VIAL	5	14,326	
LIGNOCAINE HCL 4% VIAL/50 ml	29	449	
LIGNOCAINE HCL WITH ADRENALINE	310	24,525	
THIOPENTONE SODIUM INJECT. 500 mg AMPS	76	16,579	
TOPICAL			
ETHYL CHLORIDE SPRAY 100 ml	3	3,161	
			93,413
DRUGS ACTING ON UTERUS			
ERGOMETRINE MALEATE 500 mcgm/ml	154	5,840	
OXYTOCIN INJECT. 5 UNITS/ml	26	7,187	
OXYTOCIN/ERGOMETRINE INJECT.	38	3,566	
CITOTOXIC DRUGS			
CYCLOPHOSPHAMIDE INJECT. 100 mg VIAL	9	4,226	
CYCLOPHOSPHAMIDE TABS. 50 mg	130	7,475	
FLUOROURACIL INJECT. 250 mg/ 5 ml AMPS.		415	
METHOTREXATE INJECT. 50 mg VIAL	3	11,746	
VINCRISTINE SULPHATE INJECT. 5 mg AMP.	4	415,062	
CARBIMAZOLE TABS. 5 mg	891	2,123	
			441,047
ANTIMALARIALS			
CHLOROQUINE PHOSPHATE TABS 150 mg BASE	87,906	404,807	
CHLOROQUINE PHOSPHATE INJECT. 40 mg BASE/2 ml	919	21,610	
CHLOROQUINE PHOSPHATE INJECT. 40 mg BASE/5 ml	769	38,054	

ANNEX XIII (11)

	QUANTITIES (000's)	K£	SUB-TOTAL
ANTIMALARIALS(Cont.)			
CHLOROQUINE PHOSPHATE SYRUP 50 mg BASE/5 ml. LITRE	35	94,052	
PRIMAQUINE PHOSPHATE TABS. 7.5 mg BASE	300	7,425	
QUININE BISULPHATE TABS. 300 mg.	1,008	30,492	
PROGUANIL HCL TABS 100 mg.	458	3,290	
			599,730
ANTISCHISOSTOMAL DRUGS			
METRIFONATE TABS. 100 mg	1,570	3,481	
			3,481
ANTILEPROTICS			
DAPSONE TABS. 50 mg	500	1,257	
DAPSONE TABS. 100 mg	1,501	41,922	
CLOFAZIMINE CAPS. 100 mg	75	4,980	
			48,159
ANTITUBERCULOSIS			
ISONIAZIDE/THIACETAZONE 100:50 mg TABS.	10,265	28,106	
ISONIAZIDE TABS. 100 mg	5	5	
ETHAMBUTOL TABS. 250 mg	20	386	
ETHAMBUTOL TABS. 500 mg	20	464	
STREPTOMYCIN INJECT. 1 GM VIAL	121	5,385	
STREPTOMYCIN INJECT. 5 GM VIAL	132	1,947	
			36,293
DRUGS ACTING ON EYE,EAR,NOSE AND THROAT			
TERRACOTIL EYE/EAR SUSPENSION	113	44,047	
TETRACYCLINE EYE OINTMENT 1%	390	34,701	
ACETAZOLAMIDE TABS. 250 mg	200	2,549	
			81,297

ANNEX XIII(12)

	QUANTITIES (000's)	K£	SUB-TOTAL
DISINFECTANTS/ANTISEPTICS		151,493	
			151,493
BASIC CHEMICALS FOR SOLUTIONS		85,180	
			85,180
ELECTROLITE SOLUTIONS			
DEXTROSE/SALINE INJECT. 500 ml	4	9,398	
SODIUM BICARBONATE INJECT.	23	9,569	
DEXTROSE 5% 500 ml.	6	11,743	
			30,710
DIAGNOSTIC REAGENTS			
BARIUM SULPHATE KG.	1	2,503	
			2,503
ITEMS FOR STERILE PREPARATIONS			
DEXTROSE ANHYDROUS KG.	19	18,939	
SODIUM CHLORIDE KG.	7	3,394	
SODIUM LACTATE KG.	1	3,413	
POTASSIUM CHLORIDE (215 KG)		133	
PROCAINE HCL (15 KG)		60	
YELLOW SOFT PARAFFIN	28	22,502	
ZINC SULPHATE (64.5 KG)		120	
SULPHACETAMIDE SODIUM (101 KG)		82	
			48,643
GRAND TOTAL		7,013,802	

SOURCE: CENTRAL MEDICAL STORES.

NOTE OF THE WRITER: IN COLUMN "QUANTITIES" THE FIGURES HAVE BEEN ROUNDED TO THOUSANDS. BLANK SPACES IN THIS COLUMN INDICATE QUANTITIES UNDER ONE THOUSAND.

ANNEX XIV

ANNUAL DRUG CONSUMPTION OF MAIN PHARMACEUTICAL CATEGORIES BY THE CENTRAL MEDICAL STORES DURING 1983-1984(12 MONTHS)

		VALUE £K	% TOTAL
1.	ANTIBIOTICS	2,214,219	31.56
2.	ANTIMALARIALS	599,730	8.55
3.	CYTOTOXICS	441,047	6.28
4.	BRONCHIAL RELAXANTS	381,649	5.44
5.	SULPHONAMIDES	365,195	5.20
6.	ANTIDEPRESSANTS	339,341	4.83
7.	ANTISPASMODICS	285,140	4.06
8.	ANALGESICS/ANTIINFLAMMATORIES	246,342	3.51
9.	TRANQUILIZERS/SEDATIVES	185,644	2.64
10.	COUGH/COLD REMEDIES	134,332	1.91
11.	DERMATOLOGICALS	117,028	1.66
12.	HYPOGLYCEMICS	111,187	1.59
13.	ANTIHYPERTENSIVES	110,637	1.57
14.	ANTIFUNGALS	109,427	1.56
15.	HORMONES	107,407	1.53
			81.89
	OTHERS		18.11

ANNEX XV

MEDICINAL PLANT IDENTIFIED IN KENYA

HABITAT	NAME	ALKALOIDS SAPOGENINS OR ENZYMES	PHARMACEUTICAL, THERAPEUTIC, INDUSTRIAL USE
KERICHO	CINCHONA SP.	QUININE QUINIDINE	ANTIMALARIAL ANTIARRHYTMIC FLAVOURING AGENT
TAITA TAVETA THIKA,NAKURU	AGAVE SP.	HECOGENINE	OBTENTION OF STEROIDS INDUSTRIAL FIBRE
	FENUGREEK	DIOSGENINE	OBTENTION OF STEROIDS
CENTRAL AND COAST PROVINCES	PAPAYA	PAPAIN	PROTEOLYTIC ENZYME
COASTAL AREAS	RAWOLFIA SP.	RESERPINE	ANTIHYPERTENSIVE ANTIDEPRESSIVE
	ALOES SP.	ALOIN	CATHARTIC
RIFT VALLEY, WESTERN PROVINCES	DATURA SP.	HYOSCINE (SCOPOLAMINE) HYOSCIMINE (ATROPINE)	ANTICHOLINERGIE ANTIMUSCARINIC
WIDELY DISTRIBUTED	GLORIOSA SUPERBA	COLCHICINE	ANTIINFLAMMATORY
MACHAKOS	PERWINKLE	VINBLASTINE VINCRISTINE	OXYTOXIC

ANNEX XVI

IDENTIFICATION OF KENYAN FLORA FOR POTENTIAL EXTRACTION OF ESSENTIAL OILS

FAMILY AND BOTANICAL NAME	PLANT PART	SOURCE	ESSENTIAL OIL CONTENT %	REMARKS
ANACARDIACEAE				
SCHINUS MOLLE L.	LEAVES,FRUITS	NAIROBI	3.1 & 6.5	CULTIVATED
ANNONACEAE				
XYLOPIA ARENARIAL ENGL.	FRUIT	COAST PROVINCE	0.8	
BURSERACEAE				
BOSVELLIA CARTERI BIRDW.	PLEO-RESIN	NOTHERN PROVINCE	7.5	
COMMIPHORA SPP.	PLEO-GUMRESSIN	" "	7.0	
CANNELLACEAE				
WARBURGIA UGANDENSIS SPRAGUE	BARK	NGONG HILLS	0.6	
CHENOPODIACEAE				
CHENOPODIUM AMBROSIOIDES L.	FRUITING HERB	NAIROBI	0.7	
COMPOSITAE				
AGERATUM CONYZOIDES L.	FLOWERING TOPS	NAIROBI	0.1	
BRACHYLAENA HUTCHNSII HUTCH	WOOD	NAIROBI	2.0	
HELICHRYSUM ODORATISSIUM L.	WOOD	NAIROBI	0.2	
LAGGERA BREVIPES OLIV. AND HIERN	FLOWERING TOPS	NAIROBI	0.2	
MATRICARIA CHAMOMILLA L.	FLOWER HEADS	KABETE	0.2	
SPHAERANTHUS SUAVEOLANS FORSK.	FLOWERING TOPS	ABERDARE RANGE	0.3	
TAGETES MINUTA L.	FLOWERING TOPS	NAIROBI	2.7	
TARCHONANTUS CAMPHORATUS L.	LEAVES	NAIROBI	0.4	

ANNEX XVI

FAMILY AND BOTANICAL NAME	PLANT PART
CUPRESSACEAE	
JUNIPERUS PROCERA HOCHST EXT. ENGL.	WOOD
CYPERACEAE	
CYPERUS POTUNDUS L.	
GRAMINEAE	
CYMBOPOGON CITRATUS STAPF.	LEAVES
CYMBOPOGON NARDUS (L.) RENDLE	LEAVES
HYPERICACEAE	
HYPERICUM LANCEOLATUM LAM.	FLOWERING TOPS
LABIATAE	
ACHROSPERMUM SCHIMPERI(HOCHST) PERKINS	LEAVES
AEOLANTHUS REPENS OLIV.	FLOWERING TOPS
HYPTIS PECTINATA POIT	FLOWERING TOPS
LEONOTIS NEPETIFOLIA R.BR.	SEEDS
MAJORANA HORTENSIS L.	LEAVES
MENTHA LONGIFOLIA L.	LEAVES
NEPETA AZUREA BENTH.	FLOWERING TOPS
OCIMUM BASILICUM L.	FLOWERING TOPS
OCIMUM KLIMANDSCHARICUM GUERKE	FLOWERING TOPS
OCIMUM SUAVE WILLD.	FLOWERING TOPS
PLECTRANTHUS MARRUBIODES BENTH.	LEAVES(FRESH)
ROSMARINUS OFFICINALIS	LEAVES

(2)

SOURCE	ESSENTIAL OIL CONTENT %	REMARKS
NYAHURURU	2.3	
MACHAKOS	0.9	CULTIVATED
RIFT VALLEY	0.5	
ABERDARE RANGE	0.8	
ABERDARE RANGE	0.1	
NAIROBI	0.3	
NAIROBI	0.5	
NAIROBI	2.0	
KABETE	2.8	CULTIVATED
NAIROBI	1.2	
LIMURU	0.9	
NAIROBI	1.5	
NGONG HILLS	4.1	
LIMURU	2.0	
NAIROBI	0.7	
KABETE	1.6	CULTIVATED

FAMILY AND BOTANICAL NAME	PLANT PART
LABIATAE (cont.)	
SATUREJA BIFLORA (D.DON) BENTH.	LEAVES
SALVIA OFFICINALIS	LEAVES
THYMUS VULGARIS L.	FLOWERING TOPS
LAURACEAE	
OCOTEA USAMBARENSIS ENGL.	WOOD
MYRTACEAE	
EUCALYPTUS GLOBULUS LABIL	LEAVES
EUCALYPTUS CITRIODORA HOOK	LEAVES
AGONIS FLEXUOSA LINDL.	LEAVES
CALISTEMON CITRINUS (CURT) SKEELS	LEAVES
PINACEAE	
PINUS PATULA SCHLECHT AND CHAM.	NEEDLE (FRESH)
RUTACEAE	
CITRUS AURANTIIFOLIA SWINGLE	FRUITS
CLAUSENA ANISATA (WILLD.)HOOK EX.BENTH	LEAVES
FAGARA LEPRIEURII(GUILL BERR.)ENGL.	LEAVES
TODDALIA ACULEATA PERS	LEAVES
UMBELLIFERAE	
APIUM LEPTOPHYLLUM	HERB
ANETHUM GRAVEOLENS L.	FRUITS
CORIANDPUM SATIVUM L.	FRUITS

(3)

SOURCE	ESSENTIAL OIL CONTENT %	REMARKS
LIMURU	1.5	
KABETE	2.5	CULTIVATED
KABETE	1.7	CULTIVATED
MACHAKOS	0.5	CULTIVATED
NAIROBI	2.0	CULTIVATED
NAIROBI	5.0	CULTIVATED
NAIROBI	6.6	CULTIVATED
NAIROBI	0.5	CULTIVATED
LIMURU	0.2	CULTIVATED
COAST PROVINCE	0.4	CULTIVATED
NAIROBI	1.5	CULTIVATED
KAKAMEGA FOREST	0.1	
COAST PROVINCE	0.08	
NAIROBI	1.3	CULTIVATED
KABETE	3.3	CULTIVATED
KABETE	0.5	CULTIVATED

ANNEX XVI (4)

FAMILY AND BOTANICAL NAME	PLANT PART	SOURCE	ESSENTIAL OIL CONTENT %	REMARKS
UMBELLIFERAE (cont.)				
FOENICULUM VULGARE HILL.	FRUITS	KABETE	4.0	CULTIVATED
HETEROMORPHA TRIFOLIATA (WEND L. ECKL)	FRUITS	MOMBASA RD.	2.5	CULTIVATED
PEUCEDANUM ELGONENSE WOLFF	FRUITS	ABERDARE RANGE	4.5	CULTIVATED
PIMPINELLA ANISUM L.	FRUITS	KABETE	2.7	CULTIVATED
VERBENACEAE				
LANTENA CAMARA L.	FLOWERING TOPS	NGONG HILLS		
LIPPIA JAVANICA (BURM. F.) SPRENG	FLOWERING TOPS	NGONG HILLS	2.1	
VITEX KENIENSIS TUTRILL	LEAVES	MT. KENYA	0.2	
ZINGIBERACEAE				
ZINGIBER OFFICINALE KOSCOE	RHIZOMES(FRESH)	KISUMU	3.1	CULTIVATED

SOURCE: SCREENING OF KENYA FLORA FOR ESSENTIAL OILS OF POTENTIAL ECONOMIC VALUE BY C.K. MAITAI AND S. TALALAJ, DEPARTMENT OF PHARMACY, UNIVERSITY OF NAIROBI.

ANNEX XVII

TEN-YEAR RECORD OF CINCHONA CROPS

CROPS ('000 KG)	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974
CINCHONA	439	471	725	393	768	663	508	585	547	406
COFFEE	432									
SISAL	2,279									
TEA	17,605									
CARNATIONS (000'STEMS)	124,672									
TURN OVER (Shs'000)	841,321									

SOURCE: BROOKS BOND KENYA LIMITED ANNUAL REPORT FOR THE YEAR ENDED 30 JUNE 1983

NOTE: CROPS DATA FOR THE YEARS 1974-1982 FOR ALL CROPS BUT CINCHONA HAVE BEEN OMITTED BY THE WRITER.

ASSUMING A PRICE OF DM 80 PER KILO OF CINCHONA BARK THE ANNUAL CROP YIELDED KSHS 173,141,600 REPRESENTING A 20.57% CONTRIBUTION TO THE COMPANY'S YEAR TURN OVER.

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