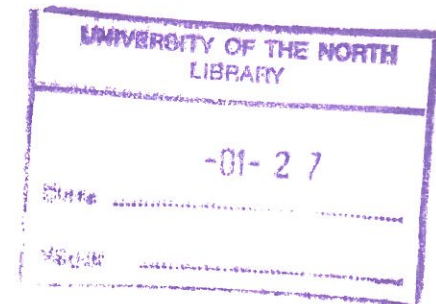


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# PHARMACY AND HEALTH CARE

by

R.S. SUMMERS



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## PHARMACY AND HEALTH CARE

Inaugural lecture delivered on  
accepting the

Chair of Pharmaceutics and  
Pharmaceutical Technology

University of the North

on the

25 April 1975

by

**ROBERT S. SUMMERS**  
Ph.D.



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## Summary

Pharmacy is defined. Its evolution is traced from its recorded origins in Mesopotamia, through the Greek, Roman and Arabic periods, to the scientific approach which culminated in the so-called "drug revolution" of the 1930's and 1940's. Since then, the methods which were used to discover new sulphonamides and antibiotics have been applied to other areas of therapeutics. Concomitant changes in the function and rôle of the pharmacist are described. His present task is to be the expert on medicines.

Statistics illustrating improvements in health and life expectancy over the last century are presented.

The present-day educational system for pharmacy is discussed and its relevance to modern pharmacy practice is shown. The major activities of a retail pharmacist are classified under three main headings: Professional, Managerial, Commercial. They are also considered in terms of distance from the patient. With certain exceptions, emphasis on commercial activities is to the detriment of the professional services.

The cycle of ill-health in developing countries is examined. It is concluded that much attention should be directed towards the basic requirements of hygiene and health education in the Homelands and rural areas of South Africa. Pharmaceutical technicians should assist with the provision of pharmaceutical services in these areas.

Future pharmacy practice will be based on hospital-centred services in the Homelands and the extant free-enterprise system in the Provinces. In both cases, community pharmaceutical service will be emphasised. In the Homelands this will be provided at government expense. In the Provinces increasing professionalism in general practice pharmacies will result in the levying of realistic professional fees.

There remains a considerable leeway to be made up in terms of levels of health. The pharmacist will play his part in improving the health care, and hence the health, welfare and development, of the peoples of South Africa.



## Opsomming

Die begrip farmasie word omskrywe. Die evolusie daarvan word nagegaan vanaf die vroegste optekening in Mesopotamië, deur die Griekse, Romeinse en Arabiese tydperke, tot en met die wetenskaplike benadering wat kulmineer in die sogenaamde verdowingsmiddelrevolusie in die dertiger en veertiger jare. Sedertdien is die metodes wat gebruik is om nuwe sulfonamiedes en antibiotika te ontdek, ook aangewend op ander terreine van die geneeskunde. Bykomende veranderinge in die funksie en rol van die apteker word beskrywe. Sy huidige taak is om 'n kenner van medisyne te wees.

Statistiek word verstrek ten opsigte van die verbetering van gesondheid en lewensverwagting gedurende die afgelope eeu.

Die huidige opvoedkundige sisteem vir farmasie word bespreek en die relevansie daarvan vir moderne aptekerspraktyk aangedui. Die hoofaktiwiteite van die kleinhandelsapteker word onder drie hoofde geklassifiseer: professioneel, op bestuursvlak en kommersieel. Hulle belangrikheid vir die pasiënt word ook nagegaan. Met sekere uitsonderinge is die klem wat gelê word op kommersiële aktiwiteite tot die nadeel van professionele dienste.

Die siklus van swak gesondheid in ontwikkelende lande word ondersoek. Daar word tot die slotsom geraak dat baie aandag gewys moet word aan die basiese vereistes van higiëne en gesondheidsopvoeding in die tuislande en landelike gebiede van Suid-Afrika. Farmaseutiese tegnici moet help met die verskaffing van farmaseutiese dienste in hierdie gebiede.

Toekomstige aptekerswese sal gebaseer word op hospitaalgesentreerde dienste in die tuislande en die bestaande vrye-ondernemingsstelsel in die provinsies. In beide gevalle sal farmaseutiese dienste aan die gemeenskap beklemtoon word. In die tuislande sal die regering vir hierdie dienste vergoed. In die provinsies sal toenemende professionalisme in algemene praktyksapteke die heffing van realistiese gelde tot gevolg hê.

Daar bly steeds 'n agterstand om in te haal ten opsigte van diverse gesondheidstoestande. Die apteker sal sy rol speel ten opsigte van gesondheidsorg; die gesondheid, welvaart en ontwikkeling van die gemeenskappe van Suid-Afrika.

Mr. Vice-Chancellor, members of Council, colleagues, ladies and gentlemen:

## 1. Introduction

I commence by posing the question "What is pharmacy?". This I do because in these days of rapid development and change there is misunderstanding of the word and a lack of knowledge of the function of the pharmacist. I intend in some measure to set the record straight.

Pharmacy is, in fact, the science and art concerned with the collection, preparation and standardisation of medicines. Its scope includes the cultivation of plants that are used as medicines, the synthesis of chemical compounds of medicinal value, and the analysis and standardisation of medicinal agents (1). Pharmacy is also responsible for the proper and safe distribution and use of medicines (2).

In a very real sense then, pharmacy is the profession which is concerned with medicines. Medicines must however never be considered on their own but always in relation to their effects on individuals, particularly in this age of potent and effective remedies, i.e. medicaments must be regarded as part of the overall health care services and not as an isolated compartment.

By tracing the path of pharmacy through recorded history, by analysing the current function of the pharmacist, and by examining the basic requirements I shall show the importance of pharmacy in health care in South Africa.

## 2. The development of pharmacy

The beginnings of pharmacy are extremely ancient. When early man expressed a juice from a succulent leaf to apply to a wound he was practising pharmacy. Actions like this took place a long time before recorded history, which began about 6 000 years ago. The first records of pharmacy and medicine come to us from Mesopotamia, the land of the Two Rivers and the Five Seas, in which kingdoms rose and waned over millenia. Sumeria, Babylon, Assyria; each in turn waxed mighty and then gave way to the next (3).

The Assyrian king Ashurbanipal gave us the first "pharmacopoeia" (a list of drugs with directions for use). He caused to be created in his palace at Nineveh a library of tens of thousands of clay tablets to form a comprehensive treatise on science, history, astrology and medicine. The medicinal extracts and preparations which were included in this library numbered approximately six hundred. They provide a starting point for systematic information in pharmacy and medicine. I say pharmacy and medicine because at that time the two occupations were one; the physician diagnosed his patient's complaint and then proceeded to compound the necessary medicines. As has often been the case, the practice of medicine also had a strong religious element.

The picture had changed by the next great civilisation of the An-



cient World, that of Egypt. There occurred the first separation of the functions of physician and pharmacist. This development does not mean that treatment was any more scientific (or dare we say it, effective) than previously. Witness the jingoistic or magical approach contained in a papyrus which dates from the time of Rameses II. Here the patient, who has received a head wound, is identified with Horus, son of Isis, the goddess of magic (4). "He is Horus, o gods, the Lord of Life, who rightfully approaches the house of his father! That no god or goddess, neither male nor female spirit, neither dead man nor dead woman, nor any evil being, male or female, shall be able to take possession of the limbs of the son of any woman, whomsoever he may be, to perpetrate anything evil or bad". And then in red ink, "to be uttered over the talons of a falcon, over the shell of a tortoise. Boil it and put it in oil. Anoint a wounded man with it on the site of his wounds. No evil or bad will befall him. A reliable remedy, proven a million times over".

The same situation of separation of capacities existed in the Greek and Roman Empires. In the Greek legend for example, Asklepios, the god of healing, delegated to Hygeia, the goddess of health, the duty of compounding his medicines. A systematic approach to medicinal substances is evident in the work of Hippocrates, the "Father of Medicine". This method was continued by Dioscorides and Galen who were expert pharmacists and authors of well-known texts on medicinal substances in Roman times.

Greco-Roman culture was in turn inherited and embellished by the Arabs, a word used to describe men of many races. During the six centuries of Arab dominance there were many noteworthy physicians and pharmacists. Of these, possibly the most prominent was Avicenna who wrote the Canon of Medicine. The fifth book of this work was devoted to medicines themselves, their properties and preparations. This exposition, written around 1 000 A.D., was accepted in the West until well into the 17th Century.

During the Middle Ages in Europe the separation of the two groups of physicians and pharmacists became less distinguishable as the practice of medicine was largely concentrated in the monasteries which established herb gardens and hospitals. The Moorish influence which spread from Spain again led in due course to the discrete practice of the different functions. The trend was later reinforced by a law enacted by the city council of Bruges, Belgium in 1683, forbidding physicians to prepare medicines for their own patients.

In Britain there was considerable friction between the physicians and the apothecaries. The latter eventually became general medical practitioners, while "chemists and druggists" subsequently assumed responsibility for the preparation and compounding of medicines.

In South Africa the European system, as opposed to the British, was applied to some extent. The Second Medical Proclamation of 1807, for

instance, prohibited physicians and surgeons from dispensing medicines. Apothecaries or pharmacists on the other hand were debarred from offering medical aid, except in emergencies (3). The proclamation only remained in force until 1830 as conditions in the rural areas made a farce of the regulations.

And so pharmacy and medicine continued side by side with slow progress, except in the fields of surgery, microbiology and immunology until well into the 20th Century. The effects of the subsequent events of the 1930's and the 1940's on the practice of pharmacy and medicine were so profound that the name "The Drug Revolution" was coined. This was the time when the sulphonamides and the antibiotics were introduced into therapeutics. For the first time in the history of mankind the physician was provided with weapons which killed or eliminated invading microorganisms without significant harm to the patient.

During the intervening years and up to the present the methods used in the search for antibiotics were applied to other fields. Numerous safe and effective medicines have been the result. In fact, in the last forty years the whole basis of the practice of medicine and pharmacy has changed out of all recognition. Many conditions which were untreatable a generation ago can now be cured. And the pharmacist's role which prior to the "drug revolution" was mainly a manipulative one has changed to that of an expert on medicines.

I emphasise that throughout pharmacy's history up to the "drug revolution" the pharmacist's main task was to dispense and compound medicines. Since then by far the larger proportion of pharmaceutical manufacturing has been carried out by the industry, under strictly controlled conditions. This situation allows the pharmacist in general practice to concentrate his attention on activities other than the actual preparation of medicaments.

Before I move on to examine the present state of pharmacy I should like to describe the progress which has been made in health care over the past century or so.

In 1900 the death rate in the United States of America was 17,6 per 1000 population per annum. By 1950 it was 9,6 and it has stabilized in this vicinity (1). Infant mortality in England and Wales 75 years ago was around 150 per 1000 live births. By 1960 it had dropped to below 20 (5), which is also the case in the U.S.A. today (1). A century ago over 40% of all deaths in England occurred in children under 5. Today the figure is about 3% (6).

It would be naive to ascribe all these improvements entirely to more effective medicines, as improved standards of living, emphasis on hygiene and better diet have all contributed greatly. It would be equally foolish to disregard the influence of curative and preventive medicine.

To some extent too, patterns of disease have altered as bacterial in-



fections became curable. During the period 1848-1872 in England over 36% of all male deaths were caused by infectious diseases. By 1970 the figure was 0,6% (7). As a corollary, as people were cured of infectious diseases and lived longer, other diseases became more prominent. The figures for cancer and circulatory disorders during the above periods were 6% and 56,6% respectively (7).

### 3. Present - day Pharmacy

As I mentioned earlier, the public's present view of pharmacy is unclear. On the one hand the pharmacist is seen as the expert on medicines and drug use. On the other is the trader, who by choice and economic circumstances concentrates much of his time and effort on commercial activities in the hurly-burly of the market-place. Off-times his economic interests appear to overshadow and even to obscure his professional rôle.

The basic reason for this situation lies within the events of and following the drug revolution. Before it occurred the compounding of prescriptions which sometimes contained as many as 20 different ingredients was time-consuming and tedious. Afterwards, with more time available, the general practice pharmacist devoted the greater part of this time to trading rather than to pharmaceutical pursuits. The choice was not entirely his as supermarkets and general merchants usurped the sale of many traditional pharmacy lines and the pharmacist saw his economic security evaporating. He chose to meet the competition at its own level, rather than to capitalise on his knowledge of medicines.

The pharmacist's options in this predicament were extremely restricted by the fact that he was not academically prepared for a professional role.

As recently as 1956 the period of practical training for pharmacy was still longer than that of academic study. It was necessary to complete a 3-year apprenticeship before one studied full-time for 2 years to obtain the Pharmacy Board's Diploma in Pharmacy. This diploma was the only qualification open to a pharmacist in South Africa in those days.

Slightly before this time, in 1955, the regulations were amended to provide for university education in pharmacy. The first degree in pharmacy in this country required a minimum of 3 years of full-time academic study. Still to its detriment, this period was not required to be continuous and was often interrupted by the compulsory 2-year apprenticeship. It can nevertheless be stated that it was from the early 1960's that pharmacy began a process of re-examination as the critical and inquisitive nature of the university graduate began to assert itself. Again in 1970 the full-time academic training was extended to 4 continuous years. The traineeship now lasts for one year and is performed after the student has qualified for the B.Pharm. degree or equivalent Diploma in Pharmacy, but before he can register. At this stage I wish

to describe briefly the 3 major subjects that the pharmacy student studies. They are:

1. **Pharmaceutics** – The formulation and preparation of the various dosage forms, based upon the principles of physical pharmacy and the factors that affect biological activity.
  2. **Pharmaceutical Chemistry** — the principles of chemistry applied to the structure, properties, reactions, synthesis and analysis of medicinally important substances.
  3. **Pharmacology** — the modes of action and the use of medicines.
- The other subjects are Forensic Pharmacy, Pharmacognosy, Pharmacy Administration, Physiology, and Public Health.

Hence, by the 1970's the pharmacist was in a position where he could make more rational decisions concerning his professional and commercial functions. A contributory factor was the inclusion of management studies in the academic curriculum (8).

To shed more light on the subject I have divided the major activities of a general practice or retail pharmacist into 3 main sections: — Professional, Managerial, Commercial. They can also be classified in terms of their degree of professionalism or commercialism (See Chart 1).

The professional duties of the pharmacist are those associated with pharmaceutical service, which I have defined in the following terms (9).

"Pharmaceutical service comprises the preparation, distribution, storage and administration of medicines and the provision of information and advice on all aspects of their use. It is directed towards the health and welfare of the patient by the pharmacist."

The pharmacist's commercial affairs, by contrast, are associated with selling, not serving. They are aimed at maximising the profit that can be obtained from merchandising as wide a range of goods as possible.

Although I have placed management between the professional and commercial spheres, it may be directed at any point or all points along the scale. Whatever the case, its objective is to produce the greatest possible efficiency of the operation, either in serving or in selling or in both.

An alternative classification of the pharmacist's activities lies in terms of distance from the patient (10). In this case the professional functions of dispensing medicines, advising the patient and counselling physicians have most relevance for the patient. The other activities which are included in pharmaceutical service are also close to the patient. The commercial activities are based on the view of the individual as a consumer and hence are furthest from him as a patient.

At the present time then the pharmacist manifests a dichotomy of roles. This situation pertains to the industrial and wholesale phar-



macist as well as to the retail practitioner. Combined they form just one line in the distribution system for pharmaceutical products (9). As far as the profession is concerned the hospital and institutional pharmacies are another important element (see Chart 2).

These four establishments by no means make up the full pharmaceutical distribution system but in terms of pharmaceutical service for the public they are the main contributors. What is disturbing at a time when the public and the authorities profess concern over drug use and misuse is the fact that not less than 65% by value of all medicines distributed in the country are supplied by establishments in which no pharmacist is present (9).

#### 4. Pharmacy and the health services

I have confirmed previously that the greatest priority for the health services in South Africa is to raise the levels of health of the Blacks, Coloureds and Indians (9). This task is immense as these groups comprise four-fifths of the population (11) (12). The plausible and simplistic solution would be for greater proportions of public money to be devoted to health services. Historically, health services have mainly emphasised curative measures. These services are satisfactory in the well-developed and bustling towns and cities of South Africa where much of the population is isolated and insulated from the cycle of ill-health (see Chart 3). The cycle is prevalent though in the densely-populated suburban townships and in the developing homelands and rural areas. It is here that our attention should be focused. There is, in fact, a great need for a large amount of the total effort on improving health to be directed towards fundamental requirements.

Similar sentiments have been expressed by the Office of Health Economics (7).

"The role of curative medicine in improving the health of a population, in the conditions of the developing countries today, is always going to be secondary to that of environmental improvement and education for behavioural change, designed to break the cycles of disease transmission."

These elements, in their turn, hinge on economics, urbanisation, water supplies and sanitation, and nutrition. Hence, a great deal of attention must be directed at grass-roots level and devoted to local facilities.

One example clearly illustrates the point. In Zambia, the capital costs of a teaching hospital in Lusaka were in the vicinity of R10 million. It can be safely stated that the health of the vast majority of the population will not be affected or improved by this hospital, basically for geographical reasons. The amount of money spent would have financed 250 rural health centres at R40 000, each serving 20 000 people and covering the country's population (7). This alternative ap-

proach would make a very real difference to the health of the people as each health centre would disseminate educational materials as well as provide for health needs.

I have not described this situation as a criticism but purely as an illustration. Sophisticated health services are necessary but they should not be over-emphasised in areas which require more basic attention to preventive care and health education. The health education sphere in particular is of great importance. As an example, even in the immediate vicinity of the university there is often a reticence among the local population to utilise the health services because of ignorance and superstition. An intensive health education campaign could do much to improve the position.

Under the circumstances which I have described it is essential that every health practitioner, whether doctor, dentist, nurse or pharmacist, is used to the maximum professional advantage. In no field is this more true than for pharmacy. In our towns and cities it is the pharmacist who is the most accessible health professional and in due course this accessibility should be carried to the country regions.

The situation will not be improved without prodigious and concentrated effort. Certainly for the foreseeable future it is unlikely that the number of pharmacists in the homelands will be increased significantly, unless the number of Black entrants to the profession is raised considerably. In any case the number of pharmacists required in these areas overall is so great that it is improbable that it will ever be attained. What is necessary is that an intermediate practitioner should be provided in the rural communities, situated at the clinics which dot the countryside.

These pharmaceutical technicians would be an innovation in South Africa, although they have been widely and successfully used in many countries, for example the U.S.A., Denmark, Sweden, Switzerland, France and Germany. In their turn they would be answerable to a Clinic Pharmacist who would have responsibility for the pharmaceutical service in a number of clinics. The next links in the chain would be Area and Regional Pharmacists. Some idea of the picture I have in mind may be gained from the chart (see Chart 4).

In this way an adequate pharmaceutical service would be built up, as an integral part of the health services. Whilst the policies of the various Departments of Health cannot be predicted in this address, concentration of effort along the lines that I have suggested would do much to raise the levels of health of the people, to increase their productivity and hence to enhance the development of the various regions.

Clearly the pharmacists concerned in a programme like this would require a very keen sense of the priorities involved. They would also need a wide-ranging, in-depth knowledge of medicines and their effects.



It should not be construed that implementation of the suggested measures will eliminate illness. Overall demand for health services never diminishes. It changes its emphasis. Nevertheless the improvements will be there and they should result in a far more satisfactory and happier life for the members of the community.

## 5. The future

The picture of pharmacy which I have drawn in this address essentially shows two main channels both leading to community pharmaceutical service.

Firstly, in the rural and homeland areas is a spreading network of hospital pharmacies and the expanding provision for pharmaceutical service which accompanies it. In these and similar establishments the emphasis will be, as it always has been, on professional pharmacy.

Secondly, in the major towns and cities is extant an efficient pharmaceutical distribution system, the final element of which is the retail or community pharmacy. These pharmacies still place a considerable emphasis on commercial aspects, which can be to the detriment of pharmaceutical services (13) (14). It cannot be denied, however, that in many instances the commercial sector subsidises the pharmaceutical services, by acting as an economic incentive for the establishment of a retail pharmacy in an area in which it would otherwise be economically non-viable. This is a most important aspect for any examination of the future of pharmacy.

The current picture of retail pharmacy is going to change, basically because of the new legislation which has only recently been promulgated (15) (16) (17). By the provisions of the Pharmacy Act (15) there is to be greater control of pharmacy in the future than there was in the past. In particular, the non-professional sphere is likely to be severely curtailed. Both the Pharmaceutical Society and the Retail Chemists' and Druggists' Association have responded to these moves by calling on their members to co-operate and to emphasise unstintingly the professionalism of pharmacy (18) (19). Generally speaking, the trend appears to be more than welcome to the vast majority of pharmacists.

One question which has not yet been satisfactorily answered is "Who is going to pay for the professional services?". In the institutional pharmacies there would appear to be no prospect of new or different methods of payment as the public authorities fund practically all of them (9). In the retail sector, however, change will occur. It will take place because the economic viability of the pharmacies concerned will depend more and more on professional pharmacy as commercial activities are restricted and certain lines of merchandise entirely removed.

The trend has serious implications regarding the prices of

medicines. On the other hand, the picture could be improved by transferring medicines from the shelves of supermarkets, general dealers and so-called cafés to the pharmacies where they belong. Such a move would compensate for the loss of other merchandise lines by pharmacy (13)(14), hence keeping prices down. Nevertheless, it is apparent that, in time to come, professional pharmaceutical services provided by retail pharmacies will have a realistic scale of fees associated with them.

Confining medicines to pharmacies would also do much to rationalise and control their distribution in the future when there is likely to be increasing and increasingly strict Government control of medicines' manufacture. In this regard it is important that future pharmacists in the industry are able to develop and produce the safest and most efficacious medicines possible.

In the more distant future, developments in data processing, in communications and in medical and pharmaceutical technology will profoundly affect the practice of pharmacy. It is not beyond the bounds of possibility, for example, that a patient's condition will be diagnosed by a computer, which then selects and supplies the required medication from a storage facility.

But before the pharmacist is replaced by a machine there is considerable leeway to be made up in terms of levels of health. The data which I submitted earlier in this address show what is possible. They should provide a very strong inducement to pharmacists and other health professionals to maximise the many opportunities which exist for improving people's health.

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Under these circumstances and bearing pharmacy's history in mind, particularly the events of the last 40 years, I must confess to a good deal of excitement in my approach to pharmacy and pharmaceutical education. It is my intention to instil much of this excitement and interest in the pharmacists of the future so that they may make a real contribution to the health care of the peoples of South Africa.

Mr. Vice-Chancellor, I hereby accept the Chair of Pharmaceutics and Pharmaceutical Technology at the University of the North.





CHART 3

THE CYCLE OF ILL-HEALTH IN THE DEVELOPING COUNTRIES

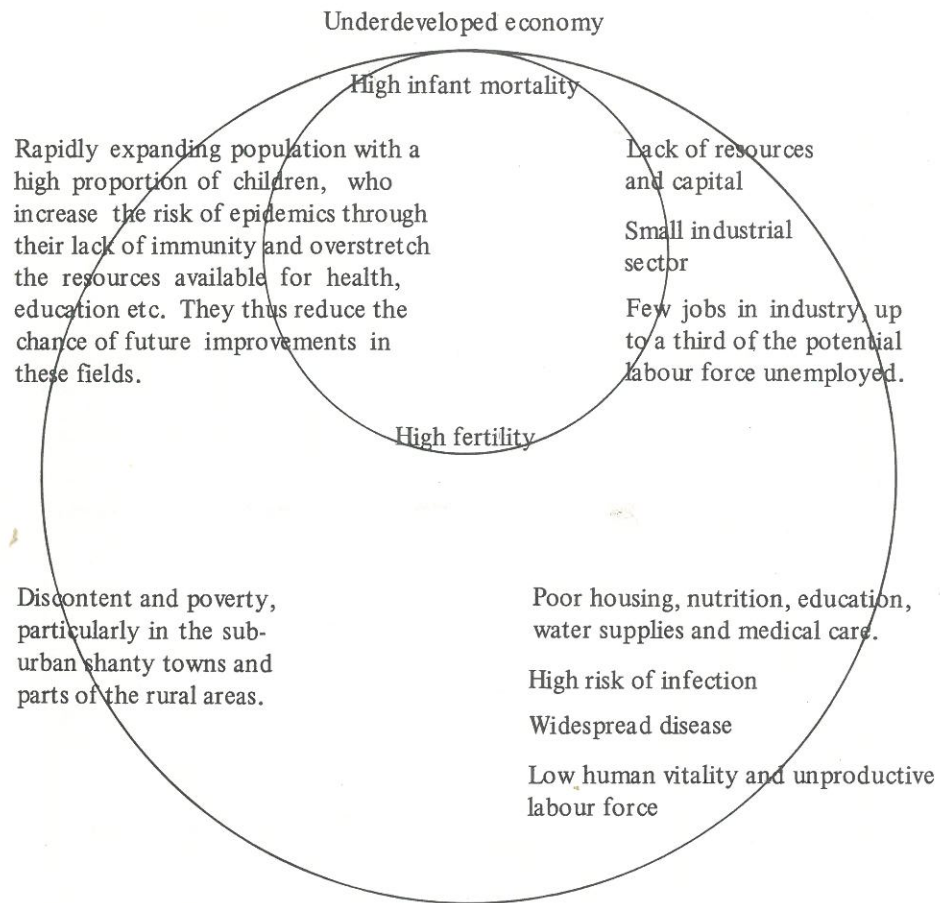
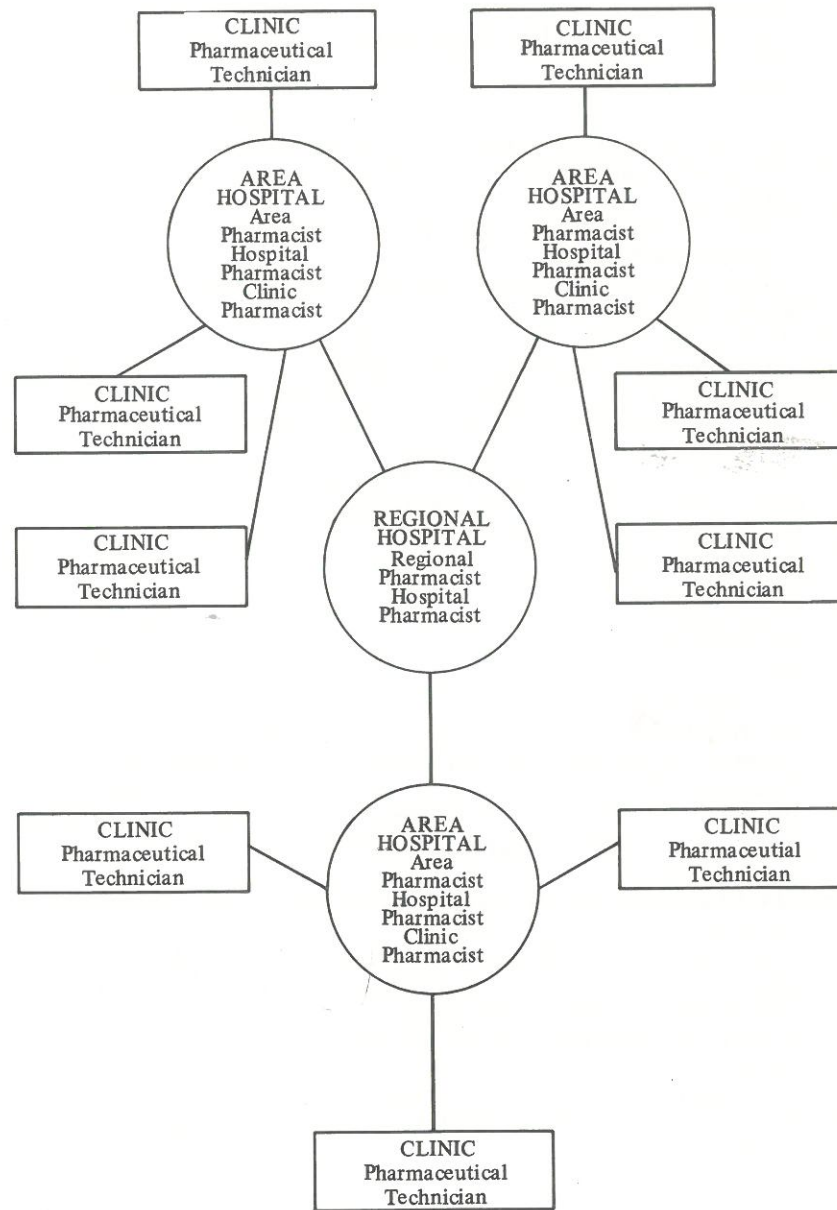


CHART 4





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| 10 | A.P. du Toit<br>Die betekenis van magië as kultuurverskynsels.<br>1968 (40c)   |
| 11 | M. Bopape<br>The definition of social group work: A comment.<br>1970 (20c)   |
| 12 | A.N.J. Herholdt<br>Noord-Afrika in die moderne internasionale politiek.<br>1971 (40c)  |
| 13 | P.S. Hattingh<br>Water supply in Bantu homeland.<br>1971 (20c)   |
| 14 | Z. Postma-de Beer<br>Some philosophical reflections on the concept of justice.<br>1971 (30c)   |
| 15 | M.L. Hugo and P.S. Hattingh<br>Outdoor recreation in Pietersburg.<br>1972 (30c)  |
| 16 | F.J. Engelbrecht<br>Tyd en neurose by die Bantoe.<br>1972 (30c)  |

**Reeks/Series B**

Lesings deur gassprekers  
Lectures by guest-speakers  
No.

- |    |                                      |   |
|----|--------------------------------------|---|
| 1  | Simposiumverslag<br>Symposium report | Voeding<br>Nutrition<br>1963 (30c)  |
| 2  | Symposium report                     | The economic and administrative development in Bantu territories.<br>1966 (50c) |
| 3  | P.A.J. Ryke                          | Die oorsprong en evolusie van lewe.<br>1967 (20c)                               |
| 4  | P.J. Conradie                        | Die dood van Agamemnon: Verskillende dramatiese interpretasies.<br>1968 (20c)   |
| 5  | Y. Huskisson                         | Music of the Bantu<br>1969 (25c)  |
| 6  | Simposiumverslag                     | Universiteitsdidaktiek<br>1969 (50c)  |
| 7  | C.F. Nieuwoudt                       | Die welsynstaatsidee<br>1971 (20c)  |
| 8  | F.J. Potgieter                       | Die geheelbeeld in waterontwikkeling in Suid-Afrika<br>1971 (20c)               |
| 9  | J.P. Louw                            | Resente ontwikkeling in die Griekse taalkunde en teksverklaring<br>1974 (20c)   |
| 10 | R. Meyer                             | The Status of Concepts<br>1974 (20c)  |
| 11 | E. Pereira                           | Romanticism and the Poetry of Keats and Wordsworth.                             |

**Reeks/Series C**

Intreeredes  
Inaugural addresses  
No.

- |   |              |  |
|---|--------------|--|
| 1 | T. Endeman   | Die gebied en taak van die Bantoe-taalkunde<br>1960 (30c) (herdruk 1972)                                       |
| 2 | D.J. Fourie  | The value of Physical Science in a modern community.<br>1960 (30c)   |
| 3 | J. Swanepoel | Enkele gedagtes in verband met die ekonomiese ontwikkeling van die Bantoegebiede in Suid-Afrika.<br>1960 (30c) |
| 4 | T.A. van Dyk | Dementia praecox or schizophrenia, and the diagnosis or differential diagnosis of the disease.<br>1961 (30c)   |
| 5 | H.L. Crause  | Enkele tendense in die ontwikkeling van die sosiologiese teorie.<br>1961 (30c)                                 |

**Reeks/Series C**

Intreeredes  
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|----|--------------------------|---|
| 6  | A.J.B. Wiid              | Enkele gedagtes oor die aard en die belangrikheid van die Wiskunde vir die Wetenskap.<br>1961 (30c) |
| 7  | M.J. Louw                | Die geografiese standpunt.<br>1961 (30c)  |
| 8  | W.M. Kgware              | In search of an educational system.<br>1961 (30c)   |
| 9  | M.W. Smuts               | Man, myth and muse. An examination of some of the functions of the poetic faculty.<br>1961 (30c)    |
| 10 | S.J. Preller             | Die moderne gemeenskap en die vereistes wat dit aan die onderwys stel.<br>1964 (30c)                |
| 11 | C. van Heerden           | 'n Semantiek op linguistiese grondslag.<br>1964 (30c)   |
| 12 | J.G. Garbers             | Op soek na affektiewe ordeningskriteria in die pedagogiese ondersoek.<br>1964 (30c)                 |
| 13 | P.A. de Villiers         | Reaksiewyses van heterosikliese N-oksiedes met asynsuuranhidried en tosiel-chloried.<br>1966 (51c)  |
| 14 | F.J. Engelbrecht         | Wetenskapsbeoefening, lewenswêreld en die logika van begrippe.<br>1967 (20c)                        |
| 15 | J.C. Steenekamp          | Enkele bemoeienisse van die Empiriese Opvoedkunde met die kind.<br>1969 (25c)                       |
| 16 | J.L. Boshoff             | The university in Africa.<br>1971 (20c)   |
| 17 | A.G. le Roux             | Psigo-sosiale spanningsvelde binne 'n veelrassige samelewing.<br>1972 (20c)                         |
| 18 | C.L. Eloff               | Enkele opmerkings oor oplossings van differensiaal-vergelykings.<br>1972 (20c)                      |
| 19 | P.C. Du V. Oliver        | Kom ons gesels Statistiek.<br>1972 (30c)  |
| 20 | A.L. du Preez            | Die apteker as bestuurder: 'n Opleidingstaak.<br>1972 (20c)   |
| 21 | R. ver Loren van Themaat | Die optekening van die inheemse regstelsels van die Bantoe in Suid-Afrika.<br>1972 (30c)            |
| 22 | E.P. Lekhela             | Tendencies in the history of Bantu education.<br>1972 (30c)   |
| 23 | D. Crafford              | Die Beoefening van Kerkgeskiedenis as Wetenskap in die konteks van Afrika. (30c)                    |
| 24 | P.J. Heiberg             | Mens, Kultuur en Opvoedkunde. (30c)   |
| 25 | D.R.J. van Vuuren        | Die oorsprong en verwantskappe van die Suid-Afrikaanse flora. (30c)                                 |



26 M.E.R. Mathivha  
27 H. v.d. Merwe  
28 H.J. Oosthuizen  
29 A.P. du Toit

30 P.G. Warnich  
31 W. Bertelsmann

Venda as a bridge language  
Dogmatiek en Teologiese Etiek  
Wat is Toegepaste Wiskunde? (20c)  
Dateringsmoontlikhede van spektrografiese analise  
van glaskrale. (20c)  
Beskouinge oor Maatskaplike Werk.  
The Essence of mens rea.