RHEUMATOID ARTHRITIS IN LESOTHO

A clinical and epidemiological survey

RHEUMATOID ARTHRITIS IN LESOTHO
A CLINICAL AND EPIDEMIOLOGICAL SURVEY

(RHEUMATOIDE ARTHRITIS IN LESOTHO
EEN KLINISCH EN EPIDEMIOLOGISCH ONDERZOEK).

PROEFSCHRIFT

TER VERKRIJGING VAN DE GRAAD VAN DOCTOR IN DE
GENEESKUNDE
AAN DE ERASMUS UNIVERSITEIT ROTTERDAM
OP GEZAG VAN DE RECTOR MAGNIFICUS
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Prof.Dr.H.A.Valkenburg
Prof.Dr.J.J.de Blécourt

COMMISSIELEDEN:
Prof.Dr.M.Frenkel
Prof.Dr.A.S.Muller

to my parents

The national symbol of Lesotho: The Kings Hat.

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CONTENTS


KHOTSO PULA NALA

CHAPTER 1

INTRODUCTION

Khotso, pula, nala = Peace, rain, prosperity
(the traditional blessing in Lesotho)

In much of the period (1979 – 1982) during which I worked in a mission hospital in Lesotho, Southern Africa, the second element in this traditional blessing just remained a vain wish, since the country experienced the worst drought recorded in over 40 years (1.1). For somebody coming from a wet country like Holland it certainly was an unusual experience, but as I was a member of the small exclusive category of rich, development – aid workers from Europe, I had the opportunity to get away from it all from time to time. It was during one of these trips that I renewed my acquaintance with Dr. S. Brighton while I was enjoying the ample water supplies of Pretoria, the capital of South Africa. He had become the head of the rheumatological department of the university of this town and soon asked me if I ever saw patients suffering from rheumatoid arthritis in Lesotho. When I said I did, he suggested that I should document this; it seemed such a pity that so few doctors in rural developing – country hospitals managed to do this, due to pressure of work and isolation. The general impression seemed to be that rheumatoid arthritis was a rare and usually mild disease in rural African communities.
It seemed a good idea and he gave me some advice on the procedures that might be adopted. On my return to Lesotho I told one of my colleagues, Dr. S. Moore, about it; he was very keen to participate in the undertaking. After consulting the rest of our colleagues, we decided to start documentation of any patient with rheumatoid arthritis from 1 May 1980. At first, we intended to operate for one year, but extended the period later by 6 months. The results of our hospital survey are documented and discussed in chapter 3. The unique character of Lesotho as a country in black Africa is outlined in chapter 2.

The country's unique character and the somewhat unexpected results of the hospital survey prompted the making of a full – scale population survey that was carried out during February 1982, the last month of my stay in Lesotho. The conditions under which the survey was made are described

in the "Diary of the survey", which is part of chapter 4, which also contains the results of the population survey and comments thereon. An attempt is made to make recommendations as to the best ways of conducting any future surveys of this kind in Africa.
Lastly, the impression gained from the data collected during the hospital survey will be compared with the outcome of the population survey to obtain an intergrated picture of the prevalence of rheumatoid arthritis in Lesotho.
It will be clear from the description of the population survey that the drought had already broken during that period, which sometimes posed difficult problems. The people of Lesotho were not very concerned about the success of a survey. After all, what is a survey compared to "pula"?

LITERATURE

1.1 Scott Hospital Annual Report 1980

CHAPTER 2 – Part A

LESOTHO

2.1 Geography

Lesotho is a small independent country in Southern Africa (fig.2.1). Its location is remarkable in that it is completely surrounded by its big neighbour, the Republic of South Africa. On the north, east and south it is bounded by the Republic's provinces of Natal, Orange Free State and Cape Province, and on the east by the Xhosa homeland Transkei, declared independent by South Africa, but not recognised as such by the rest of the world.

Lesotho is situated between latitudes 28° and 31° South and longitudes 27° and 30° East and so lies entirely outside the tropical regions. This factor together with its great altitude results in the absence of the tropical diseases so frequently encountered in the rest of Africa, even in certain parts of the Republic of South Africa. In the South African provinces of Natal and Transvaal for instance, urinary bilharzia is common and even malaria occurs occasionally. Neither of these diseases occurs in Lesotho unless imported by individuals.

The area of Lesotho is approximately 30,300 square kilometers; it is slightly larger than Belgium. It is a mountainous territory and the only country in the world with all its land situated more than 1,000 m. above sealevel (2.1).

Ecologically it can be devided into 4 distinct areas (fig.2.2). The mountains (>2,000 m. above sealevel) and foothills (1,750 – 2,000 m.) of the Drakensberg range cover approximately three quarters of the country. The lowlands (1,500 – 1,750 m.) in the west of the country cover the remaining one quarter except for the small area constituting the valley through which the Orange River, that has its origin in Lesotho, flows and which is at places lower than 1,500 m. It is predominantly a grassland with very few trees.

The climate is temperate with well – marked seasons. The sun shines on more than 300 days a year. Mean annual rainfall amounts to between 700 and 800 mm. in most parts of the lowlands with higher figures recorded for most mountainous areas; 85% of the precipitation occurs in summer (October to April). In winter it takes the form of snow in the mountains and

Figure 2.1 Lesotho.

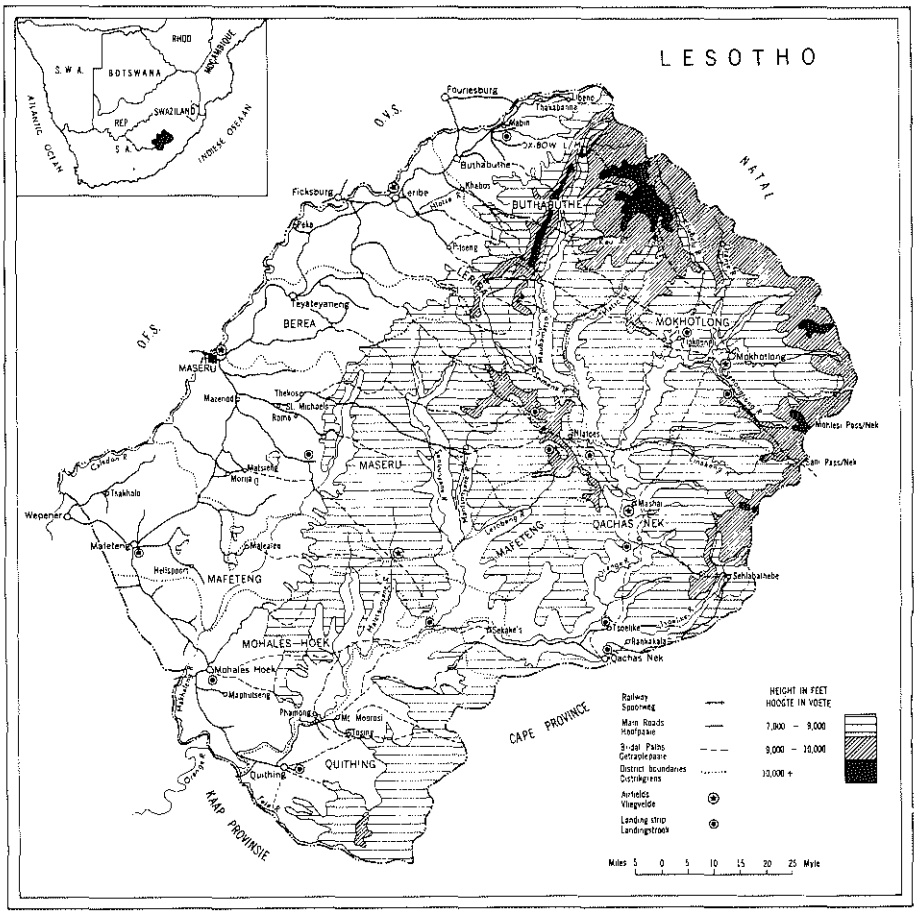
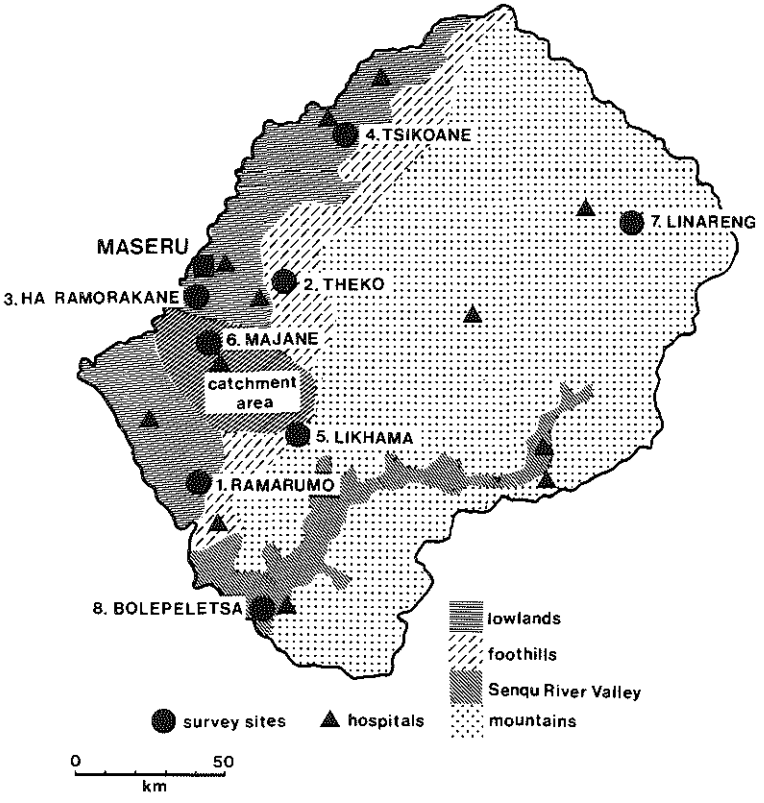


Figure 2.2 Geographical regions, functioning hospitals and Scott Hospital catchment area (=SHA), and survey sites of the population survey.



sometimes also in the lowlands, which usually experience at least one fall per year. In the mountains snowfall can occur at any month of the year. The temperatures range from +35° to −10° C. in the lowlands and from +25° to −20° C. in the mountains. The mean temperature in the lowlands in January is 24° C. and in June/July 8° C. Air frost is being experienced for up to 80 days per year in the lowlands and for most of the year in the mountains at night, though sunny winter days are usually pleasantly warm.

2.2 History

The first signs of human habitation in Lesotho date back to prehistoric times, viz. 50,000 years ago, but not much is known about this period. The Bushmen inhabited most of southern Africa thousands of years before the arrival of white men at the Cape in 1652 and left evidence of their presence in the form of rock paintings, also in Lesotho.
By the year 1800 these yellow−skinned, dwarfish hunters were almost extinct, crushed between the whites in the south and the migrating Bantu tribes from the north and ravaged by epidemics of measles, smallpox and other imported scourges (2.2).

One of the five main branches of these migrating Bantu tribes was the Sotho group, which spread over Botswana, the Transvaal, the Free State and Lesotho (fig.2.3). By the end of the eighteenth century this process of expansion had virtually petered out.
After the rise of Shaka, king of the Zulus, some rebelling Zulu leaders left Natal, burning down everything and murdering everybody they encountered. They annihilated a total of twenty−eight clans of Sotho−speaking people. It was at this time, that Moshoeshoe the First collected the survivors and founded the Basotho nation, retreating to the mountainous areas of Lesotho (the country is called Lesotho, an individual inhabitant is a Mosotho and a number of inhabitants are called Basotho). Moshoeshoe I reigned from about 1823 to 1870. It was during his reign that Lesotho became a British protectorate and it remained so until it became an independant Kingdom in 1966. It has never been part of the Republic of South Africa.

2.3 The People

According to the population census of 1976 the population of Lesotho totalled 1,216,815 persons (2.3). The exact distribution of the population over the various ecological areas can be seen in table 2.1. This

Figure 2.3 The invasion of Southern Africa.

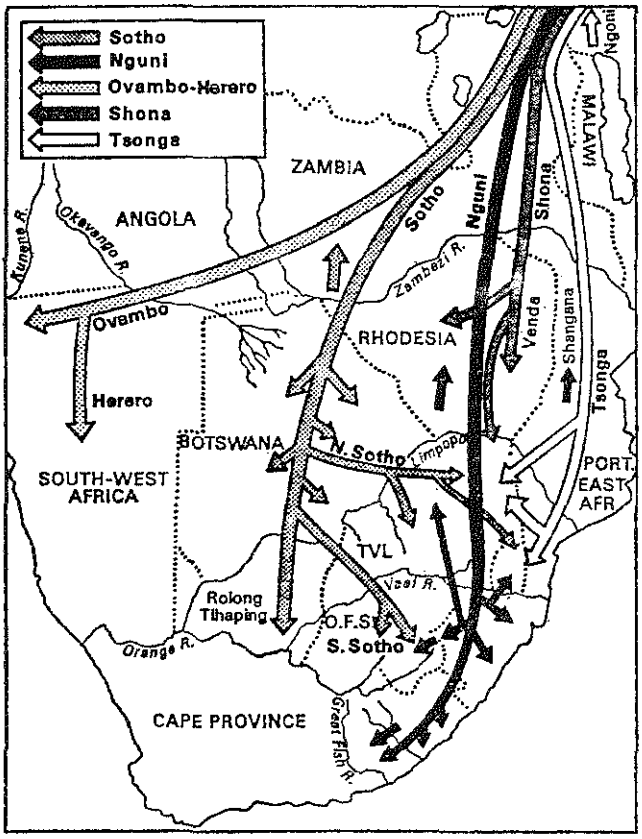


Table 2.1.

Description of the total population as given in the Lesotho population census report of 1976, vol. 1 table 1c.
Total population classified by zone, residential status and by sex.

Zone name	Present		Absent		Present + absent		
	Males	Females	Males	Females	Males	Females	Both – sexes
Lesotho							
Lowland	207,238	275,966	62,536	14,660	269,774	290,626	560,400
Foothill	102,261	137,393	30,330	4,659	132,591	142,052	274,643
Mountain	101,407	127,187	22,109	1,815	123,516	129,002	252,518
Orange river valley	47,354	65,382	14,113	2,405	61,467	67,787	129,254
All zones	458,260	605,928	129,088	23,539	587,348	629,467	1,216,815

shows that 46% of the population lives in the lowlands, 23% in the foothills, 20% in the mountains and 11% in the Orange River valley (see also fig. 2.4). In table 2.2 we see, that up to 14 years of age the number of males and females in the de facto population is about the same. However, from 15 years onwards an increasing discrepancy becomes evident, males representing only 35.6% of the population in the 15 – 34 year group and 39.4% in the 35 years and older group. This discrepancy is due to the labour – fit male agegroup being heavily recruited for employment outside the Lesotho borders in the Republic of South Africa.
We also see that the demographic profile of Lesotho exhibits the kind of age distribution that is so typical of the population of developing countries. Forty – one percent of the population is younger than 15 years and only 4.1% is 65 years and older. The population density is approximately 43 per square km., but since most of the population is concentrated in the lowlands (this area, which is one quarter of the country, being inhabited by 50% of the population), the density there is much greater, ranging from 50→100 persons per square km., thus giving the Lesotho lowlands one of the highest rural population densities in Africa (2.1).
Among the African countries, Lesotho has the unusual advantage of having a single national vernacular language, Sesotho.

2.4 Economy

Lesotho ranks among the 25 poorest nations on earth according to the UN – classification. The amount of foreign aid allocated to Lesotho annually is significantly higher than the sum derived annually from the home economy (2.4). It is a truly agricultural nation, as 85% of the population derives a significant income from agriculture (2.5). Urbanisation is a very slow process indeed. In 1966 only 2% of the de facto population, namely those living in Maseru, the capital, could be regarded as living in an urban area (2.6). The most recent estimate (1979) is 4.3% (2.7), again predominantly Maseru.

Lesotho's land tenure laws are unique. All the land belongs to the people as a whole and is administered on their behalf by the chiefs (2.8). This in fact makes the Mosotho farmer a "landholder" with only semi- – permanent interests. The mean period during which land is continuously occupied by the same household is 18 years.
Severe land erosion, inadequate farming practices and overgrazing have further reduced the already small proportion of farmland available (about 13%). This factor together with the enormous population explosion has

Figure 2.4 Population density.

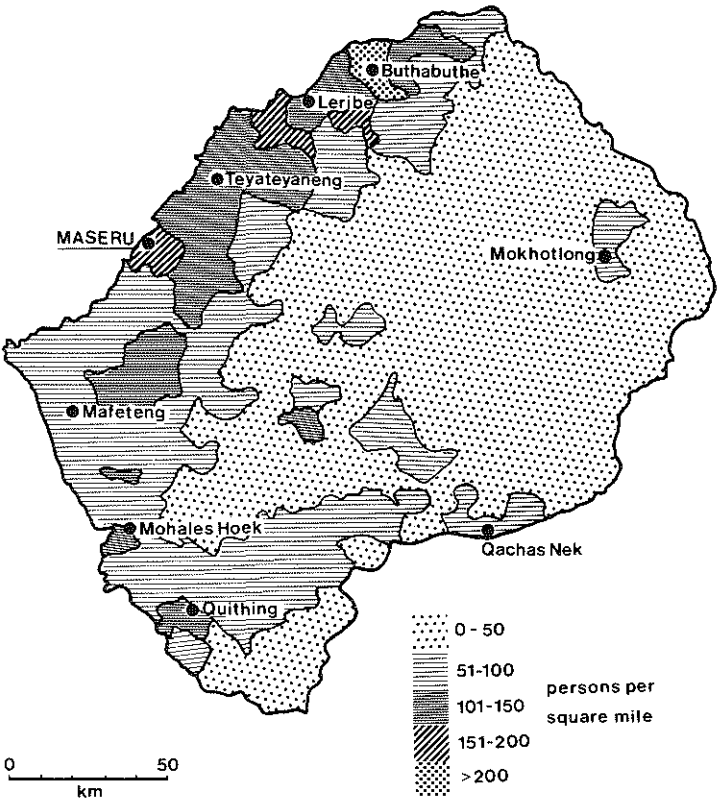


Table 2.2.

Description of the de facto population
(Lesotho population census

Age group	De facto population classified by five year							
	Mosotho		Other African		European		Asian	
	Male	Female	Male	Female	Male	Female	Male	Female
00 – 04	81,999	82,597	547	579	59	71	31	36
05 – 09	75,203	74,839	499	513	69	65	34	33
10 – 14	74,285	75,926	473	571	59	45	33	47
15 – 19	47,859	64,277	345	453	37	22	35	31
20 – 24	21,620	51,666	204	390	63	44	25	34
25 – 29	17,764	38,918	173	287	112	95	23	31
30 – 34	15,677	31,064	137	268	96	72	24	24
35 – 39	15,874	26,751	162	230	76	57	26	19
40 – 44	17,818	29,741	139	282	61	42	27	20
45 – 49	15,306	21,519	145	166	45	49	16	15
50 – 54	13,946	19,286	114	137	65	39	21	7
55 – 59	16,235	20,686	136	148	50	33	12	7
60 – 64	10,696	15,288	83	99	39	31	7	7
65 – 69	7,772	10,984	70	75	23	28	4	1
70 +	14,371	27,947	133	226	14	16	3	10
A.N.S.	6,664	8,246	63	68	22	8	16	–
Total	453,089	599,735	3,423	4,492	890	717	337	322

caused a shortage of land, and in 1974 the mean percentage of rural households without cropland in a representative study area in the lowlands was 13 (2.9).

Maize, sorghum and wheat are the main foodcrops. The production satisfies about 80% of domestic demand. Lesotho has a relatively large quantity of livestock, particularly sheep, cattle, goats and chickens, 3 million in all. However, little cash income is derived from it, especially in the lowlands, where cattle are only kept as an investment (2.5).

There are approximately 2,000 miles of roads and tracks in the country. A tarred road, which was constructed during the 1968 – 1981 period runs

which the survey sample is expected to reflect
report of 1976, vol. 1 table 7).

age groups, race and sex.

Mixed		Other races		All races		
Male	Female	Male	Female	Male	Female	Both sexes
81	76	6	17	82,723	83,376	166,099
74	65	14	11	75,893	75,526	131,419
57	82	20	13	74,927	76,684	151,611
41	68	13	23	48,330	64,874	113,204
28	40	5	11	21,945	52,185	74,130
19	40	9	9	18,100	39,380	57,480
14	28	–	6	15,948	31,462	47,410
19	25	4	6	16,161	27,088	43,249
18	16	6	6	18,069	30,107	48,176
10	12	3	8	15,525	21,769	37,294
14	18	5	4	14,165	19,491	33,656
16	15	4	4	16,453	20,893	37,346
14	7	1	1	10,840	15,433	26,273
7	12	1	3	7,877	11,103	18,980
8	20	4	10	14,533	28,229	42,762
2	5	4	1	6,771	8,328	15,099
422	529	99	133	458,260	605,928	1,064,188

from Butha – Buthe to Mafeteng. Some "dust roads" in the lowlands are well developed.

Approximately 60% of the male workforce work as migrant labourers in South Africa, mainly in the mines, while their families stay at home. They return home for varying periods of rest in between their contracts. On the other hand only about 10% of the females work in South Africa (2.5).

As a result of the activities of church missions, which started in 1833, the level of literacy is higher than in most African countries, probably around 50% at the time of the survey (2.10).

2.5 Health

The Ministry of Health has identified Lesotho's major health problems as tuberculosis, venereal diseases, gastroenteritis and typhoid fever. The major causes of infant and child mortality are respiratory and intestinal diseases, often associated with protein – caloric malnutrition (2.10). The latest national nutritional survey (2.11) suggests that over 20% of the Basotho children up to the age of five had sufficiently poor growth to indicate chronic protein – caloric malnutrition. On the other hand, relatively few of their mothers were undernourished and there was obesity in approximately 40% of urban, 30% of lowland and 13% of foothill/ mountain mothers. According to this report about 25% of the children up to the age of five were anaemic. Five percent of the mothers had a visible goitre (2.11).

The basis of a typical Basotho diet consists of thick dry maize porridge, which is eaten in large quantities at most meals and frequently as the only food (2.12). The nutritive value of the Basotho diet has been described as "deficient in all nutrients with the exception of carotene, thiamin, vitamin C and iron (2.13). An additional detrimental factor, especially in the group of male adults, is the very high rate of alcoholism. The most common dietary deficiency disease in Lesotho is pellagra. According to some estimates as much as 15% of the population is afflicted during the pellagra season (2.14). However, the general nutritional standard in Lesotho seems to have improved over the last 25 years, presumably due to better health facilities such as free milk in the rural clinics and especially better health education, since it has been stated that the most frequent cause of malnutrition in Lesotho is "lack of knowledge of food requirements especially during periods of human growth" (2.15).

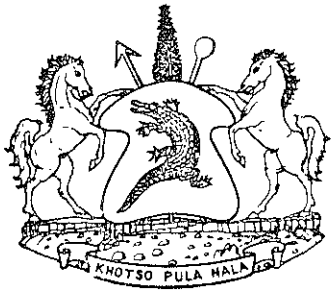
At the time of the survey Lesotho had 13 functioning general hospitals (fig.2.2), approximately 110 clinics and dispensaries, a mental hospital and a leprosarium. Moreover, the Lesotho Flying Doctor Service visits 11 mountain clinics regularly.

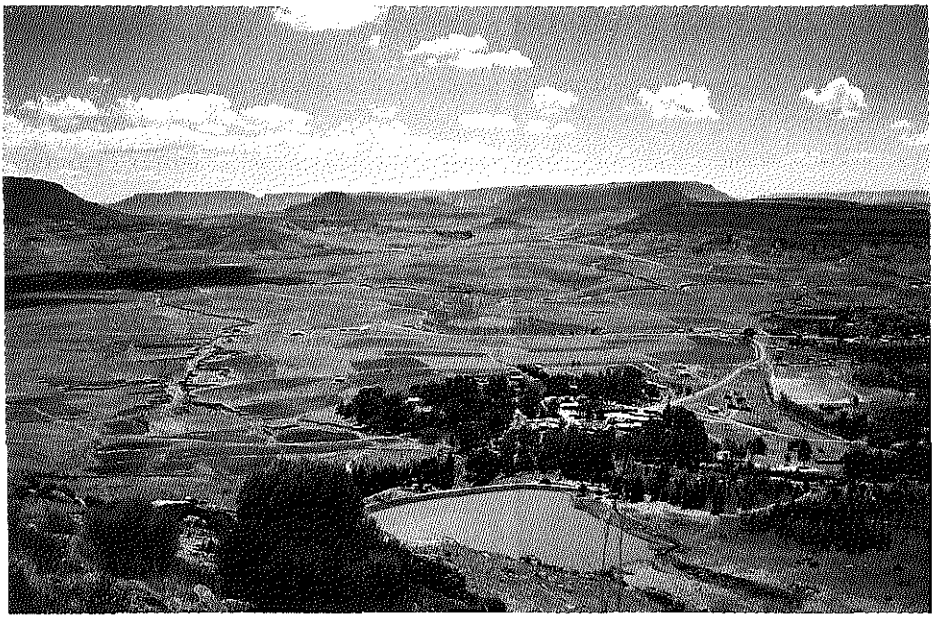
About 40% of the health services in Lesotho are non – governmental. To coordinate these the Private Health Association of Lesotho (PHAL) was founded in 1974. Scott Hospital, where the clinical survey was conducted, is one of the PHAL hospitals.

By and large, the mission hospitals seem to be more popular among the Basotho than the government hospitals, because the care, and especially the nursing, is allegedly better. They are, however, more expensive and the staff is paid less. A governmental hospital could gain considerable popularity, though, if a doctor was felt to be good and stayed there for a longer time, as was the case in Mafeteng Hospital, 40 km. south of Scott Hospital.

The three most popular hospitals were believed to be all PHAL hospitals and more or less equally distributed throughout the lowlands, Scott Hospital being the most southerly. It seemed to have a special fame for fertility problems for some reason or other, although patients with fertility problems tended to try every hospital in Lesotho, if necessary.
Forty km. north of Scott Hospital, in the capital, Maseru, is the biggest hospital of Lesotho, the Queen Elisabeth II Hospital. It is the only hospital with specialists in many medical fields and serves as a referral centre for the other hospitals. Moreover, various teams of medical specialists from South Africa visit Queen E. II Hospital a few times a year, providing a "shuttle service" as part of South African medical aid program to see and/or treat referred cases. In a few instances patients could be sent via Queen E. II Hospital to the university hospital of Bloemfontein for treatment.

There is approximately one physician to 18,000 inhabitants (as against one witchdoctor to an estimated 250 inhabitants) and one hospital bed to 500 inhabitants in Lesotho. Most of the physicians, however, are concentrated in Maseru (2.7). Compared with other developing countries in Africa Lesotho is relatively well endowed with health facilities. There are, however, serious imbalances between the services available in different parts of the country (2.16).





The Scott Hospital buildings seen from above

CHAPTER 2 Part B

SCOTT HOSPITAL AND ITS AREA

Scott Hospital, where the hospital survey was conducted, is a mission hospital, which started to function in 1938. It is situated in the lowlands, in the village of Morija (approximately 5,000 inhabitants), at an altitude of 1,700 m., 42 kilometers south of the capital Maseru. It lies alongside the tarred road that runs through the lowlands from Mafeteng in the south to Butha – Buthe in the north. Its health – area (fig.2.2), covering approximately 3,000 km.^{2} ,has an estimated population of 100,000.
The population density in the immediate surroundings of the hospital is estimated at 100 per km.^{2} , but it is much lower in the foothills and mountains in the eastern part of the area. There are 13 health clinics and dispensaries scattered throughout the area, which are regularly visited by the Scott Hospital clinic coordinator, who is a nurse especially trained for the purpose. Half of these clinics are visited on a monthly basis by one of the doctors. During the time of the survey there were four doctors available to do the clinical work. One of them spoke the language fluently, one spoke it reasonably well and two, including the author, spoke it a little, so they had to use an interpreter most of the time. A fifth doctor was solely occupied with community health care, except for night and weekend duties. His duties included preparing and conducting a village health workers training program to try to improve health conditions and health education at the most basic level.

The nearest hospitals around Scott Hospital are in Maseru, Mafeteng and Roma. Only some 60% of the outpatients come from within the health area; the rest come from as far as Qouthing in the south and Butha – Buthe in the north.
Some hospital statistics are given in table 2.3.

Table 2.3

Scott Hospital Statistics 1979-1981

	1979	1980	1981
General + Maternity			
Total number of beds	110	110	117
Total number of admissions	3523	3845	4019
Average length of stay per patient	10.6	11.5	9.8
Deaths	112	164	222
Total number of deliveries	1584	1712	1622
Operating theatre			
Major operations	385	438	471
Minor operations	2193	2369	2797
Outpatients			
Doctors consultations	37730	35222	29140
Clinics: Under Fives	17937	26242	27704
Clinics: Antenatal	13891	12619	19880
Clinics: Family planning	1411	1227	959
Clinics: TB	1566	1560	1206
Laboratory			6130
X-ray			2445

Commonest causes of death (1976)

Tuberculosis	28
Cardio-vascular disease	25
Gastro-enteritis	14
Assault	11
Pneumonia	10
Poisoning (traditional medicine)	8

LITERATURE

2.1 Ambrose, D. Guide to Lesotho, p. 21, Winchester press, Johannesburg, S.A., 1976.

2.2 Becker, P. Tribe to township, p. 30 The Chaucer Press Ltd., Bungay, Suffolk (G.B.) 1974

2.3 1976 Population Census, Ministry of Planning and Statistics, Maseru, unpublished.

2.4 Linden, E. The Alms Race, p. 2 Random House, Inc., New York, 1976.

2.5 Lesotho: A Developmental Challenge, International Bank for Reconstruction and Development, 1975.

2.6 Report of the Basotoland Educational Planning Mission, p. 43, Appendix, 1966.

2.7 Lesotho-Social Indicators Data Sheet. Annex 1 p. 1 of 5. 1981

2.8 Leistner, G.M.E. Lesotho, Ekonomiese Struktuur en Groei. p. 9 Mededelinge van die Afrika-Instituut, Pretoria 1966.

2.9 Makhanya, E.M. Plight of the rural population in Lesotho p. 11, Africa-Institute, Pretoria 1980.

2.10 Syncrisis. The Dynamics of Health XIII, Botswana, Lesotho and Swaziland, U.S. Department of Health, Education and Wellfare, Office of International Health Division of Program Analysis, D.H.E.W. Publication no (05) 75 – 50,,018,1975.

2.11 Lesotho. National Nutrition Survey, p. 15, Office of Nutrition, Development Support Bureau, Agency for International Development, Washington, 1977.

2.12 United Nations. Development Program: Report to the Government of Basutoland, Applied Nutrition Program (Rome, F.A.O. 1966) p. 4.

2.13 Williams, J.C. Lesotho. Three Manpower Problems, p. 39, Communications of the Africa Institute No. 6, Pretoria, S.A. 1971.

2.14 Ibid p. 36

2.15 United Nations, Development Program: Report to the Government of Basutoland: Applied Nutrition Program (Rome, F.A.O., 1966, Report by B. Krock).

2.16 Kingdom of Lesotho. Second five year Development Plan, 1975/6 – 1979/80, Vol. 1, p. 193, 1976.

CHAPTER 3

THE HOSPITAL SURVEY

3.1 Introduction

Up till now most of the reports on the occurrence of rheumatoid arthritis among black African population groups have been hospital based studies (3.1,3.2,3.3,3.4,3.5,3.6,3.7). The few population studies will be dealt with later. These hospital studies create the impression that rheumatoid arthritis is a rare disease among Africans, although the authors of the last paper suggest that the disease is now being seen in Kenya more frequently than in the past. This, however, is based on 76 cases of "definite" or "classical" rheumatoid arthritis seen over a period of 18 months in the university hospital in Nairobi, which also handles many referral cases from all over the country and had a total of 563,166 outpatients during the 12 months of 1974. Moreover, Nairobi can be considered an urban area and it has been suggested that this influences the prevalence of rheumatoid arthritis in African populations (3.8).

All these studies comment on the mildness of the disease. Nevertheless, differences in disease pattern appear to exist in patients seen in Kenya and in West Africa (3.4,3.7). Whereas subcutaneous nodules were hardly encountered at all in Nigeria, they were frequently found in Kenyan sufferers. The radiological features in Kenyan patients resembled more closely the changes seen in England (3.9) than those in Nigeria, and in Kenya a high prevalence of positive tests for rheumatoid factor was found (3.10), while in Nigeria the disease was mainly sero – negative (3.4,3.11).

Since, as already stated, the people of Lesotho occupy such a unique position among the black populations living in Africa, we decided to perform a prospective survey among our outpatients during one year starting on 1 May 1980. When we reached the end of that year, we decided to continue checking patients for another half year.

In most African countries outpatients are screened by a trained nurse before they see a doctor, but in Lesotho all general outpatients are seen by a doctor. There are a few categories which are seen by a trained nurse and are only sent on to the doctor if there are special problems the nurse cannot handle herself. They include the follow – up visits of ante – natal patients,

patients suffering from tuberculosis, patients coming for family planning and children under the age of 5.
All patients have to buy a small note book ("bukana") in which the doctor writes their history, diagnosis and treatment. They retain it and, if they do not lose it, (and surprisingly they seldom do), it constitutes a good record of their past history. Patients have to pay for consultation, extra medicines and possible laboratory tests and surgical procedures. The average visit (surgical procedures excluded) cost about R5, which is about 4.35 US dollars. In addition some of them had to travel long distances, so in many cases the total cost to them was considerable. It was therefore all the more surprising to see with what insignificant complaints (at all events, to us) they sometimes came. This can be attributed partly to ignorance (as in Europe) and partly to the fact that the people of Lesotho weigh the various aspects of life by standards that differ from those of Europeans. In Lesotho the Shakespearean question: "to be or not to be" can be paraphrased as "to be or not to be pregnant". A major part of the consultations was taken up by patients who came with problems concerning pregnancy. In fact, one woman in whom we diagnosed rheumatoid arthritis did not come to consult us for this, but because " she had not become pregnant again and her third child was now 3 years old"!
The diagnosis of all the outpatients who came to the hospital and were seen by a doctor, was ticked off on a tally sheet. An example of this is shown in appendix 1. The percentages of the various diagnostic categories seen in a group of almost 12,000 patients dealth with in the first half of 1981 are shown in table 3.1.
Normal pregnancies, complications of pregnancies and diseases of the genito – urinary system (including venereal diseases) represent over 50% of the complaints. For comparison, the main reasons for consultation in general practice in Europe are shown in table 3.2 (3.12).

Four doctors were normally available for the daily workload, which consisted of outpatients, wardrounds, and minor and major operations, and on some days some of us had to do various other jobs, such as paper work, organising stocks, teaching, visiting health clinics.
The number of outpatients seen by one doctor during one day ranged from about 30 to 100, the larger numbers usually during the summer. As the other tasks were also quite demanding, the time available per outpatient was often very short.
From the hospital statistics given in the preceding chapter it can be seen that the number of doctor's consultations gradually decreased, whereas the number of admissions actually increased. This could be due to the fact that

the consultation fees rose fairly sharply, especially during the last period and possibly because more health clinics started to function. Nevertheless, since the number of admissions did not drop, we could conclude that the more serious cases still came to hospital.

Table 3.1.

Percentage distribution of morbidity of 11,980 outpatients at Scott Hospital (repeat visits and under-fives excluded).

Disease	Percentage
Pulmonary Tuberculosis	0.9
Syphilis	0.9
Gonorrhea	1.0
Endocrine, Nutrition and Metabolic Diseases	1.0
Other Infective and Parasitic Diseases	0.8
Tumours/Neoplasms	0.7
Mental Disorders	0.7
Dis. of the circulatory system	2.3
Dis. of the Nervous system and sense organs	3.7
Dis. of the Digestive system	6.4
Dis. of the Respiratory system	6.4
Dis. of the Genito-urinary system	21.3
Complications of Preg., childbirth and Puerperium	8.0
Dis. of Skin and Subcutaneous tissues	3.7
Dis. of Muskulo skeletal system and Connective Tissues	*5.2*
Symptoms and ill-defined conditions	3.6
Injuries, Fractures and Dislocations	10.2
Normal pregnancy (Minor Complaints)	19.5
Medical examinations (Certificates)	3.0
Miscellaneous	0.7
Total	100.0

Table 3.2.

Percentage distribution of morbidity as seen by 52 general practitioners in Holland.

Disease	Incidence
Communicable diseases	4.5
Neoplasms	0.7
Allergies a.o.	2.1
Diseases of blood	1.3
Psychiatry a.o.	5.1
C.N.S.	10.2
Tractus circulatorius	3.3
Tractus respiratorius	22.9
Tractus digestivus	9.4
Tractus urogenitalis	5.3
Deliveries a.o.	4.0
Skin diseases	9.1
Diseases organs movement	*8.9*
Congenital malformations	0.1
Diseases of early infancy	0.7
Symptoms a.o.	2.2
Accidents, poisoning a.o.	10.3
Total	100.1

3.2 Patients and methods

3.2.1. General outpatients

When outpatients arrived at the hospital they were registered and were given a number. There were 8 books for the purpose (A to H) in which were entered the patient's registration number, name, domicile, age, sex and the amount paid for consultation and any additional charges. People who came for follow-up visits, such as hypertension checks, did not pay a consultation fee but only paid for medicines.

There was no fixed system according to which these books were used. Usually the next book was taken after 30-60 patients had been registered and 3-4 books were used in this way per day. The patients seen during visits to the health clinics were excluded from the general statistics. For example, one woman who was so crippled by rheumatoid arthritis that she could not be moved at all, was visited by us at her home through the intermediary of one of our health clinics but was not included in the general statistics nor in our record of patients suffering of rheumatoid arthritis!

The 8 books A to H were used for the analysis of the composition of the general outpatients seen during the prospective year. It was not possible to use them systematically, as neither the books nor the person that worked them out were always available. Consequently I had to take them when I could lay my hands on them. However, as already stated, the books were used at random when registering patients.

Patients were categorised according to the following criteria: new consultation or follow-up visit, age, sex and domicile in or outside the Scott Hospital Area (SHA). The age groups used were: 5-14, 15-24, 25-34, 35-44, 45-54, 55-64, 65-74 and >74. Two other subgroups emerged, one called "adult" (usually older patients who did not know their age) and one in which no age was recorded at all. A hundred of these patients were analysed, their ages approximated as nearly as possible (by events in the past such as wars and droughts) and subsequently proportionally allocated to the various age groups.

After having categorised about 6,000 patients I started to realise three things. Firstly, that it was going to be a colossal undertaking, secondly, that it would not be necessary to classify the "repeat" patients and thirdly, that it would be important to see if there was any difference in profile between people from within and outside the SHA. I should have taken a sample of the books, a method that was suggested to me when unfortunately it was too late to adopt it. At the time, I was a typical example of a clinical doctor in "the bush", who has the opportunity to observe and register a lot of worthwile data, but often lacks the time and especially familiarity with certain scientific procedures to really work them out and record them in an orderly and correct fashion.

Consequently, I developed a more complex system after the analysis of the first 6,381 patients to solve the problems I had identified as such. The first group I called group I. In group II, consisting of 13,797 cases, only the 8,588 new patients were classified according to domicile, age and sex, and in group III, consisting of 8,313 patients, only the 3,342 new patients from inside the SHA were categorised according to age and sex. This is presented in the following scheme:

Group I (6,381): – (repeat + new) – age – sex – domicile

Group II (13,797): – repeat (5,209)

– new (8,588) – age – sex – domicile

Group III (8313): – repeat (3,234)

– new (5,079) – outside SHA (1,737)

– inside SHA (3,342) – age – sex

Group I contained the whole of book D, the months May to September of book A and the months May to October of book C. Group II contained the whole of books B, E and H, the months May to October of book F and the months November to April of book C, and group III covered the rest, i.e. the whole of book G and the months November to April of book F and October to April of book A. This is shown in table 3.3.

Table 3.3.

The distribution of the groups I, II and III over the 12 months and 8 books.

Months	Books							
	A	B	C	D	E	F	G	H
MAY	I	II	I	I	II	II	III	II
JUNE	I	II	I	I	II	II	III	II
JULY	I	II	I	I	II	II	III	II
AUG.	I	II	I	I	II	II	III	II
SEPT.	I	II	I	I	II	II	III	II
OCT.	III	II	I	I	II	II	III	II
NOV.	III	II	II	I	II	III	III	II
DEC.	III	II	II	I	II	III	III	II
JAN.	III	II	II	I	II	III	III	II
FEB.	III	II	II	I	II	III	III	II
MARCH	III	II	II	I	II	III	III	II
APRIL	III	II	II	I	II	III	III	II

Since we only decided at the end of the prospective year to go on checking patients for rheumatoid arthritis, analysis of the various outpatient data described above was carried out over the period of this one year only.

3.2.2. Patients with rheumatoid arthritis

From 1 May 1980 any patient with symptoms suggestive of rheumatoid arthritis was seen by one of the two doctors conducting the survey. The other doctors were extensively briefed about this and referred these patients. A detailed history was then taken including present adress, past adresses with particular reference to any period of stay in areas that were considered to be urban (cities, mines), age, amount and source of income, social position, onset and course of the disease. Patients were arbitrarily classified urban if they had lived in an urbanized area for more than 5 years or if their disease had started there.

Classification was done according to the ARA criteria of 1959 (3.13) or the modified Rome criteria for rheumatoid arthritis used in previous surveys in southern Africa (3.8,3.14); see appendix 2. These criteria were pinned up in the three consultation rooms.

Unfortunately, some of the patients referred never turned up and it is quite possible that we missed a few patients in this way.

A specially prepared form was used for each patient satisfying at least 3 ARA criteria (see appendix 3). This form was also used for follow – up visits. Often, however, compliance with requests for follow – up visits was low. Possible explanations will be discussed later.

Most patients were photographed after they had been examined.

X – rays of the hands and feet of each patient that was clinically suspect were routinely taken, and any other clinically involved joint. Sometimes the chest was also X – rayed. One problem was that electricity is rather unreliable in Morija, so that it was not always possible to take radiographs when we wished to.

The radiographs were read independently by two skilled observers, one a radiologist with a special interest in this field and one an epidemiologist (H.A. Valkenburg) who had taken part in many previous surveys of this kind. Arthritic changes were classified in four grades according to the Atlas of Standard Radiographs of Arthritis (3.15). Grade 1 means doubtful disease, grade 2 mild but definite abnormalities and grade 3 and 4 moderate and severe disease respectively. At least grade 2 is required for it to count as a criterion under the ARA criteria.

When the observers' opinions regarding single joints differed, the average

score was taken as much as possible. All patients with erosive arthritis were classified as such unanimously.

A latex fixation test (LFT) was performed on the sera of all the patients clinically suspected to be suffering from rheumatoid arthritis as well as on the sera of two control groups. Although the test we used (Rheuma Wellco test) could also be used for quantitative titration, we usually used the screening test only. A positive test (agglutination) indicates that the serum contains at least 15 IU per ml. rheumatoid factor, which is regarded as supportive evidence for the diagnosis of rheumatoid arthritis.

For each patient with rheumatoid arthritis three age and sex matched patients with minor non – rheumatic complaints were taken as controls for the LFT.

False positive results for LFT have been reported in patients with syphilis (3.16) and in Lesotho this is a disease frequently encountered. A positive VDRL was found in 5.6% of our antenatal patients of whom blood was taken routinely for assessment of the VDRL during the 1980 – 1981 period. A proportion as high as 9.7% is even given in the annual report of the Lesotho Flying Doctor Service for 1980 for women attending family planning clinics in remote mountainous areas (3.17). For this reason VDRL was also assessed in this control group.

Active pulmonary tuberculosis has also been accounted as a cause of false positive LFT (3.18). Tuberculosis is rife in Lesotho and a major killer, as can be gathered from the 1976 report. For this reason a second control group was selected, consisting of patients suffering from active tuberculosis. The VDRL of these patients was not assessed.

Sera of 17 patients were sent to Erasmus University, Rotterdam, The Netherlands, where sera of previous surveys had also been tested, to be checked once more for the presence of rheumatoid factor by both the LFT and the Waaler – Rose test.

Basic blood tests such as ESR and Hb were also performed for most of the patients.

Where nodules were present histological confirmation was sought by sending a biopsy to the Department of Pathology of the University of Bloemfontein, Orange Free State, RSA, which did all our histology and cytology as a free service to the mission hospital.

A joint score was performed following recommendations of Dr. S. Brighton, head of the Department of Rheumatology of the University of Pretoria, RSA (personnel correspondence). This was recorded on the back of the form as shown in appendix 3 and is shown in appendix 4. The aim was to get an impression of the tenderness of the various joints by graded measurement.

If a patient winced on the application of pressure or movement of a joint, this was regarded as indicating greater pain than the mere statement that it was painful. If a patient not only winced, but also tried to withdraw the joint, we considered this to be indicative of even more pain than that indicated by a wince. We ourselves added the presence or absence of swelling on the form.

Accordingly, the joint score as it was done by us differs from the recommendations of the Third International Symposium on Population Studies of the Rheumatic Diseases (New York, 1966). We did not consider intracarpals and wrists, or tarsals and subtaloids separately. Instead, we looked at the temperomandibular, sternoclavicular, acromio clavicular and hip joints. The presence of subluxation or ankylosis was registered on the back of the form, together with the history and general physical examination.

Statistical analysis was performed by means of χ^2 analysis with Yates correction. Where more than 1 freedom grade was used this will be specifically mentioned.

3.3 Results

3.3.1 General patients

A total of 28,491 patients of 5 years and older were registered in the 8 books during the period 1 May 1980 to 1 May 1981. The discrepancy between this figure and the figures from the annual reports is due to patients referred from one of the clinics (mainly ante – natal and under – five) to be seen by one of the doctors. The numbers were seen over the various months as follows: May 2,291 – June 2,124 – July 2,662 – Aug. 2,373 – Sept. 2,354 – Oct. 2,620 – Nov. 2,220 – Dec. 2,337 – Jan. 2,654 – Feb. 2,137 – March 2,502 – April 2,217. Consequently, contrary to our expectations, which were based on impressions gained in previous years, there was no seasonal pattern in the sense that more patients were seen during the summer months (Oct. – March). Since fees went up fairly steeply during the period under investi gation, this could have played a role.

A total of 11,090 patients (38.9%) came for repeat visits, which means that the doctor had asked them to come back for a check – up. Among them were many patients with diseases like hypertension, diabetes, etc.

Of the remaining 17,401 patients 5,173 (18.3% of the total) bought a "bukana", which usually means that they came for the first time and 12,228 (42.9%) had been seen before, but with a new complaint or, on their own initiative, for an old one. The same pattern was found for each single month.

In group I (new + repeat visits), totalling 6,381 patients, 59% came from inside the SHA. In the groups II and III (new cases only) 65.6% came from inside this area. This difference is highly significant ($p < 0.001$), so it seems that more repeat patients came from outside the SHA. Doctors were perhaps more readily inclined to ask patients, who came from far, to come back or, on the other hand, these patients could be more willing to come back when asked to do so.
The M/F ratio in all the groups was constant: 25.5% males and 74.5% females. There was no monthly difference either.
To assess the extent to which the men among our patients were employed as migrant workers 2,630 outpatients were interviewed in Feb. 1981 during 16 working days; of the 1,002 males, 695 (69%) were employed as mineworkers; of the 1,317 females, 872 (66%) had a husband who was a miner, and of the 311 children, 150 had fathers who were miners. This gives an average proportion of 65%, which fits in with the estimated percentage for the rest of the country.

Most age groups were equally distributed over the 3 groups. Slight differences only were found in the 15 – 24 age group (24.9% in group I, 29.2% in group II and 33.7% in group III), the adult group (12.4% in group I, 6.6% in group II and 6.2% in group III) and the group of unknown age (9.4% in group I, 5.4% in group II and 4% in group III). More older patients may have been asked to come back for a check – up, but it is more likely that the people registering the patients were a bit careless in questioning people about their age when they came for repeat visits. Since we are mainly interested in the adult patients (> 15) for the purpose of this study, the 5 – 15 year group (9% of all the new patients) has been omitted. This leaves a total of 15,834 new adult patients seen during the prospective period. As 65.5% of the new patients came from inside the SHA, we calculate that 10,387 or about 17% of the estimated adult population from the SHA came to the hospital during this period. We must bear in mind, however, that a number of these patients will have been counted more than once, so that the actual percentage will be lower.

3.3.2 Patients with rheumatoid arthritis

Thirty – two patients with "probable", "definite" or "classical" rheumatoid arthritis were seen during the prospective period. They were seen as follows during the various months: May 5; June 2; July 3; Aug. 3; Sept. 1; Oct. 2; Nov. 4; Dec. 6; Jan. 1; Feb. 1; March 3; April 1. Five patients had already been seen during the year, but they either did not yet fulfil

enough criteria or were missed by the doctors conducting the survey. Nineteen patients were already seen in connection with joint complaints before the prospective year, most of them in 1978 and 1979.
During the following 6 months 7 more patients were seen: May 1; July 1; Sept. 1; Oct. 4. Two of these were actually seen already during the prospective year, but did not fulfil the diagnostic criteria at the time. For these data we could fortunately rely on the writings in the patients' "bukanas". In some cases we could only go by what they told us about visits to other doctors, hospitals or clinics.
Ten males and 22 females were seen during the prospective period. In the next 6 months 2 males and 5 females were seen. So 31% of all the patients were male.

The frequency with which each clinical ARA criterion was encountered in males and females is shown in table 3.4.

Table 3.4.

Clinical ARA criteria of the male and female patients.

	Females		Males		Males + Females	
	n	%	n	%	n	%
Morning stiffness	24	88.9	8	66.7	32	82.1
Pain in a joint	27	100.0	12	100.0	39	100.0
One swollen joint	24	83.9	8	66.7	32	82.1
Another swollen joint	22	81.5	8	66.7	30	76.9
Symmetrical swelling	20	74.1	6	50.0	26	66.7
Nodules	8	29.6	1	8.3	9	23.7
Total n	27		12		39	

Of the 32 patients seen during the prospective year 17 were classified as "classical", 9 as "definite" and 6 as "probable". Of the 7 patients seen later 2 were classified as "classical", 3 as "definite" and 2 as "probable". Of the 8 "probable" cases 5 were female and 3 male.

Table 3.5 shows the relation between the "Manchester" gradings according to Lawrence (3.19) and the total number of ARA criteria.
The Manchester gradings express the presence of inflammatory polyarthritis according to the clinical impression of the observer. Grade 0

Table 3.5.

Relation between the clinician's diagnosis and the ARA criteria.

Physicians grading	No of ARA criteria								Total
	3	4	5	6	i.a.	7	8	9	
0	1								1
1	1[a]	3							4
2	1		1						2
3		1[b]		3		1			5
4		1		4	4	12[c]	1	5	27
Total	3	5	1	7	4	13	1	5	39

i.a. = inactive arthritis (definite)
[a] No X – ray
[b] No RF
[c] One without RF

means no disease, grade 1 doubtful disease, grade 2 mild but definite disease, grade 3 moderate and grade 4 severe disease.
The relation between these gradings and the New York criteria is shown in table 3.6.

The age and sex specific rates for rheumatoid arthritis per 1,000 outpatients seen during the prospective year are given in table 3.7.
The same is shown for patients coming only from inside the SHA in table 3.8. The rate in males was slightly higher than that in females. There was a sharp increase after the age of 45 after which it levelled off. The youngest patient was a girl of 17 (onset at the age of 15) with "classical" rheumatoid arthritis and deformities of the hands already. The oldest patient was a man aged 85.
Thirteen patients required admission to the hospital at one stage or another and 3 of these patients had to be admitted more than once. This works out at one admission for rheumatoid arthritis per 175 admissions.

Table 3.6.

Relation between the clinician's diagnosis and the New York criteria.

Physicians grading	New York criteria					
	<1+2	1+2	1+2+3	1+2+4	1+2+3+4	Total
0	1					1
1	2[a]	1			1	4
2	2					2
3	2[b]		1	1	1	5
4	1		1[c]	3	22	27
Total	8	1	2	4	24	39

[a] No X-ray
[b] No RF
[c] One without RF

Table 3.7.

Age specific prevalence of combined probable, definite and classical rheumatoid arthritis of all patients.

Age group	Total number	Relative percentage	Affected by RA	Rate per 1000
15-24	5,046	31.9	2	0.4(0.2)*
25-34	4,698	29.7	8	1.7(0.4)
35-44	2,262	14.3	5	2.2(0.0)
45-54	1,566	9.9	8	5.1(0.6)
55-64	1,218	7.7	5	4.1(1.6)
65+	1,044	6.6	4	3.8(0.0)
Total	15,834	100.1	32	2.0(0.4)
Males	4,050	25.6	10	2.5(0.5)
Females	11,784	74.4	22	1.9(0.3)

* between brackets: rate of probable RA per 1000.

Table 3.8.

Age specific prevalence of combined probable, definite and classical rheumatoid arthritis of the patients from inside the SHA.

Age group	Total number	Relative percentage	Affected by RA	Rate per 1000
15-24	3688	35.5	1	0.3(−)*
25-34	2824	27.2	6	2.1(0.4)
35-44	1403	13.5	5	3.6(−)
45-54	1015	9.8	8	7.9(1.0)
55-64	766	7.4	2	2.6(−)
65+	691	6.7	3	4.3(−)
Total	10387	100.1	25	2.4(0.2)

* between brackets: rate of probable RA per 1000.
(2 patients, both male and classified probable, were of unknown origin. One was arbitrarly added to the patients coming from inside the SHA).

3.3.3 Serology

Latex Fixation Tests (LFT) were performed on the sera of 37 patients; one classified as "definite" and one as "probable" "escaped" before blood could be taken. Of the 37, only 3 of the tests were negative, which gives a positive rate of 92%. One of these patients was a woman classified "definite" with grade 2 erosive arthritis. The other two were men, classified as "probable". These two were included in the results, because they fulfilled enough ARA criteria, but one was clinically not suffering from rheumatoid arthritis and one was very doubtful on clinical grounds.
Seventeen sera were sent to Erasmus University to be assessed as well. Three of these sera were from patients who were not included in the results, because they did not satisfy enough criteria, although they were clinically suspected. All of these had a negative RF as assessed by the LFT and this was confirmed by the findings in Rotterdam, where both the LFT and the Waaler − Rose test were negative. Of the other 14 patients 13 had a positive and one a negative LFT. In only one case was the result found in Rotterdam slightly different. This was a patient, classified as "classical", who was found to have a positive LFT in the Scott Hospital laboratory, but a titre of 320 for LFT in Rotterdam, which is just considered negative. Her Waaler − Rose test was positive, however. In all the other cases the

Waaler – Rose test was consistent with the LFT. In about 60% of all these sera high titres for Waaler – Rose test (256 or more) and LFT (5,120 or more) were found.

A group of 90 patients, age and sex matched with patients with clinical rheumatoid arthritis in the prospective year and suffering from minor, non – rheumatic complaints, was taken to serve as the first control group after they had been screened clinically to see whether they had any signs of rheumatoid arthritis. Their VDRL was also assessed; 11 (= 12%) of these had a positive LFT and only 2 (= 2%) had a positive VDRL. These two did not have a positive LFT. These results are shown in table 3.9.

Table 3.9.

Age specific prevalence of a positive LFT in an age/sex matched control group of patients with minor, non-rheumatic complaints.
Control group I

Age group	Females		Males	
	no of controls	no of positives	no of controls	no of positives
15-24	3	–	–	–
25-34	18	–	3	–
35-44	3	–	12	2
45-54	18	3	9	3
55-64	9	1	3	–
65-74	6	2	–	–
75+	3	–	3	–
Total	60	6 *10%*	30	5 *16.7%*

The difference between males and females is not significant.

Forty – seven patients with tuberculosis were included in the second control group, age and sex matched as closely as possible. The results in this group are shown in table 3.10. A somewhat larger number of positive results was found in this group (19%). The difference is not significant, however.
The sensitivity for LFT was 34/37 = 92% for all our patients. If we look at the "definite"/"classical" group only, the sensitivity is even as high as 97% (29/30). We find the same sensitivity for those with Manchester gradings of 2 or more (31/32 = 97%).

Table 3.10.

Age specific prevalence of a positive LFT in a control group of patients suffering from tuberculosis.
Control group II

Age group	Females			Males		
	no of controls	no of positives	%	no of controls	no of positives	%
15-24	3	–		–	–	
25-34	6	2	33.3	2	–	
35-44	3	–		9	2	22.2
45-54	7	1	14.3	4	1	25.0
55-64	3	1	33.3	2	–	
65-74	5	1	20.0	–	–	
75+	3	1	33.3	–	–	
Total	30	6	20.0	17	3	17.6

The specificity in the first group is 88% and in the second group 77%. Assuming a prevalence of 1% rheumatoid arthritis at population level and 88% specificity for LFT this gives us a predictive value of a positive LFT of 7% (rule of Bayes). The predictive value of a negative test, however, will be virtually 100% in both cases.

3.3.4 Radiology

Radiographs were obtained of all patients except one, a male classified as "probable". In 6 cases (5 females, 2 of whom were classified as "probable" and did not have erosive arthritis and one man, classified as "classical") films of the hands only were obtained; X – rays of the rest were of both the hands and the feet.

Erosive arthritis (E.A.) grade 2 or more was found in 28 (74%) of them. This is shown in table 3.11 per diagnostic category. There is no difference between males and females. Of the 28 patients with E.A. 21 (75%) had grade 3 – 4 changes. Men tended to have more severe abnormalities than women. Of the 8 men with E.A. only one (12.5%) had grade 2, while of the 20 women 6 (30%) had grade 2. This difference is not yet significant, however.

Table 3.11.

The presence of erosive arthritis in males and females per diagnostic category.

Diagnosis	without erosive arthritis				with erosive arthritis					
	males		females		males		females		Total	
	n	%	n	%	n	%	n	%	n	%
probable	2	5	4	10.5	–	–	1	3	7*	18
definite	1	3	3	8	4	10.5	4	10.5	12	32
classical	–	–	–	–	4	10.5	15	39	19	50
Total	3	8	7	18.5	8	21.0	20	52.5	38	100

* One case of probable RA, a male, did not have X-rays taken.

This tendency can also be seen if we look at the degree to which the various joints or joint groups were involved in both sexes as shown in tables 3.12

Table 3.12.

The grade of erosions per joint group of the hands in male and female patients.

	X-ray grade	DIP	PIP	MCP	CMC	Carpus	Wrist	Total	Average
Females	2	1	8	10	6	2	2	29	1.1
(n=27)	3-4	–	1	3	–	13	13	30	1.1
	2+	1	9	13	6	15	15	59	2.2
Males	2	2	1	2	3	2	3	13	1.2
(n=11)	3-4	1	2	4	2	4	4	17	1.5
	2+	3	3	6	5	6	6	30	2.7

and 3.13. Here again males tend to have more severe abnormalities, but this only reaches significant levels in the feet ($p < 0.05$), where males have an average of 1 joint group scoring grade 3 – 4 against women only 0.3.
Only one female patient, classified as "classical", had grade 2 erosions of

Table 3.13.

The grade of erosions per joint group of the feet in male and female patients.

	X-ray grade	MTPI	MTPLat	PIP	Total	Average
Females	2	2	5	3	10	0.5
(n = 22)	3-4	1	4	1	6*	0.3
	2+	3	9	4	16	0.7
Males	2	2	1	2	5	0.5
(n = 10)	3-4	3	5	2	10*	1.0
	2+	5	6	4	15	1.5

* This difference in occurence of grade 3 – 4 between males and females is just significant: $p < 0.05$.

the feet without erosions of the hands. In all the other cases, erosions of the feet always went together with erosions of the hands.
The range of the number of joints involved radiologically was 0 – 9 in men and 0 – 8 in women. A few examples of radiological abnormalities among our patients are shown in figures 3.1 and 3.2.

3.3.5 Domicile

Of the 32 patients seen during the prospective year 24 (75%) came from inside the SHA, 6 from outside the SHA and of 2 the origins were unknown. Assuming that one came from inside and one from outside, 78% of the patients seen during the year came from inside the SHA, while only 65% of the general outpatients came from this area. Of the 7 seen during the next 6 months only 2 (namely, the ones that had not yet fulfilled the criteria when seen during the prospective period) were from inside the SHA, 4 from outside and the origin of one was unknown.
Of the 17 "classical" patients seen during the prospective period only one (6%) came from outside the SHA, of the 9 "definites" only 2 (22%) and 4 of the 6 "probables" (67%)! Both this remarkable difference and the fact that a greater percentage of our patients came from inside the SHA than of the general outpatients, would seem to indicate that patients with rheumatoid arthritis tend to travel less far as their affliction gets worse.

Of the total of 39 patients 14 had lived in an urban environment at some time in their lives. However, only 8 (20%) could be classified as urban

Figure 3.1 Erosive arthritis in our oldest patient, a 85 year old male.

Figure 3.2 Erosive arthritis in a patient who had never gone to see a doctor in connection with rheumatic complaints.

according to our criteria. Only one still lived in an urban area. Five of the urban patients were male. Three urban patients were classified as "definite" by means of the inactive criteria against one of the rural patients. The mean number of ARA criteria for the active urban cases was 5.4 and for the rural patients 6.4.

3.3.6 Duration and course

Although the history of the disease is notoriously unreliable, especially in an African population, where time is no object, the histories of shorter duration are probably reasonably accurate. The duration of the disease based on anamnesis is presented in table 3.14.

Table 3.14.

Duration of the disease, mostly based on anamnesis.

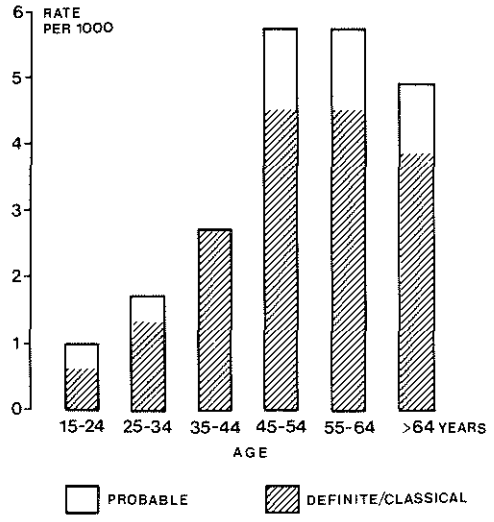
Duration in years	No of patients	Prob.	Def.	Class.	Inact.	Mean age at presen – tation
< 1	17	6	5	6	–	47
2 – 3	13	2	1	7	3	50
4 – 5	2	–	2	–	–	40
5 – 10	4	–	–	3	1	46
> 10	3	–	–	3	–	61
Total	39	8	8	19	4	49
Mean duration	3.1	0.9	1.6	5.1	3.6	

Almost half of the patients had histories of less than one year duration and 30 (77%) had histories of 3 years or less. Of the 7 cases diagnosed after the prospective year 6 had histories of less than one year and one had a history of 3 years.

Of the 10 severely crippled cases 3 had histories of less than one year, 3 of 2 years, 2 of 3 years, one of 5 years and one of 9 years. Their mean age was 47 years; 3 of them were males. "Probable" cases never had a long history (range 0.5 – 3 years) and a mean duration of 0.9 years. The mean duration of the patients classified as "definite" was 1.6 years (range 0.5 – 5), of those classified as "classical" 5.1 (0.5 – 20) and of the inactive category 3.6 years (1.5 – 10).

The mean age at the onset of the disease was 44 in males and 45 in females. There was no difference between the "probable" and the "definite"/"classical" categories. This is also shown in figure 3.3. The onset seems to occur more often after the age of 45. Before that age the increase

Figure 3.3 Age of onset of rheumatoid arthritis, based on anamnesis. Age – specific rates per 1,000 outpatients.



is gradual. Two patients with histories of many years have been included by diminishing their ages at presentation by 20 years.

We tried to follow the patients up as much as possible and kept a record of them till Dec. 1981.

Of the 16 patients seen during the first half year (May 1980 – Nov. 1980) the median number of visits was 3 (mean 3.13); 3 of these patients only came once. Of the 18 patients seen during the second half year (Dec. 1980 – April 1981) – including the two who could only be classified after the prospective year, but had already been seen in connection with joint complaints during the second half of the year – the median number of visits was 2 (mean 2.78); 4 of these patients were only seen once.

The general course of the disease can be seen in table 3.15.

Table 3.15.

General course of the disease of the patients seen first during the prospective year.

Course	First 1/2 year	Second 1/2 year	Total
One visit only	3	4	7
↑	–	2	2
≡	4	1	5
↑↓	2	3	5
↓	2	5	7
↓ ↓	5	3	8
Total	16	18	34

↑ = improving
≡ = steady
↑↓ = flare – ups
↓ = worsening
↓↓ = rapid/severe worsening

Twenty percent of the patients only came once, for which various explanations can be assumed, 44% became worse and 23.5% even got rapidly worse. The median number of visits of patients who became rapidly worse was 2 (mean 3). Some of these patients only came after we had asked them specifically to come through people from their villages and had offered to reimbourse their travelling expenses and give them free medical service (this was only done during the last few months of the survey). Some of them had to be brought by members of the family as they turned out to be so crippled that they could no longer walk. But in spite of our efforts we failed to get some of them to come back.

3.3.7 Joint score

Of 31 patients with active rheumatoid arthritis a joint score was made according to the paper shown in appendix 4. Sixteen were classified as "classical", 8 as "definite" and 7 as "probable".

The results, categorised according to the three different diagnostic groups, are presented in table 3.16.

There is a significant difference between the number of swollen joints in the "probable" category on the one hand and the "definite"/"classical"

Table 3.16.

The number of swollen joints and tenderness grades per joint group and per diagnostic category (16 Classical; 8 Definite; 7 Probable).

	Tender			Tender + Winced			Tender + Winced + withdrawn			All grades (percentages)			Swelling		
Joint	P	D	C	P	D	C	P	D	C	P	D	C	P	D	C
TM R	1	4	2			1				14	50	19			
TM L	1	4	2			1				14	50	19			
CS	2	4	5	1		2				43	50	44			
St.Cl. R	2	4	6			1				29	50	44			
St.Cl. L	2	4	7			1				29	50	50			
Ac.Cl. R	2	5	9			1				29	63	63			1
Ac.Cl. L	2	5	9			1				29	63	63			1
Sh. R	2	5	4			2				29	63	38			
Sh. L	2	5	4			3				29	63	44			
Elb. R	1	4	4		1	4	1		1	29	63	56			5
Elb. L	2	3	3		2	4	1		1	43	63	50			5
Wr. R	3	2	5	1	2	7	1	3	2	71	88	88	1	5	14
Wr. L	4	2	5	1	1	7	1	4	2	86	88	88	1	6	15
MCP R	3	–	4		1	5		3	1	43	50	63		3	7
MCP L	5	1	3		–	6	1	2		86	38	56		2	6
PIP R	2	1	5	1	2	6	1	3		57	75	69	1	4	8
PIP L	2	2	4		1	6	1	2		43	63	63		3	7
Hip R	–	1	5	1	–	1				14	13	38			
Hip L	1	–	5		–	1				14	–	38			
Knee R	3	2	8	1	2	2				57	50	63	1	1	6
Knee L	4	3	7	1	2	2				71	63	56	1	2	4
Ankle R	4	4	5	1	1	6	1	2	1	86	88	75	1	6	10
Ankle L	5	6	5	1	1	7	1	1		100	100	75	1	4	10
MTP R	3	3	5	1	3	4	1	1	1	71	88	63	1	2	3
MTP L	3	1	6	1	4	3	1		1	71	63	63	1	2	3
Mean	8.7	9.4	7.9	1.8	2.9	5.3	1.6	2.6	0.6	47	60	56	1.3	5	6.7

category on the other ($\chi^2 = 7.76$; $0.01 > p > 0.005$). There is a difference between the "classical" and the "definite" categories, that is not yet significant ($\chi^2 = 3.24$; $0.10 > p > 0.05$).

Looking at the grade of tenderness it can be concluded that no specificity exists for joints that are merely tender. Under the heading "tender and winced" significantly more joints are involved in the "classical" category than in the "definite" category ($\chi^2 = 8.2$; $0.005 > p > 0.001$), but the difference between the "definite" and "probable" cases is not yet significant ($\chi^2 = 2.55$; $0.25 > p > 0.10$).

In the group of joints under the heading "tender, winced and withdrawn" a remarkable difference is found between the "definite" and the "classical" categories, the former scoring significantly higher ($\chi^2 = 17.4$; $p < 0.001$) and even between the "probable" and the "classical" categories ($\chi^2 = 4.96$; $p < 0.05$)! There is no significant difference between "probable" and "definite" cases ($\chi^2 = 2.12$; $0.25 > p > 0.10$).

If the groups under "tender and winced" and "tender, winced and withdrawn" are considered jointly, a very significant difference is found between the "definite" and the "classical" categories on the one hand and the "probable" category on the other ($\chi^2 = 8.3$; $p < 0.005$). Although the "classical" category score is slightly higher than that of the "definite" group (mean 5.9 as against 5.5), there is no significant difference here ($\chi^2 = 0.39$; $0.75 > p > 0.50$).

The total of 19 patients with "classical" rheumatoid arthritis had between them 24 deformed joints (ankylosis or subluxation) that were not at the same time swollen (mean 1.3), but there were only 3 such joints among the 8 patients with active "definite" disease (mean 0.4).

The joints that are obviously most often swollen and tender are the wrists, after which come the ankles, PIP and MCP joints. MTPs score fairly high on the tenderness scale compared with the number of swollen MTP joints. Possibly this reflects the difficulty of properly assessing the presence of swelling of these joints in the Basotho population.

3.3.8 Joint of onset

Thirty – one patients could tell which joints were involved first. Our initial impression that the feet and ankles were most often the starting points of the disease was not confirmed, as can be seen in table 3.17, although the ankles were the joints most frequently named by women.

Table 3.17.

Joint of onset: usually based on anamnesis.

		Hands	Wrists	Hands + wrists	Feet	Ankles	Feet + ankles	Others	Total
Females	no	5	2	3	3	7	1	3	24
	%	20.8	8.3	12.5	12.5	29.2	4.2	12.5	
Males	no	3	2	1	2	–	–	1	9
	%	33.3	22.2	11.1	22.2	–	–	11.1	
Total	no	8	4	4	5	7	1	4	33*
	%	24.2	12.1	12.1	15.2	21.2	3.0	12.1	

* 6 patients could not remember the first joint(s) to be involved.

3.3.9 Extra – articular manifestations

Subcutaneous nodules were noted in 9 (24%) of the patients. Biopsies were taken in 7 cases. Histologically, 5 of these fitted in with the diagnosis rheumatoid nodule; in one the diagnosis was equivocal and one was a neurofibroma. All the nodules, except the neurofibroma were found in women.

Three patients had keratoconjunctivitis sicca and two complained of dry mouths. Rheumatoid changes of the lung were not found, although some chest films were taken of suspected patients.

3.4 Discussion

3.4.1 Clinical criteria

Although the New York criteria are said to reflect the clinician's opinion more accurately than the ARA criteria (3.20) and render a more satisfactory separation from osteoarthritis, they have no advantage over the ARA criteria when applied to hospital patients (3.21). In our group 5 patients got a Manchester grading of 1 or less. They were all graded as "probable" according to the ARA criteria; two of them were positive for the New York criteria. However, 5 of the 8 patients not classified according to

the New York criteria were graded 2 or more by the clinicians opinion. In other words, a number of "certain" cases according to the physician's opinion would have been missed by the New York criteria, but not by the ARA criteria. On the other hand, 5 cases included through the ARA criteria were not considered by the clinician to be suffering from rheumatoid arthritis at all. This would have happened in only two cases under the New York criteria. Assuming that the clinician's opinion reflects the presence of rheumatoid arthritis most accurately (3.22), this would indicate that the New York criteria tend to be more specific but less sensitive than the ARA criteria.

Since only moderate and severe grades of polyarthritis (grades 3 and 4) can be recognized with some certainty and the significance of grades 1 and 2 is less certain (3.23), we might even try to raise the specificity of the clinician's diagnosis by omitting the 2 cases with grade 2, in which case the specificity of the New York criteria would also be raised (to 71%). The specificity of the ARA criteria will only rise if the "probable" cases are excluded (100% for gradings 2 – 4 and 86% for gradings 3 – 4).
This reflects the finding in population surveys, where there is a fairly satisfactory agreement on the "definite"/"classical" category, but if "probable" cases are added, the numbers are greatly increased but the specificity reduced (3.24). For this reason the emphasis should be on the "definite"/"classical" category when applying ARA criteria (3.25).

3.4.2 Radiology

The foregoing is also relevant when dealing with erosive arthritis, because here the emphasis should be on the more severe grades, since grade 2 erosions, particularly when confined to a single joint, have no significant correlation with clinical rheumatoid arthritis in contrast to grades 3 and 4 (3.26 – 3.31). The milder grades of erosion could be associated with trauma and infection (3.32,3.33), which could explain why erosive arthritis of the feet, mainly grade 2, is found so frequently in populations walking barefoot, as part of the Basotho do. Erosive arthritis of the hands is probably a more useful indicator of the prevalence of rheumatoid arthritis in such a population (3.32). Needless to say, erosions are more frequently encountered in the hands than in the feet of our patients, but twice as many jointgroups can be evaluated radiologically in the hands as in the feet, and we were dealing with clinical (i.e. selected) patients. However there was a great degree of concordance, since only one patient had erosive arthritis (grade 2) of the feet only.

There was no difference between the occurrence of erosive arthritis of the hands in males and in females, although the different grades were much more equally divided over the joint groups in the males. In the females the wrist and carpus accounted for most of the severe gradings, while grade 2 erosions were more often seen in the more periferal joints. This is in agreement with the findings of population studies among white populations, which have not revealed any significant sex difference, grade 3 – 4 erosive arthritis being present in 0.5% of males and 0.3% in females in the U.S.A. and 0.6% in males and 0.9% in females in the U.K. (3.34). Among our patients, however, men had significantly more erosive arthritis of the feet, but only in grades 3 and 4. There is no difference in the prevalence of grade 2 erosions and men certainly do not walk barefoot more frequently than women in Lesotho. Why there is a difference in the more severe grades of erosions in the feet remains unclear. Could the fact that many of the men had been working in the mines and that consequently relatively more males than females were classified as "urban" (42 vs 11 percent) play a role?

We see a striking difference between Lesotho at the one end and Nigeria at the other when comparing the radiological findings from hospital surveys in Africa (3.4,3.5,3.7) and in England (3.35) as shown in table 3.18. The proportion of patients with grades 3 and 4 erosive arthritis is greater in Lesotho than in Nigeria, Kenya and even more severe than in England.

Table 3.18.

Radiological findings in Nigerian, Ugandan, Kenyan, English and Basotho patients with rheumatoid arthritis (figures as percentages).

Grade	Nigeria	Uganda	Kenya	England	Lesotho
0 – 1	69		19	17	26
2	21		38	36	18
3	8		36	32	37
4	2		7	15	18
2+	31	71	81	83	74

The pattern of the joints involved was generally not different from that elsewhere (3.36,3.37), the joints most frequently involved being the wrist, carpus, mcp and lateral mtp – joints.

3.4.3 Serology

Up till now the highest rate of seropositivity in African hospital surveys has been reported from Kenya(3.1,3.38,3.10). The figures presented from that country are similar to those from Europe and the U.S.A. (3.39 – 3.46). As seen in table 3.19 the rate of seropositivity in Uganda (3.5) is less than that in Kenya and there is a very great difference compared with Nigeria, in Western Africa, where indeed the prevalence of RF – positivity in the sera of control populations does not differ significantly from that found in indigenous patients with rheumatoid arthritis (3.4). In marked contrast with this, the number of seropositive patients in Lesotho is exceptionally high.

Table 3.19.

Positive rheumatoid factor (LFT) in Nigerian, Ugandan (3.51), Kenyan and Basotho patients and control groups (figures as percentages).

	Nigeria	Uganda	Kenya	Lesotho
Patients	13	54	77	92
Control group	13	14	14	12

It should be realised that in various situations different test systems were used, even where patients and controls from the same areas were concerned.

Our control groups, however, showed the same high numbers of false positives, that have been reported from elsewhere in Africa ranging from 5.5% – 17% (3.47 – 3.53,3.4,3.10,3.11). The high prevalence of chronic infections in these populations is most frequently put forward as a possible explanation. The diseases usually blamed are malaria (3.50 – 3.52,3.4,3.11), trypanosomiasis (3.50,3.54), filariasis (3.55), kala – azar (3.50), leprosy (3.56,3.57) and pulmonary tuberculosis (3.18).

The first four of these diseases do not occur in Lesotho, leprosy is rare, and tuberculosis is the only common disease. Although the number of positive LFT's was higher in the control group suffering from tuberculosis, this difference only applies to the females, but even there it does not reach a significant level ($\chi^2 = 1.73$; $0.25 > p > 0.10$). It must be kept in mind, however, that the relationship between healed tuberculosis and a positive LFT is much more definite than that between active tuberculosis and a positive LFT (3.58,3,18).

Syphilis has also been associated with a positive LFT, but the two individuals in our control group with a positive VDRL were negative in the LFT. Lastly, malnutrition has been suggested as being associated with a

high prevalence of RF (3.55). As already stated, many Basotho children certainly do suffer from malnutrition.

According to the ARA criteria, not more than 5% of the control sera may be positive for RF; a positive test cannot be counted as a diagnostic criterion if this prerequisite is not fulfilled. Because an alternative is lacking and to make comparisons with other surveys possible (3.59), a positive RF has been retained as a diagnostic criterion in African surveys.
However, if we were to disregard a positive RF as a criterion for our patients, one patient would change her classification from "definite" to "probable" and two from "probable" to "possible". This is certainly not a great change, especially not for the "definite"/"classical" category.

3.4.4 Extra – articular manifestations

As in other African studies, extra – articular manifestations were rare, except for nodules, which occurred as often as in European patients. This is again in marked contrast to Nigerian patients (see table 3.20).

Table 3.20.

Nodules in Nigerian, Ugandan, Kenyan and Basotho patients (figures as percentages).

	Nigeria	Uganda	Kenya	Lesotho
Nodules	1	9	32	24

According to the ARA criteria, both the presence of nodules and histological confirmation count as diagnostic criteria. The fact that the nodules in one of our patients (the only one that scored zero according to the physician's grading) turned out to be neurofibromas, situated at the very spot where one can expect rheumatoid nodules should lead to the conclusion that the histology must serve either to confirm or to exclude a nodule as a diagnostic criterion, since von Recklinghausen's disease is not listed under the exclusions.

3.4.5 Joint score

"Not only do the patterns of chronic disorders differ in different races in different countries, but the expressions of pain also vary; a continued and intensified study in pain and the conditions causing it in the African is indicated" (3.60). It has been noted before, that pain in a joint on motion is very common among Africans (3.61) and indeed in our sample there seems to be no specificity for pain alone. It was therefore worth trying to grade the pain, for which purpose a spontaneous, involuntary expression of pain is probably better than a verbal one, especially when there is a language barrier.

Although the more severe grades of tenderness were found significantly more often among "definite" and "classical" cases, it remains to be explained why the "definite" and even the "probable" category scores higher in the severest group headed "tender, winced and withdrawn". An explanation might be found in the following reasoning.

During the course of the disease the classification of a patient with rheumatoid arthritis could change from "probable" to "definite" and either end up in the "classical" category or become inactive. This is supported by the findings in table 3.14. This process will of course vary with time between the various patients and there will be some overlapping between the diagnostic categories when plotted against tenderness grade. "Probable" and "definite" cases will then be more active and painful than "classical" and "burned – out" disease. This might explain why the "definite" and "probable" groups score higher in the category "tender, winced and withdrawn" and the "classical" cases in the category "tender and winced". This accords with the finding that the mean number of "burned – out" joints was substantially higher among the "classical" cases than among the "definite" ones.

3.4.6 Course of the disease

" Criteria such as ability to perform everyday activities with or without assistance or recourse to mechanical aids, do not necessarily select patients with the same degree of disability in different cultures" (3.7).

In all probability the functional capacity (appendix 5) of the patients in our prospective study, whose condition grew rapidly worse (23.5%) would have been estimated as grade 3 or 4. Rasker et al. (3.62) assessed the functional capacity of 100 English patients with "definite" or "classical" rheumatoid arthritis one year after the onset of their disease. Thirteen percent had a functional capacity of grade 3 or 4. If the "definite" and "classical" cases with a history of less than 2 years only were selected from our group, 33%

of them would have been placed in either of these two higher grades. The percentage might be even higher, because it is not known what happened to the patients, who only came once. It might be postulated that some of them had deteriorated too much to come back again.
Comparison with a Scottish (3.63) and a Nigerian (3.4) hospital survey, based solely on the clinical impression after 2 years' follow – up, is made in table 3.21.

Table 3.21.

Comparison of follow-up findings in Nigerian, Scottish and Basotho patients with rheumatoid arthritis (figures as percentages).

	Scottish	Nigerian	Basotho
Improved	70	73	7
No change	12	23	37
Worse	18	4	56

Unfortunately, it is not known how big the "probable" category was in the Nigerian survey, although it is stated that the study was biased in favour of patients with severe disease.
It seems that the patients in Lesotho fared worse than both those in Nigeria and those in Great Britain.
Guintran et al. (3.64) are of the opinion that the evolution of rheumatoid arthritis as they saw it in Madagascar was often severe as a consequence of frequently delayed diagnosis and difficulties encountered in the treatment of outpatients. This might also be the case in Lesotho.
We assume that the skill of the doctors at Scott Hospital does not differ too much from that of their collegues in Nigeria, but of course the Nigerian hospital was a large referral hospital with far greater resources. However, no significant difference was found in the outcome of the disease in Nigerian patients who had received continuous hospital supervision and in those who defaulted shortly after appearing in hospital; this suggests that genetic and/or environmental factors might result in rheumatoid arthritis in Nigeria taking a different course from that in Lesotho.

This patient did not come for his RA, but because he had been attacked by somebody with a sword !

3.4.7 General considerations

It is difficult to draw meaningful conclusions regarding the incidence and prevalence of a disease from a survey conducted on a hospital population.

It has been observed in Europe that many arthritics, often with quite serious disease, are omitted from statistical studies based on hospital patients only, as some rheumatoid cripples never attend hospital at all (3.65). This was certainly the case in Lesotho, and probably to an even greater extent due to bad transport facilities and poverty. Since there are virtually no general practitioners in rural Lesotho, the doctors in the hospitals could be regarded as fulfilling the function of G.Ps partially, but even if all the patients consulting family doctors are included in European studies, many patients with symptomatic arthritis may be missed (3.66).

That this may be even more so in Lesotho is clear from comparison of the reasons for consultation in Holland and in Lesotho as shown in tables 3.1 and 3.2. In the United Kingdom as much as 18% of all general practitioner consultations have been reported to be for rheumatic conditions (3.67). Elsewhere in Africa the same phenomenon has been noted as Kanyerezi (3.5) mentions that several Ugandan patients with rheumatoid arthritis, who had symptoms for over 10 years, had not attended a hospital clinic before. It follows that estimates of the prevalence of rheumatoid arthritis based on hospital data or consultations with the family doctor are bound to be an underestimate in Europe and that this may be true to a greater extent in Lesotho.

On the other hand, if only those with moderate or severe arthritis (grade 3 – 4) are considered in European studies, the estimates will probably be more accurate (3.68). The same thing may apply to Lesotho, since of the 24 patients from within the SHA seen during the prospective year only one had "probable" disease, which seems to indicate that especially many milder cases never bother to go to hospital.

Although it might be argued, that conducting a survey of arthritis in a hospital in a developing country could have attracted more arthritic patients, thus giving a bias, this is unlikely to have happened in our case during the prospective year, considering the fact that 34.4% of the new outpatients came from the SHA as against only 25% of the patients with rheumatoid arthritis.

The estimated number of people over the age of 25 in the SHA is 40,000. Concentrating on the 22 "definite" and "classical" patients seen during the prospective year and assuming that they represent 40% of the total number of patients with "definite" or "classical" rheumatoid arthritis

(3.8) a prevalence of "definite" and "classical" cases can be calculated of 1.4 per 1,000. Including the "probable" category that can be expected at population level would give an estimated prevalence 4 – 7 times as high (3.8,3.14) or 5.5 – 9.6 per 1,000. The latter figure closely approaches the 1% rheumatoid arthritis found in temperate climates.
However, as already stated, these numbers do not necessarily represent the real prevalence, because there are too many unknown factors. If for instance the number of patients seen is not 40% but 60% of the total number of "definite" and "classical" cases in the SHA, the prevalence of patients with these two higher grades of rheumatoid arthritis drops to 0.9 per 1,000, which is considerably lower than the 0.9% reported from the U.S.A. (3.69), even though this number is not corrected for the difference between the age distribution of all the people of 25 and older in the two countries.

Although nothing definite can be said about the incidence and prevalence of rheumatoid arthritis in Lesotho, the impression given by this hospital survey is different from that given by other hospital surveys in Africa, particularly Western Africa. Nevertheless, the differences observed in the African hospital studies referred to so far may follow a certain pattern when considering the longitude, which runs roughly parallel to altitude in Africa.
The mildest forms of rheumatoid arthritis reported so far have been in Nigeria in the West of Africa and the severest forms in Kenya in the East, with Uganda occupying a position in between, both as regards its geographical position and as regards the severity of the cases reported. Lesotho seems to be placed beyond Kenya on the scale of general severity. When comparing the data from Nigeria, Kenya and Uganda with those of Lesotho, it must constantly be borne in mind that the former three are big, academic referral centres. Hospital studies conducted before these three university – centred surveys never produced any substantial numbers.

A more rapid and severe course of rheumatoid arthritis might have implications for the point prevalence without altering the incidence, since the generally agreed reduction of life span of patients with rheumatoid arthritis is probably attributable to the patients with relatively severe disease, who die 10 or more years prematurely according to one follow – up study performed in England (3.62).
This point prevalence will be discussed in the following chapters.

LITERATURE

3.1 Hall, L. (1966) Polyarthritis in Kenya. E. Afr. med. J. 43, 161 – 170

3.2 Gelfland, M. (1969) Medical arthritis in African practice. Centr. Afr. J. Med. 15, 131 – 135.

3.3 Kanyerezi, B.R. (1969) Rheumatoid arthritis in Uganda. E. Afr. med. J. 46, 71 – 75

3.4 Greenwood, B.M. (1969) Polyarthritis in Western Nigeria I Rheumatoid arthritis. Ann. Rheum. Dis. 28, 488 – 496

3.5 Kanyerezi, B.R., Baddeley, H. and Kisumba D, (1970) Rheumatoid arthritis in Ugandan Africans. Ann. Rheum. Dis. 29, 617 – 621

3.6 Anderson, I.F. (1971) Rheumatoid arthritis in the Bantu. S. Afr. med. J. 44, 1227 – 1229

3.7 Bagg, L.R., Hansen, D.P., Lewis, C., Houba, V. (1979) Rheumatoid arthritis in Kenya I Clinical observations. Ann. of Rheum. Dis. 38, 23 – 25

3.8 Solomon, L., Robin, G., Valkenburg, H.A., (1975) Rheumatoid arthritis in an urban South African Negro population. Ann. Rheum. Dis. 34, 128 – 135

3.9 Thould, A.K. and Simon, G. (1966) Assessment of radiological changes in the hands and feet in rheumatoid arthritis. Ann. of Rh. Dis. 25, 220 – 228

3.10 Houba, V., Bagg, L.R., Hansen, D.P. and Bowry, T. (1978) Rheumatoid arthrtis in Kenya II Serological observations. Ann. Rh. Dis. 37, 26 – 30

3.11 Greenwood, B.M., Muller, A.S., Valkenburg, H.A. (1971) Rheumatoid factor in Nigerian sera. Clinical and Experimental Immunology 9, 161 – 173

3.12 Oliemans, A.P. (1969) Morbiditeit in de huisartsenpraktijk P 90 – 91. HE Stenfert Kroese N.V. Leiden

3.13 Ropes, M.W., Bernett, G.A., Cobb, S., Jacox, R. and Jessar, R.A. (1959) The revised ARA Criteria for RA. Ann. rheum. Dis. 18, 49 – 53

3.14 Beighton, P., Solomon, L., Valkenburg, H.A. Rheumatoid arthritis in a rural South – African Negro population (1975) Ann. Rheum. Dis. 34, 136 – 141

3.15 Atlas of Standard Radiographs. The Epidemiology of Chronic Rheumatism (1963) Vol. 2 Blackwell Scientific Publications, Oxford

3.16 Dalman-Ciria, M. (1964) La preneba del latex en lass enfermedades nos rheumaticas Med. Clin. 12, 148

3.17 Lesotho Flying Doctor Service, Child Spacing Record 1980, Maseru

3.18 Singer, J.M., Plotz, C.M., Pevalta, F.M. and Lyons, H.C. (1962) Ann. Intern. Med. 56, 545 – 552, The presence of anti – gammmaglobulin factors in sera of patients with active pulmonary tuberculosis

3.19 Lawrence, J.S. (1961a) Prevalence of rheumatoid arthritis Ann. Rheum. Dis. 20:11 – 17

3.20 Kellgren, J.H. (1966) Epidemiology of rheumatoid arthritis. Arthr. Rheum. 9,658 – 663

3.21 Chalmers, T.M., Danchot, J., Kellgren, J.H., King, D., Pikhlak, E., Sievers,

K., Strevens, E., Tait, B. and Wood, P.H.N. (1970) Test of diagnostic criteria – experience in England and Wales. Ann. Rheum. Dis. 29,200 – 203

3.22 Muller, A.S. (1970) Population studies on the prevalence of rheumatic diseases in Liberia and Nigeria. MD thesis Leiden J.H. Plasmans – 's Gravenhage P.41

3.23 Lawrence, J.S. (1977) Rheumatism in populations. W. Heinemann. Medical Books LTD London (p 160)

3.24 idem p 199 – 200

3.25 idem p 201

3.26 idem p 169

3.27 Gofton, J.P., Robinson, H.S. and Price, G.E. (1964) A study of rheumatic disease in a Canadian indian population II Rheumatoid arthritis in the Haida Indians Ann. Rheum. Dis. 23:364 – 371

3.28 Lawrence, J.S., Bremner, J.M., Ball, J. and Burch, T.A. (1966) Rheumatoid arthritis in a subtropical population. Ann. Rheum. Dis. 25:59 – 66

3.29 Lawrence, J.S., Behrend, T., Bennett, Ph., Bremner, J.M., Burch, T.A., Gofton, J., O'Brien, W. and Robinson, H. (1966) Geographical studies on rheumatoid arthritis. Ann. Rheum. Dis. 25:425 – 432

3.30 Wood, P.H.N., (1970) Epidemiology of rheumatic disorders: Problems in classification Proc. roy. Soc. Med. 63:189 – 198

3.31 3.22 p 99

3.32 3.22 p 218

3.33 Crock, H.V. (1964) Post-traumatic erosions of articular cartilage. J. Bone Jt. Surg. 46B:530 – 538

3.34 3.22 p206

3.35 Thould, A.K. and Simon, G. (1966) Assessment of radiological changes in the hands and feet of rheumatoid arthritis Ann. Rheum. Dis. 25,220 – 228

3.36 3.22 p 208

3.37 Valkenburg, H.A. 1975, De epidemiologie van chronische reumatische gewrichtsziekten. Medicinae Scientia donat. 8th Ed. of Merck Sharp and Dohme B.V. no 17 p 5 – 16

3.38 Bagg, L.R., Hansen, D.P., Mutiboko, I.K. and Lewis, C. (1976) Chronic polyarthritis at the Kenyatta National Hospital. East African Medical Journal 53,567 – 572

3.39 Singer, J.M. and Plotz, C.M. (1956) The latex fixation test I Application to the serologic diagnosis of rheumatpid arthritis. American Journal of Medicine 21, 888 – 892

3.40 Cecchi, E. and Ferraris, F. (1959) Serological reactions in the diagnosis of rheumatoid arthritis. Acta Rheumatologica Scandinavica 5,136 – 147

3.41 Harter, F. (1959) Agglutination mit sensibilisierten Schaferythrozyten am Kälterpräzipitat im Rahmen der für die primär-chronische Polyarthritis charakterischen Serumveränderungen Zeitschrift für Rheumaforschung, 18,150 – 159

3.42 Houba, V. and Tesarek, B. (1961) Comparison of the latex test and

haemagglutination reaction in progressive polyarthritis. English summary. Fysiatricky Vestnik 32,80 – 86

3.43 Wager, O., Ripatti, N., Laine, V., Julkunen, H. and Aho, K. (1961) Clinical evaluation of the tests in rheumatoid arthrits II Hospital series of patients with definite rheumatoid arthritis. Acta Rheumatologica Scandinavica 7,209 – 218

3.44 Waller, M.V., Decker, B., Toone, Jr, E.C. and Irby, R. (1961) Evaluation of rheumatoid factor tests. Arthritis and Rheumatism 4:579 – 591

3.45 Ball, J., Bloch, K.J., Burch, T.A., Kellgren, J.H., Lawrence, J.S., and Tsigalidon, V. (1962) Comparitive studies of serologic tests for rheumatoid disease II A comparison of the bentonite flocculation test and the sensitised sheep cell agglutination test. Arthritis and rheumatism 5,61 – 69

3.46 Winblad, S. (1964) Studies in the laboratory estimation of the rheumatoid arthritis factor 5 FHA reaction with the tanned cells technique in relation to other tests. Acta Rheumatologica Scandinavica 10,81 – 91

3.47 Malawista, S.E., Boies, Jr., L.R. and Seides, S.W. (1959) Evaluation of an epidemiological method. Rheumatoid arthrits in Liberia. Ann. Rheum. Dis. 18,305 – 308

3.48 Valkenburg, H.A. and Hijmans, W. (1961) 10th International Congress of Rheumatology, Rome. Abstracts. Minerva Medica: Turin

3.49 Hijmans, W., Valkenburg, H.A., Muller, A.S. and Gratama, S. (1964) Rheumatoid arthritis in Liberia, with an assessment of serological findings. Ann. Rheum. Dis. 23,45 – 49

3.50 Houba, V. and Allison, A.C. (1966) Lancet I, 848 – 852 M – Antiglobulins (rheumatoid-factor-like globulins) and other gamma-globulins in relation to tropical parasitic infections.

3.51 Wells, J.V. (1967) Positive results to serological tests for rheumatoid factor in New Guinea Med. J. Aust. 2,777 – 779

3.52 Shaper, A.G., Kaplan, M.H., Mody, N.J. and McIntyre, P.A. (1968) Malarial antibodies and autoantibodies to heart and other tissues in the immigrant and indiginous peoples of Uganda. Lancet I, 1342 – 1347

3.53 Meyers, O.L., Daynes, G. and Beighton, G. (1977) Rheumatoid arthritis in a tribal Xhosa population in the Transkei, Southern Africa. Annals of Rheumatic Diseases, 1977, 36,62 – 65

3.54 Klein, F. and Mattern, P. (1965) Rheumatoid factors in primary and reactive macroglobulinaemia Ann. Rheum. Dis. 24,458 – 464

3.55 3.22 p 84

3.56 Cathcart, E.S., Williams, R.C., Ross, H. and Calkins, E. (1961) The relationship of the latex fixation test to the clinical and serological manifestation of leprosy. American Journal of Medicine 31,758 – 765

3.57 Abe, M., Chinone, S. and Hirako, T. (1967) Rheumatoid factor like substance and antistreptolysin O antibody in leprosy serum: Significance in erythema nodosum leprosum, International Journal of Leprosy, 35,336 – 344

3.58 Lawrence, J.S., Locke, G.B. and Ball, J. (1971) Rheumatoid serum factor in populations in the U.K. I Lung disease and rheumatoid serum factor Clin. Exp. Immunol. 8,723

3.59 3.22 p 61

3.60 Pain and arthritis in the African (Editorial) Br. Med. J. (1980) 280 (6213),504 – 505

3.61 3.22 p 25

3.62 Rasker, J.J. and Cosh, J.A. (1981) Cause and age at death in a prospective study of 100 patients with rheumatoid arthritis. Ann. Rheum. Dis. 40,115 – 120

3.63 Duthie, J.J.R., Thompson, M., Weir, M.M. and Fletcher, W.B. (1955) Medical and social aspects of the treatment of rheumatoid arthritis. Ann. Rheum. Dis. 14,133 – 149

3.64 Guintran, J.L., Coignard, A., Capdevielle, P., Allard, Ph., Delprat, J. and Laroche, R. (1979) Polyarthrite Rheumatoide a Madagascar. Medicine Tropicale 39, vol 3,279 – 283

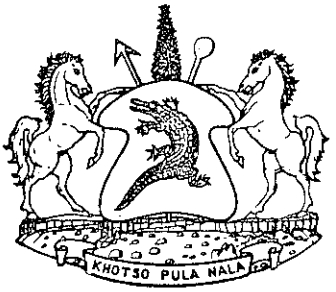
3.65 3.23 p 6

3.66 Kellgren, J.H., Lawrence, J.S. and Aitken – Swan, J. (1953) Rheumatic complaints in an urban population. Ann. Rheum. Dis. 12,5 – 15

3.67 Wood, P.H.N. (1978) Epidemiology of rheumatic diseases. In: Copeman's Textbook of the Rheumatic Diseases. 5th Edition Chapter 3. Edited by J.T. Scott, Edinburg-Churchill-Livingstone.

3.68 3.23 p 8

3.69 Engel, A., Roberts, J. and Busch, T.A. (1966) RA in adults. United States 1960 – 2. Public Health Service Publication, no 1,000, series 11, no 17.



CHAPTER 4

THE POPULATION SURVEY

4.1 Introduction

Rheumatoid arthritis has been the subject of extensive epidemiological studies in the developed world (4.1 – 4.4). Interesting differences in prevalence between countries have been found (table 4.1).

Table 4.1.

Estimates of rheumatoid arthritis in various developed countries (4.5).

Country	Prevalence		Mortality	
	Probable & definite cases by ARA criteria (%)	Ratio of rates in the sexes (M:F)	Standardized death rate	Ratio of rates in the sexes (M:F)
Finland	7.5	1: 2.5	46.9	1:3.2
Germany Federal Republic	5.7	1: 0.5	33.2	1:2.4
U.K.	4.0	1: 2.1	27.5	1:2.8
U.S.A. (Tecumseh)	2.5	1: 4.7	13.6	1:2.1
Czechoslavakia	1.3	1: 1.5	20.1	1:3.8
Japan	0.4	1:13.8	41.4	1:2.8

The variable sex ratio and contrasting patterns of reported mortality however could raise doubts about the comparability of these data. The low specificity of most of the screening criteria restricts the effectiveness of mass surveys and it has been suggested that lack of precise diagnostic criteria strongly influences prevalence studies of the disease (4.6). Thus the regional differences are said to be artificial and to result from confusion with "probable" rheumatoid arthritis cases (4.7). Some of the latter are

considered more likely to be polyarticular osteoarthrosis with a positive rheumatoid factor test. The confusion arises easily since the first three ARA criteria (morning stiffness, pain on movement of a joint and swelling of a joint) apply equally to rheumatoid arthritis and osteoarthrosis. If however only the "definite" cases are included then the prevalence of rheumatoid arthritis throughout the world would seem to be uniform at about 1% to 2% of the population (4.7). It has recently been claimed (4.8) that this longstanding opinion can no longer be held following a 15 year longitudinal population study of rheumatoid arthritis in Japan (4.9) where both incidence and prevalence (the latter being 0.3%) were found to be significantly lower than in western Europe and the United States.

Great differences in prevalence have also been reported from less well developed areas of the world, ranging from 0.9% to 11% (table 4.2).

Table 4.2.

Rheumatoid arthritis (ARA) in developing countries or populations.

Country	Age range (years)	No. in sample	Prevalence of RA (%)	Ratio of rates in sexes (M:F)
Caribian (Negros)				
Jamaica (4.10)	35 – 64	530	11.0	1:1.9
USA (Amerindians) (4.11)				
Pima	30 –	968	5.4	1:1.3
Blackfeet	30 –	1102	4.1	1:1.4
South Africa (Negros)				
Urban Tswanas (4.12)	15 –	551	3.3	1:1.4
West Africa (Negros)				
Nigeria/Liberia (4.15)	15 –	831	2.3	1:1.5
South Africa (Negros)				
Rural Xhosas (4.13)	18 –	577	2.2	?
Canada (Amerindians)				
Haida (4.14)	15 –	436	2.0	1:1.0
Caribian (Negros)				
Puerto Rico (4.16)	18 –	3885	0.9	1:3.9
South Africa (Negros)				
Rural Tswanas (4.17)	15 –	801	0.9	1:0.25

The same confusion, however, that arises in respect of the prevalence figures from the developed countries also arises when we compare the figures from these so called developing nations and populations, in fact to an even greater extent.

It has already been stated that the specificity of the first three ARA criteria is low. But, as has already been pointed out, the specificity of a positive RF in an African population is less than in Europeans, the number of false positives being approximately three times higher in the former. Accordingly, if someone in an African example complains, say, of morning stiffness and pain in a joint and happens to have a positive RF (a chance of about 1:8), he/she will be classified as "probable" according to the ARA criteria. This problem does not exist to the same extent when making the diagnosis of "definite" rheumatoid arthritis according to the ARA criteria, as the swelling of at least one joint or, which is rarer, the presence of nodules is required if such a diagnosis is to be made.
This also applies to a certain extent to the New York criteria, since a positive RF and the presence of erosive arthritis loose their specificity as criteria in the absence of both of the first two, clinical, criteria.
Just as a high number of false positive RFs can raise the prevalence especially of "probable" rheumatoid arthritis, so will the presence of many people with erosive arthritis grade 2 without clinical disease have the same implication as was the case in the Nigerian/Liberian and the Jamaican samples.
Although an extremely high prevalence rate has been reported from Jamaica, this was due to an excess of mild cases in the Jamaican population, and no severe cases were encountered. When applying the Rome criteria "probable" disease tended to be increased and "definite" disease diminished. It was suggested that the Jamaicans have a relatively high predisposition to rheumatoid arthritis but that they tend to have a milder form of the disease (4.10.). The latter suggestion could equally apply to the populations investigated in Nigeria and Liberia, where grade 3 or 4 inflammatory polyarthritis was not diagnosed, but the prevalence of "probable" and "definite" cases according to the ARA criteria was not significantly different from the values expected on the basis of the figures from England (4.15.).

Apart from this confusion concerning the dilution of the total prevalence figures by uncertain cases which, as we have seen, also arises when considering the population surveys from the developed countries, specific problems are encountered when conducting this kind of survey in the developing areas of this world and interpreting the results thereof.
Muller noted with regard to the Nigerian survey that the difficulties in getting a random population sample in developing countries, where census figures are usually not available and where births and deaths are seldom registered, had been underestimated (4.18). Consequently, the response rate

of the Nigerian and Liberian study could not be determined; willingness to participate, however, was least among old people and it was almost certain that especially the women of 55 years and older refused to come to submit themselves to an examination (4.19). This is a serious problem, since it is in this group that rheumatoid arthritis can be expected to be found most frequently.
Moreover, the majority of the respondents also did not know their age and an estimated age had to be recorded, which was a guess, often based on events in nature such as catastrophies like earthquakes (4.20).

A third problem that arose while conducting this first population survey in Africa was the doubtful reliability of the histories. It was observed that often the same questions asked to the same person resulted in different answers. In particular it was impossible to get any reliable information on morning stiffness and a history of past polyarthritis, a problem that has also been reported in the study among the Haida Indians (4.14.). Consequently, the presence of morning stiffness and a history of past polyarthritis had to be omitted as criteria for the diagnosis of rheumatoid arthritis (4.21). The clinical diagnosis of inflammatory polyarthritis was eventually thought to constitute the most reliable index of the frequency of occurrence and the severity of rheumatoid arthritis in African populations (4.22).
Based upon the experiences gained from this first African population survey, the following recommendations were made with regard to possible subsequent studies of the prevalence of rheumatoid arthritis in African population groups: – firstly, that it would seem advisable to select for the survey one or more villages small enough to enable the entire population to be included in the sample (4.23), and secondly, that the diagnostic criteria for rheumatoid arthritis, based as they are on European and American experience, should be modified to be applicable to the African situation (4.24).

These recommendations have been largely heeded in later population surveys, which were all conducted in Southern Africa. The first one, actually a combined survey, compared the findings for a group of rural and a group of urban Tswanas in the Transvaal, South Africa (4.17, 4.12). Although the first recommendation (regarding the size of the village) was not effectuated, Soweto being a town of over a million inhabitants and Phokeng a rural village of just over 10,000 people, the criteria were modified to suit the African situation. An interesting point that emerged was a highly significant difference between both the prevalence and the form of rheumatoid arthritis encountered in the rural and the urban populations. Both the prevalence of "definite" and of "definite" and "probable" rheumatoid arthritis combined were significantly lower in the rural Tswanas than those

reported in European and American populations (4.17). Besides, such changes as were encountered on clinical and radiological examination were invariably mild and no respondent in the entire survey had clinical features that would have ordinarily been accepted as those of rheumatoid arthritis. Consequently, the picture obtained bears a close resemblance to that presented by West Africa.
In the urban population, however, the prevalence of rheumatoid arthritis was found to be strikingly similar to that in other industrialised countries throughout the world (4.17). Moreover, the form of the inflammatory polyarthritis encountered resembled that of clinical rheumatoid disease much more closely than did the very mild and even dubious manifestations reported in other African studies.

The modified criteria used in the Tswana survey were also applied in the survey conducted two years later among the inhabitants of two adjacent villages in the Transkei, Southern Africa (4.13). Although it was claimed, that the relatively low prevalence of rheumatoid arthritis found was consistent with the outcome of other surveys in unsophisticated African Negro populations in West Africa and South Africa, it could be argued that the prevalence figures given in this survey cannot properly be compared with those found in industrialised countries, since unfortunately no adjustment was made for the difference in age distribution that is known to exist in the populations of developing and highly developed countries. If adjusted the figure could therefore be higher. If we compare the prevalence figure of 2.2% for "probable" and "definite" cases combined in the survey among the Xhosas with the 3.3% found among the urban Tswanas, who can be assumed to have the same population pyramid as the Xhosas, it can be calculated that this is not yet a significant difference ($\chi^2 = 2.94$; $0.10 > p > 0.05$). The 0.68% for "definite" cases in the Transkei compared with the 0.9% in the urban Tswanas and the 0.12% observed in the rural Tswanas is unfortunately based on numbers that are too small to warrant any definite statement.

4.2. Procedures

4.2.1. Method of sampling

The survey was designed by the Tuberculosis Research Institute (TBRI) at Pretoria and aimed at establishing the point prevalence of pulmonary tuberculosis in Lesotho. The study of the prevalence of rheumatoid arthritis was incorporated in this survey and was consequently

performed at the same time and on the same population sample, with the exception of all the children under the age of 15.

The de facto Basotho population from that age onwards served as the target population. As can be calculated from table 2.2, this amounted to a total number of 366,373 female and 221,602 male Basotho at the time of the 1976 census. Simple stratification was employed according to the four topographical zones with weights assigned to determine the number of sites to be selected from each (table 4.3).

Table 4.3.

Weighted distribution of sample sites according to topographical zones.

Zone	Altitude (m.)	Population (1976)	No. of sites.
Lowlands	1,500 – 1,750	560,400	4
Foothill	1,750 – 2,000	274,643	2
Mountain	2,000 +	252,518	1
Orange River Valley	1,000 – 1,500	129,254	1
All zones	1,000 +	1216,815	8

Eight villages, irrespective of population size, were selected randomly and, if they were too small to supply 400 people (of all ages) for registration, grouped with adjacent villages according to the methods outlined by the W.H.O. in 1958 (4.25).

Table 4.4 shows the sites selected with their respective 1976 census population sizes.

Villages adjacent to sample sites, which were included because the original sites were too small in population size, are also given where applicable. Their location is shown in fig. 2.2.

In the case of site 7, Linareng, no adjacent village was chosen for reasons described in the "diary" to be found in the next few pages of this chapter, and site 8 , Bolepeletsa, turned out to be large enough in itself.

Several other problems arose. Sometimes, as in the case of Linareng, there happened to be more villages with the same name in the same area. Sometimes it was extremely difficult to find a person who knew where a village was located; in about half of the cases even the districts nurse did not know the location of a selected village and we had to ask many people (e.g. outpatients at Scott Hospital) before we found out. In two cases it turned out that the village had been allocated to the wrong topographical

Table 4.4.

Villages included in survey sample with population size as in 1976.

Zone	Site no.	Village	District	Population in 1976
Lowland	1	Ramarumo (+ Ha Libe)	Mohale's Hoek	158 (301)
	2	Majane (+ Thaba Chitja)	Mafeteng	190 (?)
	3	Ha Ramorakane	Maseru	1003
	4	Tsikoane	Leribe	1779
Foothill	5	Likhama (+ Sekiring)	Mafeteng	133 (?)
	6	Theko	Maseru	500
Mountain	7	Linareng	Mokhotlong	280
Orange River Valley	8	Bolepeletsa (+ Mabitseng)	Quithing	263 (135)

In subsequent tables these 8 villages will be rearranged according to altitude.

area in the census report. Majane was situated in the lowlands instead of the foothills and Theko in the foothills instead of the lowlands. However, since they were situated in the right districts and no other villages could be found with the same names, we assumed them to be the sites selected.

4.2.2. Method of registration

In the month preceding the examinations a registration clerk/motivator had the sample group registered. This was usually done by or under the supervision of the public health nurse of the district in which the village concerned was situated.

Every living quarter in the sample group was visited to register the persons living there. Each household was given a number, which was entered on the registration list as the "family number". An individual "attendance card" was filled in for every person belonging to the household, i.e. for each individual who habitually slept in the house or had habitually slept there and intended to return. The registration official therefore carried two forms: – firstly, a registration list bearing the sequential numbers (see appendix 6), name, age, sex, family number and classification for attendance (see below); – secondly, the attendance card with the same

information as that on the registration list, but prepared for every individual separately (see appendix 7). This card also bore the screening date together with the name of the screening centre. These cards were left with the respective households or individuals themselves for presentation to the survey team on the first day of examination.

A person was classified as temporarily absent and the registration list marked TA if he/she belonged to the household but was absent from the community and was expected to remain absent on the night preceding the examinations. A person who was simply away from home, working in the fields, for instance, but was expected to return to the household at night was included in the examinations and was not classified as TA.
A person was classified as temporarily present (TP) if he/she did not belong to the household but was present at the registration and was expected to sleep in the house the night before the examinations started. These two categories (TA and TP) have eventually been omitted from the figures used to calculate the prevalence of rheumatoid arthritis.

Apart from being registered the people had to be motivated as well. The fact that tuberculosis is the biggest killer disease in Lesotho may in itself have been a motivation. People were told that a diagnosis of tuberculosis could not be made on the spot but that the results would be conveyed to them as soon as they became available. The possibility of taking blood samples from some was mentioned.
The cooperation of the chief was extremely important for a proper motivation and it was on him that our initial efforts were focussed. Fortunately, most of them turned out to be very cooperative.

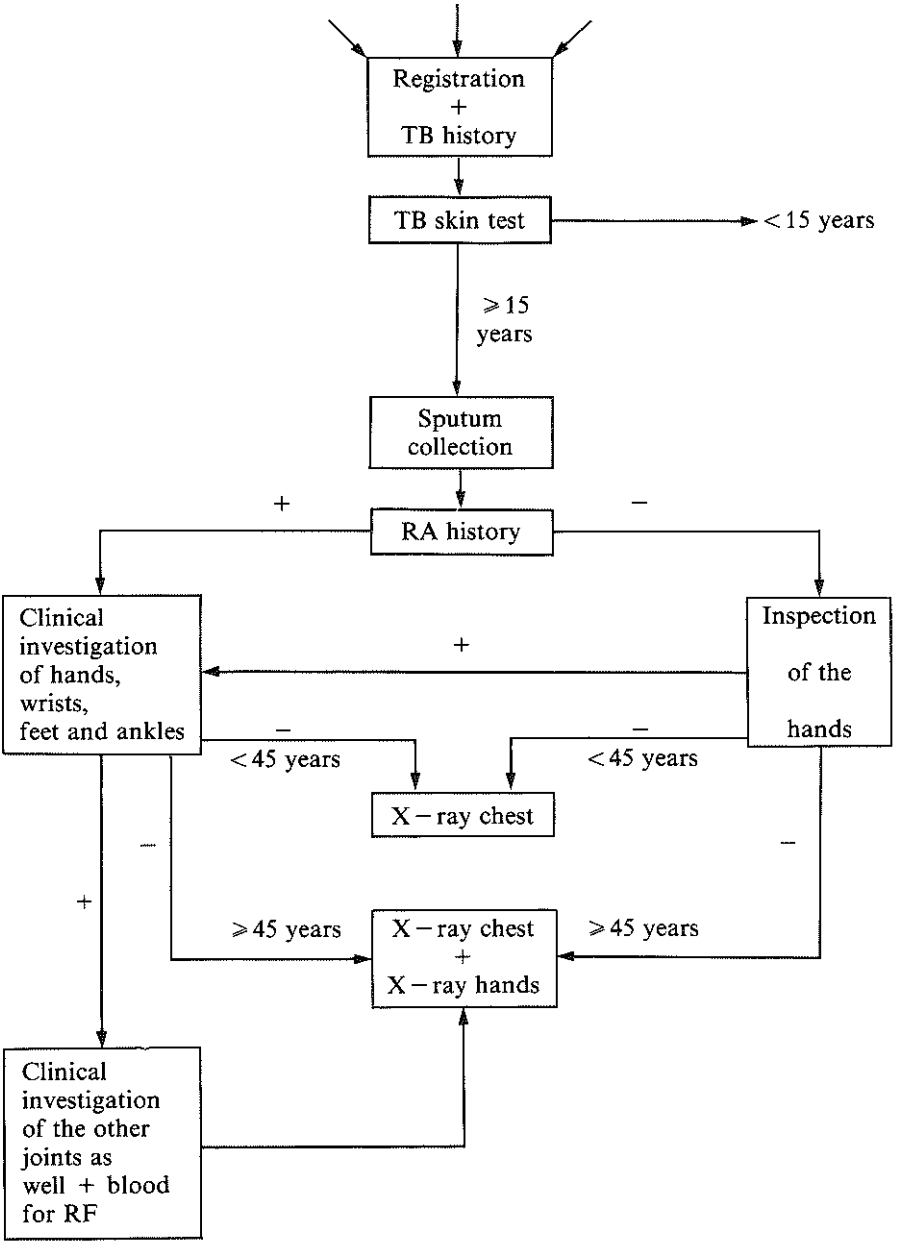
4.2.3. Method of examination

Since the TB team had to read the results of their tuberculin skin tests after three days, each village was visited twice. This had the advantage of enabling us to screen possible defaulters from our first visit during our second visit.

The routine for persons of 15 years and older at the screening centre was as follows (see also fig. 4.1): all registered persons were to assemble at the screening centre before 8 a.m. on the appointed day. Every individual carried his/her attendance card which was to be handed to the list controller. When this had been checked, the history with regard to tuberculosis was taken. Next, the tuberculin test was done and people had to inhale in front of a nebulizer spraying salty water to make it easier for them to produce sputum.

Figure 4.1

Flow sheet of the procedures at the screening centre of the TB and the RA team combined.



When they had done this, they were sent on to the interviewers of the rheumatoid arthritis team. Usually there were two of them though one was sometimes enough. One of them was an experienced interpreter and used to taking histories for the doctors in the outpatient department of Scott Hospital. They had to put five questions to each person and complete the form shown in appendix 8. They had both been extensively trained to understand the meaning of the five questions. Next, the hands of every individual were inspected by the author and if one or more of the five questions had been answered affirmatively, a formal examination of both hands and feet was undertaken. If the result of this investigation warranted it, elbows, shoulders and knees were investigated as well and blood was taken for R.F. determination. The next two persons seen during the survey of the same sex and age group were taken as controls for RF and aspirins were handed out freely to persons providing blood samples. This worked so well that sometimes people wanted to trade blood for pills and became angry with us for not complying. The blood was taken to Scott Hospital where it was centrifuged and the serum of each patient divided over two tubes and kept at -20^{o} C in a freezer belonging to friends who kept the temperature down by means of a generator at times when the electricity supply in Morija failed. The author took the sera with him packed in ice when he returned to Holland a few weeks later. At the Erasmus University the presence of RF was assessed by means of the LFT, untreated as well as inactivated at 56^{o} C, according to Singer and Plotz (4.26) as modified by Valkenburg (4.27), and the Human Erythrocyte Agglutination Test (HEAT), which is a modification of the Waaler – Rose test as described by Valkenburg (4.28). Furthermore uric acid was determined in 64 of the 68 sera by means of the Automatic Enzymatic Method (4.29).

After the screening for rheumatoid arthritis a chest X-ray film was taken of all persons of 15 years and older and an X-ray of the hands of all persons of 45 years and older as well as of individuals with suspected arthritis. This was done by means of an Odelca Camera taking 10x10 cm. pictures. The radiographic equipment was fixed in a specially constructed camper. For the chest X-ray people had to stand on a small platform which raised them to the required height. After this they had to kneel down on the platform with their hands raised above their head against the screen for the radiograph of the hands. Unfortunately, some villages could not be reached by the camper due to the extremely bad condition of some "roads". Consequently, no X – ray films have been taken in the villages of Linareng (here also the sera for RF determination were lost), Ramorakane and Bolepeletsa. Only a very limited number of X – rays could be taken at

Tsikoane. The films of the hands have been read twice by Prof. Dr. H.A. Valkenburg on magnifying them 4 times. The grading adopted is described in chapter 3. Discrepancies between two readings were followed by a third – independent – reading of the films concerned.

Efforts were made if at all possible to visit at their homes people who could not attend the examinations because of illness. Our second visit afforded an excellent opportunity for this. Since people had been registered per household, it was easy to detect that a member of a certain family had not attended the first day of examinations; some other member of the family who came on the second day could then be asked to explain this absence. If the reason turned out to be an illness of which the symptoms described could indicate either tuberculosis or rheumatoid arthritis, we asked to be taken to this sick member of the family. Of course this procedure could unfortunately not be followed if no member of a complete family attended the second day of examinations.

4.3 Diary of the survey

1981

The diary of the second part of this rheumatoid arthritis survey actually starts in February – March 1981, when I was on furlough in Holland. While discussing the hospital survey with Prof.Dr. H.A. Valkenburg in Rotterdam he suggested that I might carry out a population study as well, and the idea appealed to me. Holidays seem to be good breeding grounds for new initiatives, provided one meets the right kind of people.

Back in Lesotho I tried to find ways of putting the idea into effect, but gradually became somewhat discouraged. I began to see more and more clearly the formidable problems that had to be overcome if I was to get a representative population sample and deal with all the individuals in such a sample properly. First of all one needs the cooperation of the authorities in the capital and the various districts; secondly, one needs the cooperation of the chiefs in the villages, and thirdly, one needs the cooperation of the population itself. Even if all these bodies and people are willing to cooperate it often takes them a long time to decide to do so, and even then one has to check regularly and carefully that promises are being kept.
Money and time are essential if one is to accomplish this. If these prerequisites are fulfilled, the other necessary instruments such as manpower, information and contacts will follow, although the last item can make up for lack of the first two.

Since my roulette system did not work out the way I had hoped it would in the casino of Maseru and my working days did not get shorter, I lacked both of these first two essentials. Just when I was reluctantly beginning to give up my idea of using village health workers for a population survey because the time to train and supervise them and the money to pay them was lacking, an unexpected opportunity presented itself.

Once a month we were visited by a retired physician from Ireland, a tuberculosis specialist, who coordinated the battle against this disease in Lesotho. I learned from him in May 1981 that a big, nation-wide TB-survey would be held in Lesotho during the whole month of November of that year. It was organised by the South-African Tuberculosis Research Institute (TBRI) in Pretoria and he himself was participating in it to the extent that a major share of the organisation rested on his shoulders. He was so kind as to write a letter on my behalf asking if I might participate by conducting a parallel arthritis survey. The autorities at the Institute were most responsive and helpful and my scheme was included in their planning in June.

In July I was told that the survey had to be postponed until the middle of January 1982, so the last week of it would coincide with the last week of my employment at Scott Hospital. Since I had to start work in Holland on 1st April, I was rather dismayed when in November I suddenly received news that it had been postponed another 3 weeks and would now been held during the whole month of February 1982. This was due to difficulties encountered in building the special camper that was to carry the X-ray equipment. It had to be very carefully installed and the coupling linking the camper with the landrover that was to tow it had to be balanced out perfectly to negotiate the rough terrain without harming the equipment.

It was still not ready when the survey finally started, so we had to modify the program originally envisaged by starting with Linareng, the village high up in the mountains, that the camper would in any case be unable to reach.

The first week

We went up by plane to find that registration, which should have been done some weeks earlier had not been done and that the people responsible were on a leprosy course in the capital. The village where the survey was to be held was some distance from the village where the airstrip was located and of the two landrovers that the regional health service had at its disposal one was out of order and the other was not available that week. Consequently, we had to go to a lot of trouble to get a proper car and then we had to start by registering and motivating the people ourselves. After the

Site no. 7, Linareng

actual survey day it was decided to leave earlier, partly because it looked as if it would be impossible to secure another car for the scheduled second visit to Linareng. So we booked seats on a scheduled flight back to Maseru instead of waiting for the charter aircraft that had brought us up.
The plane did not arrive at the scheduled time, however, and since it was impossible to get radio contact with Maseru, it was also impossible to find out the reason for the delay. We were told that the planes were usually not on schedule and very often did not turn up at all. To our relief,it turned up later that day, be it without the necessary co – pilot. That weekend we learned that the X – ray equipment was still not quite ready. With a bit of luck it would arrive in the middle of the second week, though it might even not come until the end of the week. Besides, we heard that Tsikoane, the second village for that week, had not yet been registered! This was eventually done in time, thanks to tremendous efforts on the part of the TB specialist.

The second week

The summer, usually the wet period of the year, had been excessively dry up to that moment. Mother Nature selected the Monday of this week to try to make up for it by "blessing" us with torrential rains, which started early in the morning. Hoping that it would stop after a few hours, we decided to proceed. The rain did not stop and with our three cars we got hopelessly stuck in the mud on what actually turned out to be the wrong road! It took us two full hours to get going again. When eventually we arrived at Ha Theko, the people there clearly thought we had been crazy to come in such weather. In Lesotho everything stops when it rains. Besides, it seemed as if they doubted whether these muddy, bedraggled people were really experts conducting a survey. So it was decided to visit Ha Theko later. Fortunately the rain stopped during the evening of that day and the next day, at Tsikoane, everything went well except for a thunderstorm around noon which held everything up for about an hour.
Unfortunately the X – ray equipment only arrived at the end of the week, too late to be used during the second visit to Tsikoane.

The third week

We had to drive south to Mohaleshoek, the district capital of the area where Bolepeletsa, the next survey site, was situated. The X – ray equipment had already been driven there during the weekend, but on arrival in Mohaleshoek we learned that it had not stood up the rough road as well as

People queuing for the X – ray caravan

we had hoped. A supporting beam had broken and the developer tank was in danger of slipping off its shelf.
So we left for Bolepeletsa without it. We would start with a school just outside the village. The children were neatly lined up for us, but when we wanted to begin it was discovered that the TB skin tests had been forgotten. Consequently, our TB specialist had to rush back to Maseru (3 hours' drive) and fetch them. In the meantime we went back to Mohaleshoek and fortunately a garage was found where the tank shelf was properly repaired. We then waited for the arrival of the skin tests. When at 2.30 pm nothing had arrived yet, we went to Bolepeletsa again, where we found our friend. Apparently there had been a misunderstanding, as he had thought we would meet at the school again instead of at the hotel in Mohaleshoek.
When we finally arrived at Bolepeletsa itself, the severest hailstorm I had yet experienced in Lesotho broke loose, which made it necessary for us to stay in the cars for half an hour. Eventually, we started work at 4.30 p.m. I only managed to screen a number of people by questionnaire. Fortunately, our second visit to the village later that week went without a hitch, except that on the way down I suddenly saw one of my tires overtake me on a very rough part of the road. We managed to see a number of people we had missed during the first visit. The road was too rough for the X – ray equipment, however.

The second village we visited during that week was the first location where we could take X – rays. It consisted of two villages. The response rate in the village of Ha Libe, where we had drawn up, was good, but only a few people came from Ramarumo, the other village, 1.5 km. away. Besides, we had to cope with another violent thunderstorm that broke over us at 2.30 p.m.

Since the X – ray machine had to be reset each time to be able to take radiographs of the hands after it had been used for a chest, we decided fairly soon only to use it for the hands of all persons of 45 years and older and the hands of the individuals suspected of having RA (or polyarthritis).

The third site for that week, Majane, did not pose any of the problems we had got used to by now, except that the supporting local health team did not turn up and somebody had to go back to Maseru to fetch them.

The fourth week

Then the last week of the survey came round. The first site actually consisted again of two small villages. The place where we positioned ourselves was situated in between them. The response rate in one of these villages, Likhama, was very high, thanks to the chief, who was present all

A hailstorm during the survey

day to supervise his people. The response rate in the other village, Sekiring, was much lower. Moreover, it turned out that many people, especially schoolchildren, had been wrongly classified as "present", whereas they were actually "temporarily absent".

The second site we had to visit that week (Ramorakane) again posed some problems. There were two bad roads to this village. The better one crossed a river, but after the copious rainfall of the previous weeks this was impossible. The other one was even worse, not more than a track, but at least it avoided the river. The X – ray machine, however, could not make it along this route. There were many side tracks on the way down and at a certain moment we unfortunately took the wrong one. We ended up in the middle of nowhere and for 2.5 hours found our way time and again cut off by big "donga's", deep ditches made by erosive processes, or by totally impassable terrain. Fortunately, when we eventually arrived at the village at 11.30 a.m., we found that everything had been beautifully arranged by the local chief, family by family in accordancewith the sequential numbers.

That same evening I managed to arrange with the matron of the hospital at Leribe, the capital of the district in which Tsikoane (site 3) is situated, that we would pay this village a third visit to take X – rays on the Friday of that week.

The next day, Wednesday 24th Feb., we went to Ha Theko, the village we had missed during the second week because of the rains. There were no problems this time and the response rate was fairly good.

On Friday, the last day of the survey for me, we drove again to Tsikoane. The X – ray machine had already gone ahead. When we arrived there we could not find it, however, and decided to drive on to Leribe to question the matron there. On arrival we were told that she had left for Tsikoane. Apparently the X – ray machine could not get to the village and so another place was found for it, about 1 km. away. We got somebody to take us to the place in a small landrover. We were dropped at the camper and the matron took the landrover back to Leribe.

It became clear fairly soon that only a handful of the fittest would come down, despite the fact that the people generally were very anxious to get an X – ray, because they attributed a certain healing power to it. A message was sent to the hospital in Leribe and after a long wait the small landrover came back from the village with the news that all the people who had been waiting for us there had left, because nothing had been told them about transport, despite our request that this be done. Eventually, I made a list of the 5 people of whom I was keen to have X – rays and sent the landrover back to the village with instructions that they be sought and brought over.

They managed to get three of them, which was more than I had hoped for. I was glad that the survey had at last been completed.
The outcome is shown in table 4.5.

Table 4.5.

Numbers of people, blood tests and radiographs per village.

Village	No of persons	No of sera	No of radiographs
Linareng	80	–	–
Ha Theko	173	13	66
Likhama	123	24	51 + 1+
Tsikoane	163	10	20
Ha Libe	65	2	25
Ramarumo*	22	1	7
Majane	172	15	54 + 7+
Ramorakane	155	2	–
Bolepeletsa	139	1	–
Total	1092	68	223 + 8+

+ Volunteers seen by the TB team
* These were left out from the final figures (see text 4.4.1.)

4.4 Results

4.4.1 Response rates

A total of 3,797 persons were registered in all the eight villages, 1,639 males and 2,158 females. Of these 841 boys and 885 girls were under the age of 15; 148 of the males and 83 of the females were classified as "temporarily absent" (TA) and 4 persons were classified as "temporarily present" (TP) (table 4.6).
The distribution over the various villages of the people classified TA is shown in table 4.7.

Table 4.6.

Comprehensive data of the population survey.

Males	Registered		TA/TP	Eligibles		Non – response	Respondents	
Age	n	%	%[1]	n*	%	%[2]	n	%
0 – 14	841	51.3	1.3	–	–	–	–	–
15 – 24	271	16.5	13.7	219	35.6	56.2	96	34.3
25 – 34	134	8.1	36.6	86	14.0	77.9	19	6.8
35 – 44	89	5.4	29.2	59	9.6	54.2	27	9.6
45 – 54	91	5.6	18.7	68	11.1	45.6	37	13.2
55 – 64	84	5.1	7.1	76	12.4	34.2	50	17.9
65 – 74	41	2.5	7.3	37	6.0	32.4	25	8.9
75 +	32	2.0	0	30	4.9	23.3	23	8.2
Un-known	56	3.4	0	40	6.5	92.5	3	1.1
Total	1639	100.1	9.0	615	100.1	54.5	280	100.0
Females								
0 – 14	885	41.0	2.1	–	–	–	–	–
15 – 24	414	19.2	7.0	363	32.0	36.9	229	29.0
25 – 34	248	11.5	8.5	212	18.6	29.4	150	19.0
35 – 44	148	6.9	7.4	132	11.6	22.0	103	13.0
45 – 54	160	7.4	2.5	150	13.2	24.7	113	14.3
55 – 64	131	6.1	0	123	10.8	20.3	98	12.4
65 – 74	84	3.9	2.4	74	6.5	21.6	58	7.3
75 +	55	2.5	0	54	4.7	31.5	37	4.7
Un-known	33	1.5	0	29	2.6	93.1	2	0.3
Total	2158	100.0	3.8	1137	100.0	30.5	790	100.0
Grand Total	3797		6.1	1752		38.9	1070	

[1] = of no. registered
[2] = of no. eligible
* = the differences between the numbers of eligible and registered persons are not in correspondence with the percentages TA/TP. The reason for this is that the village of Ramarumo was left out of the eligible people (see text 4.4.1).

Table 4.7.

Number of people classified as T.A. per village and sex (all ages).

Village	Males		Females	
	n	%	n	%
Linareng	–	–	1	0.9
Ha Theko	6	2.9	2	0.7
Likhama	65	26.9	38	14.4
Tsikoane	9	4.7	7	2.3
Ha Libe	34	13.9	4	1.6
Majane	–	–	1	0.4
Ramorakane	29	13.7	25	8.1
Bolepeletsa	5	2.3	5	1.6
Total	148	9.0	83	3.8

As was to be expected, males were more often classified TA than females and the difference was mainly due to differences in the age – group from which the miners were recruited. Since this age – group comprises 30% – 40% of the population and, as we have already seen, since about two – thirds of the adult males are employed as migrant workers, we could have expected the overall TA percentage to be higher than the 9% we found, even taking into account that miners nowadays get fairly long furloughs. Besides, the differences between the villages are noteworthy, ranging from zero to 26.9% in males and from 0.4% – 14.4% in females.
These two observations lead us to suspect that the meaning of being temporarily absent has not always been properly understood by either the registration team or the villagers. This suspicion is probably true, since the author himself happened to observe a few cases, especially of male villagers, who were classified as "present" though they were actually "temporarily absent". This could not be done routinely because it could only be established by questioning their relatives thoroughly, which was a time consuming – business.

The children under the age of 15 as well as the TA and TP categories have not been included in the totals used to assess the response rates for the rheumatoid arthritis survey. In most villages the numbers seen by the TB team and the RA team were equal or differed by one or two persons not seen

by one of the teams. Only in two villages were the differences greater. In Bolepeletsa the RA-team saw 13 people more than the TB team. This may possibly be imputed to the difficulties encountered when visiting this village (see Diary). In Ha Libe, however, the TB team saw 37 people more than the RA team. As already stated, a severe thunderstorm upset the survey in this village, which could be the cause of the difference. This site actually consisted of two villages: Ha Libe and Ramarumo (table 4.4). The response rate of the former village, which was 1.5 km from the actual survey site, was very bad (22 persons seen by the RA team out of a total of 114 registered adults); consequently, this village is not represented in the figures of the rheumatoid arthritis survey.

After adjusting the figures of the TB survey in the manner described, the total numbers of males and females registered for the rheumatoid arthritis survey are shown in table 4.6 by the category "eligibles". A relative lack of males is still seen in the 25 – 55 age – group, but for the females the profile is much less pronounced.

The actual response rates for males and females per village and age – group are shown in tables 4.8 and 4.9. A few general trends can be observed and need emphasizing.

1. Except in the highest age – group the response rates for females are much better than for males.
2. The fact that this difference is most pronounced in the younger age – groups up to the age of 55 supports the previous assumption that many males have wrongly been classified as "present" instead of as "temporarily absent". Of course it could also be argued that these males were working outside the village only to return at night, but in Lesotho it is usually the females who work on the land. Possibly some of the men were working in other, bigger villages or towns nearby, but this would not explain the situation in Linareng, which is a very isolated village high up in the mountains.
3. In a number of villages schoolchildren were missed because they went to school at some distance from the village to return only in the evening. This is reflected in the relatively lower response rate for females aged 15 – 24 years.
4. It is very doubtful whether the "unknown" age category represents a relatively large group of very old people like in the hospital survey. As can be seen, very few people of this category presented themselves for the survey, so usually the relatives or neighbours had to guess their ages for us. In the hospital survey, however, the persons themselves could be questioned on the subject.

Table 4.8.

Numbers seen and response rates of adult males per village and age group.

	Age groups																	
	15 – 24		25 – 34		35 – 44		45 – 54		55 – 64		65 – 74		75 +		Unknown	Total		
Village	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	n	%	
Linareng	3	30	3	19	1	50	5	63	2	67	2	67	1	100	–	17	28	
Ha Theko	18	50	2	13	4	57	3	30	7	64	5	83	5	83	–	44	48	
Likhama	14	42	1	25	4	50	7	88	5	56	3	60	3	100	–	37	53	
Tsikoane	12	40	4	36	6	86	4	36	8	80	7	100	4	100	–	45	56	
Ha Libe	3	19	2	15	2	50	2	33	5	50	–	–	3	67	–	17	27	
Majane	21	57	2	18	4	36	5	50	7	70	2	25	5	71	–	46	48	
Ra-morakane	11	44	4	57	3	43	6	67	12	80	3	100	2	67	–	41	59	
Bolepeletsa	14	44	1	11	3	23	5	83	4	50	3	75	–	–	3	33	38	
Total no seen	96	44	19	22	27	46	37	54	50	66	25	68	23	77	3	280	46	

Table 4.9.

Numbers seen and response rates of adult females per village and age group.

	Age groups																	
	15 – 24		25 – 34		35 – 44		45 – 54		55 – 64		65 – 74		75 +		Unknown	Total		
Village	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	n	%	
Linareng	18	78	16	100	5	100	8	89	6	100	5	100	4	100	1	63	84	
Ha Theko	36	66	22	71	20	71	20	83	19	79	8	80	4	57	–	129	72	
Likhama	19	59	21	70	12	80	8	89	18	90	4	67	4	100	–	86	74	
Tsikoane	31	52	19	68	14	70	17	71	19	76	10	77	8	67	–	118	64	
Ha Libe	20	56	4	80	5	83	7	70	3	60	6	100	3	75	–	48	61	
Majane	48	74	22	69	12	67	15	75	8	62	13	76	8	80	–	126	72	
Ra-morakane	31	63	20	65	20	87	25	83	12	80	5	71	1	50	–	114	73	
Bolepeletsa	26	60	26	67	15	88	13	54	13	87	7	70	5	45	1	106	62	
Total no seen	229	63	150	71	103	78	113	75	98	80	58	78	37	69	2	790	70	

5. The total response rates have been greatly influenced by the relatively low rates of the younger age – groups, because they represent the largest numbers.

4.4.2 Questionnaires

As could be expected, it was the second question that was answered in the affirmative most often (see table 4.10).

Table 4.10.

Distribution of positive answers to rheumatism (males and females).

	Questions									
Village	Question no 1		Question no 2		Question no 3		Question no 4		Question no 5	
	n	%	n	%	n	%	n	%	n	%
Linareng	4	5.0	29	36.3	11	13.8	2	2.5	12	15.0
Ha Theko	1	0.6	24	13.9	16	9.2	4	2.3	2	1.2
Likhama	–	–	11	8.9	10	8.1	5	4.0	1	0.8
Tsikoane	1	0.6	23	14.1	19	11.7	4	2.5	9	5.5
Ha Libe	–	–	17	26.2	9	13.8	3	4.6	6	9.2
Majane	1	0.6	14	8.1	2	1.2	2	1.2	4	2.4
Ramorakane	2	1.3	12	7.7	5	2.9	5	2.9	3	1.9
Bolepeletsa	1	0.7	16	11.5	15	10.8	4	2.9	7	5.0
Total	10	0.9	149	13.9	88	8.2	29	2.7	46	4.3

Question no 1: morning stiffness
Question no 2: pain in hands/feet
Question no 3: swelling of hands/feet
Question no 4: deformation of hands/feet
Question no 5: deterioration usefulness of hands

The percentage would no doubt have been much higher if we had asked about pain, not only in the hands and feet, but also in other parts of the muskulo- skeletal system, especially because it would have included all the backaches.

The question about morning stiffness had to be formulated very carefully. At first many people said "yes" to the question but if the meaning of the condition was explained more carefully to them they hastened to reconsider their reply. Fortunately, the interviewer had often been of assistance when dealing with the patients with rheumatoid arthritis described in chapter 3 and was familiar with the condition. Eventually only about 1% of the people answered the question in the affirmative; in none of them was rheumatoid arthritis encountered.
The question about swelling was not always answered correctly. A few times people did not mention swelling that was detected on clinical examination and they sometimes complained of joint swelling without there being any clinical evidence. Edema of the ankles turned out to be a complicating factor. In a number of cases this was just pitting edema but sometimes pure soft tissue swelling was also found. This was related to a large number of people who had answered question 2 in the affirmative while specifically indicating their ankles. For 34 persons (23%) ankles prompted a positive answer to question 2 and for 31 (35%) ankles prompted a positive answer to question 3.
Infections and eczema could also be a cause for confusion. One boy for instance answered question 4 in the affirmative because he had athletes' eczema and somebody else did the same with questions 2,4 and 5 because of a paronychium. Of course, these were perfectly legitimate reasons from the sufferers' point of view. Neurological problems like an old hemiparesis could be a reason for an affirmative answer at least to question 5.

Table 4.11.

Number and percentages of questions answered affirmatively by males and females per age category (agegroup "unknown" not included).

Males	Total n	Q.1 %	Q.2 %	Q.3 %	Q.4 %	Q.5 %
15 – 34	4	–	0.9	–	2.6	–
35 – 54	14	1.6	4.7	4.7	6.3	4.7
55 +	32	–	15.3	6.1	5.1	6.1
Females						
15 – 34	63	1.1	6.3	7.1	0.3	1.8
35 – 54	78	1.4	18.7	11.2	2.3	2.8
55 +	131	1.0	34.2	14.5	5.7	12.4

For all questions with the obvious exception of question 4 (see table 4.11) the percentage of women responding positively was much higher than that of men. Besides, affirmative answers to questions 2,3,4 and 5 were more frequently given by members of the older age – groups.
About one in every five persons gave a positive answer to at least one question (see table 4.12); consequently, about 20% of all the people in the survey underwent clinical investigation of hands and feet. Much of this group was made up of older females.

Table 4.12.

Cumulative distribution of number and percentage of affirmatively answered questions.

Village	One question positive		Two questions positive		Three questions positive		Four questions positive		At least one question positive	
	n	%	n	%	n	%	n	%	Total*	%+
Linareng	22	27.5	12	15.0	4	5.0	–	–	38	47.5
Ha Theko	18	10.4	13	7.5	1	0.5	–	–	32	18.5
Likhama	12	9.7	6	4.9	1	0.8	–	–	19	15.4
Tsikoane	21	12.9	9	5.5	3	1.8	2	1.2	35	21.5
Ha Libe	13	20.0	9	13.8	–	–	1	1.5	23	35.4
Majane	19	11.0	2	1.2	–	–	–	–	21	12.2
Ramorakane	12	7.7	4	2.6	1	0.6	1	0.6	18	11.6
Bolepeletsa	18	12.9	8	5.8	3	2.2	–	–	29	20.9
Total	135	12.4	63	5.8	13	1.2	4	0.4	215	20.1

* Nobody answered all 5 questions positively
\+ Heterogenety is highly significant $\chi^2_7 = 62.28; p < 0.0001$

The hands of the remaining 80% were examined visually. No rheumatoid arthritis was detected in this group. Most of the abnormalities that were found were traumatic amputations, ganglions and congenital deformities. Camptodactyly, often bilateral, was observed on a number of occasions. The PIP joint of the fifth finger, however, is listed under the joints that are excluded according to the New York criteria.

As can be seen in tables 4.10 and 4.12, Linareng, the isolated village high up in the mountains, has the highest score for both affirmative answers to most of the single questions and for answers to at least one question. Ha Libe in the lowlands ranks second, while Majane and Ramorakane, both also situated in the lowlands, have the lowest score. Statistically a significant heterogenity between the villages is present ($\chi^2_7 = 62.43; p < 0.0001$). Possible explanations will be discussed later.

4.4.3 Inflammatory polyarthritis (I.P.)

The principle of the Manchester gradings for clinical polyarthritis is explained in chapter 3. All cases (grade 1 – 4) were observed in the age – groups above 35 and all definite gradings (grade 2 or more) above the age of 55 (see table 4.13). There was no difference in the occurrence of both doubtful and definite gradings between males and females.

Table 4.13.

Age and sex specific prevalence of inflammatory polyarthritis (I.P.) grades 1,2 and 4.

Age in	Males I.P. – grade			Females I.P. – grade		
years	n	1	2 – 4	n	1	2 – 4
15 – 24	96			229		
25 – 34	19			150		
35 – 44	27			103	1	
45 – 54	37	1		113	3	
55 – 64	50	2		98	1	2*
65 – 74	25			58	3	
75 +	23	1	1*	37	2	1*
Unknown	3			2		
Total	280	4	1	790	10	3
%		1.4	0.4		1.3	0.4
Total 45 +	135	4	1	306	9	3
%		3.0	0.7		2.9	1.0

* one each from Ha Theko and Ha Libe and 2 from Tsikoane + one with grade 4 I.P.

The only individual graded 4 was a 63 – year – old woman whose grandchildren told us that she could not attend the survey since she was sick and "stiff". Consequently, we went to see her and found her to be so crippled by rheumatoid arthritis that she could not be moved. X-rays could not be taken of her but both the Latex and the Waaler-Rose test were positive in very high titers. Apparently she had had the disease for 13 years and had been treated for it in the capital to no effect. She happened to live in one of the rare European – styled houses in the village, and the only house also with a tractor in front of it, so presumably she was from one of the richest families. She had always lived in Tsikoane, by far the largest village in the survey.

Of the 3 individuals with grade 2 polyarthritis, two had erosive arthritis and one of these also had a positive Latex and Waaler-Rose test. The other two were seronegative.

Of the 14 people with grade 1 polyarthritis, 5 had no X-ray film taken and of 3 no blood was available. Of the 9 whose hands were photographed, 3 had X-ray changes grade 1 and one had erosive arthritis grade 2. The latter individual was also positive for both RF tests. In all, 4 of the 11 people with a Manchester grading 1 had a positive rheumatoid factor and 3 of these were positive for both Latex and Waaler-Rose tests. These differences are summarized in table 4.14. They do not yet reach a significant level ($\chi^2_2 = 5.31; 0.05 < p < 0.10$).

Table 4.14.

Relation between inflammatory polyarthritis and RF.

	Grade			
	0	1	2 – 4	Total
Total number	1052	14	4	1070
Number tested	53	11	4	68
Positive test	8[b]	4[b]	2[a]	14
Negative test	45	7	2	54

[a] 2 positive for both tests
[b] 3 positive for both tests

Tables 4.15 and 4.16 show the sensitivity and the predictive value (P.V.) for each individual question of the questionnaire and for the cumulative number of positively answered questions in relation to inflammatory polyarthritis. The upper part of table 4.16 relates to any question or combination of questions and the lower part to the minimal number of questions answered in the affirmative.

Table 4.15.

Sensitivity and predictive value of each single question of the questionnaire for the 18 individuals with inflammatory polyarthritis grade 1 – 4 and the 4 with grade 2 – 4.

	Questions							
	No 2		No 3		No 4		No 5	
Grade 1 – 4	n	%	n	%	n	%	n	%
Sensitivity	15	83	7	39	6	33	6	33
P.V.		10		8		21		13
Grade 2 – 4								
Sensitivity	4	100	1	25	2	50	1	25
P.V.		3		1		7		2

Question 2 seems to have the highest sensitivity and a higher predictive value than question 3. The predictive value of question 4 is definitely higher than any of the other questions both with regard to doubtful and definite cases combined and to the definite gradings only. One out of every five people answering this question in the affirmative gets a Manchester grading of at least 1.

When it comes to the total number of questions to which a positive answer was given, it is obvious that the highest sensitivity is reached if at least one question is answered in the affirmative. Although it is 100% in our group it could be argued that people with asymptomatic disease confined to joints other than the hands and wrists may have been missed. Surprisingly, two individuals with mild but definite inflammatory polyarthritis only answered question 2 positively despite obviously swollen joints on examination; they were both over 75, which may have influenced the accuracy of their answers.

Table 4.16.

Absolute and cumulative number of positively answered questions in relation to clinical grading.

	No of positively answered questions								
	1		2		3		4		Total n of cases
Grade 1 – 4	n	%	n	%	n	%	n	%	
Sensitivity	8	44	5	28	4	22	1	6	18
P.V.		6		8		31		25	
Grade 2 – 4									
Sensitivity	2	50	1	25	–	–	1	25	4
P.V.		1		8		–		25	
	1+		2+		3+		4+		
Grade 1 – 4									
Sensitivity	18	100	10	56	5	28	1	6	
P.V.		8		13		29		25	
Grade 2 – 4									
Sensitivity	4	100	2	50	1	25	1	25	
P.V.		2		3		6		25	

Questions 3,4 and 5 were all named once by individuals with grading 1 as their only complaint. The woman with grading 4 gave affirmative answers to all questions except the one about morning stiffness. This criterion had both a sensitivity and a predictive value of zero.

4.4.4 Active rheumatoid arthritis according to the ARA criteria

Table 4.17(a + b) summarizes the findings on the prevalence of 4 of the 6 clinical ARA criteria for active rheumatoid arthritis and their relation to the presence of radiological evidence of the disease (erosive arthritis, EA), of rheumatoid factor (RF) and of inflammatory polyarthritis. As we have already seen, morning stiffness was not found in any person suspected

Table 4.17a.

Clinical criteria for active rheumatoid arthritis (1961 and 1966) in relation to rheumatoid factor (RF) and erosive arthritis (EA).

Males	number of clinical criteria	0	1	1	2	2	3	3	4			
	criterion		pain	swell.	pain + swell.	swell. 2	pain + swell.2	symm. swell.	pain + symm. swell.	Total	%	
complete data	RF negative:											
	− EA negative	7	1 + 1[a]	−	1	−	−	−	1[a] + 1[b]	12	4.3	
	− EA positive	−	−	−	−	−	−	−	−	0	0	
												5.8%
	RF positive:											
	− EA negative	2	−	−	−	−	1[a]	−	−	3	1.1	
	− EA positive	−	1	−	−	−	−	−	−	1	0.4	

incompl. data	EA unknown:											
	– RF negative	2	–	–	–	–	1[a]	–	–	3	1.1	
	– RF positive	–	–	–	–	–	–	–	–	0	0	
												19.3%
	RF unknown:											
	– EA negative	47	2	–	–	–	–	–	–	49	17.5	
	– EA positive	2	–	–	–	–	–	–	–	2	0.7	
only clin. exam.	RF unknown: EA unknown:	202	7	–	1	–	–	–	–	210	75.0	
	Total	262	12	–	2	–	2	–	2	280		
	%	93.6	4.3	–	0.7	–	0.7	–	0.7		100.1	

a = inflammatory polyarthritis grade 1.
b = inflammatory polyarthritis grade 2 – 4.

Table 4.17b.

Clinical criteria for active rheumatoid arthritis (1961 and 1966) in relation to rheumatoid factor (RF) and erosive arthritis (EA).

Females	number of clinical criteria	0	1	1	2	2	3	3	4			
	criterion		pain	swell.	pain + swell.	swell. 2	pain + swell.2	symm. swell.	pain + symm. swell.	Total	%	
complete data	RF negative:											
	− EA negative	17	5	−	2 + 1[a]	−	−	−	3 + 2[a]	30	3.8	
	− EA positive	−	−	−	−	−	−	−	1[b]	1	0.1	
												4.8%
	RF positive:											
	− EA negative	3	1	−	−	−	1[a]	−	−	5	0.6	
	− EA positive	−	−	−	1[a]	−	−	−	1[b]	2	0.3	

incompl. data	EA unknown:											
	−RF negative	4	2	−	1[a]	−	−	−	1	8	1.0	
	−RF positive	−	−	−	−	−	1[a]	−	1[b]	3	0.4	
												15.3%
	RF unknown:											
	−EA negative	82	24	−	2	−	−	−	1[a]	109	13.8	
	−EA positive	−	1	−	−	−	−	−	−	1	0.1	
only clin. exam.	RF unknown: EA unknown:	553	64 + 1[a]	−	12	−	1[a]	−	−	631	79.9	
	Total n	659	99	−	19	−	3	−	10	790		
	%	83.4	12.5	−	2.4	−	0.4	−	1.3		100.0	
	Grand total n	921	111	−	21	−	5	−	12	1070		
	%	86.1	10.4		2.0		0.5		1.1			

a = inflammatory polyarthritis grade 1.
b = inflammatory polyarthritis grade 2 − 4.

to be suffering from arthritis, and a subcutaneous nodule was only found once, but could very well have been a lipoma. The upper part of the table shows the criteria of those respondents on whom complete data were available; the middle part contains the data of those whose data were incomplete. They were mostly people over 45 together with inhabitants of the villages of Linareng, Ramorakane, Bolepeletsa and, to a lesser extent, Tsikoane. The lower part of the table deals with all the people of whom a clinical assessment only was achieved by examining hands and feet or just inspecting the hands only. Most of them were under 45. This was of course the majority, since blood was only taken from "suspected" individuals and their controls. Moreover, the sera from Linareng, a village where no X – ray films could be taken either, were lost.

It has been noted before that "pain in a joint on motion" is very common in African samples, probably because of frequent sprains and other minor injuries. In Lesotho about 7% of the men and 17% of the women complained of pain in the hands and/or feet. As stated when dealing with the questionnaire, the ankles were a frequent cause for complaints, not only of pain but also of swelling. In 5 cases classified as "probable" (all females), the ankles were the only joints found to be swollen. In 4 (all females) of these 5 they were bilaterally swollen and tender and these people should therefore have been classified as "definite" if they had a positive RF or erosive arthritis, which none of them had. None of these was thought to be suffering from rheumatoid arthritis, so none of them got a clinical grading of one or more.

A diagnosis of "probable" rheumatoid arthritis was made 16 times in all (5 men and 11 women). In 1 case the RF was unknown, in 3 cases no radiograph was taken and in 1 case both the EA and the RF were unknown. X – ray changes grade 1 and grade 2 were both present in 2 out of 12 people and a positive RF was found in 5 of the 14 persons tested. There was a fairly good relation with the clinical grading, since only 5 times no grading was given at all, 10 times a grading of 1 and once a grading of 2. On the other hand, of the 14 people with I.P. grade 1, ten or 71% had "probable" RA. There were three "definite" cases,two with clinical grading 2 and one with grading 4. Two had EA (of one no radiographs were obtained) and two were seropositive.

As with previous African surveys, a history of past polyarthritis was not considered reliable and consequently omitted. Since no persons presented themselves with convincing symmetrical subluxation or ankylosis – except for the individual classified as "definite" with a Manchester grading of 4, who also classified as an active case, –, the diagnosis of inactive arthritis was not made.

Table 4.18 gives the age and sex specific prevalence of combined "probable" and "definite" rheumatoid arthritis.

Table 4.18.

Age and sex specific prevalence of combined "definite" and "probable" rheumatoid arthritis.

Age	Males			Females			Total		
	Total n	n	%	Total n	n	%	Total n	n	%
15 – 24	96	–	–	229	–	–	325	–	–
25 – 34	19	–	–	150	–	–	169	–	–
35 – 44	27	–	–	103	–	–	130	–	–
45 – 54	37	–	–	113	4	3.5	150	4	2.7
55 – 64	50	2	4.0	98	4	4.1	148	6	4.1
65 – 74	25	–	–	58	4	6.9	83	4	4.8
75 +	23	3	13.0	37	2	5.4	60	5	8.3
Unknown	3	–	–	2	–	–	5	–	–
Total	280	5	1.8	790	14	1.8	1070	19	1.8
Total 45 +	135	5	3.7	306	14	4.6	441	19	4.3

The crude total prevalence was 1.8% and there was no difference in prevalence between males and females. The 3 "definite" cases were all female, two seropositives of 63 years old and one seronegative of 80 years old. The crude prevalence of "definite" rheumatoid arthritis is therefore 0.28% (ninety – five percent confidence limits 0.06 – 0.81%) for the total population over 15 years of age. No case of "probable" or "definite" arthritis was encountered under the age of 45 and above that age there was a gradual increase in prevalence. Taking only the age groups of 45 and older into account, the prevalence of "probable" and "definite" RA was 3.7% in men and 4.6% in women. "Definite" RA occurred in 0.68%.

The sensitivity and predictive values of both the individual questions and the total number of questions answered positively did not differ much from the rates found in persons with grade 1 – 4 polyarthritis. As regards the total number of questions, both rates were generally slightly higher for

Table 4.19a

The New York criteria for rheumatoid arthritis in relation to rheumatoid factor (RF) and erosive arthritis (EA).

Number clinical criteria		0	1	1	2	Total	%
		criterion	"present history" of pain in 3 or more joints	swelling, limit., etc. in 3 or more joints	"present history" and swelling etc. in 3 or more joints		
MALES complete data	RF neg.:						
	– EA neg	6	3 + 1[a]	–	1[a] + 1[b]	12	4.3
	– EA pos	–	–	–	–	–	–
	RF pos.:						
	– EA neg	2	1[a]	–	–	3	1.1
	– EA pos	–	1	–	–	1	0.4
Incomplete data	EA unknown:						
	– RF neg	2	1[a]	–	–	3	1.1
	– RF pos	–	–	–	–	–	–
	RF unknown:						
	– EA neg	47	2	–	–	49	17.5
	– EA pos	2	–	–	–	2	0.7

Only clin. exam.	RF unknown EA unknown	206	4	–	–	210	75.0
	Subtotal n	265	13	0	2	280	100.1
	%	94.6	4.6		0.8	100	

a = inflammatory polyarthritis grade 1.
b = inflammatory polyarthritis grade 2 – 4.

Table 4.19b

The New York criteria for rheumatoid arthritis in relation to rheumatoid factor (RF) and erosive arthritis (EA).

Number clinical criteria		0	1	1	2	Total	%
		criterion		"present history" of pain in 3 or more joints	swelling, limit., etc. in 3 or more joints	"present history" and swelling etc. in 3 or more joints		
FEMALES complete data	RF neg.:						
	− EA neg	16	11 + 3[a]	−	−	30	3.8
	− EA pos	−	−	−	1[b]	1	0.1
	RF pos.:						
	− EA neg	3	1 + 1[a]	−	−	5	0.6
	− EA pos	−	1[a]	−	1[b]	2	0.2
Incomplete data	EA unknown:						
	− RF neg	6	1	−	1[a]	8	1.0
	− RF pos	−	1 + 1[a]	−	1[b]	3	0.4
	RF unknown:						
	− EA neg	86	22 + 1[a]	−	−	109	13.8
	− EA pos	1	−	−	−	1	0.1

Only clin. exam.	RF unknown EA unknown	576 + 1[a]	52 + 1[a]	1	–	631	79.9
	Subtotal n	689	96	1	4	790	99.9
	%	87.2	12.2	0.1	0.5	100	
	Grand Total n	954	109	1	6	1070	
	%	89.2	10.2	0.1	0.6	100.1	

a = inflammatory polyarthritis grade 1.
b = inflammatory polyarthritis grade 2 – 4.

the ARA defined cases. As regards the individual questions, there was no difference between the results of the questions 2 (pain) and 4 (deformities); on the other hand both rates were higher for question 3 (swelling) in the case of ARA classified persons and lower for question 5 (deterioration of usefulness). Possibly this reflects the greater emphasis placed on objective abnormalities in the ARA criteria compared with the more subjective impression of the clinicians' opinion.

4.4.5 Rheumatoid arthritis according to the New York criteria

In table 4.19(a + b) the clinical New York criteria are listed in relation to erosive arthritis (EA) and rheumatoid factor (RF) in the same way as for the ARA criteria. The first criterion only includes a "present" history. Furthermore, a mild limitation of many joints, especially the wrists was so frequently observed that this finding was not included in the second criterion. The first criterion is very common, reflecting the high percentage of people answering question 2 in the affirmative. It was often difficult if not impossible to find any other evidence of tenderness of a joint except the persons' own verbal statement. Isolated objective abnormalities as required for the second criterion were only once encountered (in a female). The 6 cases with 2 criteria together embraced all the people with a clinical grading of I.P. of grade 2 or more and two with a grading of 1.

4.4.6. Serology

4.4.6a Rheumatoid factor

Due to the difficult circumstances under which the survey was carried out, it was not always possible to take blood from the very first person that presented himself or herself as control. Sometimes we had to wait until quieter moments and occasionally blood could only be taken in the next village. Moreover, sera were lost a few times. Eventually, as we have already seen (table 4.14), a total of 68 sera were tested by means of the Latex Fixation Test (LFT) and the Waaler-Rose Test to determine the presence of rheumatoid factor (RF). The LFT was considered to be positive at a titre of 1/640 or more and the Waaler – Rose Test at a titre of 32 or more confirm the other population studies hitherto performed in Africa.
Nineteen of the sera tested were of men, 4 of them positive for the Waaler – Rose Test and 2 for the LFT. Of the 49 female sera 10 were positive for the Waaler – Rose Test and 6 for the LFT. All the cases with a positve LFT were also positive for the Waaler – Rose Test. The titre distribution for

both tests per age – group is presented in tables 4.20 and 4.21. Since the numbers are small and there did not seem to be any important differences between males and females, the two sexes have been combined. Positive results in both tests were only found in persons of 55 and older. Above this age, however, there is no definite age trend, probably because of the selection process. The two seropositive individuals with definite polyarthritis were females aged 63, so they fell in the age group that got the highest LFT score. One had a titre of 1/5120 and one a titre of 1/10240. One of the remaining two "definite" cases had a LFT titre of 1/320 and was just negative. Neither of the latter had a titre in the Waaler – Rose test; the former two however had positive titres of 512 and 128 respectively.
The prevalence of a positive LFT was 12% and that of the Waaler – Rose Test 21%. If only non-suspected cases are considered these prevalences drop to 6% and 15%, respectively. The rates of sensitivity, specificity and predictive value of a positive test are shown for I.P. and for the clinical ARA criteria in table 4.22.
It will be observed that the sensitivities of the two tests do not differ very much and that the specificity of the LFT is somewhat higher. The relatively high rates of the predictive values are of course greatly influenced by the selective character of part of this group of 68 people. Although the specificities of the two tests with regard to I.P. or clinical ARA criteria do not differ much the sensitivity is higher for I.P. and the predictive value for a positive test is higher for the clinical ARA criteria.

Table 4.22.

Sensitivity (Sn), Specificity (Sp) and Predictive Value of a positive test (PV+) for inflammatory polyarthritis (IP) and clinical ARA criteria.

	LFT		Waaler – Rose	
IP	grade 1 – 4	grade 2 – 4	grade 1 – 4	grade 2 – 4
Sn	33	50	40	50
Sp	94	91	85	81
PV+	63	25	43	14
ARA	1+	3+	1+	3+
Sn	15	27	27	33
Sp	91	92	86	83
PV+	63	50	64	36

Table 4.20.

Titre distribution of LFT by age.

Age	Total in sample	Total tested	Reciprocal titre									no.	%
			⩽ 20	40	80	160	320	640	1280	2560	5120+	640+	640+
15–24	325	3	2		1							–	
25–34	169	–										–	
35–44	130	2	2									–	
45–54	150	12	12									–	
55–64	148	21	14	1		1		3+			2+	5	24
65–74	83	9	4	2	1	1+		1+				1	11
75+	60	21	10+1+	3	1+	1+	1+2+	1+	1+			2	10
Total	1065	68	45	6	3	3	3	5	1		2	8	12
%		100	65	9	4	4	4	7	1.5		3		

+ positive in Waaler – Rose test.

Table 4.21.

Titre distribution of Waaler – Rose test by age.

Age	Total in sample	Total tested	Reciprocal titre									no.	%
			⩽ 2	4	8	16	32	64	128	256	512+	32+	32+
15 – 24	325	3	3										
25 – 34	169	–											
35 – 44	130	2	2										
45 – 54	150	12	6	4	2								
55 – 64	148	21	14	1	1			2+	2+		1+	5	24
65 – 74	83	9	3	1	1	2	1+1+					2	22
75+	60	21	13	1			2	1	2+1+	1+		7	33
Total	1065	68	41	7	4	2	4	3	5	1	1	14	21
Total %		100	60	10	6	3	6	4	7	1.5	1.5		

+ also positive in LFT.

4.4.6b Uric acid

At a later stage uric acid was also determined in the sera of 64 of these 68 individuals. The values found ranged from 3.4 – 7.9 mg/dl. Normal values for Europe and Northern America are 3 – 9 mg/dl for males and 2.5 – 7.5 mg/dl for females. The woman with a titre of 7.9 mg/dl was the only person to fall outside this range; she did not have any joint complaints. Six persons had a uric acid level higher than 7 mg/dl and 12 had levels between 6 – 7 mg/dl. Only one of the four with symmetrical tender soft tissue swelling of the ankles was found in the first group. She had a titre of 7.4 mg/dl. Of the 18 people with a uric acid level of 6 mg/dl or more 6 (33.3%) had one or more swollen joints. This is not more than may be expected since 20 (29.4%) of the 68 persons from whom blood was taken for RF assessment were suffering from at least one swollen joint.

4.4.7 Radiographic assessment.

A total of 231 X-ray films of hands were taken (see also table 4.5) in 5 villages. They included 7 films of people from the village of Ramarumo, which has been excluded from the analysis, and 8 films of volunteers; these have not been included either. None of these 15 radiographs showed any signs of rheumatoid arthritis.

The prevalence of erosive arthritis in the remaining 216 respondents is shown in table 4.23 for both sexes and by age group. There were so few respondents in the unknown age group that they have not been listed. None of them had an X-ray taken. The percentage of males with erosive arthritis is slightly higher than that of the females, 4.7% against 2.6%. There was no definite age pattern except that erosive arthritis was not found under the age of 55.

The only case of grade 4 erosive arthritis might have been due to septic arthritis according to the X-ray reader. This man was indeed not clinically suspected of suffering from polyarthritis. Of the 7 persons with erosive arthritis, 2 were diagnosed as definite clinical polyarthritis and one as doubtful polyarthritis. They did not include the 2 cases with erosive arthritis of the DIP joints only. If we do not include these two cases nor the one suspected of septic arthritis, the predictive value of erosive arthritis is 50% for definite disease. Since there is little doubt that the individual with grade 4 polyarthritis had severe erosive arthritis, the predictive value could even have risen to 60% if we could have taken X-ray films of her.

Of the 14 persons with "probable" or "definite" arthritis according to the ARA criteria who were tested radiographically 4 had erosive arthritis;

Table 4.23.

Prevalence of erosive arthritis in the hands of 64 male and 152 female respondents (volunteers and people from Ramarumo not included).

Males				Grade 1		Grade 2 – 4	
Age	Total no.	No. tested	%	n	%	n	%
< 45	142	2	1.4	–	–	–	–
45 – 54	37	13	35.1	–	–	–	–
55 – 64	50	22	44.0	3	13.6	–	–
65 – 74	25	14	56.0	4	28.6	1[0]	7.1
75 +	23	13	56.5	1	7.7	2[+]	15.4
Total	277	64	23.1	8	12.5	3	4.7
Females							
< 45	482	4	0.8	–	–	–	–
45 – 54	113	53	46.9	4	7.5	–	–
55 – 64	98	44	44.9	11	25.0	2	4.5
65 – 74	58	34	58.6	6	17.6	1[0]	2.9
75 +	37	17	45.9	2	11.8	1	5.9
Total	788	152	19.3	23	15.1	4	2.6
Grand total	1065	216	20.3	31	14.4	7	3.2

[0] only DIP joints
[+] one possibly old septic arthritis

of the 7 with erosive arthritis 4 had "probable" or "definite" rheumatoid arthritis.

Grade 2 changes were found in all joints without predilection. In the two cases with "definite" rheumatoid arthritis they were found in the PIP, MCP and wrist joints. Grade 1 changes showed a strong predilection for the MCP joints.

There was a difference between the prevalence of X-ray changes grade 1 – 4 observed in the villages. Although a prevalence of of 27.5% and 21.2% respectively was found in Likhama and Ha Theko, the prevalence in Majane was as low as 1.9%. The prevalence in Ramarumo and Ha Libe combined was 15.6%. It is interesting to note that the former two villages are both situated in the foothills and the latter in the lowlands. Tsikoane, also in the lowlands, had a prevalence of 20% but there selection had taken place (see diary). The difference between the two villages in the foothills and the two unbiased villages in the lowlands is highly significant ($\chi^2 = 9.07; 0.005 > p > 0.001$).

4.4.8 Relation between TB and RA data

Eight persons including one from Ramarumo produced positive sputum. RF was not assessed in any of them, so none of them was suspected to be suffering from rheumatoid arthritis.

A total of 62 chest X-rays were regarded as showing abnormalities. They included 2 persons from Ramarumo, both of whom were seen by the RA team. Only 15 of them were of persons below the age of 45. Approximately half of these (32) were not thought to be connected with tuberculosis. Of the remaining 30, 16 were classified as inactive pulmonary tuberculosis and 14 as active. Three in this last group produced positive sputum.

One person with positive sputum had abnormalities on his chest X-ray film that were not thought to be related to tuberculosis; one had a negative radiograph and of 3 no X-rays could be taken.

The relation between abnormalities on the chest X-ray, and the films of the hands as well as the presence or absence of rheumatoid factor is shown in table 4.24.

Although the impression is created that a positive rheumatoid factor is found more often than may be expected in persons with pulmonary tuberculosis, the figures are unfortunately too small to enable one to say anything definite about them. There is no significant difference in the prevalence of a positive rheumatoid factor between people with and without abnormalities on the chest film.

Inflammatory polyarthritis was encountered 5 times in this group of 62 persons. Once grade 2 (seronegative and without erosive arthritis) and 4 times grade 1 (3 times seropositive for both RF tests).

A total of 6 persons classified as "probable" according to the ARA criteria were found in the same group; they included the five cases with inflammatory polyarthritis mentioned above. The number of people with inflammatory polyarthritis grade 1 or more and the number of "probable"

cases according to the ARA criteria is significantly higher in this group of 60 persons than may be expected ($\chi^2 = 17.04; p < 0.001$ and $\chi^2 = 24.64; p < 0.001$ respectively). Half of the chest X – ray abnormalities found in this group were thought to be related to tuberculosis.

Table 4.24.

Results of X – ray films of the hands and rheumatoid factor (RF) in persons with abnormalities on the chest X – ray.

X – ray chest	RF		X – ray hands grade		
	pos.	neg.	0	1	2
TB (n = 30)					
active (n = 14)	2	1	6	–	2*
inactive (n = 16)	2	4	11	3	–
Total TB	4	5	17	3	2
Other abnormalities	1	9	19	6	–
Total	5	14	36	9	2

* One dip joints only and one possibly old septic arthritis.

4.5. Discussion.

When discussing the results of this survey we should constantly be aware of its limitations. Firstly, there are the limitations inherent in any survey of this kind in developing countries, such as the difficulty of obtaining a proper population sample, the bad condition of many roads, the lack of cooperation on the part of sections of the population, and language barriers.

Secondly, there are the limitations inherent in this particular survey, partly because it was principally designed as a tuberculosis survey. The main restriction here was the impossibility of taking X – ray films of the

feet. The Odelca camera is typically designed for radiographs of the chest and it was impossible to lay people down on their backs on the small platform and raise them upside down until their feet rested against the screen. Actually, we were quite surprised that the films of the hands came out so well.

The limitations of this survey are also due in part to the selective methodology that had to be adopted because of the lack of manpower. Under these conditions the use of a questionnaire as a screening procedure for the detection of rheumatoid arthritis was considered the most feasible. This method has been adopted before in Jerusalem (4.30), Puerto Rico (4.16), Tenessee (4.31) and Pittsburg (4.32, 4.33). It is mainly valuable to screen out negative cases. The five questions used in Lesotho are a mixture of traditional questions (morning stiffness, pain, swelling) and questions of which it was hoped that they might have a high sensitivity in an African culture.

The three questions used in previous surveys were:

- a "Have you ever had arthritis or rheumatism?"
- b "Have you ever had swelling in any joints?"
- c "Do you wake up with stiffness or aching in your joints or muscles?"

Together they are known as the Index of Rheumatoid Arthritis (IRA).

In Jerusalem a fourth question was added: "Have you ever had difficulty in making a fist?" Morning stiffness was found to have a sensitivity of 81% in Jerusalem and 96% in Pittsburgh! The latter percentage seems extremely high and could raise doubts as to whether all bias had been properly excluded in the Pittsburgh survey. We have seen that the sensitivity of this question in our survey was zero. The question about swelling had a higher sensitivity in Jerusalem than in Lesotho (58% vs. 42%) but a lower specificity (84% vs. 93%). This was to be expected, since in our survey this question was restricted to the joints of hands and feet.

Comparison of the sensitivity and specificity, by number of questions answered positively, in relation to "probable" and "definite" rheumatoid arthritis in Jerusalem and Lesotho is made in table 4.25.

Here again the higher specificity in Lesotho was probably due to the more restricted nature of most questions (no past but only present history of arthralgia; swelling restricted to hands and feet). The sensitivity, however, was lower in Lesotho. Although it seems to be 100% for a minimum of at least one positive answer, this would certainly have been lower if everybody had undergone all of the investigative procedures. Theoretically, people with clinical disease confined to joints other than the hands or wrists may have been missed if they gave a negative reply to each question. A larger

Table 4.25.

Specificity and sensitivity by number of questions answered positively in relation to active rheumatoid arthritis in Lesotho and Jerusalem.

	Specificity (%)		Sensitivity (%)	
Questions answered "yes"	Lesotho	Jerusalem	Lesotho	Jerusalem
Number:				
One or more	81	61	100	95
Two or more	92	81	63	77
Three or more	99	93	32	41

group of especially "probable" cases will have been missed, however, due to the limited extent to which radiographs were taken and the selective character of the group of which RF was assessed.

The response rate in Liberia and Nigeria turned out to be lowest among the older women (4.34). In Lesotho, however, this was the group with the highest response. Although the overall completion rate was lower than in Soweto, Phokeng and the Transkei, this was mainly due to the low rates of the younger age groups, especially the males. It remains to be seen whether greater familiarity with Western medicine contributes to a higher response rate (4.35) and so explains the difference between Western and Southern Africa.

As already stated, the level of literacy in Lesotho is higher than in most other black African countries. Since schools are usually some distance away from the villages, schoolchildren were often unable to attend the survey. This fact, together with the missing migrant workers wrongly classified as "eligible" instead of "T.A.", might explain the low completion rates in the younger age groups and in the group of males up to the age of 55. In view of these low rates, it would seem advisable to concentrate discussion of most of the results of this survey on the age groups of 45 years and older.

Tables 4.26 and 4.27 show the differences between the combined Leigh and Wensleydale survey (4.36) and various African samples. The observed numbers of inflammatory polyarthritis (grade 2 or more), "probable" + "definite" rheumatoid arthritis cases according to the ARA criteria and "definite" arthritis cases alone are compared with those calculated from the Leigh and Wensleydale survey. The differences between observed (O) and expected (E) numbers are expressed as percentages of the

Table 4.26.

Rates (as percentages) of observed and expected number of males with rheumatoid arthritis in different African populations; expected number calculated from Leigh and Wensleydale survey.

Males	Number	Inflammatory polyarthritis		Prob. + Def. RA		Def. RA	
	n	obs. n	(O − E)/E %	obs. n	(O − E)/E %	obs. n	(O − E)/E %
Leigh + Wensleydale							
15+	1060	30	n.a.	26	n.a.	5	n.a.
45+	523	21	n.a.	21	n.a.	4	n.a.
55+	288	12	n.a.	13	n.a.	3	n.a.
West Africa							
15+	320	4	−66	10	− 3	0	−100
45+	134	3	−44	6	+12	0	−100
55+	69	1	−65	5	+61	0	−100
Phokeng							
15+	311	3	−66	5	−34	0	−100
45+	94	3	−20	5	+33	0	−100
55+	74	3	− 3	4	+20	0	−100
Soweto							
15+	197	1	−82	5	+ 4	0	−100
45+	68	1	−63	3	+10	0	−100
55+	52	1	−54	2	−15	0	−100
Lesotho							
15+	280	1	−87	5	−27	0	−100
45+	135	1	−82	5	− 8	0	−100
55+	98	1	−75	5	+13	0	−100

n.a. = not applicable.

Table 4.27.

Rates (as percentages) of observed and expected number of females with rheumatoid arthritis in different African populations; expected number calculated from Leigh and Wensleydale survey.

Females	Number	Inflammatory polyarthritis		Prob. + Def. RA		Def. RA	
	n	obs. n	(O − E)/E %	obs. n	(O − E)/E %	obs. n	(O − E)/E %
Leigh + Wensleydale							
15+	1174	74	n.a.	71	n.a.	19	n.a.
45+	606	60	n.a.	67	n.a.	18	n.a.
55+	379	47	n.a.	58	n.a.	16	n.a.
West Africa							
15+	412	6	− 77	9	−64	1*	− 85
45+	133	4	− 70	5	−66	1*	− 75
55+	60	−	−100	3	−67	0	−100
Phokeng							
15+	490	4	− 87	2	−93	1*	− 87
45+	226	4	− 87	2	−92	1*	− 85
55+	180	4	− 82	2	−93	1*	− 87
Soweto							
15+	354	10	− 55	13	−39	5	− 13
45+	140	10	− 28	13	−16	5	+ 20
55+	104	8	− 38	12	−25	5	+ 14
Lesotho							
15+	790	3	− 94	14	−71	3	− 77
45+	306	3	− 93	14	−59	3	− 67
55+	193	3	− 92	10	−66	3	− 63

* inactive
n.a. = not applicable.

expected number. Negative percentages indicate that the observed rates are lower than in the U.K.; −100% reflects the absence of cases in the African samples and +100% would mean a doubling of prevalence in the African situation. Unfortunately, the figures from the Transkei could not be included, because no details on the age − and sex distribution in that survey are available. No further age division above the age of 55 was made, because these data were not available from West Africa. The 45 − 55 age group is not been presented as a separate entity but is included in the age group of 45 years and older, because in Soweto for instance there were only 16 males between the ages of 45 and 54.

There is a remarkable difference between males and females with 3 or more ARA criteria. Generally the number of males observed to be suffering from "probable" or "definite" arthritis was equal to or greater than the expected number, but the observed number of females was considerably lower. The only location where the difference is less pronounced is Soweto. The position is seen to be quite the reverse, however, when we look at the figures for "definite" arthritis. Apparently the positive rates for males in table 4.26 are only due to "probable" cases. No male was found to be suffering from "definite" rheumatoid arthritis in any African population survey. This statement also includes the Transkei survey, in which 3 "definite" cases were found, all females. It could be argued that the efflux of migrant labour tends to produce a selection towards a more unhealthy sample, including more males with joint problems. However, the excess prevalence in Lesotho is only seen in males over 54 and they are not involved in migrant labour. If these "probable" cases represent genuine rheumatoid arthritis, it would seem that either African males tend to get a milder form of the disease without progression to a more severe stage, or they die sooner when their disease gets worse. Another possible explanation is that these "probable" cases do not represent genuine rheumatoid arthritis. This would lend support to statements made in the introduction to this chapter about the confusion arising from inclusion of the "probable" category.

For the females the difference between the rates for "probable" and "definite" cases combined and the "definite" category by itself is much less marked, but it could be postulated that there is a tendency in Lesotho towards more serious cases compared with West Africa and Phokeng, especially when we note that the 2 "definite" cases diagnosed there were "inactive". It should be remembered that "probable" cases without a clinical grading might have been missed in Lesotho. There were also 5 subjects with grade 1 inflammatory polyarthritis that could have changed their ARA classification if one or two of the criteria (X − ray film and/or RF) missing in their case had been positive. Three could have changed from

"probable" to "definite" and two could have become classified as "probable".

The most marked difference, however, is that between the results of the Soweto survey and those of the other three surveys. The prevalence of "probable" and "definite" rheumatoid arthritis combined in the total sample of Soweto was 3.3%, which was significantly different from the 0.87% found in Phokeng ($\chi^2 = 8.44; p < 0.01$). No significant difference can be found, however, compared with the prevalence figures of West Africa (2.3%), the Transkei (2.2%) or even the 1.8% found in Lesotho ($\chi^2 = 3.6; 0.10 > p > 0.05$). Unfortunately, the numbers of "definite" cases are small and the prevalence figures show considerable overlap if 95% confidence limits are applied: Soweto 0.91% (0.35 – 2.09), Phokeng 0.12% (0.003 – 0.7), Transkei 0.68% (0.13 – 1.55), West Africa 0.12% (0.004 – 0.7) and Lesotho 0.28% (0.06 – 0.81). As stated, the two cases classified as "definite" in West Africa and Phokeng were both inactive. If only the females classified as "definite" are considered, there is a significant difference in prevalence in the combined surveys of Phokeng, West Africa and Lesotho compared with Leigh and Wensleydale ($\chi^2 = 15.71; p < 0.001$).

The figures for inflammatory polyarthritis show a less distinctive pattern. The highest rates are found among the females of Soweto and the males of Phokeng and the lowest rates in Lesotho. It should be noted, however, that the exact grading procedures have not been used in the other surveys conducted in Southern Africa. Although it has been noticed that agreement between observers regarding the clinical grading of inflammatory polyarthritis was remarkably high in Holland (4.37), it is questionable whether such agreement obtains in other cultures. There was certainly a distinct difference between the clinical gradings of the observers in the West African survey (4.38).

The fact should not be overlooked that the author was a typical clinician and was still impressed by the obvious and serious cases that have been described in the clinical survey. An epidemiologist might well have given higher scores in certain cases. Moreover, the results might have been different if every subject could have been investigated clinically. In other words, somewhat reduced figures could indeed be expected regarding the prevalence of inflammatory polyarthritis in this survey, which may explain the fairly good correlation with the ARA gradings and with EA and RF.

The New York criteria are not mentioned in the other surveys conducted in Southern Africa. The principal difference between Lesotho and West Africa was that the second criterion was considerably less prevalent in Lesotho. This was probably due to the fact that 80% of the people in the Lesotho survey were not examined clinically.

The rate of seropositivity in the group of people whose sera were tested for the presence of RF was high, even if we bear in mind that they were partly selected. It could be argued that this might have been due to the age distribution of these people (96% were over the age of 45), since many studies report higher prevalence figures in the older age groups (4.39,4.40,4.41). Very high rates especially for the LFT were found in institutions for the aged (4.42,4.43), but this has not been confirmed by others (4.44). Looking back at table 3.9 it is obvious that the clinical control group was less balanced in favour of the older age groups. Even though the prevalence of a positive LFT under the age of 45 was lower than it was above this age (5% against 18%) this difference is not yet significant ($\chi^2 = 2.17; 0.25 > p > 0.10$). Consequently, it might be assumed that the high prevalence rate of a positive LFT is genuine.

The higher rate for positive Waaler – Rose tests, however, seems to be mainly due to the higher frequency in the age group of 75 years and older. This does not necessarily have to be a consequence of old age itself, because it has been reported that in a tribal population in India there was little increase in the prevalence of positive Waaler – Rose tests after the age of 24 (4.45) and in a population sample in Java there was even a reduction after the age of 44 (4.46). It has been suggested that the factors responsible for positive tests are not those to which the population is constantly exposed, but that they vary from one cohort to another. In the Pima Indians, for instance, rheumatoid factors have been found mainly in those born in times of severe drought and starvation. Most of the people of 75 years and older in Lesotho would have been born during the Anglo – Boer War of 1889 – 1902. However, hostilities only took place around Lesotho's borders in that war. In fact, it brought a certain prosperity. The only negative effect was an influx of refugees and consequently increasing overpopulation. Henceforth increasing numbers of men went to work in the South African mines and tuberculosis, a disease unknown in Lesotho a generation earlier, started to take terrible toll of returning miners and their families (4.47).

As already stated, diseases such as tuberculosis have been reported as causing a positive RF. Upper respiratory tract illness in particular has been mentioned as a possible cause of positive Waaler – Rose tests but not of positive LFTs (4.48,4.49).

All the other surveys conducted in Southern Africa show a rate of seropositivity for the LFT that is 4 – 8 times higher than the rate for the Waaler – Rose test, which accords with most reports from other parts of Africa. Could it be that upper respiratory tract infections are more prevalent in Lesotho than elsewhere in Africa because of the climate and the high altitude (4.50)? Or did the sudden influx of refugees during the

Anglo – Boer War result in exposure to unfamiliar antigens?
As described in chapter 3, the high number of positive LFTs among Africans has frequently been attributed to the load of parasitic infections. Since these do not occur in Lesotho, a possible explanation is high total antigenic load (tuberculosis and venereal disease included) combined with malnutrition. Genetic differences are probably of no importance (4.41,4.11,4.51,4.52,4.53).
Immigrants to Israel from Africa had a higher prevalence of a positive LFT than those from Europe, and this prevalence decreased with the length of their stay in Israel (4.54). This finding emphasizes the importance of environmental factors. However, the phenomenon was not observed in association with the Waaler – Rose test.

It is suggested that the best model to fit all the information available on this point is a latent tendency to develop a positive RF, which is acquired during the first few years of life under the influence of inter alia malnutrition and which alters the immune status of the host. Certain factors might then intensify this aquired tendency and trigger off an increase in the production of auto – antibodies, thus evoking a positive RF. However, the stimuli for the development of a positive LFT or a positive Waaler – Rose test appear, at least partly, to be different.

Of the various possible stimuli, lung pathology is of particular interest in the case of Lesotho. It has been stated that lung disease is responsible for rheumatoid factor production in 26% of seropositive individuals in urban communities and in 11% of rural dwellers in the U.K. (4.55). As already stated, the highest correlation has been found with healed tuberculosis. The figures in our survey (see table 4.24) create the same impression but are too small to admit of any definite conclusions.
It remains obscure why in the group with abnormalities on their chest X – rays there were more subjects with a clinical grading of one or more than could be expected. This cannot be due to what is called rheumatoid lung disease, since this is a rare disorder (4.56) and most of our respondents only received a grade 1 clinical grading of inflammatory polyarthritis.

It was a pity that, due to the technical problems described earlier, no X – ray films of the feet could be taken. In some populations (e.g. Jamaica and Nigeria) a much higher prevalence of erosions in the feet have been reported than in the hands. However, they were not indicative of the presence of rheumatoid arthritis and, as already stated, erosive arthritis of the hands is probably a more useful indicator of the presence of rheumatoid arthritis. Only one woman in our clinical survey had erosive arthritis of the feet without erosive changes in the hands.

It would also have been preferred if we could have taken radiographs routinely above the age of 35 years as recommended (4.57). The prevalence of erosive arthritis of the hands ranges from 1.0% – 5.6% in males and 0.8% – 5.6% in females aged 35 – 64, according to population studies from all over the world (4.58). Although the prevalence figures for Lesotho fall right in the middle of these ranges, it should be borne in mind that they are based on a higher age group. If the 45 – 64 age group only is analyzed, an overall prevalence of 1.5% is found. The percentage would almost certainly have been lower if 35 – 44 the age group had been included, which gives Lesotho a low rate of erosive arthritis. This is in contrast with the findings in the Transkei, where also only the hands were X – rayed and a prevalence of 3.3% was found for all individuals above 18. Since detailed data regarding radiographic changes from the survey carried out in West Africa were available (4.59), they have been used for comparison with the findings in Lesotho (see table 4.28).

Table 4.28.

Observed and expected number of subjects with grade 1 and grade 2 – 4 erosive arthritis of the hands; expected number calculated from the survey conducted in Liberia and Nigeria.

		Grade 1		Grade 2 – 4	
	Age	Obs.	Exp.	Obs.	Exp.
Males	45 – 54	0	3.4	0	0.8
	55 +	8	15.9	3	1.4
Females	45 – 54	4	9.6	0	0
	55 +	19	29.6	4	4.2
	Total	31	58.5	7	6.4

Although there is hardly any difference between the results for grade 2 – 4 erosions, grade 1 abnormalities were found almost twice as frequently in West Africa as in Lesotho. Observer differences are unlikely here as all the radiographs from African surveys were read by the same observer with the exception of the Transkei. It should be noted, however, that the minifilms produced in Lesotho by the Odelca equipment were considerably more difficult to interpret than the full – sized films made elsewhere. This might

account for the decreased "sensitivity" in picking up minimal radiological changes. Why X – ray abnormalities in Lesotho were more prevalent in villages in the foothills than those in the lowlands remains to be clarified. The prevalence of erosive changes in people with "definite" rheumatoid arthritis did not differ from the percentage observed in Soweto.

Having discussed the general outcome of the population survey, we should now reappraise the methods used to collect the data. Everybody will agree that ideally each subject in a sample should be fully investigated and that therefore the evaluation of a method will have to be done against the background of the time, manpower and resources available. Large surveys such as the two other national surveys conducted in Holland (4.60) and the U.S.A. (4.61) will often call for certain screening measures like questionnaires.

Although the sensitivity and specificity of the questions used in Lesotho cannot be assessed with absolute accuracy, because most of the people were not fully investigated, one gets the impression that they fulfilled their purpose reasonably well. In the author's view it seems unlikely that serious cases have been overlooked. This accords with reports from the U.K. (4.62,4.63). Although many mild cases may have been missed, virtually all the serious ones have been included. However, the fact that half of the people with inflammatory polyarthritis only confirmed question no. 2 and denied obvious swelling should urge caution in our case. As stated, both these subjects were very old, and their age might have influenced the validity of their answers.

It has become clear that the question about morning stiffness in an African population serves no screening purpose and is very time consuming. This does not mean that it can be omitted as an ARA criterion, since 82% of the clinical patients complained of morning stiffness and our interpreter for the population survey had also officiated in the hospital survey. A selection of more serious "definite" cases may have been seen at the hospital, since only one of the three "definite" cases in the population survey received a clinical grading of 3 or more as against 97% of those in the hospital survey.

Although only one person with grade 1 polyarthritis gave a positive answer to the question on deterioration of usefulness (no.5), the question does not seem to add much value. The question on deformity (no.4) seems to be a better asset next to questions about pain and swelling. Inspection of the hands, which was intended as a check – up on the questions on swelling and deformity (nos. 3 and 4), revealed no rheumatic abnormalities, but only a few congenital deformities, which the people had presumably become so used to that they did not notice them.

During examination of the joints people frequently stated that it was painful without there being any objective signs to back up their statement, even when they did not make the impression of being dissimulant. This finding seems to underline the low specificity of a person's bald statement that he or she is suffering from pain in a joint as described in chapter 3. All the same, I cannot think of any screening application of the graded pain description tested in the hospital study.

Regarding the comparability of the various criteria it has already been stated that the figures for grade 2 – 4 inflammatory polyarthritis could well have been higher if other, more epidemiologically trained, observers had been available. Table 4.29 supports this view. It compares the rate between the "probable" + "definite" cases with the "definite" cases (P + D)/D and the rate of subjects with grade 2 – 4 inflammatory polyarthritis with the "definite" cases (IP2 – 4)/D in various populations.

Table 4.29.

Rate of "definite" (D) rheumatoid arthritis (active + inactive) versus "probable" (P) and "definite" arthritis combined and versus inflammatory polyarthritis (IP) grade 2 – 4 in different populations.

	(P + D)/D	(IP2 – 4)/D
England (L + W)	3.9	4.3
Lesotho	6.0	1.3
Soweto	3.7	2.2
Phokeng	7.3	7.3
West Africa	15.0	8.0

It will be observed that the Lesotho survey shows the greatest concordance between inflammatory polyarthritis and "definite" ARA cases. Moreover, it has the greatest disparity between the "probable" and "definite" cases combined on the one hand, and subjects with inflammatory polyarthritis on the other. Lastly, in a large survey in the Netherlands among 6,500 adults in which both observers of the West African survey participated, the ratio of grade 1 I.P. to grades 2 – 4 I.P. was 2:1 compared with 3.5:1 in the Lesotho survey, while the ratio (P + D)/D was 2.8 and (I.P. 2 – 4)/D 3.0 (unpublished data).

There was also a great deal of overlap between the New York criteria and the "definite" cases, but this might have been due to the screening methods. Therefore the ARA criteria seem to be more suitable for this survey when comparing the results with those of other surveys. As has been argued before

the number of "probable" cases diagnosed in Lesotho is probably too low. Moreover, it has already been stressed (3.4.1.) that for validity reasons the emphasis should be on the "definite" category. Since in our survey some "probable" cases without even a grade 1 inflammatory polyarthritis could have been classified as "definite" in the presence of a positive RF or erosive arthritis, it might be wise to require confirmation of such an ARA diagnosis by a clinical diagnosis of at least grade 2.

Extensive surveys are necessary if we are to be able to compare the prevalence figures of "definite" rheumatoid arthritis, because of the small numbers of cases with the disease. It has been argued that screening methods such as questionnaires can be useful for extensive surveys especially because the more serious cases are not so liable to be missed. To this purpose it is particularly important that the sensitivity of the first step in the screening procedure is high. If this is not so, too many persons with the disease will be overlooked; this first step, the questionnaire, therefore determines the validity of the whole survey. Subsequent steps will require a higher specificity to increase cost – effectiveness.

It is clear from the description that the survey in Lesotho has been far from perfect: registration sometimes had to be carried out on the very last moment in a great hurry; response rates in certain groups of eligible people were low; survey procedures were interrupted by thunderstorms; X – ray films could not be taken on a number of occasions because of inaccessibility of sites for the caravan carrying the equipment; sera were taken from a limited number of persons only, and were occasionally lost. Conclusions from the rates for sensitivity, specificity and predictive value calculated from the results must therefore be drawn with considerable care. Unfortunately, a number of problems encountered will probably remain inherent in any survey of this kind conducted in developing countries.

Based on the experience in Lesotho the following procedures might be put forward for any future surveys:

1. A questionnaire should be prepared which is adapted to the cultural pattern of the population concerned and validated beforehand in a pilot study in, say, a hospital outpatient department.
2. The questionnaire should be answered by each participant in the survey. It should be simple and confined mainly to joint pain and deformities. Any layman in particular should be capable of conducting the study. Sites of joint pain could be marked on a dummy.
3. Everybody indicating joint pain and/or deformities at one or more sites would be seen by a paramedical assistent who has received

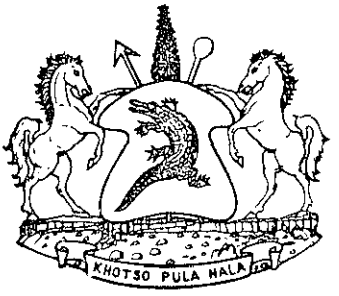
additional training in joint disorders. This assistant would examine the joints for tenderness on movement or pressure and joint swelling. It must be verified beforehand that he or she is a capable and trustworthy person.

4. Anybody with even the slightest objective joint abnormality would be seen by a doctor with experience of rheumatic conditions. In the case of rheumatoid arthritis it still seems reasonable only to investigate hands and feet at first, which would still further reduce the time spent on clinical investigations by a doctor. Preferably the doctor should also check on persons investigated but not referred by the paramedical investigator, e.g. 1 in 10 up to a number of 250. Radiographs would be taken of each person with suspected joint disease. Three films (of the hands, feet and lateral cervical spine) would be taken of any subject thought to be suffering from inflammatory polyarthritis (New York symposium 1966); RF assessment would also be done in these cases and when gout is suspected uric acid would be determined. For reference purposes blood at least would be taken from an age and sex stratified sample of at least 250 people (50 in each decade, starting at age 25). These people could also be used for the clinical investigation by the doctor of non – referred cases referred to above. It could be argued that radiographs at least of the hands of this control group should also be obtained.
5. Wherever the pilot study gives the impression that the validity of the questionnaire is lower in the upper age groups (as was possibly the case in Lesotho), the investigation of everybody above, say, the age of 65 could be considered.

If the people with objective abnormalities only had been investigated by a doctor, a reduction to approximately 5% of the total sample would have resulted (table 4.17) as against about 20% (table 4.12) as happened by the method adopted for the present survey; however, incorporating the large group with pain on investigation as the only sign would raise the proportion from 5% to 15%. These figures of course depend on the number and kind of diseases sought.

A survey limited to Morija itself, which is after all a village with an estimated 2,500 adult inhabitants, might have been carried out along these lines if I had been sooner aware of the opportunities as well as the problems involved. With the help of my colleagues this could certainly have been done in a more leisurely fashion because of our greater familiarity with the area investigated and the proximity of the hospital.

It would therefore be a good thing if future "tropical doctors" were encouraged to discern the opportunities in this field, and were instructed on how to conduct research in their future environment. To that end they should, when necessary, be able to obtain constant professional support from their own country.



LITERATURE

4.1 See 3.67 Chapters 2+3

4.2 Bennett P.H., Wood P.H.N., eds. (1968) Population studies of the rheumatic diseases. International Congress Series. No. 148. Excerpta Medica Foundation, Amsterdam

4.3 See 3.23, Chapter 6

4.4 Wood P.H.M., ed. (1977). The challenge of arthritis and rheumatism – a report in problems and progress in health care for rheumatic disorders. London: British League against Rheumatism.

4.5 Wood P.H.M., Beun R.T. (1972). Statistical appendix, digest of data on the rheumatic diseases 3: handicap and disability, and international comparisons of morbidity and mortality. Annals of the Rheumatic Diseases 31,72 – 77

4.6 See 3.30

4.7 Wood P.H.M. and Badley E. (1982) Rheumatic disorders. In: Epidemiology of Diseases. Ed. by D.L. Miller and R.D.T. Former. First ed. Blackwell Scientific Publications. Chapter 27

4.8 Muirden K.D. (1983) Epidemiology of Rheumatic Diseases. International Medicine. Vol. 2 No. 3 4 – 6

4.9 Schichikawa K., Takenaka Y., Maeda A., Yoshino R., Tsujimoto M., Ota H., Kashiwada T. and Hongo I. (1981). A longitudinal population survey of R.A. in a rural district in Wakayama. The Pyumachi, 21 (suppl.) 35 – 43

4.10 See 3.28

4.11 O'Brien W.M., Bennett P.H., Burgh T.A. and Bumin J.J. (1967). A genetic study of rheumatoid arthritis and rheumatoid factor in Blackfeet and Pima Indians. Arthr. and Rheum., 10:163 – 179

4.12 See 3.8

4.13 See 3.53

4.14 See 3.27

4.15 See 3.22

4.16 Mendez – Bryan R., Gonzales – Alcones R. and Roges L. (1964) Rheumatoid arthritis: prevalence in a tropical area. Arthr. and Rheum., 7:171 – 176

4.17 See 3.14

4.18 See 3.22 p 12

4.19 See 3.22 p 8 and 10

4.20 See 3.22 p 13

4.21 See 3.22 p 33

4.22 See 3.22 p 41

4.23 See 3.22 p 14

4.24 See 3.22 p 42

4.25 Tuberculosis Research Office Technical Guide of the W.H.O. no. 1, 1958

4.26 Singer J.M. and Plotz C.M. (1956) The latex fixation test. I. Application to

the serologic diagnosis of rheumatoid arthritis. Amer. J. Med., 21:888 – 892

4.27 Valkenburg H.A. (1963) Latex Fixation test (LFT). In: The epidemiology of chronic rheumatism (eds. Kellgren J.H., Jeffrey M.R. and Ball J.) Vol. I,337 – 339 Blackwell, Oxford

4.28 Valkenburg H.A. (1963) Human erythrocyte agglutination test (HEAT) In: The epidemiology of chronic rheumatism, Vol. I, 330 – 333

4.29 Gochman N. and Schmitz J.M. (1971) Automated determination of uric acid, with the use of uricase – peroxidase system. Clin. Chem. 17, 1154

4.30 Adler E. and Abrahamson J.H. (1968) The use of questions as an indication of active rheumatoid arthritis. Israel J. Med. Sci., 4:210 – 217

4.31 Cobb S., Muller M. and Wieland M. (1959) On the relationship between divorce and rheumatoid arthritis. Arth. Rheum. 2:414 – 418

4.32 Rubin T., Rosenbaum J. and Cobb S. (1956) The use of interview data for the detection of associations in field studies. J. chron. Dis., 4:253 – 266

4.33 Cobb S., Warren J.E., Merchant W.R. and Thompson D.J. An estimate of the prevalence of rheumatoid arthritis (1957) J. Chron. Dis. 5:636 – 643

4.34 See 3.22, p. 8

4.35 See 3.22, p. 13

4.36 See 3.19,

4.37 Valkenburg H.A. (1968) Observer variance and prevalence of rheumatoid arthritis and osteoarthrosis in a longitudinal population study in the Netherlands. In: Population studies of the rheumatic diseases, 181 – 191

4.38 See 3.22, p. 32

4.39 Ball J. and Lawrence J.S. (1961) Epidemiology of the sheep cell agglutination test. Ann. rheum. Dis. 20:235 – 243

4.40 Kissick W.L. (1961) Studies of the epidemiology of the rheumatoid factor. Arthr. Rheum. 4:424

4.41 Waller M., Toone E.C. and Vaughan E. (1964) Study of rheumatoid factor in a normal population. Arthr. Rheum. 7:513 – 520

4.42 Heimer R., Levin F.M. and Rudd E. (1963) Globulins resembling rheumatoid factor in serum of the aged. Amer. J. Med. 35:175 – 181

4.43 Cammarata R.J., Rodnan G.P. and Fennell R.H. (1967). Serum anti – gammaglobulin and antinuclear factors in the aged. J. Amer. Med. Ass. 199:455 – 458

4.44 De Blecourt J.J., Westendorp Boerma F. and Vorenkamp E.O. (1967). Incidence of "rheumatoid factors" in aged serum. Ann. Rheum. Dis. 26:47 – 49

4.45 See 3.23, p. 176

4.46 Valkenburg H.A. (1963) in The Epidemiology of Chronic Rheumatism (eds. Kellgren, Jeffrey and Ball), pp 330 and 337. Blackwell Scientific Publications, Oxford.

4.47 See 2.1, p. 83

4.48 See 3.22, p. 72

4.49 Lawrence J.S., Valkenburg H.A., Tuxford A.F. and Collard P.J. (1971).

Rheumatoid factors in the United Kingdom. II. Association with certain infections. Clin. exp. Immunol., 9:519 – 537

4.50 Singh I., Chohan I.S., Lal M., Khanna P.K., Srirastava M.C., Nanda R.B., Lamba J.S. and Malnotra M.S. (1977). Effects of high altitude stay on the incidence of common diseases in man. Int. J. Biometeor. 21:93 – 122

4.51 Lawrence J.S. (1967). Genetics of rheumatoid factors and rheumatoid arthritis. Clin. Exp. Immunol. 2:769 – 783

4.52 Bennett P.H. and Burch T.A. (1968). The genetics of rheumatoid arthritis. In: Population studies of the rheumatic diseases, p. 136 – 147.

4.53 Veenhof – Garmann A.M., Steiner F.J.F., Westendorp – Boerma F. De Blecourt J.J. and Valkenburg H.A. (1968). The prevalence of rheumatoid arthritis and rheumatoid factor in relatives and spouses of seropositive and seronegative patients suffering from definite or classical rheumatoid arthritis. In: Population studies of the rheumatic diseases, 123 – 127

4.54 Adler E., Abrahamson J.H., Goldberg R., Elkan Z. and Ben Hadar S. (1967). Rheumatoid arthritis in a Jerusalem population. 2. Epidemiology of Rheumatoid factors. Amer. J. Epidem. 85:378 – 386

4.55 See 3.23, p. 194

4.56 Patterson C.D., Harville W.E. and Pierce J.A. (1965). Rheumatoid lung disease. Ann. intern. Med. 62:685

4.57 See 3.23, p. 22

4.58 See 3.23, p. 219

4.59 See 3.22, p. 88 – 89

4.60 De Graaf R. (1962). De rheumatoide arthritis in Nederland. Publikatie van de gezondheidsorganisatie T.N.O. Ed. Van Gorcum + comp. N.V. Assen

4.61 National center for Health Statistics (1966). R.A. in adults. U.S. 1960 – 2. PHS Pub. no. 1000, series 11, no. 17. Public Health Service, Washington, D.C.

4.62 Miall W.E., Ball J. and Kellgren J.H. (1958). Prevalence of rheumatoid arthritis in urban and rural populations in South Wales. Ann. rheum. Dis., 17:263 – 271

4.63 See 3.23, p. 8 and p. 10

CHAPTER 5

POPULATION STUDY VERSUS HOSPITAL RESULTS

Although no significant differences are seen when comparing the present population study with the other surveys conducted in Africa, the population study does strengthens the impression that rheumatoid arthritis is less prevalent and generally less severe in rural areas in Africa than in the urban environment of Soweto and in industrialized countries.
This is contrary to what the results of the hospital survey would lead us to expect. Factors that might have caused a greater number of people with rheumatoid arthritis to go to Scott Hospital than went to hospitals elsewhere in Africa are the following:

1. Transport facilities in Lesotho might be better. If so, people with severe arthritis in Lesotho will have had less difficulty in reaching a hospital than those in other African countries.
2. Rheumatoid arthritis may give rise to more complaints in a colder climate. Rheumatic complaints are generally more frequent in colder climates (5.1,5.2).

Even such climatic differences as exist between the north and the south of England seem to cause a greater incapacity from arthritis and rheumatism in northern England than in the south (5.3,5.4). These observations accord with the higher rate of complaints found in the mountain village of Linareng.
People such as foundry and textile workers who are exposed to heat during their work have significantly fewer rheumatic complaints than control groups (5.5,5.6). Although doubt remains as to the importance of climate in relation to rheumatoid arthritis (5.7) and although no evidence is available that it plays a part in the aetiology of the disease, experimental studies in a controlled climate chamber have made it appear likely that weather conditions affect the activity of the arthritic process (5.8,5.9). However, rapid climatic changes seemed to be more important than mere temperature. Moreover, if climatic conditions caused a greater flow of patients with rheumatoid arthritis to a hospital in Lesotho than to hospitals elsewhere in Africa, it remains to be explained why so few "probable" cases

were documented. They may undoubtedly have been overlooked more easily than their "definite" counterparts in a busy outpatients department, but it is unlikely that this happened to the extent that was observed in the present instance.
Furthermore, in one of the West African situations (Cavalla, Liberia) rheumatoid arthritis was still a rare disease at the level of the outpatients department, even when the physicians in charge started deliberately to look for it (5.10). Most cases seen were of juvenile onset and the hospital figures seemed to reflect the population data collected at a later stage. In the Cavalla situation the hospital primarily served the population of plantation workers and their families in which the population survey was conducted. Although it is doubtful (see before) whether people came to Scott Hospital solely because of its reputation for dealing with rheumatic conditions, this cannot be entirely discounted.

It is not only the number of patients with rheumatoid arthritis seen at the hospital that may have distorted the picture, but also the prevalence estimate based on that number (chapter 3). The estimate automatically decreases when the assumed figures for hospital attendance rates increase.

On the other hand, there are some considerations that might modify the impression created by the population study.
As the prevalence rate of a disease is a function of the incidence rate and disease duration, it will be lower in case of a lower incidence rate or a shorter duration of the disease, or both. In Lesotho the prevalence rate in the open population contrasts with the suggestion created at the clinic level where considerable numbers of patients with severe rheumatoid arthritis were seen. Not only is the prevalence rate low, but in the epidemiological survey severely diseased rheumatoid arthritis patients were hardly encountered. The following is an attempt to explain the discrepancies.

1. The prevalence rate of rheumatoid arthritis in Lesotho might be low because of a low incidence rate.

Altitude could be a contributing factor here, because the incidence rate of rheumatoid arthritis and many other diseases, with the noteworthy exception of lobar pneumonia, has been reported to be significantly lower at high altitudes (5.11). However, a low prevalence rate was also found in West Africa, at an altitude of not more than 500 ft.
On the other hand, the incidence rate for a disease will turn out to be low when those subjects susceptible to attract the disease prematurely die, e.g. in childhood. Evidence exists for a genetic trend in seropositive rheumatoid artrhritis (5.12) and a diminished survival in siblings of rheumatoid probands has been reported from the U.K. (5.13). As the effect is likely to

be stronger where childhood mortality is greater, the principal of the survival of the fittest could therefore result in a low incidence rate, and consequently a low prevalence rate, of rheumatoid arthritis in the adult population. Unfortunately it will be be very difficult to confirm or refute this hypothesis since a declining childhood mortality is usually the consequence of other radical socio – economic changes, which in themselves might change the pattern of the disease.

2. The prevalence rate of rheumatoid arthritis found in Lesotho might be low because of a severe course of the disease once it has started (see chapter 3).

This could contribute to a selective hiding of diseased persons among the non – respondents. Cultural beliefs and (severe) disability might prevent the diseased from attending a survey, because it has been stated, that the number of physically handicapped in Lesotho found in a large survey could have been underestimated because of the likelihood of disabled persons hiding in their houses and also because of fear to be taken away (5.14). As the denominators of most surveys are small and non – response is generally high in developing countries, a few cases missed might make all the difference. This phenomenon could be more prominent in Lesotho than elsewhere in rural Africa, because the disease seems to run a more severe course as seen in the clinic. Climate may influence the degree of incapacity of the disease (see before), but it should also be recalled that the rate of seropositivity of patients suffering from rheumatoid arthritis possibly increases from east to west in Africa and that seropositivity is usually associated with a more serious prognosis (5.15,5.16).

A complicating factor is the presence or absence of endemic parasitic infections, as these infections might be capable of preventing the onset of rheumatoid arthritis or modifying its course (5.17,5.18,5.19). The prevalence rate of tropical parasitic diseases is generally related to altitude. In West Africa parasitic infections are common, but in Lesotho, Soweto (1750 m.) and the Transkei they are absent. In Phokeng – with a lower altitude and a warmer climate than Soweto – malaria is not endemic, but bilharzia is common in the Transvaal outside the cities. The figures from Nairobi (Kenya) are confusing in this respect, as Nairobi is situated at an altitude of 1,850 m., but the University Hospital also admits many patients from lower areas, e.g. Mombasa where parasitic infections are common.

3. A severe course of rheumatoid arthritis in Lesotho may also cause a low prevalence rate because of a short duration of the disease and a high mortality.

This possibility is underlined by the findings of a study in Czechoslovakia (5.20,5.21), which revealed very significant differences with the Leigh and

Wensleydale study in the prevalence rate of "definite" arthritis in the older age groups from 55 years onwards. However, in a follow – up study it was found, that the older rheumatoid patients in Czechoslovakia had not survived (5.22).
The reduced life span of patients with rheumatoid arthritis, particularly of those severely affected, is discussed in chapter 3. Infections seem to play an important role, because in one study it was observed that there is excessive mortality from infections among rheumatoid patients, in fact, nine times that among the rest of the population (5.23). This has recently been confirmed by others in a major follow – up study (5.24). Although this might be due to steroid administration, the absence of any increase in mortality since 1950 would make this unlikely. On the contrary, mortality due to the disease has been declining since the Second World War (5.4,5.25). This may have been due to the introduction of antibiotics and an improved medical care in the industrialized countries since then. It should be realised, however, that most mortality studies have been done on cohorts of hospital patients and have not so much been based on observations in the open population (5.26).

In Lesotho, on the other hand, it has been noticed in the survey on the physically handicapped mentioned before (5.14), that the majority of the disabled do not seek medical treatment until they are very ill and that many of them die "because they do not or *cannot* seek medical attention when it is urgently needed". The reason usually given was lack of money.
There are, of course, fewer medical resources in remote rural areas. It has been stated that also in South Africa the inhabitants of a planned township had superior economic status and easier access to health services than people living in isolated rural areas (5.27). The medical facilities in Soweto are probably among the best, since it is the largest black township in South Africa. On the other hand, it was found during follow – up visits in Nigeria (5.28) that medical care had not made any difference to the state of the disease, though, unlike in Lesotho, the disease was generally not very severe there, being usually sero – negative and without any severe erosions or nodules.

The duration may also be influenced by altitude and climate, as the mortality attributed to rheumatoid arthritis has been observed to be significantly higher in countries with colder climates in Europe (5.29) and in non – metropolitan counties and in the Mountain States of the United States (5.30). Consequently the mortality attributable to rheumatoid arthritis might be higher in Lesotho, the coldest and most mountainous country in Africa, than elsewhere on this continent.

Considering all the (conflicting ?) data together, it seems probable that the low prevalence rate of rheumatoid arthritis in rural black African populations is at least partly due to a low incidence rate, caused by genetic and/or environmental influences. Furthermore it cannot be excluded that in all the African population surveys, with the possible exception of Soweto, diseased persons have been hiding among non – respondents and that the extent to which this happens is influenced by the general course of the disease. Since the course can also contribute to a shorter duration and consequently a lower prevalence rate, it is an important factor to take into account; hospital patients suffering from rheumatoid arthritis seem to be more severely affected in Lesotho than in West Africa. They also have a higher rate of seropositivity. It is uncertain how great the influence is of endemic parasitic diseases or climatic and geographic differences. Genetic influences may play a role as well. The association of rheumatoid arthritis with an increase in frequency of the antigen HLA – DR4 of the human histocompatibility complex is well established by now (5.31,5.32,5.33). The results of a large population survey recently conducted in Holland suggest, however, that the presence of HLA – DR4 could be associated with a disease modifying factor, rather than with a disease susceptibility factor (5.34). Consequently, the course of the disease is more likely to be severe in the presence of HLA – DR4 (5.35,5.36). It would therefore be interesting to know the HLA profile in the African populations discussed above.

A low incidence rate in conjunction with a mild course of the disease could result in the population and the hospital figures observed in West Africa. The prevalence rate of Phokeng could represent the same picture. When, on the other hand, a low incidence rate is linked with a more rapid and severe course of the disease, the figures could resemble those found in Lesotho. When the results of the combined samples from West Africa and Phokeng (1,436 adults) are compared with those of the combined samples from Lesotho and the bordering Transkei (1,647 adults), 6 cases of active "definite" rheumatoid arthritis, all females, were observed in the latter populations, whereas none were found in West Africa or Phokeng at all. The greater prevalence rate of "definite" cases in Soweto might be attributable to better accessible medical care.

In other words, it cannot be excluded that the low prevalence rate found in the population study in Lesotho was due to a low incidence rate of rheumatoid arthritis coupled with it taking a more rapid and severe course resulting in a non – response bias and a higher mortality in this mountainous country, where health facilities are inferior to those in either

Soweto or the industrialized countries and the possible protective effect of parasitic diseases is lacking.

The only way to sort out the problems described above and get a better insight into the incidence rate and course of rheumatoid arthritis in an African population would seem to conduct longitudinal studies in migrant urbanizing populations. It is evident that at the present juncture this can hardly be considered feasible in tropical regions (5.37). Studies in developing countries with considerable differences in altitude and hence climate, together with an urbanizing trend in which people move from high to low altitudes or vice versa might offer an opportunity to get a better insight into the influence of exogenous factors on the incidence and natural history of rheumatoid arthritis. It would then, when possible, be necessary to include studies on genetic factors, parasitic infections and (childhood) mortality.

LITERATURE

5.1 Burch T.A. (1966). Epidemiological studies on the rheumatic diseases. Milit. Med. 131:507 –

5.2 See 3.23, p. 509

5.3 See 3.23, p. 506

5.4 Wood Ph.M. (1970). Digest of data on the rheumatic diseases. 2. Recent trends in sickness, absence and mortality. Ann. Rheum. Dis. 29:324 – 329

5.5 Lawrence J.S., Molyneux M.K. and Dingwall – Fordyce I. (1966). Rheumatism in foundry workers. Brit. J. industr. Med. 23:42 – 52

5.6 Lawrence J.S. (1961). Rheumatism in cotton operatives. Brit. J. industr. Med. 18:270 – 282

5.7 See 3.23, p. 36

5.8 Hollander J.L. and Yeotros S.J. (1963). The effect of simultaneous variations of humidity and barometric pressure on arthritis. Bull. Amer. Meteor. Soc., 44::489 – 494

5.9 Edstrom G. (1944). Can rheumatic infection be influenced by an artificial tropical climate? Acta Med. Scan. 117:376 – 414

5.10 Hymans W., Valkenburg H.A., Muller A.S. and Gratama (1964). Rheumatoid arthritis in Liberia. Ann. Rheum. Dis. 23:45 – 49

5.11 Singh I., Chohan I.S., Lal M., Khanna P.K., Srirastava M.C., Nanda R.B., Lamba J.S. and Malnotra M.S. (1977). Effects of high altitude stay on the incidence of common diseases in man. Int. J. Biometeor. 21:93 – 122

5.12 see 3.23, p. 248

5.13 Dixon A.St.J. and Kay A. (1964). ARC Annual Report, p. 54

5.14 Schmidt J.E. (1976). A survey of the physically handicapped in Lesotho, p. 25 – 27. Funded by the Overseas Development Ministry.

5.15 Roitt I.M., Hay F.C., Nineham L.J., Male D.K. (1982) Rheumatoid Arthritis. In: Clinical Aspects of Immunology. Ed. by Lachman P.J. and Peters D.K. Oxford, Blackwell Scient. Publ. Vol. II: 1161 – 1195

5.16 Cats A. and Hazevoet H.M. (1970) Significance of positive tests for rheumatoid factor in the prognosis of rheumatoid arthritis. Ann. Rheum. Dis. 29:254 – 260

5.17 Greenwood B.M. (1968). Autoimmune disease and parasitic infections in Nigerians. Lancet, 2, 380 – 382.

5.18 Greenwood B.M., Herrick E.M. and Voller A. (1970). Suppression of autoimmune disease in NZB and (NZBxNZW)F, hybrid mice by infection with malaria. Nature (Lon.), 226,266 – 267

5.19 Greenwood B.M., Herrick E.M. and Voller A. (1970). Can parasitic infection suppress autoimmune disease? Roc. voy. Soc. Med., 63:19 – 20

5.20 Sitaj S., Svec V. and Urbaulk T. (1964) K. Otazke tzv. epizodickych benygnych artritid. Vnitrni Lek. 10:565

5.21 Sitay S. and Sebo M. (1968) R.A. and A.S. on Czechoslovakia. In: Population studies of the Rheumatic Diseases p. 64

5.22 See 3.23, p. 222
5.23 Uddin J., Kraus A.S. and Kelly H.G. (1970). Survivorship and death in rheumatoid arthritis. Arthr. Rheum. 13:125 – 130.
5.24 Vandenbroucke J.P. (1984) Hazevoet H.M. and Cats A. Survival and cause of death in rheumatoid arthritis: a 25 – year prospective follow – up. J. Rheumatology (in print).
5.25 See 3.23, p. 158
5.26 Allenbeck P. (1984). Epidemiological investigations on rheumatoid arthritis in Stockholm. M.D. Thesis, Karolinska University, Stockholm.
5.27 Community Health Editorial: Division by race. (1983) Lancet, 2, p. 465
5.28 See 3.4
5.29 Wood P.H.N. (1969). Digest of morbidity and mortality data on the rheumatic diseases. Ann. Rheum. Dis. 28:443 – 446
5.30 Burch T.A. (1968). Mortality from R.A. in the U.S. 1959 – 61. In: Population studies of the Rheumatic Diseases, p. 39 – 42
5.31 Stastny P. (1974). Mixed lymphocyte culture typing cells from patients with rheumatoid arthritis. Tissue Anti. 4: 571 – 579
5.32 Thomsen M., Morling N., Snorrason E., Svejgaard A. and Sorensen S.F. (1979) HLA – Dw4 and rheumatoid arthritis. Tissue Anti. 13: 56 – 60
5.33 Stastny P. (1980) Rheumatoid arthritis. Joint Report. In: Histocompatibility Testing 1980. Ed. by Terasaki P.I. Los Angeles: UCLA Tissue Typing Laboratory. p. 681 – 686
5.34 de Jongh B.M. (1983) Immunogenetic Studies of the HLA System and Disease. M.D. Thesis, Rijksuniversiteit Leiden.
5.35 Roitt I., Festenstein H., Jaraquemada, Papasteriadis C., Hay F.C. and Nineham L.J. (1978) HLA – DRw4 and prognosis in rheumatoid arthritis. Lancet I:730
5.36 Alarcon G.S., Koopman W.J., Acton R.T. and Barger B.O. (1982) Seronegative Rheumatoid Arthritis. A distinct immunogenetic disease? Arth. Rheum. 25: 502 – 507
5.37 See 3.22, p. 42

SUMMARY

Hospital – based surveys and the few population studies (one in West Africa and two in South Africa) on the pattern of rheumatoid arthritis in black African population groups have created the impression that the disease is rare here and generally runs a milder course. A noteworthy exception was found to be the urbanized population of Soweto, where both the prevalence and the severity of the disease among the females resembled the usual pattern observed in the industrialized countries.
Since experience in the outpatient department of Scott Hospital, a mission hospital in Lesotho, seemed to point to a different picture of the disease in this country, it was decided to conduct a prospective hospital study to verify this impression.

The first part of chapter 2 gives a description of Lesotho and its people, the Basotho. It is a small country with unique characteristics. It received its independence from British Government in 1966, but is completely surrounded by the Republic of South Africa. It is very mountainous and the only country in the world with all its territory at more than 1,000 m. above sealevel. Since it also lies outside the tropics, the climate is colder than elsewhere in Africa. It ranks among the 25 poorest nations on earth and much of its male population is employed as migrant workers in South Africa. Over 95% of the population is regarded as rural.
The second part of chapter 2 gives a picture of Scott Hospital. It was set up in 1938 and serves a health area of approximately 3,000 km.^{2} with an estimated population of 100,000. At the time of the survey it had 110 beds, and about 35,000 outpatients consulted doctors at the hospital annually. Approximately 50% of the outpatient consultations were related to complaints concerning the genito – urinary system or pregnancy. Injuries came second at 10%. The two commonest causes of death at the hospital were tuberculosis and cardiovascular disease.

Chapter 3 contains an account of the hospital survey. From 1st May 1980 all patients with rheumatoid arthritis seen at the outpatient department of Scott Hospital were documented. Initially it was decided to stop documentation after one year, but it was extended by six months.
During the first year almost 16,000 new outpatients of 15 years and older consulted a doctor. Thirty – two patients with "probable", "definite" or

"classical" rheumatoid arthritis according to the ARA criteria were observed during the first year and 7 during the next 6 months. The age and sex specific rates were slightly higher for males than for females. Thirty – one patients were classified as "definite" or "classical" and 8 as "probable". The rate of seropositivity was 92%. In a relatively healthy control group it was found to be 12% and in a group of patients suffering from tuberculosis it was 19% (not significantly higher). Erosive arthritis was observed in 74% of the patients. Subcutaneous nodules were noted in 24% of the patients and the majority could be confirmed histologically. At follow – up the disease seemed to have become rapidly worse in a fairly high number of patients.
Using the figures for patients with "definite" and "classical" rheumatoid arthritis seen during the first year and including the "probable" category that can be expected at population level, it is calculated that the prevalence of rheumatoid arthritis may approach the percentage found in countries with temperate climates. Comparison with other hospital surveys from Africa gives the impression that the disease seen in Lesotho is more severe than elsewhere in Africa. A trend towards more severe disease seems to run from West to East in Africa itself.

The results of the hospital survey led to a population survey, which was carried out in February 1982. This survey is described in chapter 4. It was originally designed as a tuberculosis survey and the study on the prevalence of rheumatoid arthritis was later incorporated in it.
Eight villages were randomly chosen from the 1976 census report. They were scattered all over the country. Before the actual survey started the villages were visited by teams to motivate and register the inhabitants. All the persons registered were to come to the screening centre on the appointed date. A questionnaire consisting of 5 questions on rheumatic complaints was completed for every person upwards of 15 years of age. Anybody giving at least one affirmative answer was investigated clinically by the author. If any of them was thought to be suffering from rheumatoid arthritis, X – ray films of the hands were obtained by means of an Odelca camera (films of 10x10 cm.) and blood was taken for RF assessment in Rotterdam, Holland. Control groups were also formed. Moreover, radiographs of the hands were taken of every individual of 45 or older.
The practical problems encountered during the survey are described in the "Diary". Eventually, 280 male and 790 female adults were screened for the presence of rheumatoid arthritis. Twenty percent of them had to be investigated clinically. The question about pain had the greatest screening

value, but the question about morning stiffness served no screening purpose at all.

The prevalence of inflammatory polyarthritis grade 2 – 4 was 0.4% in both males and females. The prevalence of "definite" rheumatoid arthritis according to the ARA criteria was 0.3%. All cases were female and all received a clinical grading of inflammatory polyarthritis grade 2 or more. The prevalence of "probable" and "definite" rheumatoid arthritis combined was 1.8%. There was a fairly great degree of overlap between the ARA criteria and inflammatory polyarthritis grade 1 – 4.

RF assessment was made for 68 individals. The rate of seropositivity was 12% for the LFT and 21% for the Waaler – Rose test. Of the tested "probable" and "definite" cases combined 41% had a positive RF.

Radiographs were taken of 216 respondents. Erosive arthritis was found in 4.7% of the males and 2.6% of the females. The prevalence of erosive arthritis in radiographed persons with "probable" or "definite" rheumatoid arthritis was 29%.

The results of the population survey accord with the other published surveys in rural African communities. Rheumatoid arthritis seems to be less prevalent there than it is in industrialized countries and in Soweto. Remarkably enough, no "definite" cases were observed among male respondents in any of the African surveys. "Definite" rheumatoid arthritis was therefore entirely confined to females, Soweto women included. It is argued that for validity reasons the emphasis in surveys should be on the "definite" category.

It is suggested that the high rate of seropositivity may be due to a latent tendency to develop a positive RF aquired under the influence of such factors as malnutrition and triggered during adulthood by certain other factors. No definite explanation can be given for the higher frequency of a positive Waaler – Rose test compared with LFT in the Basotho.

A suggestion is made as to how to conduct future population studies of this kind in developing countries with minimum expenditure and maximum efficacy.

Possible reasons for the discongruency between the hospital results and the population results are discussed in chapter 5. Reasons for a greater flow of severe patients towards the hospital in Lesotho compared with those elsewhere in Africa could be: more rheumatic complaints in colder climates, better accessibility of the hospital in Lesotho owing to better transport facilities or simply Scott Hospital's reputation regarding rheumatic diseases (unlikely).

On the other hand the low population prevalence figures might be due

to: an excess mortality during childhood of those susceptible to develop the disease; diseased persons hiding in the community and therefore not responding; a small incidence rate of rheumatoid arthritis at high altitude, together with a more rapid and severe course of the disease, resulting on the one hand in hospitalisation and on the other in a higher mortality rate. The latter might also be influenced by the lack of proper medical care, whereas the natural history of the disease after it has initiated could be modified by the absence of major parasitic infections and their possible protective effect.

SAMENVATTING

De indruk bestaat dat rheumatoide arthritis een zeldzame ziekte is en over het algemeen weinig ernstig verloopt in zwarte Afrikaanse bevolkingsgroepen. Dit is gebaseerd op onderzoek verricht in ziekenhuizen en ook op de resultaten van enkele bevolkingsonderzoeken, waarvan er tot nu toe één heeft plaatsgevonden in West Afrika en twee in Zuid Afrika. Een opmerkelijke uitzondering vormt de bevolking van Soweto, de zwarte voorstad van Johannesburg, waar zowel de prevalentie als de ernst van de ziekte onder vrouwen overeen bleek te komen met het patroon dat gewoonlijk in de industrielanden wordt aangetroffen.
Aangezien deze indruk niet strookte met de ervaringen die werden opgedaan in de polikliniek van Scott Hospital, een zendingsziekenhuis in Lesotho, werd besloten om een prospectief onderzoek onder de patienten van dit ziekenhuis te verrichten om dit te kunnen bevestigen.

Het eerste deel van hoofdstuk 2 geeft een beschrijving van Lesotho en de mensen die er wonen, de Basotho. Het is een klein land met unieke kenmerken. In 1966 werd het onafhankelijk van Engeland, maar het wordt volledig omringd door Zuid Afrika. Het is bijzonder bergachtig en het is het enige land ter wereld dat in zijn geheel hoger ligt dan 1000 m. boven de zeespiegel. Aangezien het bovendien niet in de tropische streken is gelegen, is het klimaat kouder dan elders in Afrika. Het wordt gerangschikt onder de 25 armste landen ter wereld en een groot gedeelte van de mannen werkt als gastarbeider in Zuid Afrika. Meer dan 95% van de bewoners leeft op het platteland.
Het tweede deel van hoofdstuk 2 geeft de beschrijving van Scott Hospital. Het ziekenhuis bestaat sinds 1938 en bestrijkt een gebied van ongeveer 3.000 km.^{2} met een bevolking die geschat wordt op 100.000 mensen. Ten tijde van het onderzoek had het ziekenhuis 110 bedden; rond de 35.000 poliklinische patienten consulteerden er per jaar een dokter. Ongeveer de helft van de nieuwe consultaties vonden plaats wegens klachten die betrekking hadden op het uro – genitale stelsel of verband hielden met zwangerschap. De tweede belangrijkste oorzaak voor bezoek aan de polikliniek waren "verwondingen", waarvoor ongeveer 10% van alle polikliniekpatienten kwam. De twee meest voorkomende oorzaken van overlijden in het ziekenhuis waren tuberculosis en cardiovasculaire ziekten.

Het onderzoek dat verricht werd in het ziekenhuis wordt beschreven in hoofdstuk 3. Vanaf 1 mei 1980 werden alle patienten, die in de polikliniek gezien werden met rheumatoide arthritis, beschreven. Aanvankelijk werd er besloten om hier na een jaar mee te stoppen, maar na dit jaar werd het gedurende nog eens 6 maanden voortgezet.
Gedurende het eerste jaar waren er bijna 16.000 nieuwe consultaties van poliklinische patienten ouder dan 14 jaar. Gedurende dit jaar werden er 32 patienten waargenomen met "waarschijnlijke", "definitieve" of "klassieke" rheumatoide arthritis volgens de ARA criteria; gedurende het halve jaar daarna waren het er 7. De leeftijds – en geslachtsspecifieke ratio's waren enigszins hoger voor mannen dan voor vrouwen. Bij 31 patienten werd de diagnose "klassieke" of "definitieve" rheumatoide arthritis gesteld en bij 8 de diagnose "waarschijnlijke" rheumatoide arthritis. Het percentage van seropositieve patienten was 92. In een controle groep van relatief gezonde patienten was dit 12% en in een groep van tuberculose patienten 19%, wat niet significant hoger was. Erosieve arthritis werd aangetroffen in 74% van de patienten met rheumatoide arthritis en subcutane noduli waren aanwezig bij 24%; de meerderheid hiervan kon histologisch bevestigd worden. Bij het vervolgen van de ziekte bleek een vrij groot aantal patienten snel slechter te worden.
Uitgaande van het aantal patienten met "definitieve" en "klassieke" rheumatoide arthritis dat gedurende het prospectieve jaar gezien werd is berekend, dat met inbegrip van de "waarschijnlijke" categorie, die in de open populatie kan worden verwacht, de prevalentie van rheumatoide arthritis het percentage zou kunnen benaderen, dat in landen met een gematigd klimaat wordt gevonden. Vergelijking met andere onderzoekingen verricht in ziekenhuizen in Afrika wekt de indruk dat de ziekte in Lesotho ernstiger verloopt dan elders in Afrika. Op dit continent lijkt de vorm waarin de ziekte zich presenteert ernstiger te worden naarmate de onderzochte bevolking zich oostelijker bevindt.

De resultaten van het onderzoek verricht in het ziekenhuis hebben aanleiding gegeven tot een bevolkingsonderzoek dat uitgevoerd werd in februari 1982. Dit wordt beschreven in hoofdstuk 4. Het was oorspronkelijk bedoeld als een tuberculose onderzoek en het onderzoek naar de prevalentie van rheumatoide arthritis werd daar later aan toegevoegd.
Op aselecte wijze werden 8 dorpjes gekozen uit het rapport van de volkstelling van 1976. Ze lagen verspreid door het gehele land. Voorafgaande aan het eigenlijke onderzoek werden deze dorpjes bezocht door mensen die tot taak hadden om de bewoners te motiveren en te registreren. Op de vastgestelde dag moesten dan alle geregistreerde

personen naar de afgesproken plaats van onderzoek komen. Voor iedereen vanaf 15 jaar werd een vragenlijst ingevuld die bestond uit 5 vragen aangaande rheumatische klachten. Een ieder die op tenminste 1 vraag een bevestigend antwoord gaf werd klinisch onderzocht door de schrijver dezes. Bij verdenking op rheumatoide arthritis werden er rontgenfoto's genomen van de handen met behulp van een Odelca camera, die foto's maakte van 10 x 10 cm., en werd er bloed afgenomen voor de bepaling van de rheumafaktor. Controlegroepen werden ook hiervoor uitgekozen. Bovendien werden er rontgenfoto's van de handen gemaakt bij iedereen vanaf 45 jaar.
De praktische problemen die werden ondervonden bij de uitvoering van het onderzoek zijn beschreven in de "Diary" (dagboek). Uiteindelijk is er bij 280 mannen en 790 vrouwen nagegaan of zij aan rheumatoide arthritis leden. Van hen moest 20% klinisch worden onderzocht. De vraag naar pijn bleek de grootste waarde te hebben om rheumatoide arthritis op te sporen, terwijl daarentegen de vraag naar ochtendstijfheid geen enkel nut had.
De prevalentie van rheumatoide arthritis op klinische gronden (met een zgn. "Manchester" gradering van 2 – 4) was 0,4% voor zowel de mannen als de vrouwen. De prevalentie van "definitieve" rheumatoide arthritis volgens de ARA criteria was 0,3%; al deze gevallen betroffen vrouwen die een klinische gradering kregen van tenminste 2. De prevalentie van "waarschijnlijke" en "definitive" rheumatoide arthritis tesamen was 1,8%. Er was een redelijk grote mate van overeenstemming tussen de gevallen met een diagnose op grond van de ARA criteria en degenen met een klinische gradering van 1 – 4.
Van 68 mensen is het serum nagekeken op de aanwezigheid van rheumafaktor. Bij 12% werd een positieve LFT vastgesteld en bij 21% een positieve Waaler – Rose test. Van uitsluitend de groep met "waarschijnlijke" of "definitieve" rheumatoide arthritis was het percentage met een positieve rheumafaktor 41.
Rontgenfoto's zijn genomen van 216 deelnemers. Bij 4,7% van de mannen en 2,6% van de vrouwen werden erosies aangetroffen. Van uitsluitend de groep "waarschijnlijke" of "definitieve" rheumatoide arthritis daarentegen was dit percentage 29.

De resultaten van het bevolkingsonderzoek komen overeen met de andere gepubliceerde onderzoeken verricht onder bevolkingsgroepen van het platteland in Afrika. De prevalentie van rheumatoide arthritis lijkt hier minder te zijn dan in de industrielanden of in Soweto. Het is wel opmerkelijk dat in geen van de onderzoeken die in zwart Afrika verricht zijn de diagnose "definitieve" rheumatoide arthritis gesteld kon worden onder

de mannen. Zelfs in Soweto waren de gevallen met "definitieve" rheumatoide arthritis uitsluitend beperkt tot de vrouwen. Er wordt beargumenteerd dat bij onderzoeken de nadruk zou moeten liggen op de "definitieve" categorie om wille van een geldige vergelijkbaarheid.
Verder wordt gesteld, dat het hoge percentage positieve rheumafactoren te wijten zou kunnen zijn aan een latente neiging tot het ontwikkelen hiervan onder invloed van o.a. ondervoeding; vervolgens zouden speciale faktoren gedurende de volwassen leeftijd aanleiding kunnen geven tot het daadwerkelijke ontstaan van een positieve rheumafaktor. Er kan geen definitieve verklaring worden gegeven voor het feit dat de Waaler – Rose test vaker positief was onder de Basotho dan de LFT.

Er wordt een voorstel gedaan omtrent de beste manier om in de toekomst dit soort bevolkingsonderzoek in de ontwikkelingslanden te verrichten met een minimum aan onkosten en een maximum aan effectiviteit.

In hoofdstuk 5 worden mogelijke verklaringen voor het verschil tussen de resultaten van het ziekenhuis – en het bevolkingsonderzoek besproken. Het is mogelijk dat in ons ziekenhuis een groter aantal ernstige patienten de polikliniek bezocht dan elders in Afrika. Als redenen hiervan zouden kunnen worden aangevoerd, dat er meer rheumatoide klachten voorkomen in een kouder klimaat, of worden verondersteld, dat het ziekenhuis in Lesotho beter bereikbaar was door betere transportfaciliteiten of eenvoudigweg dat Scott Hospital een goede naam had m.b.t. rheumatische aandoeningen. Dit laatste is onwaarschijnlijk.

Aan de andere kant zou de lage prevalentie van rheumatoide arthritis die gevonden werd in de open populatie veroorzaakt kunnen worden door de volgende factoren: een verhoogde stervenskans van kinderen, die als volwassenen rheumatoide arthritis zouden hebben gekregen; mensen met de ziekte die zich verbergen in de gemeenschap en niet op komen dagen; een geringere incidentie van rheumatoide arthritis op grotere hoogte gepaard gaande met een sneller en ernstiger verloop van de ziekte, resulterend in enerzijds een toegenomen hospitalisatie en anderzijds een hogere mortaliteit. Het laatste zou ook in de hand kunnen worden gewerkt door een gebrek aan medische voorzieningen, terwijl bovendien het natuurlijke verloop van de ziekte wanneer die eenmaal ontstaan is anders zou kunnen zijn door het ontbreken van belangrijke parasitaire ziekten en het beschermende effect dat hier mogelijk van uitgaat.

APPENDICES

1. Out – patients tally sheet
2. ARA criteria
3. Rheumatoid arthritis form
4. Joint examination form
5. Functional criteria
6. List of registered people
7. Attendance slips
8. Questionnaire

APPENDIX 1
Out – patients tally sheet

DATE:

DISEASES	0 — 4 YRS			5 YRS AND OVER				TOTAL	
								0-4 YRS	5 + YRS
A. QUARANTINABLE DISEASES: (for immediate isolation and reporting).									
Cholera; Plague; Louse-borne Typhus; Smallpox; Yellow Fever.	00000 00000	00000 00000	00000 00000	00000 00000	00000 00000	00000 00000	00000 00000		
B. NOTIFIABLE: (to be reported on form and sent to District Health Inspector)									
1. Typhoid	00000	00000	00000	00000	00000	00000	00000		
2. Meningitis	00000	00000	00000	00000	00000	00000	00000		
3. Diptheria	00000	00000	00000	00000	00000	00000	00000		
4. Chickenpox	00000	00000	00000	00000	00000	00000	00000		
5. Poliomyelitis	00000	00000	00000	00000	00000	00000	00000		
6. Rabies	00000	00000	00000	00000	00000	00000	00000		
C. OTHER									
7. Pulmonery Tuberculosis	00000	00000	00000	00000	00000	00000	00000		
8. Whooping Cough	00000	00000	00000	00000	00000	00000	00000		
9. Mumps	00000	00000	00000	00000	00000	00000	00000		
10. Food Poisoning	00000	00000	00000	00000	00000	00000	00000		
11. Syphilis	00000	00000	00000	00000	00000	00000	00000		
12. Gonorrhea	00000	00000	00000	00000	00000	00000	00000		
13. Measles	00000	00000	00000	00000	00000	00000	00000		
14. Gastro-Enteritis	00000	00000	00000	00000	00000	00000	00000		
15. Leprosy	00000	00000	00000	00000	00000	00000	00000		
16. Jaundice	00000	00000	00000	00000	00000	00000	00000		
17. Goitre	00000	00000	00000	00000	00000	00000	00000		
18. Pellagra	00000	00000	00000	00000	00000	00000	00000		
19. Marasmas	00000	00000	00000	00000	00000	00000	00000		
20. Protein-Calorie Malnutrition	00000	00000	00000	00000	00000	00000	00000		
21. Other Endocrine, Nutrition & Metabolic Diseases	00000	00000	00000	00000	00000	00000	00000		
22. Other Infective and Parasitic Diseases	00000	00000	00000	00000	00000	00000	00000		
23. Tumours/Neoplasms	00000	00000	00000	00000	00000	00000	00000		
24. Dis. of Blood & Blood forming organs	00000	00000	00000	00000	00000	00000	00000		
25. Mental Disorders	00000	00000	00000	00000	00000	00000	00000		
26. Dis. of the circulatory system	00000	00000	00000	00000	00000	00000	00000		
27. Dis. of the Nervous system and sense organs	00000	00000	00000	00000	00000	00000	00000		
28. Dis. of the Digestive system	00000	00000	00000	00000	00000	00000	00000		
29. Dis. of the Respiratory system	00000	00000	00000	00000	00000	00000	00000		
30. Dis. of Genito-urinary system	00000	00000	00000	00000	00000	00000	00000		
31. Complications of Preg. childbirth & Puerperium	00000	00000	00000	00000	00000	00000	00000		
32 Dis. of Skin and Subcutaneous tissues	00000	00000	00000	00000	00000	00000	00000		
33. Dis. of Muskulo Skeletal System and Connective tissue	00000	00000	00000	00000	00000	00000	00000		
34. Congenital & Perinatal diseases of the New-born	00000	00000	00000	00000	00000	00000	00000		
35. Symptoms and ill-defined conditions.	00000	00000	00000	00000	00000	00000	00000		
36. Injuries, Fractures & Dislocations	00000	00000	00000	00000	00000	00000	00000		
37. Dis. of teeth	00000	00000	00000	00000	00000	00000	00000		
	00000	00000	00000	00000	00000	00000	00000		
Re-Attendances	00000	00000	00000	00000	00000	00000	00000		
Normal Pregnancy (Minor Complaints)	00000	00000	00000	00000	00000	00000	00000		
Medical Examinations (Certificates)	00000	00000	00000	00000	00000	00000	00000		
Referrals: from other Institutions	00000	00000	00000	00000	00000	00000	00000		
to other institutions									

APPENDIX 2

ARA criteria (1959) for active rheumatoid arthritis.

1. Morning stiffness.
2. Pain on motion or tenderness in at least one joint (observed by a physician).
3. Swelling (soft tissue thickening or fluid, not bony overgrowth alone) in at least one joint (observed by a physician).
4. Swelling (observed by a physician) of at least one other joint (any interval free of joint symptoms between the two joint involvements may not be more than three months).
5. Symmetrical joint swelling (observed by a physician) with simultaneous involvement of the same joint on both sides of the body (bilateral involvement of midphalangeal, metacarpophalangeal, or metatarsophalangeal, joints is acceptable without absolute symmetry). Terminal phalangeal joint involvement will not satisfy this criterion.
6. Subcutaneous nodules (observed by a physician) over bony prominences, on extensor surfaces or in juxta – articular regions.
7. X – ray changes typical of rheumatoid arthritis (which must include at least bony decalcification localized to or greatest around the involved joints and not just degenerative changes). Degenerative changes do not exclude patients from any group classified as rheumatoid arthritis.
8. Positive agglutinations test – demonstration of the "rheumatoid factor" by any method which in two laboratories, has been positive in not over 5% of normal controls.
9. Poor mucin precipitate from synovial fluid (with shreds and cloudy solution.
10. Characteristic histologic changes in synovial membrane with three or more of the following: marked villous hypertrophy; proliferation of superficial synovial cells often with palisading; marked infiltration of chronic inflammatory cells (lymphocytes or plasma cells predominating) with tendency to form "lymphoid nodules"; deposition of compact fibrin, either on surface or interstitially; foci of cell necrosis.
11. Characteristic histologic changes in nodules showing granulomatous foci with central zones of cell necrosis, surrounded by proliferated fixed cells, and peripheral fibrosis and chronic inflammatory cell infiltration, predominantly perivascular.

A diagnosis of "classical" rheumatoid arthritis requires that SEVEN of the criteria be satisfied; for "definite" rheumatoid arthritis the requirement is at least FIVE and for "probable" rheumatoid arthritis at least THREE. In criteria 1 through 5 the joint signs or symptoms must be continuous for at least 6 weeks at time of diagnosis. The patient is excluded if features listed under "Exclusions" are present. This list is not reproduced here; it contains features typical for diseases other than rheumatoid arthritis but at times showing joint involvement.

Criteria for inactive rheumatoid arthritis (1961).

1. A past history of polyarthritis.
2. Symmetrical deformity of peripheral joints consisting of ankylosis or irreducible subluxation (there must be some involvement of one hand or foot).
3. X – ray changes of rheumatoid arthritis of grade 2 or more.
4. Positive serological test for rheumatoid factor.

The diagnosis is "definite" if three or four criteria are fulfilled and "probable" if two criteria are fulfilled. The MODIFIED criteria for inactive arthritis as they have been used in previous surveys in Africa consist of only the last three of these criteria. The diagnosis is "definite" if three criteria are fulfilled and "probable" if two are fulfilled.

New York criteria for rheumatoid arthritis (1966).

1. A history, past or present, of an episode of joint pain involving three or more limb joints but without stipulation as to duration.
2. Involvement by swelling, limitation of motion, subluxation, or ankylosis of at least three limb joints. There must be symmetry of two of the joints involved and there must also be involvement of one hand, wrist or foot. (Excluded are the distal interphalangeal joints, the fifth proximal interphalangeal joints, the first carpo – metacarpal joints, the hips and the first metatarso – phalangeal joints). Subluxation of the lateral metatarso – phalangeal joints must be irreducible.
3. X – ray features of grade 2 or more erosive arthritis in hands, wrists or feet.
4. A positive serological reaction for rheumatoid factor.

Terms summarizing the number of criteria fulfilled, such as "probable" or "definite" are not suggested.

Exclusions from those fulfilling these criteria shall not be applied.

APPENDIX 3
Rheumatoid arthritis form

20/11/80

NAME Mama Ovabi Sekeko AGE 76 SEX F

AREA + PAST ADRESSES Soloane (near mine) Always lived there

DIAGNOSIS: (CLASSICAL RA) - DEFENITE RA - PROBABLE RA - POSSIBLE RA

HISTORY + CINICAL COURSE OF DISEASE Painful joints for many years Started with wrists + hands, then feet and elbows Have been swollen ++ especially hands + wrists. Morning stiffness for many hours Shoe size has become bigger 2) bilateral epicondylitis severe flexion contractions of all fingers of both hands (Rh) One by one nodule (rheumatic) ave. left ulnar ulna. No spleen palpable nodules are (R) elbow + (L) ulnar (slightly distally from half) 21/4 Bed Pleasy knees now stable too 1/5 Biopsy taken

SOURCE + AMOUNT OF INCOME + K 10 / 2 month from only son

X-RAY NUMBERS AND DIAGNOSIS Chest / hands / feet 6631/80

LABORATORY ESR 38 Rh Fact (+) WCC 4700

HISTOLOGY Rheumatoid nodule

ARA ANATOMICAL STAGE

I
1. no destructive changes roentgenologically
2. evidence of osteoporosis may be present
3. roentgenologic evidence of osteoporosis with or without slight bonedestruction; slight cartilage destruction may be present

II
4. no joint deformities; limitation of mobility may be present
5. adjacent muscle atrophy
6. extra-articular soft tissue lesions (e.g. nodules, tendovaginitis) may be present

III
7. roentgenologic evidence of cartilage and bone destruction in addition to osteoporosis

IV
8. joint deformity, such as subluxation, ulnar deviation, or hyperextension, without fibrous or bony ankylosis
9. extensive muscle atrophy
10. fibrous or bony ankylosis

PHOTOGRAPH NUMBER

APPENDIX 4
Joint examination form

JOINTS EXAMINED		RESULTS OF JOINT EXAMINATION					
		Swelling	Not Tender (0)	Tender (+1)	Tender + winced (+2)	Tender + winced + withdrawn (+3)	JOINT SCORE
Temperomandibular				X			
Cervical spine					X		
Sterno-clavicular	(right)		X				
	(left)		X				
Acromio-clavicular	(right)			X			
	(left)			X			
Shoulders	(right)		X				
	(left)		X				
Elbows	(right)	X			X		
	(left)	X			X		
Wrists	(right)	X			X		
	(left)	X			X		
M.C.P.	(right)				X		
	(left)				X		
P.I.P.	(right)	X	X				
	(left)	X	X				
Hips	(right)			X			
	(left)			X			
Knees	(right)		X	/			
	(left)		X				
Ankles	(right)	X		X			
	(left)	X		X			
Meta-tarsals	(right)	X	X				
	(left)	X	X				

APPENDIX 5

Functional criteria

American Rheumatism Association (U.S.A.).

1. Performs all usual activities without handicaps.
2. Performs adequately for normal activities, despite discomfort occasionally in one or more joints.
3. Limited to little or no activities or usual occupation or self – care.
4. Largely or wholly incapacipated bed – ridden, or confined to wheelchair, little or no self – care.

APPENDIX 6
List of registered people

Location: Bolepetsa Location No: 2000

Sequential number	Family number	Sex	Age	Classification	Name	
371 ✓	076	F	26		Liketi	Monnapula
372		F	82		'Ma-Mohammed	Mathena
373		M	14		Moeti	Mathena
374		M	36		Tello	Monnapula
375		M	6		Santsetsana	Monnapula
376		F	2		Poleso	Monnapula
377		M	18	T.A	Lebamang	Motsoeleoane
7378 ✓	077	M	64		Lephapang	Rapulana
7379 ✓		F	24		'Mamatle	Rapulana
7380		F	80		Sarah	Rapulana
381		F	20		'Nkabenuti	Rapulana
382		M	23	T.A	Boy	Rapulana
383		M	?	T.A	Lillo	Rapulana
384		F	2y 6mths		Mahlathakong	Rapulana
385		M	1y 6mths		Motsamai	Rapulana
386	078	M	?		Makhele	Lichaba
387		F	31		'Mokhehang	Lichaba
388		F	14		'Mamera	Lichaba
389		F	12		'Mafoka	Lichaba
7390		M	7		Lebohang	Lichaba
7391		F	3		Mosalenyane	Lichaba
7392	079	F	45		Maria	Lichaba
7393		F	4		'Mamaka	Lichaba
7394	080	F	62		'Mamaleli	Letsie
7395	081	M	38		Sello	Lichaba

APPENDIX 7
Attendance slips

TUBERCULOSIS INVESTIGATION - ATTENDANCE SLIP

Name ELINAH MALOPE Sex F

Registration No. 15 Family No. 5 Age 70

Screening centre Chongwe School 8 a.m. Date 17 August 1979 20 " "

TUBERCULOSIS INVESTIGATION - ATTENDANCE SLIP

Name SIBONGILE MALOPE Sex F

Registration No. 16 Family No. 5 Age 15

Screening centre Chongwe School 8 a.m. Date 17 August 1979 20 August 1979

TEAR AGAINST A RULER OR CUT

TEAR OF EACH SL AND GIVE TO PERSO REGISTERE OR LEAVE ALL SLIPS FROM SAM FAMILY WITH A RESPONSIBL MEMBER C THE HOUSEHOL

TUBERCULOSIS INVESTIGATION - ATTENDANCE SLIP

Name ______ Sex ______

Registration No. ______ Family No. ______ Age ______

Screening centre ______ Date ______

TUBERCULOSIS INVESTIGATION - ATTENDANCE SLIP

Name ______ Sex ______

Registration No. ______ Family No. ______ Age ______

Screening centre ______ Date ______

TUBERCULOSIS INVESTIGATION - ATTENDANCE SLIP

Name ______ Sex ______

Registration No. ______ Family No. ______ Age ______

Screening centre ______ Date ______

TUBERCULOSIS INVESTIGATION - ATTENDANCE SLIP

Name ______ Sex ______

Registration No. ______ Family No. ______ Age ______

Screening centre ______ Date ______

APPENDIX 8
Questionnaire

R H E U M A T O I D A R T H R I T I S S U R V E Y

Name _____ Sequential No. [ ][ ][ ][ ][ ]

Status
- [0] volunteer
- [1] registered
- [9] don't know

Site No. [ ][ ]

Sex
- [1] male
- [2] female
- [9] don't know

Age [ ][ ]

Joint stiffness
- [1] Yes
- [2] No

Do you suffer from stiffness in your joints on waking in the morning?

Painful hands/feet
- [1] Yes
- [2] No

Do you suffer from pain in your hands or feet?

Joint swelling
- [1] Yes
- [2] No

Have you efer suffered, or are you still suffering, from swelling of joints in your hands or feet?

Deformities
- [1] Yes
- [2] No

Do you have deformed hands or feet? (Excluding accidental injury.)

Usefulness of hands
- [1] Yes
- [2] No

Is there any deterioration in the use of your hands?

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ABOUT THE AUTHOR

Jan Daniel Moolenburgh was born on July 15th, 1952, in Leiden, The Netherlands. He passed his secondary school exam in 1970 at the "Karel van Mander Lyceum" (later renamed "Spaarne Scholengemeenschap") in Haarlem. He started his medical training in the same year at the university of Leiden. In 1974 he was chairman of the Medical Students Association of the university (MFLS) and during the following 2 years he was a member of the Faculty Council. In July 1976 he passed the American E.C.F.M.G. exam in The Hague. He obtained his medical degree in May 1977 and left for South Africa in June of that year.

From the first of July 1977 until the end of that year he was a senior housedoctor in the Department of Obstetrics and Gynaecology of the University of Pretoria (Head: Prof. F.G. Geldenhuys). During the first 6 months of 1978 he was a senior housedoctor in the Department of Surgery of the same university (Head: Prof. C.J. Mieny). After his return in Holland in August 1978 he attended the National Course in Tropical Medicine at the Tropical Institute, Amsterdam, and has been teaching neurology at the "Stichting Opleiding tot Sociale Arbeid" in Haarlem.

In February 1979 he was sent out for 3 years as a mission doctor by "Dienst over Grenzen", a developing aid organization, to Scott Hospital, Morija, Lesotho. In September 1979 he married Sonya Erasmus in Durban, South Africa. He received additional training in anaesthetics in the King Edward VIII Hospital, Durban in March 1980. In March 1982 he left Lesotho and returned to Holland.

In April 1982 he started his post – graduate training in internal medicine in the Diaconessehuis at Voorburg with Dr. P.C. Brinkerink.

The study described in this thesis was conducted in Lesotho from 1st May 1980 until February 1982. The results were worked out under supervision of Prof. Dr. H.A. Valkenburg, Head of the Institute of Epidemiology, Erasmus University Rotterdam, who had already been guiding the latter half of the project from a distance.