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Southern African cardiomyopathy in the Republic of South Africa, 1978–1980

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Summary

Data on deaths from all cardiovascular conditions (CV) and from cardiomyopathy (MY) are analysed from death certificates for the black populations of the Republic of South Africa. Current rates of death, compared with rates standardized against the notional world standard, suggest that marked increases of CV mortality are to be expected. Regional patterns of MY contrast markedly with the distributions of CV deaths, and Zulu seem less liable to either CV or MY than Xhosa or Tswana. A sample of hospitals also recorded CV and MY for a year among admitted patients, and this morbidity information is compared with the mortality data. Overall it seems likely that increasing numbers of black CV patients pose a threat to the viability of the nation's medical services and warrant stringent surveillance for both economic and humanitarian reasons.

Résumé

Des données concernant les morts dues à toutes les conditions cardiovasculaires et à la cardiomyopathie sont analyseés à partir des certificats de décès des populations noires de la République de l'Afrique du Sud. Une comparaison des taux de mortalité actuels avec les taux standardisés contre le standard mondial notionnel suggère qu'il faut s'attendre à une nette augmentation de mortalité cardiovasculaire. L'incidence régionale de la cardiomyopathie fait un contraste marqué avec les distributions de morts cardiovasculaires, et les Zoulou semblent moins sujets à des conditions cardiovasculaires ou à la cardiomyopathie que les Xhosa ou les Tswana. Un groupe d'hôpitaux ont enregistré pendant un an les conditions cardiovasculaires et la cardiomyopathie parmi les malades qui se présentaient et l'information concernant ce genre de morbidité est comparée avec les données concernant la mortalité. En général il semble probable qu'un nombre de plus en grand de Noirs atteints de conditions cardiovasculaires va menacer la viabilité des services médicaux de la nation et va justifier une surveillance très stricte pour des raisons tant économiques qu'humanitaires.

Introduction

Reports of an unusually high occurrence of a cardiomyopathy of unknown origin among black people in southern Africa have been common for some years [1,2]. However, it has not been possible to obtain an overall statistical or geographical view because of the scattered and localized nature of the data [3,4].

Two recent events have now made it possible to change that situation and to try — even with shortcomings — to compile a first approximation towards a national picture.

Sources of data

Population at risk

The total enumeration of population of all races in South Africa (RSA), held by the Central Statistics Services, Pretoria (CSSP) in 1980, provides a basic denominator for the calculation of rates. These census data are subdivided by age and sex, by place of actual residence, by national (tribal) group, and by magisterial district. The latter units have here been amalgamated into regions in order that statistical cells retain reasonable numbers within each one.

Mortality

Deaths among black people for the whole of the RSA (not including Transkei, Bophuthatswana

Table 1. Age-specific cardiovascular (CV) and cardiomyopathic (MY) mortality rates per 100,000 in South Africa, 1978–1980

	Black males				Black females			
	All RSA		Urban only		All RSA		Urban only	
Age (years)	All CV	425 MY	All CV	425 MY	All CV	425 MY	All CV	425 MY
Under 1	37.34	1.17	59.57	2.14	31.67	0.91	49.02	1.72
1–4	2.45	0.09	4.31	0.22	2.17	0.35	4.20	0.77
5–9	2.21	—	4.32	—	2.74	0.18	5.08	0.20
10–14	4.69	0.04	7.30	—	4.72	0.03	8.58	—
15–19	7.95	0.07	12.17	0.02	12.08	0.19	20.02	0.34
20–24	13.43	0.18	14.37	0.33	15.24	0.33	22.75	0.60
25–34	32.48	0.73	33.80	0.99	31.18	0.24	44.72	0.28
35–44	93.90	1.69	104.97	2.34	77.64	0.51	120.16	1.14
45–54	235.96	3.57	278.46	4.83	173.93	1.40	266.26	1.99
55–64	540.06	5.75	667.09	9.77	395.15	2.73	653.67	5.59
65–74	1149.01	9.42	1593.06	17.18	851.54	4.22	1605.18	8.79
75 +	1541.16	10.61	2703.88	17.80	1282.39	8.37	2695.52	17.72
All ages	88.10	1.08	117.56	1.83	82.29	0.66	132.91	1.16

given in Table 2 and mapped (for males) in Figs 2 and 3. The standardized mortality rates (smr) shown in Fig. 2 emphasize four areas of the country with high figures: firstly the Rand, west and south Rand area; secondly a Natal coastal strip; thirdly a north–south line from East London to Mafikeng and including Bloemfontein; and finally the Paarl and Hopefield areas inland of Cape Town. However, as Table 2 shows, many of these smrs are based on very small numbers (for example, Colesberg (20) 1 death observed, 0.45 expected). For this reason Fig. 3, a stochastic map, emphasizes only those places that deviate at a statistically significant level. Cardiomyopathy is significantly common as a cause of male death only in Durban (35), Bloemfontein (65), Vereeniging (52), Vanderbijlpark (53), Johannesburg (47) and Mafikeng (25). This might be taken to imply that MY is a rather sophisticated diagnosis, which may not often be made *post mortem* in minor centres. However, this cannot explain its rarity in Cape Town (01/02), Port Elizabeth (14), East London (28/29) or Kimberley (22/26), centres where it would hardly be missed if it were present. The urban areas (see square symbols on the maps) of Pretoria (46/51) and Klerksdorp (60/61) also rarely see this cause of death. It is unacceptable to suppose that MY is misdiagnosed in all those major centres — especially in view of the high morbidity diagnosed at, for example, Groote Schuur Hospital and several others.

For women too (Fig. 4) the whole Rand area is the major centre certifying this cause of death with, in addition, three deaths in Colesberg (20), 1 in Hermanus (07) and 5 in Port Shepstone (39). The contrast between Johannesburg (47) with 26 deaths and Cape Town (01) with two deaths is remarkable, and there were only four deaths in Durban (35) in the 3 years of record (Table 2).

For each sex, these regional patterns of MY mortality are quite unlike those of the rest of the cardiovascular spectrum of causes of death among black people [5].

Mortality implications in the future

These mortality data can also provide some guide to the future. The black mortality rate, standardized to the (notional) world population structure (wasmr), gives an indication of the number of MY deaths that would be expected if the black population of the RSA reached the

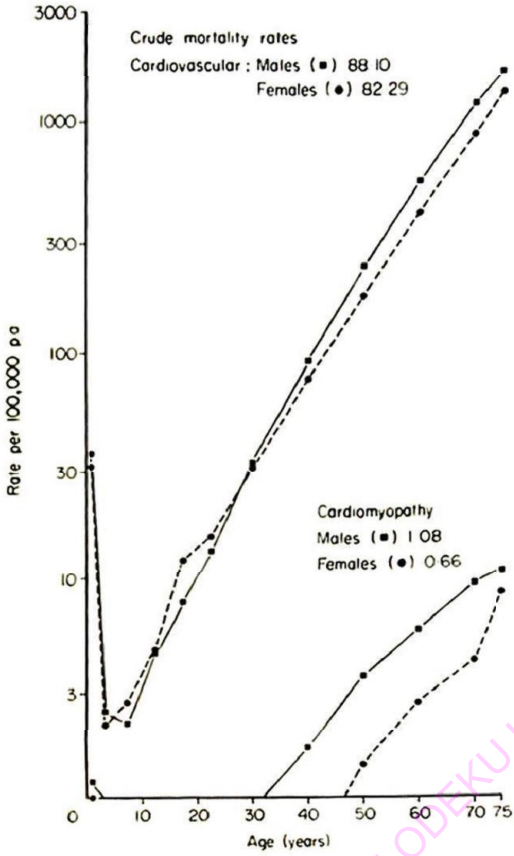

Fig. 1. Age-specific death rates for black populations of South Africa from cardiomyopathy (ICD 425) by males and females and by urban resident and national totals, 1978–1980.

world's average proportions of young and old. This would involve a demographic shift towards more elderly and fewer children — a structure more like the balance seen in the white population.

At present the black male MY crude morality rate (cmr) is 1.08 per 100,000 per annum and the female cmr is 0.66. The respective wasmr are 1.9 and 1.0; an increase for males of 77% and for females of 47%. This degree of increase can be expected for demographic reasons alone. This calculation implies that other social and environmental factors, which may be contributory, are held constant. Since a situation of no socio-economic change is unlikely, these increases must be looked upon as the minimum expected figures.

Ethnic (tribal) variations of mortality

Since 29 regions within the RSA contain black populations comprising predominantly one single national (tribal) group, it is possible to separate these regions for analysis [7]. Considering only those regions in which the dominant national group makes up 85% or more of the black population, Table 3 shows their mortality experience with regard to MY and CV causes. (Most of the migrant-receiving urban areas, especially of the highveld, receive a varied tribal inflow and so are excluded from this analysis.)

The two most numerous peoples, the Zulu and the Xhosa, experienced almost the same numbers of male CV deaths, 2964 and 2704, in the years 1978–1980. By virtue, however, of the Zulu being almost twice as numerous (in the homogeneously peopled areas considered) the two peoples will have very different numbers expected. Most crucially the Xhosa have significantly more CV cases and Zulu significantly fewer CV cases than would be expected at the overall national rate. This is true both for all the homogeneous areas and for the smaller number classified as urban. In the case of MY, Zulu again have significantly few deaths, both of males and females (Table 3).

The results for the Shangaan people of Gazankulu (74) and the Tswana of Mafikeng (25), although for small populations, show the Shangaan with low male and female CV numbers and the Tswana females (but not males) with high CV numbers of deaths. The Shangaan also record significantly few MY deaths in either sex.

Morbidity: all cardiovascular conditions and cardiomyopathy

It is a regrettable fact that the morbidity recording systems of the RSA's major hospitals allow no possibility of routine retrieval of cause of either admission or out-patient treatment. Furthermore, in most instances it would be impractical to distinguish between one patient admitted several times over a period of time from different persons each admitted on a single occasion.

There is one major exception to this state of affairs and that is the western Cape group of

Table 2. Mortality 1978–1980 — black population of RSA by regions

Region		Male deaths			Female deaths		
		Obs.	Exp.	smr	Obs.	Exp.	smr
01	Cape	5	5.0	99	2	1.2	169
02	Paarl	3	1.3	225	0	0.1	0
04	Uniondale	0	0.3	0	0	0.2	0
05	Oudtshoorn	0	0.2	0	0	0.0	0
06	George	0	0.2	0	0	0.1	0
07	Hermanus	0	0.4	0	1	0.0	4527
08	Ceres	0	0.7	0	0	0.1	0
09	Hopefield	2	0.5	406	0	0.0	0
10	Clanwilliam	0	0.1	0	0	0.0	0
11	Namaqualand	0	0.3	0	0	0.0	0
12	Walvis Bay	0	0.3	0	0	0.0	0
14	Port Elizabeth	8	6.3	127	7	3.4	208
16	Calvinia	0	0.0	0	0	0.0	0
17	Beaufort West	0	0.1	0	0	0.0	0
18	Willowmore	0	0.1	0	0	0.1	0
19	Graaff-Reinet	2	0.8	263	1	0.5	193
20	Colesberg	1	0.4	224	3++	0.3	953
21	Prieska	0	0.1	0	0	0.0	0
22/26	Kimberley	5	2.6	194	2	1.2	173
23	Gordonia	1	0.3	329	0	0.1	0
24	Kuruman	0	1.0	0	0	0.2	0
25	Mafikeng	7++	1.6	451	0	0.6	0
27	Boshof	1	0.8	132	0	0.5	0
28/29	East London	8	4.0	201	3	2.8	108
30	Grahamstown	4	2.9	140	5	2.0	257
31	Barkly East	0	1.0	0	1	0.7	136
32	Aliwal North	1	0.7	148	2	0.5	367
33	Bethulie	0	0.7	0	1	0.4	253
35	Durban/Pinetown	20++	3.2	622	4	1.3	305
36	Lower Tugela	1	1.7	60	2	0.6	334
37/38/73	Pietermaritzburg	8	9.0	89	5	6.4	78
39	Port Shepstone	3	1.1	265	5++	0.5	958
40	Umzinto	2	1.2	167	2	0.6	324
41	Underberg	0	0.5	0	0	0.4	0
42	Mount Currie	2	0.8	252	3+	0.4	801
43	Newcastle	2	5.2	38	4	3.2	124
44	Vryheid	1	2.5	40	0	1.4	0
45	Eshowe	2	2.8	71	1	1.5	69
46/51	Pretoria/Brits	7	10.5	67	4	4.0	99
47	Johannesburg	44++	22.7	194	26++	9.9	254
48	Germiston	19	15.1	126	17++	4.8	351
49	Brakpan	11	8.7	126	3	3.1	95
50	Krugersdorp	15	10.7	140	7+	2.1	340
52/53	Vereeniging/ Sasolburg	21++	7.8	269	15++	3.3	461
55	Rustenburg	0−	4.4	0	2	1.1	177
56	Pietersburg	0−−	7.1	0	0−	4.1	0
57	Nelspruit	8	6.5	123	7	2.9	239
58	Witbank	4	5.8	69	1	2.2	45
59	Piet Retief	7	7.3	96	4	4.0	100
60/61	Klerksdorp	6	10.1	59	1	3.6	28
62/64	Kroonstad/Welkom	12	12.7	95	5	4.7	105

(*continued*)

Table 2. Mortality 1978–1980 — black population of RSA by regions (*continued*)

63	Harrismith	4	5.3	76	3	3.7	81
65	Bloemfontein	11++	2.9	374	0	1.4	0
66	Wepener	1	3.3	30	2−−	6.6	30
69/70	Ciskei	5	9.8	51	5	3.7	135
71	Umlazi	0−−	10.8	0	0−−	5.6	0
72	Nkandla	17−	28.6	59	4−−	29.4	14
74	Gazankulu	0−	5.0	0	1−	5.8	17
78	Lebowa	0−−	19.9	0	1−−	19.5	5
80	Qwaqwa	0	1.7	0	0	1.6	0
82	Kangwane	0	1.7	0	0	1.6	0
85	Kwandebele	0	1.8	0	0	1.7	0
RSA total deaths (3 years)		281	281	100	162	162	100

++ $P < 0.01$, obs. > exp.,
\+ $P < 0.05$, obs. > exp.,
− $P < 0.05$, obs. < exp.,
−− $P < 0.01$, obs. < exp., by the Poisson significance test.

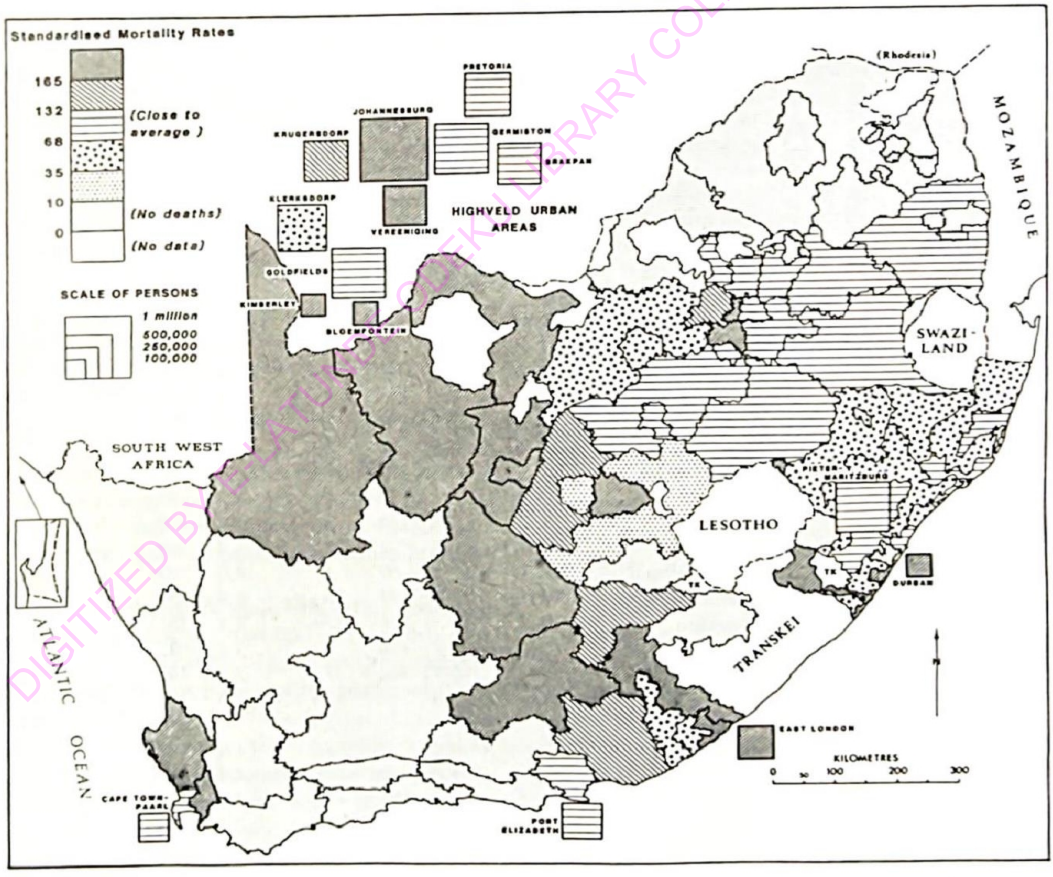

Fig. 2. Standardized mortality rates for black males for cardiomyopathy, 1978–1980 (For key to areas see Table 2).

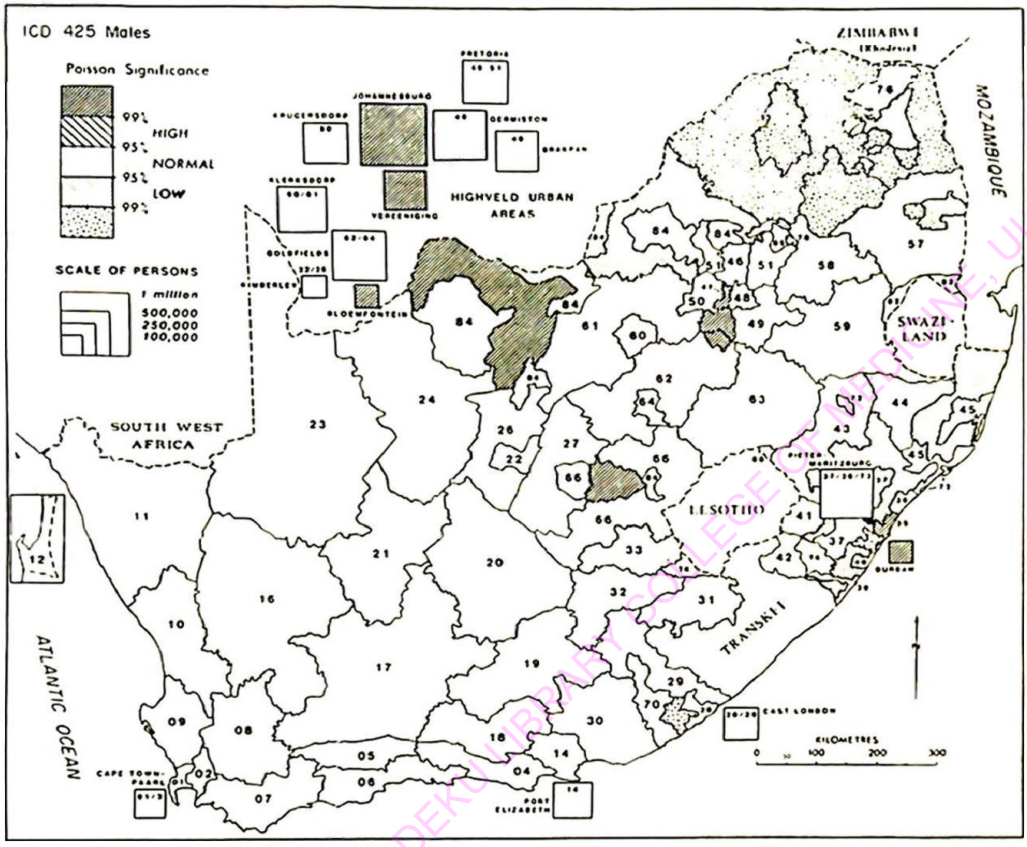

Fig. 3. Significant ($P < 0.05$) deviations of black male deaths for cardiomyopathy by region from nationally expected numbers.

three hospitals centred on Groote Schuur. Here medical diagnoses on the wards are routinely transferred to computer record and linked to a patient's name, race and identifying number. The system works so well that it is possible easily to retrieve all heart-related diagnoses regardless of whether the patient had a variety of other conditions in addition. Monthly summaries for 24 months, October 1982–September 1984, were retrieved for analysis.

In addition, a small sample of hospitals kindly agreed to take part in a prospective recording of all their cardiovascular cases for a single year on behalf of this survey. It should be stressed that the diagnoses employed, whether from Groote Schuur informatics or the other hospitals, are those made by medical personnel on the wards actually seeing the patients themselves. These diagnoses, made after admission and often more medically refined than opinions initially employed as admitting criteria, are compared with total numbers of patients upon discharge only as a measure of the size and workload of each hospital. In both cases, western Cape medical informatics and the 22 hospitals of the sample, data refer only to in-patients. Patients with less severe conditions may never seek treatment or, alternatively, may be treated as out-patients and not be entered in the records. Usable prospectively recorded data sets finally came from 22 scattered hospitals (Fig. 5), of which 12 completed a full 12 months and 10 some lesser, but still useful, period of months.

The informatics records, reduced in Table 4 to a single year averaged from the 2 years avail-

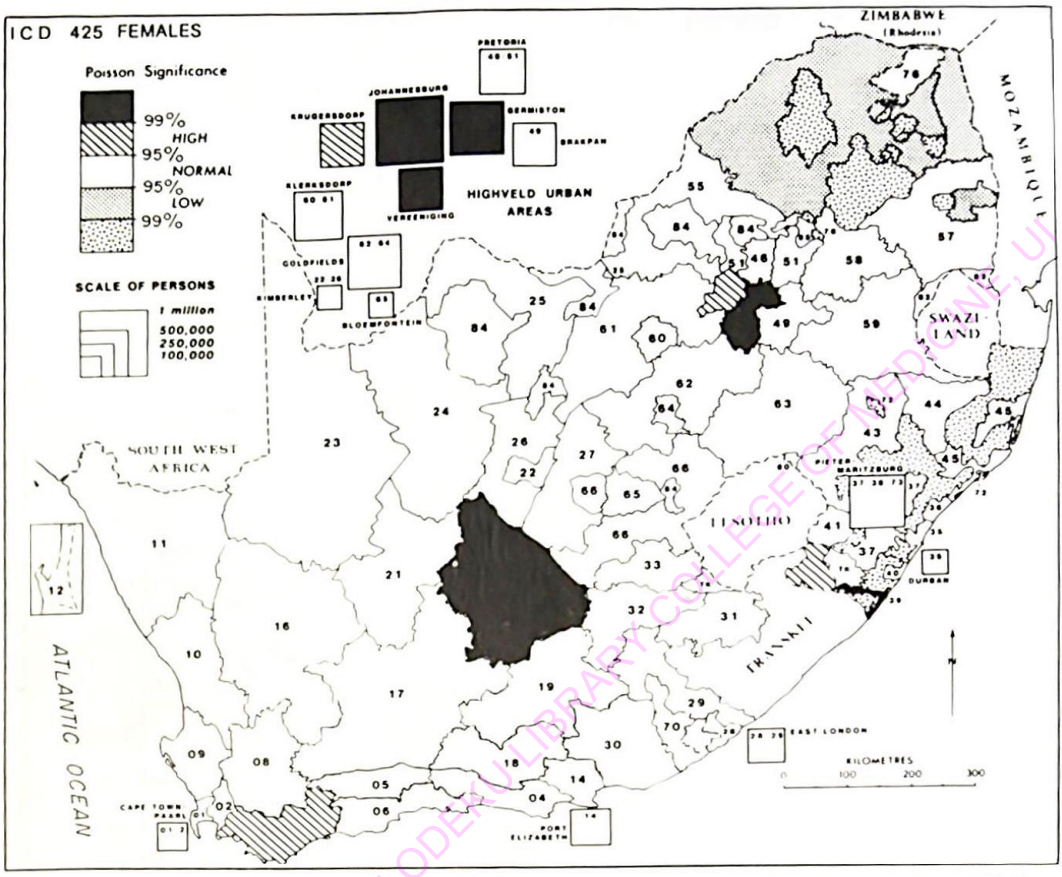

Fig. 4. Significant ($P < 0.05$) deviations of black female deaths for cardiomyopathy by region from nationally expected numbers.

able, have the advantage of allowing comparison of all heart conditions (CV) with total discharges. For black males over all ages, CV makes up 10% of in-patients' morbidity, and for patients over 45 years it accounts for 23%, with a clearly increasing gradient with age. Whilst the overall gradient is ten-fold, the real rise seems to start around 40 and climb quickly above 45. This is similar to experience among white patients in the western world [9].

Among black females (Table 4) the rate of change with age is sharper but the overall proportion of CV admissions is only one-third of that for black males.

The specific diagnosis, cardiomyopathy (ICD9-425), was made at Groote Schuur for 48 black males and 26 black females, comprising 11.0% and 6.4%, respectively, of all CV discharges. This proportion of male CV morbidity being cardiomyopathies is identical with the proportion recorded among black mineworkers [8]. As the black population of the catchment area of Groote Schuur is drawn 95.5% from the Xhosa group of peoples, this information may be taken as applying almost entirely to Xhosa in-patients.

Turning now to the sample of hospitals surveyed, these serve predominantly three groups of people; four hospitals are situated in Zulu areas, six in Xhosa areas and a further 12 scattered in areas where no particular national (tribal) group of black people is dominant (Fig. 5).

Table 5 gives the total number of heart cases of each sex diagnosed and the period of time recorded in each of 17 hospitals. The total discharge figure is used to calculate the percentage

Table 3. Ethnic variations of cardiovascular (CV) and cardiomyopathic (MY) mortality, 1978–1980

ICD	Black male deaths				Black female deaths			
	All CV		425 MY		All CV		425 MY	
	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.
Xhosa	2964++	2736.3	35	32.0	3144++	2336.1	24	18.6
Urban Xhosa	1727++	1344.2	24	16.7	1691++	937.1	12	7.4
Zulu	2707−−	4365.1	27−−	51.2	2261−−	5439.8	10−−	42.8
Urban Zulu	456−−	710.8	8	9.0	364−−	789.1	5	6.4
Tswana	102	122.8	7	1.8	111++	67.4	0	0.6
Shangaan	37	439.5	0−−	5.0	20−−	704.8	1−−	5.8

++ $P < 0.01$, obs. > exp.,
−− $P < 0.01$, obs. < exp., by the Poisson significance test.

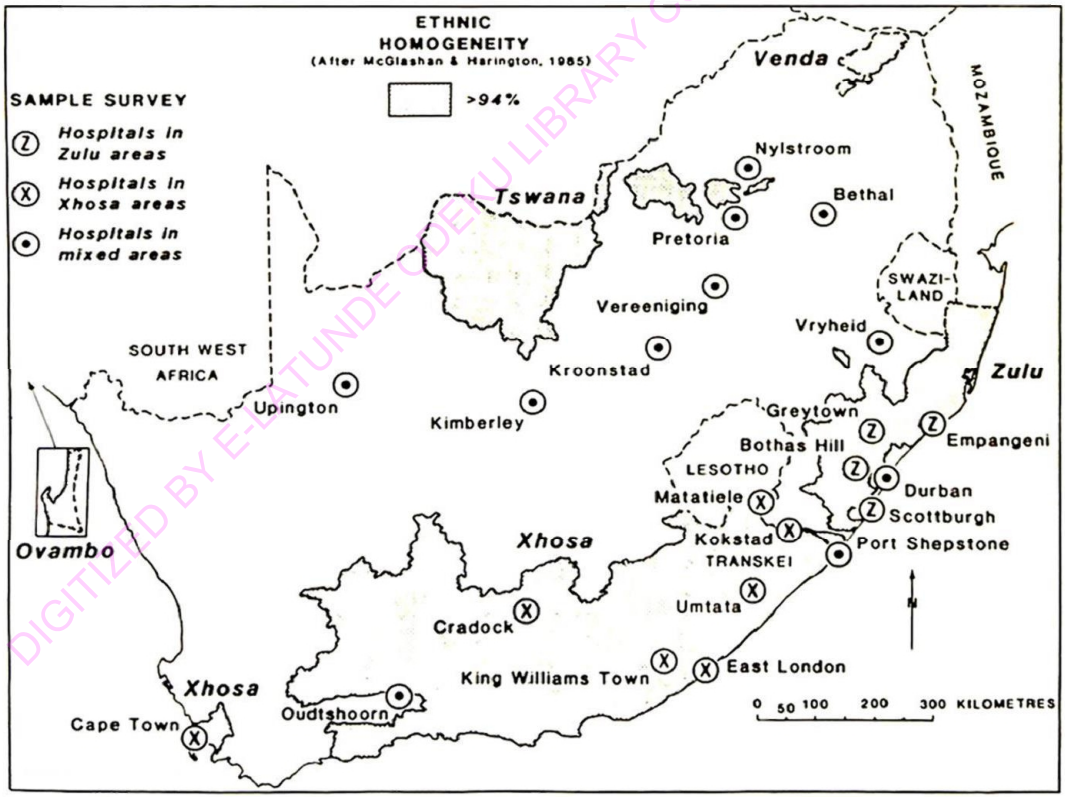

Fig. 5. Sites of hospitals providing morbidity data among the black population and showing also ethnically homogeneous areas.

Table 4. Morbidity from Western Cape Medical Informatics (average of year, 1982–1983)

	Age (years)	0–14	15–24	25–34	35–44	45+	Total
Black males	CV cases	33	54	44	55	250	436
	Discharges	1539	644	508	415	1098	4204
	%	2.1	8.4	8.7	13.3	22.8	10.4
Black females	CV cases	27	67	84	55	173	406
	Discharges	1890	3386	3819	1333	647	11075
	%	1.4	2.0	2.2	4.1	26.7	3.7

Table 5. Hospital morbidity in the black population in the prospective survey period (October 1983–September 1984)

Place	Months recorded	All heart cases: No. males	All heart cases: No. females	Total persons discharged	CV%	Expected numbers	Poisson significance
Botha's Hill	12	83	73	1222	12.8	28.3	++
Empangeni	8	192	148	16674	0.9	386.4	−−
Greytown	12	95	137	8474	2.7	196.4	+
Scottburgh	12	211	206	13635	3.1	315.9	++
Zulu sub-total	—	581	564	40005	2.9	927.0	++
East London	10	52	45	12754	0.8	295.5	−−
Kokstad	3	33	96	1787	7.2	41.4	++
Matatiele	3	11	10	2431	0.8	56.3	−−
Umtata	9	60	62	12896	0.9	298.8	−−
Xhosa sub-total	—	156	213	29868	1.2	692.1	−−
Bethal	12	29	22	7922	0.6	183.5	−−
Kroonstad	12	232	356	14793	4.0	342.8	++
Nylstroom	12	54	74	2390	5.4	55.4	++
Oudtshoorn	12	3	7	351	2.8	8.1	?
Pt. Shepstone	12	105	110	11695	1.8	271.0	−−
Pretoria	7	257	232	26167	1.9	606.3	−−
Vereeniging	12	322	395	22700	3.2	526.0	++
Vryheid	12	59	57	9786	1.2	226.8	−−
Walvis Bay	6	25	18	1380	3.1	32.0	?
Sub-total	—	1086	1271	97184	2.4	2251.9	
Total (17 hospitals)		1823	2048	167057	2.3	3871.0	

++ $P < 0.01$, obs. > exp.,
+ $P < 0.05$, obs. > exp.,
−− $P < 0.01$, obs. < exp., by the Poisson significance test.

of patients who suffered CV conditions. The number of cases expected is calculated on an assumption that the generalized rate of 2.3% applied in every hospital. The Zulu hospitals have, in general, significantly more than that proportion; the hospitals serving the Xhosa significantly less and the third subgroup, serving heterogeneous peoples, show varied results by specific hospitals. In particular, Vereeniging (Sebokeng) and Pretoria (Kalafong) show contradictory results in the two largest hospitals, as do Port Shepstone and Kroonstad in the next two largest hospitals. The overall result suggests a generally much lower rate of CV patients in these sample hospitals than in the Groote Schuur group.

In order to analyse cardiomyopathy a further five hospitals (which were unable to provide discharge figures to indicate their workloads) can be brought to account (Table 6). The total, 13.2% of male CV being MY, is not so different from 11% shown at Groote Schuur (and also recorded among mineworkers). The female total of 10.2% is distinctly higher. There seems therefore to be no justification here for believing that MY cases are failing to be recognized around the country generally, although, of course, they may be missed in individual hospitals.

The overall impression is that CV is a major cause of morbidity among Zulu in-patients compared with Xhosas, but that MY is commoner among Xhosas. A major anomaly is the King Edward VIII hospital in Durban. Here, in only 4 months recorded, 26 males and 42 female cardiomyopathy patients were admitted among totals of 38 and 72 cardiovascular admissions. This particular hospital, with its professorial cardiac unit, is not grouped with Zulu hospitals because it receives patients referred from a wide area and because Durban itself has a black population only 82% Zulu. Xhosa are locally the most numerous minority group.

Seasonality of cardiovascular morbidity

The literature, both in South Africa [10] and elsewhere overseas [11,12], shows that both heart conditions and other ill health patterns may show monthly or seasonal variations. This has been ascribed to thermal stress related either to hot or cold weather. It may, therefore, be expected to be at its greatest where seasonal range of temperatures is high.

The results for Groote Schuur hospitals from the medical informatics data are shown in Table 7. For males there is a weakly significant ($P = 0.06$) winter peak of patient numbers and, for females, a winter peak followed by a spring trough in patient numbers. When the sexes are accumulated the winter peak appears much more marked ($P < 0.01$).

One may infer that Cape Town winters reach levels of cold that are thermally stressful (as in Tasmania) but, having only moderately hot summers, do not reach the temperature stress levels reported in highveld centres or in Durban.

Table 6. Cardiovascular and cardiomyopathic black patients in prospectively recorded survey of 22 hospitals

	Males			Females		
	CY	MY	%	CV	MY	%
Zulu group*	581	33	5.7	564	25	4.4
Xhosa group*	384	54	14.1	449	79	17.6
Third group*	1184	200	16.9	1428	146	10.2
Total 22 hospitals	2177	287	13.2	2441	250	10.2

* See Fig. 5.

Table 7. Groote Schuur Medical Informatics. All heart-related morbidity among black South Africans by season (discharge numbers)

	Summer Dec.–Feb.	Autumn Mar.–May	Winter June–Aug.	Spring Sep.–Nov.	Total year	Season average
Males	169	150	202+	180	701	175.25
Females	137	178	180+	177−	612	153.00
Persons	306	328	382++	297	1313	328.25

++ $P < 0.01$, obs. > exp.,
+ $P < 0.06$, obs. > exp.,
− $P < 0.06$, obs. < exp., by the Poisson significance test.

Comparison of mortality between major population groups

One of the major points of interest in epidemiology in southern Africa is the proof of significant contrasts in disease occurrence along racial lines. Table 8 shows the number of deaths from all CV causes and for MY for each of the four (racial) populations in South Africa for the years 1978, 1979 and 1980.

It is at once clear that there is a vast difference between, on the one hand, whites and Asians among whom 30–33% of all deaths are heart related and, on the other hand, coloured and black people in whom 12–20% are heart related. Even allowing for some under recording of both coloured and black deaths a difference in real terms almost certainly would remain.

In addition there are considerable differences in the ways in which cardiomyopathy occurs. The final line of Table 8 employs a calculation of expected black deaths on the assumption that the national RSA proportions of deaths are applied to black deaths. In spite of the fact that black mortality makes up nearly half of RSA total heart deaths and so carries major weight in the calculation, the observed black deaths from cardiomyopathy differ very significantly from the nationally calculated proportions. This is true for both sexes consistently, with nearly double the number of cardiomyopathic deaths that should be expected if the national rate currently occurred among black people. The male ratio of observed to expected deaths is 281:151 and the female ratio 163:88.

Black people have thus very significantly more cardiomyopathy than other South Africans. This cause of death with high occurrence is offset by very significantly low death rates from other heart conditions.

Conclusion

It is clear that CV conditions generally are still a comparatively minor cause of death among South Africa's black population but that proportions of deaths and gross numbers of deaths can be expected to rise sharply as the population structure changes. The proportion currently dying of cardiomyopathy, although substantially and very significantly higher than in other races in the republic, is still small compared to the numbers admitted to hospital with this condition. There is evidence now that MY is widely diagnosed across the country and is not merely a concomitant of the particular conditions of the mining industries. Indeed, morbidity rates of MY in miners and (here) in non-miners are similar. In both parts of the population, these patients become a major source of economic loss by reduction in working time and costs of hospitalization.

The increasing numbers of black patients requiring hospital admission for cardiovascular conditions are a threat to the national health services and it is still necessary to stress that quantified information on comparable bases across the country is woefully inadequate. However, data could relatively easily be organized to become available. This step would provide a more authoritative base on which to plan improved public health measures for the future.

Table 8. Cardiovascular mortality by race 1978–1980

	White		Coloureds		Asians		Blacks	
	M	F	M	F	M	F	M	F
Total deaths: all causes (001-999)	61307	48048	40282	30268	8358	5657	188273	128492
CV deaths	18464	15112	6070	6249	2789	1873	22985	20311
CV as % of all	30.1	31.5	15.1	20.6	33.4	33.1	12.1	15.8
Cardiomyopathy (MY)	28	15	21	10	3	1	281	163
MY as % of CV	0.15	0.10	0.35	0.16	0.10	0.05	1.22	0.80
Expected MY at RSA rate							151.1*	88.2*

* See text.

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