

An integrated analysis of health facilities in the nine provinces of South Africa

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The development of a comprehensive national health plan must take into account an analysis of the provision and distribution of health facilities. This study collected and verified data from a number of different sources, on the number and types of hospital beds, the number of fixed clinics, and the population sizes in each of the nine new provinces of South Africa. A comprehensive database of these figures was compiled for the years 1988 and 1993.

Integrated analyses were made of the distribution and types of health facilities in South Africa by using population/facility ratios. Notable disparities were found to exist between provinces in the total (public and private) distribution of hospital beds per 1 000 population, but the distribution of acute hospital beds between provinces is more even. In provinces where there is more than one medical school, there is a marked imbalance between the levels of care, with greater emphasis placed on tertiary care, at the expense of the secondary level. Given the World Health Organisation recommendation of 10 000 people per clinic, there is a shortfall in most provinces.

Recommendations are made with regard to the rationalisation of academic and referral beds, and the factors to be considered in the addressing of shortages of clinic facilities. However, the limitations of a resource-based planning approach must be recognised, and it is recommended that comprehensive analyses be carried out at regional and sub-regional levels to determine the appropriate delivery of health care.

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The provision and distribution of health facilities is an important aspect of the development of a national health plan. Several studies¹⁻⁵ have attempted to collate this information with regard to South Africa, but most⁶⁻⁹ have focused mainly on the numbers of hospitals and hospital beds. There is insufficient information on the distribution of clinics, and no studies have adequately integrated clinic and hospital information or compared the data with planning norms. The purpose of this paper is to collate data on the distribution of all health facilities in South Africa and, by making appropriate analyses, offer some recommendations for the redressing of imbalances.

Material and methods

Primary data collection

Data on health facilities, defined here as hospitals and fixed (as opposed to mobile) clinics in the private and public sector, existing in 1988 were collated first. The *Hospital and Nursing Yearbook*¹⁰ (HNYB) was the primary source of data for hospitals. Other sources used were the statistical reports of the provinces, of the Central Statistical Services,¹¹ and reports from the National Association of Private Hospitals.

For the clinics, the HNYB together with reports from the regional directors of the then Department of National Health and Population Development (DNHPD) were used. The timetables from clinics under various local authorities and the statistical abstracts from the Development Bank of Southern Africa^{12,13} (DBSA) were also used.

Verification of hospital data

The HNYB was regarded as the most comprehensive single source; all other reports and data sources were therefore compared to it. In addition, a random selection of hospitals was made, and the information confirmed by telephonic communication with hospital administrations. Other editions of the HNYB^{14,15} were also compared with the 1988 edition for any additions, deletions or inconsistencies.

Verification of clinic data

It was found that the HNYB information was difficult to interpret, especially as it included both fixed and mobile clinics. Verification was carried out by comparison of reports of the regional directors of the DNHPD with the HNYB. Some obvious discrepancies were found, so clinic timetables from a number of local authorities were also obtained. Finally, a number of local authorities were interviewed telephonically to verify the accuracy of the clinic data.

Quality of data

The use of multiple sources of data made it possible to detect omissions and additions. It was found that the hospital data of the HNYB were comprehensive. The degree of divergence of data from other sources from those of the HNYB was analysed. The hospital bed data did not differ significantly. The percentage ranged from -1,44 to +1,59 for beds in the public sector, and -1,64 to -8,92 for beds in the private sector.

However, errors were found in the totals of figures, both in the 1988 and previous editions of the HNYB, and studies that made use of those totals will therefore have retained those errors. All totals used in this study have been verified as correct and some, therefore, do not coincide with those appearing in the HNYB.

Collation of the clinic data provided many methodological problems. No data source had a comprehensive list of clinics within the provinces. Exhaustive telephonic contacts with local authorities significantly improved this information. Revised clinic data from all the sources identified are therefore used in this study, and are considered sufficiently comprehensive for analysis.

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Update of 1988 database

The 1988 database was updated using the 1994 HNYB.¹⁶ Since validation of the hospital bed data in the HNYB in 1988 proved to be fairly accurate, the figures for 1993 were transcribed directly. The clinic data were updated by the addition of new entries to the revised 1988 database.

Definitions and categories used for analysis

The data were organised into a model of health care delivery which would categorise data into: (i) geographical areas in respect of the nine new provinces as defined in the new Constitution;¹⁷ (ii) ownership and management in respect of the public and private sectors; and (iii) levels of health care, i.e. primary, secondary and tertiary levels.

Ownership and management

Hospitals have been categorised as public, private or military. The public sector includes those facilities administered and financed by government authorities. The private sector covers a wide range of institutions not administered exclusively by the State (although they may be state-financed and admit public-sector patients), and includes the following: (i) private hospitals run on a for-profit basis; (ii) provincial-aided hospitals whose annual maintenance deficits are subsidised by the Department of Hospital Services; (iii) industrial hospitals, which include Chamber of Mines hospitals that treat their employees for any medical condition and for injuries arising out of and in the course of employment, and other industrial hospitals, which are owned and administered by large industrial corporations to provide care for their employees; (iv) contractor hospitals that are administered by organisations with a mutual agreement or contract with the State. These include the Lifecare group, which runs mainly psychiatric institutions and receives payment from the Government on a *per capita* basis; (v) hospitals administered by the South African National Tuberculosis Association (SANTA), which provides care for tuberculosis patients; and (vi) other hospitals, which include those run by religious and welfare organisations.

The military sector controls the military hospitals which provide services to South African National Defence Force members and their dependants.

Levels of care

Although the primary level includes more than just health facilities, for the purposes of this study only the provision and distribution of fixed (i.e. not including mobile) clinics, health centres and day hospitals are analysed.

The secondary level data were categorised into general and special hospitals according to the services provided. A *general hospital* is defined as one which provides general medical and/or general surgical care. *Special hospitals* include: (i) psychiatric hospitals and sanatoria (providing long-term care for psychiatric patients but excluding acute psychiatric beds in general hospitals); (ii) tuberculosis hospitals and institutions (excluding acute tuberculosis care provided by general hospitals but including SANTA centres); and (iii) miscellaneous hospitals, including maternity

hospitals, nursing homes, institutions for the aged and chronically sick, and homes for infectious and convalescent patients. The study excluded homes for the mentally handicapped.

The tertiary level includes highly specialised services not normally found at the secondary level: (i) academic hospitals (hospitals attached to a medical school); and (ii) other referral hospitals, defined as hospitals which have specialist services as well as an intensive care unit, or hospitals with highly specialised units which carry out plastic surgery, neurosurgery and/or cardiac surgery.

Where applicable, the term 'referral beds' applies to all tertiary hospital beds (i.e. academic teaching beds plus other referral beds), while 'acute beds' applies to all referral and general beds, excluding special beds.

Classification of hospitals according to the level of care does not imply that a hospital functions only as, for example, a referral hospital or a general hospital. Hospitals perform a range of different functions, but separation of the different functional areas is difficult.¹⁸ Most referral hospitals provide primary and secondary as well as tertiary care. General hospitals provide primary care in addition to secondary care. For this analysis, hospitals have been classified under the highest level according to the facilities and resources available, as this determines the degree of care that can be given.

Population figures

The population figures for the nine provinces are those published by the DBSA.¹⁹ These population figures were applied to the facilities data in such a way as to compare them with accepted ratios used internationally and in health services research. The ratios of hospital beds per 1 000 population and, for clinics, of population per clinic were used.

Results and discussion

Hospital data

The provincial distribution of hospital beds per 1 000 population is given in Table I. This includes all hospital beds in both the public and the private sectors in 1993.

Table I. Distribution of total hospital beds per 1 000 population (public and private), 1993

Province	No. of hospital beds	Beds/1 000 population
Eastern Cape	23 157	3,5
Eastern Transvaal	6 058	2,1
Free State	11 493	4,1
Gauteng	41 297	6,0
KwaZulu-Natal	32 826	3,8
Northern Cape	3 090	4,0
Northern Transvaal	12 846	2,5
North-West	11 518	3,3
Western Cape	19 664	5,4
Total	161 949	4,0

Table I shows notable differences in the distribution of hospital beds between the provinces, ranging from 2,1 beds per 1 000 population in the Eastern Transvaal to 6,0 per 1 000 population in Gauteng. The total number has decreased from 4,4 beds per 1 000 population in 1988²⁰ to 4,0 in 1993.

The total number of hospital beds per 1 000 population in both the public and the private sectors does not accurately reflect the number of beds accessible to the general population. Private hospital beds are primarily accessible to the small proportion of the population that can afford them. A more appropriate analysis is the distribution of total public sector hospital beds (referral, general and special beds) per population, and acute beds (only referral and general) per population. These figures are shown in Table II. They also illustrate notable differences between provinces in the total number of public sector hospital beds per 1 000 population. However, when the special beds are removed from the analysis, there is a more even distribution of acute hospital beds per 1 000 population between the provinces. This disproves the often expressed argument that Gauteng and the Western Cape have more hospital beds per population, and that the disparities between provinces are large.

Table II. Distribution of public sector hospital beds in the provinces, 1993

Province	Public beds/1 000 population (referral, general, and special)	Acute beds/1 000 population (referral and general)
Eastern Cape	2,7	2,2
Eastern Transvaal	1,5	1,5
Free State	2,6	2,2
Gauteng	3,0	2,4
KwaZulu-Natal	2,9	2,5
Northern Cape	2,7	2,2
Northern Transvaal	2,1	2,0
North-West	2,5	2,1
Western Cape	3,9	2,3
Total	2,7	2,2

The comparable totals in 1988 were 3,1 public beds and 2,6 acute beds per 1 000 population. There has, therefore, been an overall decrease between 1988 and 1993.

A comparison of the total number of beds (not the ratio of beds to population) between 1993 and 1988 (Table III) shows that there has been an overall increase since 1988. This is attributable to a dramatic increase in the number of private beds, which has almost doubled in the private for-profit hospitals. This trend towards increasing privatisation is further illustrated by the fact that 72 new private for-profit hospitals were established between 1988 and 1993.

Interestingly, while there has been a decrease in public sector beds, there has been a slight increase in academic beds.

De Beer²¹ suggested the following ratios for hospital beds, based on an adaptation of the recommendations made by the Health Services Plan:²² general beds — 3,25 per 1 000 population; referral beds — 0,25 per 1 000 population; total — 3,50 per 1 000 population.

Table III. Comparison of distribution of hospital beds in 1993 and 1988 according to ownership and type

	No. beds in 1993	No. beds in 1988	Difference	% Change
All beds	161 949	158 567	3 382	2
Public beds	110 408	112 957	-2 549	-2
Academic	18 340	17 998	342	2
Other referral	18 718	19 972	-1 254	-6
General	54 319	54 740	-421	-1
Special	19 031	20 247	-1 216	-6
Private	50 521	44 538	5 983	13
Private for profit	18 432	9 825	8 607	88
Province-aided	3 910	4 704	-794	-17
Industrial	7 091	9 789	-2 698	-28
Contractors	14 272	13 962	310	2
SANTA	5 287	5 335	-48	-1
Other	1 529	923	606	66
Military	1 020	1 072	-52	-5

In the light of these ratios, an appropriate ratio of referral beds to general beds is 0,08. Although this ratio cannot be used indiscriminately, its value is that it provides an indicator of the appropriate balance between referral and general beds. Tertiary and secondary level facilities should complement each other, with the lower level facilities serving as a filter for the higher levels.²³ Therefore, there should be more general beds than referral beds. However, in the provinces of Gauteng and Western Cape, these ratios are completely reversed (Table IV), and the Free State has an almost equal number of referral beds to general beds per 1 000 population. The reversal of the ratios in Gauteng and the Western Cape is explained by the fact that they have three and two medical schools respectively.

Table IV. Ratio of all referral beds to general beds in provinces, 1993

	Referral beds		General beds		Referral/general
	No.	Beds/pop.	No.	Beds/pop.	
Eastern Cape	4 818	0,7	10 039	1,5	0,48
Eastern Transvaal	284	0,1	3 947	1,4	0,07
Free State	2 806	1,0	3 401	1,2	0,83
Gauteng	12 278	1,8	4 329	0,6	2,84
KwaZulu-Natal	6 706	0,8	14 832	1,7	0,45
Northern Cape	547	0,7	1 108	1,5	0,49
Northern Transvaal	2 340	0,5	8 039	1,6	0,29
North-West	2 219	0,6	5 221	1,5	0,43
Western Cape	5 030	1,4	3 403	0,9	1,48
Total	37 028	0,9	54 319	1,3	0,68

Clearly, the academic hospitals in these two provinces unfairly disadvantage them. If the academic beds are removed from the calculations, the ratios of referral beds per 1 000 population between the provinces are more evenly distributed, and Gauteng and the Western Cape, in fact, fall below most of the other provinces (Table V). However, the removal of academic beds from the analysis also leaves the Orange Free State, Gauteng and the Western Cape with an inadequate number of acute beds for the population (Table VI).

Table V. Number of academic and other referral hospital beds per 1 000 population, 1993

	Academic beds	Other referral	Other ref./pop.
Eastern Cape	1 036	3 782	0,6
Eastern Transvaal	0	284	0,1
Free State	1 906	900	0,3
Gauteng	9 235	3 043	0,4
KwaZulu-Natal	2 303	4 403	0,5
Northern Cape	0	547	0,7
Northern Transvaal	0	2 340	0,5
North-West	0	2 219	0,6
Western Cape	3 860	1 170	0,3
Total	18 340	18 688	0,5

Table VI. Number of acute hospital beds per 1 000 population (excluding academic beds)

Eastern Cape	2,1
Eastern Transvaal	1,5
Free State	1,5
Gauteng	1,1
KwaZulu-Natal	2,2
Northern Cape	2,2
Northern Transvaal	2,0
North-West	2,1
Western Cape	1,3
Total	1,8

The Health Services Facilities Plan of 1980²² recommended 2 - 4 acute beds per 1 000 population. This implies that removal of all academic hospitals from the referral system of these provinces could lead to a collapse of their systems.

Clinic data

If the World Health Organisation²⁴ recommendation of 10 000 people per clinic is used there is a shortage of clinics in some of the provinces (Table VII). There are also large disparities in the number of people per clinic between the provinces. Because of the sensitivity of this analysis, a second source of clinic data, Regional Health Management Information System (ReHMIS), was used (A. J. Herbst — personal communication), although the information is currently being validated. The data from this source are shown in parentheses. Overall, the number of people per clinic has decreased since 1988, from 16 190 in 1988²⁰ to 15 979 in 1993.

Table VII. Total number of clinics and population per clinic in 1993*

	No. of clinics	Population/clinic
Eastern Cape	530 (584)	12 576 (11 413)
Eastern Transvaal	162 (209)	17 521 (13 581)
Free State	168 (259)	16 694 (10 829)
Gauteng	273 (460)	25 080 (14 885)
KwaZulu-Natal	373 (367)	22 919 (23 294)
Northern Cape	122 (124)	6 261 (6 160)
Northern Transvaal	287 (355)	17 842 (14 424)
North-West	268 (319)	13 085 (10 993)
Western Cape	365 (464)	9 918 (7 802)
Total	2 548 (3 141)	15 979 (12 963)

* ReHMIS data are given in brackets for comparative purposes.

Recommendations for an appropriate distribution of health facilities

Hospitals

With the exception of the Eastern Transvaal, there is overall an adequate number of hospital beds in the provinces. However, there is an imbalance between the levels of care in provinces in which there is more than one academic teaching institution. The shortage of primary level facilities in most provinces has also been highlighted. This disparity between levels in certain of the provinces has placed an unacceptable demand and burden on tertiary hospitals,²⁵ as they are forced to perform functions that should be carried out at other levels.

It is essential that the total number of acute beds in all the provinces be maintained, as rapid population growth will reduce the number of beds available per population. In all provinces the present ratios are at the lower end of the recommended figures, while the Eastern Transvaal falls well below this.

With the exception of the Free State, Gauteng and the Western Cape, the distribution of beds between the tertiary and secondary levels is adequate and could be maintained. In the Free State, it might be necessary to convert a small proportion of tertiary beds to secondary bed status in order to obtain adequate ratios. However, in Gauteng and the Western Cape it is essential that action is taken to reverse their ratios. It will be necessary to rationalise the number of academic hospitals in these two provinces, so that medical and health sciences facilities in close geographical proximity are amalgamated or share the same facilities. It should be noted that the description of hospitals as 'teaching' or 'academic' hospitals does not imply that all teaching should take place at these centres. Teaching and training should take place at all levels of the health care system. The terms here denote these institutions' tertiary status.

The study has shown that if all academic hospitals are removed from the control of the Provincial Health Authority and placed under the National Health Authority as national referral hospitals, then Gauteng and the Western Cape will have an inadequate number of hospital beds for their populations. National referral hospitals draw more of their inpatients from the larger cities in which they are located.²⁶ Removal of these hospitals from the provincial referral system might therefore lead to a collapse of the system.

One option is that these hospitals remain within the provincial referral system, but that the institutions be rationalised, and a proportion of the tertiary beds converted to secondary beds.

A second option would be to designate half the academic hospital beds as national referral beds, and place them under the national authority. The other half can be placed under the provincial authority, and have ordinary referral status. This would maintain acceptable ratios within the two provinces (Table VIII).

Rationalisation of academic hospital beds is necessary, whichever option is taken. Halving the number of academic hospital beds does not imply, however, that rationalisation is strictly a numerical calculation.

Table VIII. Number of acute and other referral hospital beds per 1 000 population if half the academic beds are converted to other referral beds

	Acute beds/ 1 000 pop.	Other ref./ 1 000 pop.
Eastern Cape	2,2	0,6
Eastern Transvaal	1,5	0,1
Free State	1,9	0,7
Gauteng	1,8	1,1
KwaZulu-Natal	2,4	0,6
Northern Cape	2,2	0,7
Northern Transvaal	2,0	0,5
North-West	2,1	0,6
Western Cape	1,8	0,9
Total	2,0	0,7

Recommended ratios: 2 - 4 acute beds/1 000 population; 0,25 referral beds/1 000 population.

In developing an appropriate health care delivery system for South Africa each province needs to have a self-reliant referral system to handle most referrals, except for highly specialised procedures that should be performed at designated national referral centres. Certain academic teaching hospitals are currently carrying out these functions. If the second option is applied, an appropriate health care delivery system can be created.

If the academic hospitals remain within the provincial referral system (option 1) the provinces of Gauteng and the Western Cape will be heavily reliant on these hospitals for all their referrals, which would reduce their national referral capacities. Even if other provinces could still refer to these hospitals there would be a tendency for the provinces in which they are located to use them more frequently. This is why the referral system within each province needs to be independent of national referral centres.

The second option is therefore recommended, as this will ensure that all provinces will have an adequate number of hospital beds, a self-reliant referral system, and an equal opportunity to refer to national referral centres.

Clinics

If the WHO recommendation of 10 000 people per clinic is accepted, the number of additional clinics needed in 1993 in each province is as shown in Table IX, which also shows the number of clinics needed according to the ReHMIS data source.

Two agencies were mainly responsible for the provision of funds for the building of clinics: the Independent Development Trust (IDT), a government-initiated independent funding agency, and the Central Economic Advisory Services (CEAS), a government agency with the task of allocating funds from the sale of strategic oil reserves. The last column of Table IX indicates the number of clinics that have been approved by these agencies.^{27,28}

However, this clinic building programme has little impact on the backlog of clinics needed. Rapid population growth will result in this backlog steadily increasing. In the light of population figures to the year 2000,²⁹ the number of additional clinics required by that year will range from 1 618 according to ReHMIS data, and 2 211 according to data used in this study. This means that between 1993 and 2000, 230 - 315 clinics need to be built per year.

Table IX. Additional clinics needed to obtain recommended ratio of people per clinic

	Additional clinics needed	Additional clinics needed (ReHMIS data)	No. of clinics approved in clinic building programme of CEAS and IDT
Eastern Cape	137	83	48
Eastern Transvaal	122	75	38
Free State	112	21	32
Gauteng	412	225	30
KwaZulu-Natal	482	488	24
Northern Cape	N/A	N/A	6
Northern Transvaal	225	157	45
North-West	83	32	17
Western Cape	N/A	N/A	26

A clinic building programme will need to take into account these existing shortages, and plan appropriately for future needs, but the WHO recommended ratios should not be applied indiscriminately. They serve merely as a guideline, and in certain areas a clinic could serve a much larger population. Other factors that should be used in combination with this guideline are population density, distance to and between clinics, transport, time spent in travelling, availability of services, and other available resources such as general practitioners. It is imperative that micro-analyses are carried out at provincial levels to validate the information on the number of clinics and to determine the need for clinics. For instance the ratios for the Western Cape and Northern Cape fall within the WHO recommendations, but some clinics may be inappropriately located, geographically inaccessible, or only open for certain periods. Gauteng, on the other hand, falls well below the WHO recommendation, but has a higher population density and smaller geographical radius. The existing clinics, therefore, could be more appropriately utilised.

It is strongly recommended that, as a first step, provinces comprehensively analyse existing resources to ensure their appropriate and maximal utilisation. This is essential before a major clinic building programme is embarked upon.

Conclusion

These analyses provide only a fairly crude examination of health facilities. It is essential to have detailed analyses at regional and sub-regional levels, which take into account factors such as people's needs, population density and growth, long-term disease trends, location and accessibility of facilities, availability of services, transport, distance, geographical access and time spent in travelling.

The analyses have shown that it is crucial that the number of hospital beds in South Africa be maintained, as increasing population growth will result in there being an inadequate number for the population size. In provinces where there is more than one medical school, it is essential that rationalisation of academic hospital beds occurs. All provinces should have equal access to these rationalised academic hospitals, which should be designated national referral centres. In addition, provinces should have a self-reliant referral system to manage most referrals, excluding highly specialised procedures.

Whereas it is essential that the number of hospital beds is maintained, the primary level of care must be emphasised. Analyses at the regional and sub-regional levels should be directed towards maximal utilisation of existing resources. A clinic building programme needs to take into account existing resources and shortages, and plan appropriately for future needs.

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