Wetenskaplike Artikel

Geographical distribution of dental operators in South Africa over the period 1972-1992

*PJ van Wyk, †J Kroon and ‡PE Cleaton-Jones

*Department of Health, Private Bag X828, Pretoria, 0001 and †Department of Community Dentistry, University of Pretoria and ‡Dental Research Institute, MRC, University of the Witwatersrand, Johannesburg

Keywords: Dentists, dental therapists.

SUMMARY

Using data available on dentists for 1972, 1982 and 1992 and on dental therapists for 1992 the geographical distribution of dental operators (dentists/dental therapists) in South Africa was determined and the dental operator to population ratios were calculated. Over a period of 20 years the number of dentists in South Africa has increased by 135.6 per cent while the total population of the area has increased by 59,8 per cent. The lowest operator to population ratio was 1:4517 found in the PWV-region, and the highest ratio was 1:48730. recorded in the Northern Transvaal. The greatest decrease in dental operator to population ratios occurred in Natal and Transvaal. The study shows that there is an imbalance in the geographic distribution of dental operators favouring large urban areas.

INTRODUCTION

A gradual decline in the prevalence of dental caries has occurred worldwide as a result of the availability of fluoride containing products, especially dentrifices. This has led to a decrease in the demand for curative dental services. Despite this trend, many dental schools, especially in Europe, have continued to train the same number of dentists each year. This has led to an oversupply of dentists which necessitated the closure of several dental schools in Europe or the reduction in intake of dental students. A recent development is that a previously closed dental school in the Netherlands is to re-open due to a shortage of dentists in that country.

This disturbing trend initiated several studies on dental manpower needs. In South Africa recommendations were put forward by the Commission of Enquiry into the Dental Services and the Training of Non-White Dentists (1967). As a direct

Article received: 22/2/1994 approved for publication: 28/6/1994 PJ van Wyk, BSc, MChD (Comm Dent), Dip Pub Adm, is a Specialist in Community Dentistry with the Department of Health. J Kroon, BChD (Hons), MChD (Comm Dent), DGA (Dent), DGG (Dent) PE Cleaton-Jones, BDS, MBBCh, PhD, DSc, DTM&H, DPH, DA

OPSOMMING

Aan die hand van data beskikbaar vir tandartse vir 1972. 1982 en 1992 en vir tandterapeute vir 1992 is die geografiese verspreiding van operateurs (tandartse/tandterapeute) in Suid-Afrika en die operateur tot bevolkingsgetalleverhouding bestudeer. Die getal tandartse in Suid-Afrika het oor 'n tydperk van 20 jaar met 135,6 persent toegeneem terwyl die totale bevolking oor dieselfde tydperk met 59,8 persent gestyg het. Die laagste operateur tot bevolkingsverhouding is in streek H (PWVstreek) gevind (1:4517) terwyl die hoogste operateur tot bevolkingsverhouding vir streek G (Noord-Transvaal), 1:48730, aangeteken is. Die grootste afnames in die operateur tot bevolkingsverhoudings is in Natal en Transvaal gevind. Die studie toon ook 'n wanverspreiding van tandheelkundige operateurs aan wat groot stedelike gebiede bevoordeel.

consequence of this report three new dental faculties were established, and the facilities at existing faculties were expanded. This led to an increase of 143 per cent in dental graduates between 1970 and 1979. The Commission (1967) predicted that by 1980, there would be 1708 dentists registered in South Africa. Germishuys (1978) however, showed that this figure had already been reached in 1973 and that this trend would lead to an overproduction of dentists by 1983.

Dreyer, Lemmer and Dreyer (1984) summarized the views at that time of branches of the Dental Association of South Africa (DASA) and Faculties of Dentistry. They concluded that no new dental faculties should be established, but that existing faculties should be expanded and opened to all ethnic groups. They also suggested that fouryearly reviews of dental manpower should be undertaken. Reddy (1985) also supported the recommendation regarding the inclusion of all ethnic groups in dental manpower planning.

Smith and Cleaton-Jones (1985) reported on the geographical spread of dentists in the RSA and the dentist to population ratios in the years 1972 and 1982. They confirmed that there had been an increase in the number of dentists and a decrease

in the dentist to population ratios between 1972 and 1982. The study highlighted the maldistribution of dentists in South Africa.

They believed that a better geographical spread of dentists could be encouraged through the annual publication of dentist to population ratios in magisterial districts. A year later, Dreyer *et al.*, (1986) in a report of the *ad hoc* Committee appointed by the Federal Council of the DASA, pointed out that an over-production of white dentists might become a reality and that a reduced intake of white students by dental faculties was essential.

Recent developments have placed less emphasis on dentists as the main dental service providers. Dreyer *et al.*, (1992) recommended the establishment of an oral health care workforce consisting of health educators, assistants, hygienists, dental therapists, dentists, specialists and technicians. They suggested that there should be a decrease of 50 per cent in the number of dentists trained over the next 5 to 10 years and an increase to 250 per annum in the number of dental auxiliaries.

The purpose of the present survey was to record trends in the geographical distribution of dentists and dental therapists over the period 1972-1992.

MATERIALS AND METHOD

The sample studied comprised dentists listed in the 1972, 1982 and 1992 registers and dental therapists listed in the 1992 register of the South African Medical and Dental Council but excluded those in Namibia, the independent national states of Bophuthatswana, Ciskei, Transkei and Venda and those outside the RSA. The dentists and dental therapists, were grouped into magisterial districts according to their registered postal address. Specialists were included as dentists and no distinction was made between dentists and dental therapists in academic or institutional employment and in private practice. Owing to their low numbers dental therapists were not included in previous studies in which manpower to population ratios were calculated. With increasing numbers of dental therapists qualifying at dental schools and their importance in oral health service rendering, especially in rural areas, it has become essential to include their numbers in the calculation of dentist to population ratios. In the 1992 figures, dentists and dental therapists were grouped together as operators.

Population figures used in the survey were those of the Population Census (1970 and 1980) adjusted for 1972 and 1982. The 1991 Population Census figures were used unchanged to calculate the 1992 operator to population ratios. The magisterial districts used were those listed by the Central Statistical Services (Population Census, 1991).

RESULTS AND DISCUSSION

1. National Distribution

Table I shows the total number of registered dentists, the total population, the dentist to population ratios for 1972, 1982 and 1992, and the operator to population ratio for 1992.

There has been an increase in the number of dentists in the area under study from 1599 in 1972 to 3767 in 1992, an increase of 135,6 per cent. During the same period the total population of the area increased from 19,4 to 31,0 million representing an increase of 59,8 per cent. The total dentist to population ratio has decreased from 1:12133 in 1972 to 1:8229 in 1992. The dental operator to population ratio decreased to 1:7991. If these data are converted to dentists/operators per 10 000 of the population the rate increases from 0,82 in 1972 to 1,25 in 1992 representing a change of 50,5 per cent. By applying linear regression techniques, Smith and Cleaton-Jones (1985) predicted a dentist to population ratio of 1:8019 for 1992. This ratio is very close to the 1:7991 and the 1:8229 calculated for the operator to population and the dentist to population ratios respectively in 1992. These figures clearly indicate that linear techniques could be a useful tool in manpower predictions.

 Table I: Total number of registered dentists, total population and the dentist/operator to population ratio over a period of 20 years.

	1972	1982	1992
Number of registered dentists	1703	2994	3998
Number of dentists in the same	ole 1599	2584	3767
Percentage increase in dentist	3	61,6	45,8
Total population	19,4 million	25,5 million	31,0 million
Percentage increase in popula	tion	31,4	21,6
Dentist to population ratio	1:12133	1:9868	1:8229
Number of dental therapists			112
Operator to population ratio			1:7991
Dentists/Operators per 10 000 of the population	0,82	1,01	1,25

2. Regional distribution

It is envisaged that regionalism will play an important role in the future. An equitable distribution of resources is one of the basic elements of primary health care - the strategy which has been adopted by the Department of National Health and Population Development for health care delivery in South Africa (1992). It could therefore be assumed that the geographical distribution of oral health personnel by region could be a determining factor in the ability of a regional government to render oral health services. At the time of preparing this paper South Africa was divided into 4 provinces and 9 development regions (Fig. 1). The trends in the distribution of dentists/operators by province is shown in the appendix (See pages 461 *et seq*).

Functionally, dentists/operators could broadly be classified into those actively involved in service rendering in the private and public sectors or

Dental operators in South Africa 1972-1992

Table II: Distribution of dental operators by development region in 1992 (TBVC countries excluded).

Region	Dental operators Total Number	Dental operators at training in- situations	Dental operators adjusted figures	Dental operator to population ratio total	Dental operator to population ratio adjusted		
A	857	108	749	1:4137	1:4734		
(Western Cape)							
В	46	-	46	1:15533	1:15533		
(Northern Cape)							
С	145	-	145	1:16875	1:16875		
(Orange Free State)							
D	209	-	209	1:8924	1:8924		
(Eastern Cape)							
E	524	6	518	1:15182	1:15358		
(Natal)							
F	132	-	132	1:15750	1:15750		
(Eastern Transvaal)							
G	85	-	85	1:48730	1:48730		
(PWV)							
Н	1781	184	1597	1:4051	1:4517		
(Northern Transvaal)							
J	100	-	100	1:10240	1:10240		
(Western Transvaal)							
Total	3879	298	3581	1:7988	1:8653		

Table III: Original and revised dental operator to population ratios by development region.

evelopment region		Total population	Dental Operator to population ratio	Revised operator to population ratio	
A	(Western Cape)	3 545 689	1:4734	1:1608	
в	(Northern Cape)	714 508	1:15533	1:4667	
С	(Orange Free State	2 446 870	1:16875	1:4531	
D	(Eastern Cape)	1 865 138	1:8924	1:2702	
Е	(Natal)	7 955 526	1:15358	1:3904	
F	(Eastern Transvaal	2 078 978	1:15750	1:4216	
G	(Northern Transvaal	4 142 016	1:48730	1:11108	
н	(PWV)	7 214 248	1:4517	1:1507	
J	(Western Transvaal	1 023 947	1:10239	1:3059	

 Table IV: Changes in the number of dentist/operators per province over

 a ten year period (1982-1992).

Province	Increase	Decrease	No change			
Cape	46 (70,8%)	6 (9,2%)	13 (20%)			
Natal	24 (32,8%)	5 (17,2%)	0			
Orange Free State	19 (61,3%)	5 (16,1%)	7 (22,6%)			
Transvaal	59 (79,7%)	6 (8,1%)	9 (12,2%)			
Total	148 (74,4%)	22 (11,1%)	29 (14,6%)			

 Table V: Changes in the dentist/operator: population ratio per province

 over a ten year period (1982-1992).

Province	Increase	Decrease			
Cape	16(24,6%)	49(75,4%)			
Natal	5(17,2%)	24(82,8%)			
Orange Free State	10(32,3%)	21(67,7%)			
Transvaal	13(17,3%)	61(82,7%)			
Total	44(22,1%)	155(77,9%)			



Fig. 1: Development regions of South Africa.

 Table VI: The five magisterial districts with the lowest operator to population ratios in South Africa for 1992.

Magisterial District	Operators 1992	Operator: Population ratio 1992
Cape Town	169	1:1062
Pretoria	486	1:1374
Bellville	151	1:1788
Durban	252	1:1880
Hermanus	11	1:1965

 Table VII: The five magisterial districts with the highest operator to population ratio in South Africa for 1992.

Magisterial District	Operators 1992	Operator: Population ratio 1992
Seshego	2	1:151338
Nongoma	1	1:169153
Witsieshoek	2	1:171443
Mokerong	1	1:446155
Ntuzuma	1	1:458529

training institutions. Although a wide spectrum of oral health services is being rendered at training institutions it is generally accepted that staff at these schools are primarily involved in teaching and research. Their inclusion in the number of dentists/ operators available could therefore give a biased view of the real number of operators available for service rendering. To make dental operators to population ratios between regions more comparable the number in employment at training institutions in a specific region should therefore be subtracted from the total number of dentists/operators available in a specific region. Table II shows the distribution of dental operators by development region, the number of dental operators at training institutions, the dental operator to population ratio as well as the dental operator to population ratio adjusted to compensate for operators employed in training institutions.

Of the 3879 dental operators in South Africa, 1781 or 45,9 per cent were in region H (PWV-region) and 857 or 22,1 per cent in region A (Western Cape). The dental operator: population ratio varies between 1:4517 to 1:16875, except for region G (Northern Transvaal) where at was 1:48730.

Caution should be exercised in the interpretation of ratios of dental operator to total populations because not all people need or seek dental care and furthermore socio-economic factors need to be taken into account. Results from the 1988/89 National Oral Health Survey indicated that 31,5 per cent of Asian, 21,5 per cent of Black 26,7 per cent of Coloured and 59,9 per cent of White respondents made use of oral health services during the year prior to the survey (Van Wyk et al., 1991). The calculated weighted national mean was 28,9 per cent. By applying these percentages to total population figures, the total number of people in a region who made use of oral health services during a particular year and the dental operator to population ratio (revised) could be calculated (see Table III).

3. Magisterial district distribution

The numbers of registered dentists (1972 and 1982) and operators (1992) in magisterial districts as well as the corresponding dentist/operator: population ratio over a period of 20 years are listed in the appendix (See pages 461 *et seq*). In 1992 registered operators were resident in 189 or 58,9 per cent of the 320 magisterial districts used by the Central Statistical Services. Tables IV and V show changes in the number of dentists or operators and in the dentist/operator : population ratio per province over the 10 year period 1982-1992 (See appendix pages 461 *et seq*).

The greatest increase in the numbers of dentists/ operators and the greatest decrease in the dentist/operator:population ratio occurred in Natal and Transvaal. A decrease in the dentist/operator: population ratio in a specific magisterial district

Comprehensive Medical Centre in Durban North requires a Dynamic Dentist *Contact:* Dave (031) 5612411 (083) 2760132 could either be attributed to an increase in the number of dentists/operators or a decrease in the total population or both.

The five magisterial districts listed in Table VI have the lowest operator to population ratios and are either major urban areas or very popular retirement resorts or have a dental school within their boundaries. The magisterial districts with the highest operator to population ratios are listed in Table VII, are in rural areas and show a positive trend in that there is an influx of oral health personnel into these areas.

REFERENCES

- Commission of Enquiry into Dental Services and Training of Non-White Dentists (1967), pp 485-497, Pretoria: Government Printer.
- Dreyer, WP, Lemmer, J & Dreyer, AG (1984) The dental manpower situation in South Africa. *Journal of the Dental Association of South Africa*, **40**, 696-706.
- Dreyer, WP, Lemmer, J, Dreyer, AG, Becker, LH & Heydt, H (1986) The future dental manpower needs of South Africa. Report of the *Ad Hoc* Committee appointed by the Federal Council of the Dental Association of South Africa. *Journal of the Dental Association of South Africa*, **42**, 86-90.
- Dreyer, WP, de Vries, J, du Plessis, JB, Moola, MH, Naidoo, LCD, van Rensburg, BGJ, Preston, CB & Zietsman, ST (1992) An optimal Oral Health Care Workforce for South Africa. *Journal of the Dental Association of South Africa*, **48**, 393-397.
- Germishuys, PJ (1978) Tandheelkundige Mannekrag: 'n tekort? Journal of the Dental Association of South Africa, 34, 51-55.
- Population Census (1970) Geographical distribution of the population. Pretoria: Central Statistical Service.
- Population Census (1980) Geographical distribution of the population. Pretoria: Central Statistical Service.
- Population Census (1991) Age by development region, statistical region and district. No 03-01-03 (1991) Pretoria: Central Statistical Service.
- Reddy, J (1985) The dental manpower situation in South Africa (Letter to the editor). *Journal of the Dental Association of South Africa*, **41**, 135-137.
- Register of Ambulance Emergency Care Assistants, Anaesthetists' Assistants, Biomedical Engineers, Dental Therapists, Food Inspectors, Hearing Aid Acousticians, Masseurs, Orthoptists, Remedial Gymnasts. For the Republic of South Africa (1992) South African Medical and Dental Council.
- Register of Medical Practitioners, Interns and Dentists (1972) Pretoria: South African Medical and Dental Council.
- Register of Medical Practitioners, Interns and Dentists (1982) Pretoria: South African Medical and Dental Council.
- Register of Medical Practitioners. Interns and Dentists (1992) Pretoria: South African Medical and Dental Council.
- Smith, M & Cleaton-Jones, PE (1985) Dentist in the RSA, 1972 and 1982. A study of geographic spread and dentist to population ratios. Journal of the Dental Association of South Africa, **41**, 467-472.
- Subcommittee: Primary Health Care (1992) Strategy for Primary Health Care in South Africa, Pretoria: Government Printer, 4.
- Van Wyk, PJ, Faber, HS, Van Rooy, HK & Olivier, I (1991) The Utilization of Oral Health Services in the RSA. *Journal of Dental Research*, **70**, 846.

APPENDIX

Please see pages 461 et seq.

FOR SALE

P Grant-Smith Acucam & Sony Printer Take over lease Tel: (01212) 20203 (01212) 22957

Ap	pendix:Number of rec	pistered dentists in 1972,	1982 and 1992 by magisterial district as	s well as the corresponding dentist to population ratio.
				, , ,

Magisterial District	Dentist/Operators Dentist/Operator:Population ratio					Magisterial District	Dentist/Operators Dentist/Operator:Population ratio						
inagiotoriai pioticio	1972	1982	1992	1972	1982	1992		1972	1982	1992	1972	1982	1992
	430	702	1 1 1 2				Stellenbosch	9	19	35	1:8532	1:3374	1:2110
Adelaide	0	0	1	_	-	1:15220	Sterkstroom	0	1	0		1:9280	
Albany	5	9	5	1.14100	1:1576	1:13941	Strand	2	9	13	1:13714	1:3358	1:3084
Albert	Ő	õ	1	-	-	1:16995	Stutterheim	0	Ū.	2	-	-	1:20060
Alexandria	Ő	1	1	-	1:30660	1:26651	Swellendam	1	2	2	1:24797	1:13480	1:16074
Aliwal-North	2	3	2	1:11054	1:7527	1:13743	Tulbagh	0	0	1	~	-	1:25334
Bathurst	4	3	3	1.7536	1:11000	1:10806	Uitenhage	5	9	16	1:18909	1:14960	1:11411
Beaufort-West	1	1	1	1:26948	1:27600	1:31726	Vredenburg	1	4	6	1:18851	1:7980	1:6651
Bellville	27	105	151	1:10149	1:2057	1:1788	Vredendal	1	3	4	1:19679	1:7613	1:7241
Bredasdorp	2	3	3	1:8410	1:5513	1:7692	Vryburg	3	2	2	1:21286	1:39770	1:49276
Caledon	4	4	6	1.11933	1:15060	1:13175	Warrenton	0	1	2	•	1:18840	1:11184
Calvinia	, O	2	ž	-	1:9180	1:9215	Wellington	3	5	5	1:8374	1:6180	1:7486
Cape Town	174	212	169	1.1379	1.997	1.1062	Worcester	6	9	12	1:14183	1:10567	1:9763
Ceres	1	2	3	1.29834	1.18390	1.15684	Wynberg	Ř	15	235	1:70190	1:49736	1:4688
Clanwilliam	ò	0	2		-	1.14072	TRANSVAAL	887	1	423	2	098	
Gradock	2	4	4	1.17958	1.9790	1.9286	Alberton	3	9	15	1:50735	1:28693	1:24529
De Aar	1	1	2	1.20324	1.24140	1.12719	Amersfoort	õ	1	1	-	1:29160	1:33461
East London	23	27	44	1.7167	1.6080	1:5465	Balfour	õ	. 1	3	-	1.46000	1.12770
Fort Beaufort	20	1	2	1.7107	1.0000	1.11397	Barberton	2	8	6	1.39449	1.8860	1.12028
Fraserburg	0	0	1	-	-	1:4367	Belfast	1	1	3	1:32772	1:33100	1.9658
Coordo	4	12	21	1.12770	1.5188	1:4552	Benoni	13	26	50	1:12657	1.7901	1:5773
Beodycod	4	26	26	1.12773	1.9468	1.9985	Bethal	3	5	7	1:36715	1.17588	1.11111
Sordonia	3	20	20	1.27825	1.3400	1.14828	Boksburg	7	14	31	1:15000	1.11199	1.6320
Graaff Boinet	3	2	4	1.11250	1.14910	1.14620	Bolobedu	,	0	1	-	-	1.96669
Hartewator	0	<u>د</u>	-+	1.11230	1.14310	1.29146	Braknan	ğ	12	11	1.12705	1.6650	1:11860
Harbort	ő	1	,		1.20080	1:26316	Brite	2	11	28	1.33842	1:6307	1.3993
	5	4		1.2404	1.20000	1.1965	Bronkhoretenruit	1	3	5	1:400042	1.12940	1.0000
Hermanus	5		2	1.2434	1.3030	1.1905	Carolina	0	1	2	1.40004	1:31840	1.15219
Jumanadarn	3	1	11	1.0323	1.6660	1.3082	Christiana	1		1	1.13873	1:14280	1:13596
loubarting	3	- -	1	1.5525	1.0000	1.13385	Cullinan	, 0	0	1	1.10070	1.14200	1:32006
Jouberana	10	01	22	1:0610	1.7220	1.13303	Deteromille	0	3	1		1.10860	1:36036
Amberley	12	21		1.9010	1.7329	1:4036	Delmas	0	1	2		1:42800	1:24307
King William's Town	4	, ,	2	1.6073	1.4009	1.4230	Eerstobook	0	0	2		1.42000	1:06058
Kiikwood	. C	0	10	1.5050	1.2942	1.10255	Ermolo	6	7	11	1.17334	1.17120	1:10098
Knysna	. 0	9	19	1.5252	1.3042	1,2004	Cormiston	25	26	11	1.17334	1.17129	1.10050
Kullsrivier	1	4	17	1.05575	1.13200	1,12400	Germiston	25	30	2	1.0042	1.4025	1.2110
Nuruman	1	2		1.20070	1.10020	1.12409	Grobloradal	1	2	3	1.20006	1.01010	1:10247
vialmesbury	3	0	11	1.17570	1.13003	1.10314	Heidelberg	,	3	5	1.33300	1.10710	1.10247
viddelburg	0	0	-	-	1:21/3/	1.01674	Hisbueld Didge	2	4		1.17735	1.10710	1.10411
viontagu	U	0	1	1.15000	1.0044	1.21074		420	F07	10	1.2205	1.12304	1.10392
Mossel Bay	2	5	13	1:15982	1:0044	1:4552	Jonannesburg	429	567	590	1:3305	1.10100	1:2009
Namaqualand	1	0	4	1:56009	1:11067	1:10034	Kempton Park	12	22	34	1,12112	1.13130	1.10435
Judisnoorn	5	10	9	1:9978	1:0140	1:7500	Kierksdorp	15	25	34	1.13/91	1.9547	1.9455
Paarl	9	14	22	1:9310	1:7776	1:6187	Koster	1	1	2	1:31579	1:27980	1:14614
Piketberg	1	1	2	1:29544	1:28900	1:17076	Krugersdorp	15	22	32	1:8481	1:6995	1:6132
Port Elizabeth	45	71	93	1:9199	1:7911	1:7211	Letaba	5	11	10	1:16867	1:8087	1:5990
Postmasburg	1	1	6	1:41627	1:55880	1:9132	Lichtenburg	6	7	8	1:12832	1:11151	1:9877
Queenstown	6	4	5	1:9267	1:12215	1:8894	Lydenburg	2	3	2	1:23242	1:14560	1:18488
Riversdale	2	3	4	1:10827	1:6733	1:6255	Marico	1	1	3	1:48573	1:49020	1:12994
Robertson	1	2	2	1:25514	1:13970	1:16166	Mdutjana	0	0	1	-	1.1	1:25485
Simonstown	6	12	17	1:5388	1:4043	1:3431	Messina	1	1	1	1:23014	1:26520	1:22959
Somerset Fast	1	2	3	1:27397	1:13450	1:9919	Middelburg	4	10	18	1:30545	1:12746	1:7779
		10	22	1:4068	1.3727	1:2725	Mkobola	, O	0	3			1.70924

Magisterial District	Dentist/Operators Dentist/Operator:Population ratio					Magisterial District	Dentist/Operators Dentist/Operator:Population ratio					ratio	
angioteriar biotriot	1972	1982	1992	1972	1982	1992	in-ground provide	1972	1982	1992	1972	1982	1992
Mokerong	0	0	1	-	-	1:46155	Frankfort	1	1	4	1:42891	1:43900	1:11154
Moutse	0	0	1	-	-	1:102179	Harrismith	2	2	6	1:37818	1:39760	1:10537
Nelspruit	6	12	19	1:12511	1:9138	1:3259	Heilbron	1	1	1	1:38397	1:39900	1:40987
Nigel	3	5	9	1:10107	1:6392	1:10320	Henneman	0	1	0	-	1:19120	-
Nkomazi	0	0	2	-		1:38483	Jagersfontein	0	0	1	-	-	1:6353
Oberholzer	5	9	9	1:19181	1:13984	1:19752	Kroonstad	5	8	10	1:18634	1:13020	1:11096
Pilgrimsrest	0	3	6		1:17927	1:4844	Ladybrand	1	2	1	1:34031	1:15930	1:30532
Phalaborwa	0	0	5		1.1	1:6025	Lindley	1	0	1	1:37936		1:37664
Piet Betief	2	3	4	1:31135	1:35840	1:16013	Odendaalsrus	1	1	4	1:40482	1:55160	1:24401
Pietersburg	6	14	24	1:11998	1:8249	1:2675	Palys	1	3	۲ ۲	1:27859	1:10/07	1:24339
Potchefstroom	10	15	20	1:12415	1:9400	1:9278	Sasolburg	4	q	10	1.15072	1.8631	1.8908
Potoietersrus	2	7	10	1:47286	1.15103	1:6957	Senekal		1	2	1:48853	1:48500	1.0300
Pretoria	185	328	486	1:3419	1.1668	1.1374	Theunissen	1	1	1	1:29974	1:27320	1:38482
Bandburg	10	19	151	1.0410	1.11037	1:2261	Viljoenskroon	0	Ó	1	-		1:59279
Randfontoin	.0	13	10	1.10570	1.22865	1:11641	Virginia	3	3	6	1:17939	1:25273	1:13630
Reedepoort	12		69	1:10064	1.22003	1.0041	Vrede	1	1	2	1:42280	1:48040	1:18662
Rustenburg	10	29	00	1.10904	1.3930	1.3223	Welkom	7	14	24	1:19932	1:13404	1:10341
Rustenburg	8	14	28	1:11025	1:7837	1:4475	Wepener	0	1	1	-	1:14300	1:12964
Schweizer-Reneke	1	1	1	1:39308	1:41306	1:46893	Wesselsbron	0	1	0	-	1:24120	-
Seknukhuneland	0	0	3	-	-	1:34778	Witsieshoek	0	0	2	-	-	1:71443
Seshego	0	0	2		-	1:51338		216	352	530			
Soshanguve	0	0	1		•	1:46334	Camperdown	1	1	0	1:26431	1:42180	
Soutpansberg	3	3	7	1:23058	1:25500	1:5120	Dundee	3	3	2	1:11630	1:11187	1:15806
Springs	11	15	26	1:9561	1:11345	1:6066	Durban	133	195	252	1:4095	1:2657	1:1880
Standerton	3	6	6	1:28795	1:15410	1:14315	Eshowe	1	1	2	1:13807	1:28680	1:6678
Swartruggens	0	1	0	-	1:11880	-	Estcourt	2	1	3	1:22549	1:50660	1:16497
Thabamoopo	0	0	3	-		1:11731		0	0	1	-	-	1:17265
Thabazimbi	0	0	3	-	-	1:16281	Hiabisa (Natai)	0	0	3	-	-	1:56573
Vanderbijlpark	12	17	23	1:7541	1:19838	1:18870	Impendie	0	10	1	-	-	1:2815
Vereeniging	18	20	33	1:12479	1:8861	1:7591	Imanda	3	13	37	1:64710	1:11938	1:8091
Volksrust	1	1	1	1:29537	1:29860	1:29924	Klipsivies	0	0	10	-	-	1:22626
Warmbad	1	3	4	1:36675	1:14140	1:10423	Liona Biyer	2	5	10	1:34196	1:21004	1:04/8
Waterberg	2	5	8	1:29764	1:15076	1:6124	Lions River	3	2 7	10	1:13597	1:21940	1:/1//
Westonaria	3	5	8	1:21310	1:21296	1:20066	Lower Ingela	3	, 0	10	1.33040	1.10329	1.7430
White River	1	2	6	1:30870	1:64360	1:5039	Mooi Rivior	3	0	12	1.12/17	1.7090	1.4074
Witbank	6	9	15	1:17386	1:17156	1:11552	Mount Currio	0	,	2	•	1.23060	1.12055
Wolmaranstad	1	2	2	1:56803	1:29280	1:30749	Mtupzini	0	0			-	1.19455
Wonderboom	1	11	57	-	1:25931	1:4669	Newcastle	4	13	12	1.11300	1.4282	1:4465
ORANGE FREE STATE	66	107	144				Nongoma	4	0	1	1.11303	1.4202	1.60153
Bethlehem	4	6	9	1:19305	1:13537	1:8991	Nautu	0	0	2		_	1.6818
Bethulie	1	2	1	1:11632	1:4940	1:9333	Ntuzuma	0	0	1			1:458529
Bloemfontein	27	45	58	1:7955	1:5689	1:5175	Pietermaritzburg	25	46	64	1.6967	1.4070	1.3571
Bothaville	0	1	1	-	1:60220	1:54726	Pinetown	17	31	57	1.13925	1.11429	1:3232
Brandfort	- 0	0	1	-	•	1:23521	Port Shenstone	4	15	20	1.11505	1.5275	1:3362
Bultfontein	0	1	2	-	1:27940	1:14278	Umlazi	0	0	2		1.0270	1.149638
Clocolan	1	, n	0	1.20756			Umvoti	2	1	4	1.18007	1.45220	1.10290
Dewetsdorn	1	ñ	0	1:15029		_	Umzinto	5	2	8	1:10975	1:46970	1.5865
Edenburg	1	۰ ۱	1	1.8644	1.5	1-6068	Underberg	n n	1	ñ	1.10070	1.14540	1.0000
Ficksburg	1	1	2	1.28239	1:32580	1:18405	Vryheid	4	5	6	1:22116	1:17644	1:14253
rickabuly	r		2	1.20203	1.02.000	1.10403		•	÷	5			