AGE STANDARDISED INCIDENCE RATES AND AGE SPECIFIC
MORBIDITY RATES FOR INTRA-ORAL SQUAMOUS CELL
CARCINOMA IN BLACKS ON THE WITWATERSRAND.

ABDOOL HAFIZ KOLA

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I hereby declare that this dissertation is my own work
and has not been submitted or incorporated in another
dissertation or thesis for any other degree.

A.H. KOLA
Johannesburg,
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ABSTRACT

The South African population is made up of
Blacks, Whites, Coloureds and Asians. Since each
population group is distinct in its culture and habits
and have widely differing life styles and socio-
economic levels an ideal oppurtunity exists for the
study of environmental influences on the aetiology
of particular cancers. In addition accurate epidemio-
logical data is essential in order to assess changing
patterns of the disease and the efficacy of the
prevention programmes. The aim of this study was to
determine age standardised incidence rates and age
specific morbidity rates of intra-oral squamous cell
carcinoma for Blacks on the Witwatersrand. All new
cases of intra-oral cancer during the period (1971-1980)
were traced. The population at risk was determined
from the National Population Censuses of 1970 and 1980.
According to the method used in the International
Union Against Cancers (U.I.C.C.) publication
(Waterhouse et al 1976 and 1982) age standardised
incidence rates and age specific morbidity rates were
calculated for tongue, floor of mouth, buccal mucosa,
hard and soft palates and gingivae and alveolar ridge
using standard World, European and African populations.
These results indicate that in the population group
studied intra-oral cancer is much more common in males

and / ...

than females (5,55:1 standardised rates) most commonly affects the tongue followed by the floor of mouth, palate, buccal mucosa and gingivae and alveolar ridge and is a disease of the elderly occurring most commonly in the seventh decade in males and in the sixth decade in females.

When compared with standardised rates reported, either for Blacks in other geographic locations in South Africa, or for other population groups in this country, or for selected countries elsewhere in the World, important differences have emerged which probably reflect differences in exposure to specific aetiological agents amongst the various population groups compared.

CHAPTER 1.

INTRODUCTION

Squamous cell carcinoma is the most common
intra-oral malignant tumour, accounting for over 90%
of all such tumours (Van Wyk 1982). In most Western
countries oral cancer accounts for 3-5% of all malignant
tumours (Binnie et al 1972; Pindborg 1980). In some
parts of India however oral cancer accounts for app-
roximately 40% of all cancers (Pindborg 1980).

The South African population is made up of Blacks,
Whites, Coloureds and Asians. Since each population
group is distinct in its culture and habits and have
widely differing life-styles and socio-economic levels,
an ideal oppurtunity exists for the study of environ-
mental influences on the aetiology of particular
cancers. Regretfully, however, there is no national
cancer registry in South Africa. This makes it
difficult to compare cancer patterns amongst the
various population groups (Harrington 1980).

Much of the published information on oral cancer
in South Africa refers to frequency of the disease in
departmental samples. (Shear, 1970; Fleming, Shear
and Altini, 1982, Fleming 1983). Such data whilst
being extremely useful must be assessed and compared

with / ...

with considerable caution since the samples are biased
and not standardised.

Age standardised incidence rates and age specific
morbidity rates for intra-oral squamous cell carcinoma
in the various population groups in South Africa have
been published by Oettle and Higginson (1966);
Muir Grieve (1967): Schonland and Bradshaw (1968a and
b and 1969), Isaacson et al (1978) and Breytenbach
(1979). Their results are shown in Table I. Care must
be taken in comparing these results since the standard
populations used in the various studies differ.
Despite this these studies have shown significant
differences in the distribution of oral cancer amongst
the various population groups studied. Age standardised
incidence rates and age specific morbidity rates for the
Black population on the Witwatersrand have never
been determined.

The purpose of this study is to determine age
standardised incidence rates and age specific morbidity
rates of intra-oral squamous cell carcinoma for Blacks
on the Witwatersrand, so as to be able to compare
the incidence to that in other population groups
within South Africa, as well as in other parts of the
world. In order to make the comparisons as complete
and as meaningful as possible it was decided

to / ...

Table I

ORAL CANCER MORBIDITY RATES PER 100,000 POPULATION PER ANNUM (SOUTH AFRICA)

AUTHOR	POPULATION AT RISK	STANDARD POPULATION USED	SITE	INDIANS		COLOUREDS		WHITES		BLACKS	
				M	F	M	F	M	F	M	F
OETTLE & HIGGINSON (1966)	JOHANNESBURG BANTU	AFRICAN	ORAL CANCER							4,1	1,5
MUIR GRIEVE (1967)	CAPE COLOURED AND WHITE	NORWEGIAN AND U.S.A.	LIP			2,9	0	17,4	1,4		
			TONGUE			3,7	0,3	3,7	0,6		
			REST OF MOUTH			2,2	0,6	5,4	1,1		
SCHONLAND & BRADSHAW (1968a and b)	DURBAN INDIANS (HINDUS AND MOSLEMS)	AFRICAN	LIP	0,4	0						
			TONGUE	0,6	1,3						
			REST OF MOUTH	1,9	4,8						
SCHONLAND & BRADSHAW (1969)		AFRICAN	BUCCAL CAVITY	4,4	8,1						
			TONGUE	1,5	3,0						
			REST OF MOUTH								
BREYTENBACH (1979)	COLOUREDS OF THE CAPE PENINSULA	WORLD	TONGUE			4,7	0,6				
			FLOOR OF MOUTH			1,9	0,4				
			LIP			1,5	0,1				
			CHEEK			0,6	0,8				
			GINGIVA			1,0	0,3				
			PALATE			0,6	0,1				
ISAACSON ET AL (1978)	BLACKS OF GREATER SOWETO	WORLD	TONGUE							2,26	0,17
			MOUTH AND CHEEK							1,77	0,11

to follow exactly the methodology used in the
International Union Against Cancer (U.I.C.C.)
publication Cancer Incidence in five Continents (Water-
house et al 1976, 1982). Such comparisons might
provide important clues as to possible aetiological
agents in the various population groups. Identi-
fication of such aetiological agents will contribute
greatly to decreasing the incidence of this disease
in the future.

CHAPTER 11.

MATERIALS AND METHODS

The Witwatersrand is a geographic area extending
approximately 100 kms West and East of Johannesburg.
The following cities and towns, which were established
in association with the gold mining industry, are
included in the Witwatersrand: ALBERTON, BENONI,
BOKSBURG, BRAKPAN, GERMISTON, JOHANNESBURG, KEMPTON
PARK, KRUGERSDORP. OBERHOLZER, RANDBURG, RANDFONTEIN,
ROODEPOORT, SPRINGS AND WESTONARIA.

The population at risk was the Black (Negroid)
population of the Witwatersrand during the period
1971-1980. This black population consists of the
following ethnic groups: Xhosa, Zulu, Swazi, South
Ndebele, North Ndebele, South Sotho, North Sotho,
Tswana, Shangaan, Venda and other Blacks.

Population figures were obtained from the National
Population Census published by the department of
Statistics in 1970 and 1980. In the National
Population Census the age of the population is given
in five year sub periods up until 25 years of age.
Thereafter the age is given in decades. The Department
of Statistics in Pretoria, on request, supplied relevant
population figures broken down into five year sub-
periods for all ages except for individuals 75 years

and / ...

and older who are recorded as a single group. This was necessary since the age specific morbidity rates published in Cancer Incidence in Five Continents (Waterhouse 1976, 1982) are expressed in this way.

Since 1975 was the midpoint of this study, and since no national population figures were available for this period, it was decided to calculate the population at risk at this time. This was done by using the 1970 and 1980 National Population Census figures from which the growth rate (r) was determined for each age group (in five year sub-periods) for males and females. An example of how the growth rate and the population at risk in 1975 was calculated is shown

Example: (Methodology as supplied by the Department of Statistics - Pretoria).

Male population 20-24 years

1970 Census: 129,234 Black males on the Witwatersrand

1980 Census: 200,022 Black males on the Witwatersrand

Growth rate 1970/1980 per year:

$$r = \left[\frac{200,022}{129,234}\right]^{\frac{1}{10}}$$

$$= 1,0446$$

Growth rate for 5 years
(ie. 1970-1975)

$$r = (1,0446)^5$$

$$= 1,244$$

1975 Calculated population = 1970 population x r (5 yr)

160,778

Table II

Black population at risk - Witwatersrand 1970/1975/1980

	1970		1975		1980	
	MALES	FEMALES	MALES	FEMALES	MALES	FEMALES
-1	20,130	17,374	21,780	19,486	23,566	21,940
1-4	69,745	83,818	77,397	83,021	85,889	82,232
5-9	81,109	99,697	85,089	96,057	89,264	92,550
10-14	75,195	95,501	77,398	87,162	79,666	79,552
15-19	81,010	82,861	91,755	87,329	103,926	92,040
20-24	129,234	80,359	160,778	98,202	200,022	120,007
25-29	109,631	74,708	137,730	84,801	173,032	96,257
30-34	91,120	66,389	120,815	75,247	160,186	85,286
35-39	78,821	60,053	94,653	63,901	113,666	67,995
40-44	67,315	48,762	76,769	52,240	87,550	47,607
45-49	57,239	36,711	63,709	41,806	70,911	55,966
50-54	41,907	29,361	47,296	33,269	53,377	37,698
55-59	25,366	18,575	30,643	22,249	37,018	26,650
60-64	15,966	10,890	19,551	14,012	23,941	18,028
65-69	9,583	7,052	11,185	8,756	13,055	10,872
70-74	3,370	6,330	4,720	5,879	6,610	5,461
75+	3,720	6,173	4,692	6,852	5,918	7,605
	960,461	824,614	1,125,960	880,269	1,327,597	947,746

Figures obtained from National Population Census

TABLE III

	MALES			FEMALES		

```
4 692                                    75        6 852
4 720                                    70        5 879
11 185                                   65        8 756
19 551                                   60       14 012
30 643                                   55       22 249
47 296                                   50       33 269
63 709                                   45       41 806
76 769                                   40       52 240
94 653                                   35       63 901
120 815                                  30       75 247
137 730                                  25       84 801
160 778                                  20       98 202
91 775                                   15       87 329
77 398                                   10       87 162
85 089                                    5       96 057
77 397                                    0       83 021
21 780                                             19 486

   20   15   10    5    0     0    5    10   15   20
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MALES (%)   FEMALES (%)

1,125,960   880,269
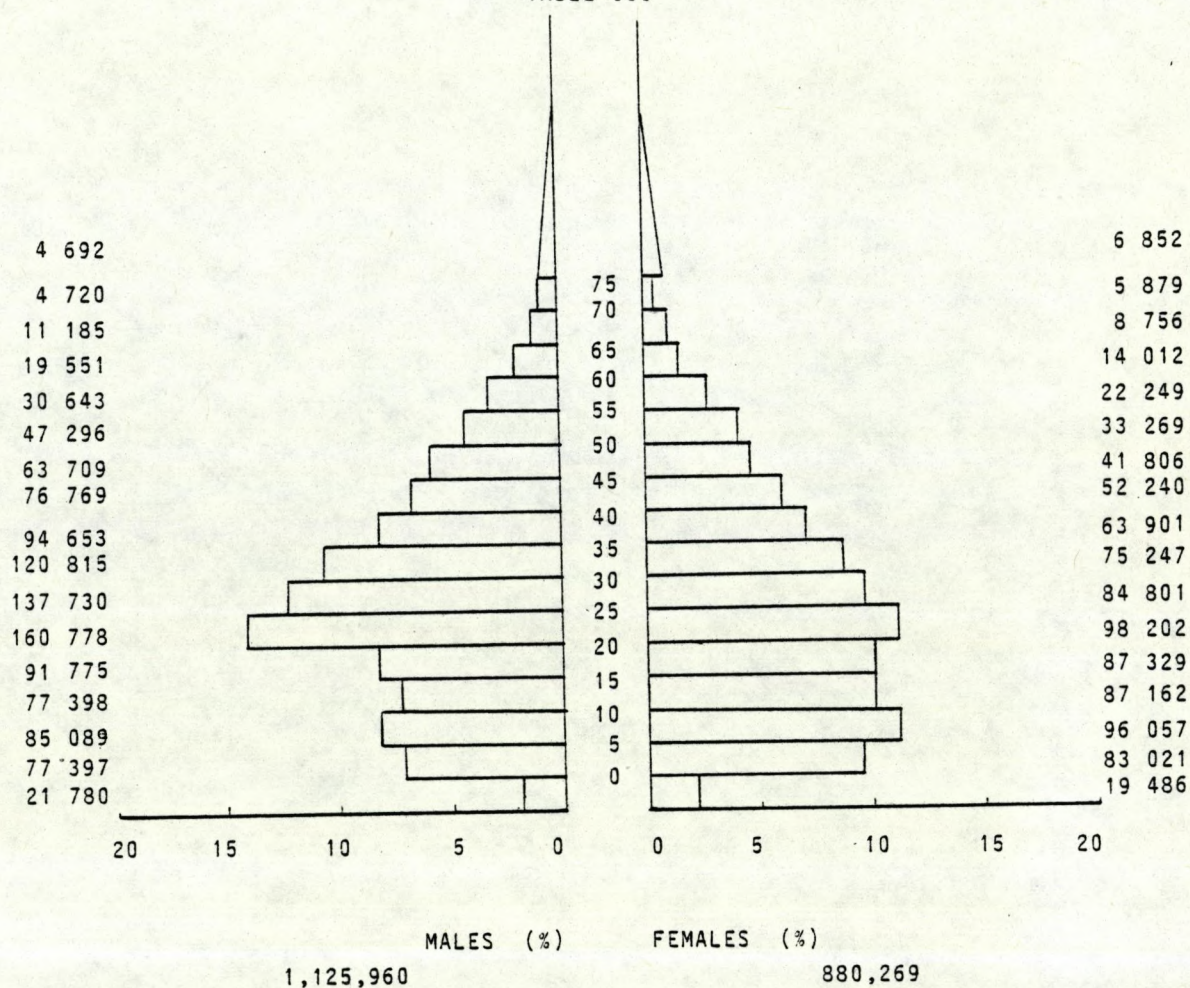
Population pyramid showing distribution of Black males and females according to age in five year sub-periods, on the Witwatersrand in 1975.

In this way the Black population at risk on the Witwatersrand in 1975 was calculated. The age in five year sub-periods and sex distribution are shown in Tables II and III. The population at risk was determined as being 2,006,229 of whom 1,125,960 were males and 880,269 were females.

All new cases of intra-oral squamous cell carcinoma that occured in Blacks on the Witwatersrand during the years 1971-1980 were traced. This was done by examining the pathology archives of the South African Institute for Medical Research at Baragwanath, Germiston and Krugersdorp and the archives of the Department of Oral Pathology at the University of the Witwatersrand.

All oral pathological lesions which are biopsied or surgically treated at all the Black hospitals on the Witwatersrand are accessioned in these laboratories. Since few if any black patients would be privately treated for oral cancer it was felt unnecessary to search the archives of the private pathology laboratories. In this manner it was felt that, within reason, all new patients who sought treatment for their oral cancer were traced. Care was taken to include only new cases and to exclude recurrences and metastases. Care was also taken to include only those patients who were resident on the Witwatersrand at the time their tumour was diagnosed.

Cases / ...

Cases of cancer of the lip and of the tonsil and pillar of fauces were excluded from this study.

In each case the patients name, residential address, age, sex and the site of the lesion was recorded. This data was obtained from available records in the various pathology laboratories and from the patients hospital clinical files. The histology was only checked in a few cases where there appeared to be some doubt in the original pathological report as to the diagnosis.

All cases were divided on the basis of the site of the lesion viz.

ICD 141   Squamous cell carcinoma of the tongue

ICD 143   Squamous cell carcinoma of the gingivae
            and alveolar ridge.

ICD 144   Squamous cell carcinoma of the floor of the
            mouth.

ICD 145-0   Squamous cell carcinoma of the buccal
            mucosa.

ICD 145-2x Squamous cell carcinoma of the hard and
and
ICD 145-3x soft palates.

For each of the above sites, age standardised incidence and age specific morbidity rates were calculated for males and females according to the method recommended by Waterhouse et al (1976, 1982) in the U.I.C.C. publication Cancer Incidence in Five

Continents.   In the 1976 edition of this publication
incidence rates are standardised against African,
World and European standard populations. However in
the 1982 edition incidence rates have been standardised
only against a standard world population. The standard
world population is identical in these two editions.
In order to allow for comparison with similar data
from other countries in existing publications, it
was decided to follow the style of the 1976 edition
of Cancer Incidence in Five Continents and to
calculate the age standardised incidence rates
and age specific morbidity rates using standard
African, European and World populations. Incidence
rates are expressed as number of cases per 100,000
population per year. Age specific morbidity rates
were recorded in five year sub periods upto 74 years.
Patients 75 years and over were recorded as a single
group since the national population census is
compiled in this way. The occurrence of cancer in
persons whose age at registration of the disease
was unknown was allowed for by multiplying the
standardised rate, calculated on the basis of cancer
in persons with known age at registration by N/K
where N is the total number of cases of the same
type in persons of the same sex including those
occurring in persons of unknown age and K is the
number occuring in persons of known age (Waterhouse

et / ...

et al 1976). This is referred to as the corrected
age standardised incidence rate.

In each case the variance and standard error
was also determined.

While the age specific morbidity rates are
tabulated in five year sub-periods in Table V to
Table XIV in the histograms (figure 1,2 and 3) these
rates have been expressed in decades in order to make
the histograms more meaningful and easier to interpret.

While individual rates have been calculated for
each of the abovementioned sites, in order to compare
the results of this study with those of other authors
the standardised rates for floor of mouth, gingivae
and alveolar ridge, buccal mucosa and hard and soft
palates are occassionaly added and expressed as a
single rate for mouth (ICD 143-145) in accordance
with the style used by Waterhouse et al (1976, 1982).

RESULTS

A. Crude distribution

During the ten year period (1971-1980), 357 new
cases (307 males; 50 females) of intra-oral squamous
cell carcinoma were diagnosed in Blacks on the Wit-
watersrand. The total population at risk was 2,006,229
of which 1,125,960 were males and 880,269 were females
(Tables II and III). In four cases the age of the
patients could not be established. The male:females
ratio is 6:1. Most cases occurred on the tongue
(161 males; 23 females), palate (38 males; 4 females),
gingivae and alveolar mucosa (4 males; 1 female) and
buccal mucosa (6 males: 3 females) (Table IV).
There is a wide age distribution with most cases
occurring in the sixth decade (Table IV).

An additional 18 cases were excluded from this
study since although these patients had been treated
on the Witwatersrand, their residential address could
not be traced as their hospital records were either
incomplete or totally missing. In four of these cases
there was in addition no record of the exact site of
the lesion. Since we could therefore not confirm
that these patients were infact resident on the Wit-
watersrand, it was decided not to include them in
this study.

Table IV

Crude distribution of intra-oral cancer in Blacks on the Witwatersrand (1971-1980)

	TONGUE		FL. OF MOUTH		PALATE		GIN & ALV. MUC		BUCCAL MUC	
	M	F	M	F	M	F	M	F	M	F
0										
1-4										
5-9										
10-14										
15-19	1									
20-24		1								
25-29		1								
30-34	2		1		1					1
35-39	3	1	6	1	2				1	
40-44	15	1	19	2	5		1	1		1
45-49	23	4	9	4	6	1	2		1	
50-54	34	9	16	4	5	1				
55-59	27	2	9	2	5	1	1			
60-64	24	2	19	2	5	1			1	
65-69	17		7	3	4		1		2	1
70-74	7	2	5		3					
75+	6		6	1	1				1	
Not Known	2		1		1					
	161	23	98	19	38	4		1	6	3

M:F 6:1

TOTAL NO. OF MALES   - 307
TOTAL NO. OF FEMALES -   50
                          357

B. Age standardised incidence rates and age specific
    morbidity rates

(I) ICD 141 - Squamous cell carcinoma of the tongue

Table V shows the age standardised incidence
rates and age specific morbidity rates for squamous cell
carcinoma of the tongue in Black males on the Wit-
watersrand. The age standardised incidence rates
per year are 2,66 per 100,000 (World standard population)
1,42 per 100,000 (African standard population)
3,73 per 100,000 (European standard population).
The corrected rates are 2,69, 1,44 and 3,78 respectively.

Table VI shows the age standardised incidence
rates and age specific morbidity rates for squamous
cell carcinoma of the tongue in Black females on the
Witwatersrand. When standardised against the World
standard population the age standardised incidence
rates is 0,41 per 100,000; against African standard
population 0,26 per 100,000; and against European
standard population 0,52 per 100,000 per year.

The age specific morbidity rates for males and
females are shown in Figure 1 and Tables V and VI.
As can be seen squamous cell carcinoma of the tongue
occurs most frequently in the sixth and seventh decades.
The disease is rare before the age of 40. Cases have
however occurred even in the second and third decades.

Table V
AGE STANDARDISED INCIDENCE RATES AND AGE SPECIFIC MORBIDITY RATES FOR SQUAMOUS CELL CARCINOMA OF TONGUE IN BLACK MALES (1971-1980)

AGE (IN YEARS)	POPULATION AT RISK (BLACK MALES)	NO OF PERSONS IN STANDARD POPULATION (WATERHOUSE ET AL 1976,1982)			OBSERVED INCIDENCE PER 100,000 PER YEAR $Rx = \dfrac{10^5 \times 0}{Px\ Y}$	EXPECTED CASES IN STANDARD POPULATION PER 100,000 $Ex = \dfrac{Rx \cdot Wx}{100,000}$			VARIANCE $Vx = \dfrac{Ex\ Wx}{Px\ Y}$		
X	Px	Wx WORLD	Wx AFRICAN	Wx EUROPEAN	Rx	Ex WORLD	Ex AFRICAN	Ex EUROPEAN	Vx WORLD	Vx AFRICAN	Vx EUROPEAN
0	21,780	2,400	2,000	1,600	-	-	-	-	-	-	-
1-4	77,397	9,600	8,000	6,400	-	-	-	-	-	-	-
5-9	85,089	10,000	10,000	7,000	-	-	-	-	-	-	-
10-14	77,398	9,000	10,000	7,000	-	-	-	-	-	-	-
15-19	91,755	9,000	10,000	7,000	0,1	0,01	0,01	0,01	0,0001	0,0001	0,0007
20-24	160,778	8,000	10,000	7,000	-	-	-	-	-	-	-
25-29	137,730	8,000	10,000	7,000	-	-	-	-	-	-	-
30-34	120,815	6,000	10,000	7,000	0,2	0,01	0,02	0,1	0,0001	0,0002	0,0001
35-39	94,653	6,000	10,000	7,000	0,3	0,02	0,03	0,02	0,0001	0,0003	0,0001
40-44	76,769	6,000	5,000	7,000	2,0	0,12	0,1	0,14	0,0009	0,0007	0,0013
45-49	63,709	6,000	5,000	7,000	3,6	0,22	0,18	0,25	0,0021	0,0014	0,0027
50-54	47,296	5,000	3,000	7,000	7,2	0,36	0,22	0,50	0,0038	0,0014	0,0074
55-59	30,643	4,000	2,000	6,000	8,8	0,35	0,18	0,53	0,0046	0,0012	0,0104
60-64	19,551	4,000	2,000	5,000	12,3	0,49	0,25	0,62	0,0100	0,0026	0,0159
65-69	11,185	3,000	1,000	4,000	15,2	0,46	0,15	0,61	0,0123	0,0013	0,0218
70-74	4,720	2,000	1,000	3,000	14,8	0,30	0,15	0,44	0,0127	0,0032	0,0279
75+	4,692	2,000	1,000	4,000	12,8	0,30	0,13	0,51	0,0128	0,0028	0,0435
ALL AGES	1,125,960	100,000	100,000	100,000	(1,43)	(2,66)	(1,42)	(3,73)	0,0594	0,0152	0,1318

STANDARDISED INCIDENCE RATES = 2,66/100,000 World Std Population

STANDARDISED INCIDENCE RATES = 1,42/100,000 African Std Population

STANDARDISED INCIDENCE RATES = 3,73/100,000 European Std Population

(Y = number of years on which rates are based: 1971-1980 = 10)

(0 = observed frequency)

$$\text{STANDARD ERROR} = \frac{\sqrt{\sum Vx}}{\sum Wx}$$

STANDARD ERROR = 0,24/100,000 (WORLD)

STANDARD ERROR = 0,12/100,000 (AFRICAN)

STANDARD ERROR = 0,36/100,000 EUROPEAN

The observed incidence and standardised rates as corrected for cases of unknown age are shown in brackets in the relevant columns

Table VI   AGE STANDARDISED INCIDENCE RATES AND AGE SPECIFIC MORBIDITY RATES FOR SQUAMOUS CELL CARCINOMA OF TONGUE IN BLACK FEMALES (1971-1980)

AGE (IN YEARS)	POPULATION AT RISK (BLACK FEMALES)	NO OF PERSONS IN STANDARD POPULATION (WATERHOUSE ET AL 1976,1982)			OBSERVED INCIDENCE PER 100,000 PER YEAR $R_x = \dfrac{10^5 \times O}{P_x\,Y}$	EXPECTED CASES IN STANDARD POPULATION PER 100,000 $E_x = \dfrac{R_x\,W_x}{100,000}$			VARIANCE $V = \dfrac{E_x\,W_x}{P_x\,Y}$		
X	P_x	W_x WORLD	W_x AFRICAN	W_x EUROPEAN	R_x	E_x WORLD	E_x AFRICAN	E_x EUROPEAN	V_x WORLD	V_x AFRICAN	V_x EUROPEAN
0	19,486	2,400	2,000	1,600	-	-	-	-	-	-	-
1-4	83,021	9,600	8,000	6,400	-	-	-	-	-	-	-
5-9	96,057	10,000	10,000	7,000	-	-	-	-	-	-	-
10-14	87,162	9,000	10,000	7,000	-	-	-	-	-	-	-
15-19	87,329	9,000	10,000	7,000	-	-	-	-	-	-	-
20-24	98,202	8,000	10,000	7,000	0,1	0,01	0,01	0,01	0,0001	0,0001	0,0001
25-29	84,801	8,000	10,000	7,000	0,1	0,01	0,01	0,01	0,0001	0,0001	0,0001
30-34	75,247	6,000	10,000	7,000	-	-	-	-	-	-	-
35-39	63,901	6,000	10,000	7,000	0,2	0,01	0,02	0,01	0,0001	0,0003	0,0001
40-44	52,240	6,000	5,000	7,000	0,2	0,01	0,01	0,01	0,0001	0,0001	0,0001
45-49	41,806	6,000	5,000	7,000	1,0	0,06	0,05	0,07	0,0009	0,0006	0,0012
50-54	33,269	5,000	3,000	7,000	2,7	0,14	0,08	0,19	0,0021	0,0007	0,0040
55-59	22,249	4,000	2,000	6,000	0,9	0,04	0,02	0,05	0,0007	0,0002	0,0013
60-64	14,012	4,000	2,000	5,000	1,4	0,06	0,03	0,07	0,0017	0,0004	0,0025
65-69	8,756	3,000	1,000	4,000	-	-	-	-	-	-	-
70-74	5,879	2,000	1,000	3,000	3,4	0,07	0,10	0,10	0,0024	0,0005	0,0051
75+	6,852	2,000	1,000	4,000	-	-	-	-	-	-	-
ALL AGES	880,269	100,000	100,000	100,000	0,26	0,41	0,26	0,52	0,0082	0,0030	0,0145

STANDARDISED INCIDENCE RATES = 0,41/100,000 World Std Population

STANDARDISED INCIDENCE RATES = 0,26/100,000 African Std Population

STANDARDISED INCIDENCE RATES = 0,52/100,000 European Std Population

(Y = number of years on which rates are based: 1971-1980)

(0 = observed frequency)

STANDARD ERROR = $\dfrac{\sqrt{\sum V_x}}{\sum W_x}$

STANDARD ERROR = 0,09/100,000 (WORLD)

STANDARD ERROR = 0,05/100,000 (AFRICAN)

STANDARD ERROR = 0,12/100,000 (EUROPEAN)

Fig. 1   Age specific morbidity rates for squamous cell
         carcinoma of the tongue in Black males on the
         Witwatersrand, 1971-1980, shown as cases per
         million per year.

(II)   ICD   143 - <u>Squamous cell carcinoma of the</u>

<u>gingivae and alveolar ridge</u>.

The age standardised incidence rates and age
specific morbidity rates for squamous cell carcinoma
of the gingivae and alveolar mucosa in Black males
and females on the Witwatersrand is shown in Table VII
and Table VIII. The age standardised incidence rates
for males are: against World standard population
0,07 per 100,000; against African standard population
0,05 per 100,000; and against European standard
population 0,09 per 100,000 per year.

The age standardised incidence rates for females
are: standardised against World standard population
0,01 per 100,000; against African standard population
0,01 per 100,000; and against European standard
population 0,01 per 100,000 per year.

The age specific morbidity rates are shown in
Tables VII and VIII. there are too few cases from which
to draw definite conclusions especially in females,
however it can be seen that squamous cell
carcinoma in this site did not occur before the age
of 40 with most cases occurring between the age of
55 and 69.

TABLE VII

AGE STANDARDISED INCIDENCE RATES AND AGE SPECIFIC MORBIDITY RATES FOR SQUAMOUS CELL CARCINOMA OF THE GINGIVAE AND ALVEOLAR MUCOSA IN BLACK MALES (1971-1980)

AGE (IN YEARS)	POPULATION AT RISK (BLACK MALES)	NO OF PERSONS IN STANDARD POPULATION (WATERHOUSE ET AL 1976,1982)			OBSERVED INCIDENCE PER 100,000 PER YEAR $Rx = \dfrac{10^5 \times 0}{Px \cdot Y}$	EXPECTED INCIDENCE IN STANDARD POPULATION PER 100,000 $Ex = \dfrac{Rx \cdot Wx}{100,000}$			VARIANCE $V = \dfrac{Ex \cdot Wx}{Px \cdot Y}$		
X	Px	WORLD Wx	AFRICAN Wx	EUROPEAN Wx	Rx	WORLD Ex	AFRICAN Ex	EUROPEAN Ex	WORLD Vx	AFRICAN Vx	EUROPEAN Vx
0	21,780	2,400	2,000	1,600	-	-	-	-	-	-	-
1-4	77,397	9,600	8,000	6,400	-	-	-	-	-	-	-
5-9	85,089	10,000	10,000	7,000	-	-	-	-	-	-	-
10-14	77,398	9,000	10,000	7,000	-	-	-	-	-	-	-
15-19	91,755	9,000	10,000	7,000	-	-	-	-	-	-	-
20-24	160,778	8,000	10,000	7,000	-	-	-	-	-	-	-
25-29	137,730	8,000	10,000	7,000	-	-	-	-	-	-	-
30-34	120,815	6,000	10,000	7,000	-	-	-	-	-	-	-
35-39	94,653	6,000	10,000	7,000	-	-	-	-	-	-	-
40-44	76,769	6,000	5,000	7,000	0,1	0,01	0,01	0,01	0,0001	0,0001	0,0001
45-49	63,709	6,000	5,000	7,000	0,3	0,02	0,02	0,02	0,0002	0,0002	0,0002
50-54	47,296	5,000	3,000	7,000	-	-	-	-	-	-	-
55-59	30,643	4,000	2,000	6,000	0,3	0,01	0,01	0,02	0,0001	-	0,0004
60-64	19,551	4,000	1,000	5,000	0,9	0,03	0,01	0,04	0,0008	0,0001	0,0014
65-69	11,185	3,000	1,000	4,000	-	-	-	-	-	-	-
70-74	4,720	2,000	1,000	3,000	-	-	-	-	-	-	-
75+	4,692	2,000	1,000	4,000	-	-	-	-	-	-	-
ALL AGES	1,125,960	100,000	100,000	100,000	0,036	0,07	0,05	0,09	0,0012	0,0005	0,0021

STANDARDISED INCIDENCE RATES = 0,07/100,000 World Std Population

STANDARDISED INCIDENCE RATES = 0,05/100,000 African Std Population

STANDARDISED INCIDENCE RATES = 0,09/100,000 European Std Population

(Y = number of years on which rates are based: 1971-1980)

(0 = observed frequency)

STANDARD ERROR $= \sqrt{\dfrac{\Sigma Vx}{\Sigma Wx}}$

STANDARD ERROR = 0,03/100,000 WORLD

STANDARD ERROR = 0,02/100,000 AFRICAN

STANDARD ERROR = 0,05/100,000 EUROPEAN

TABLE VIII
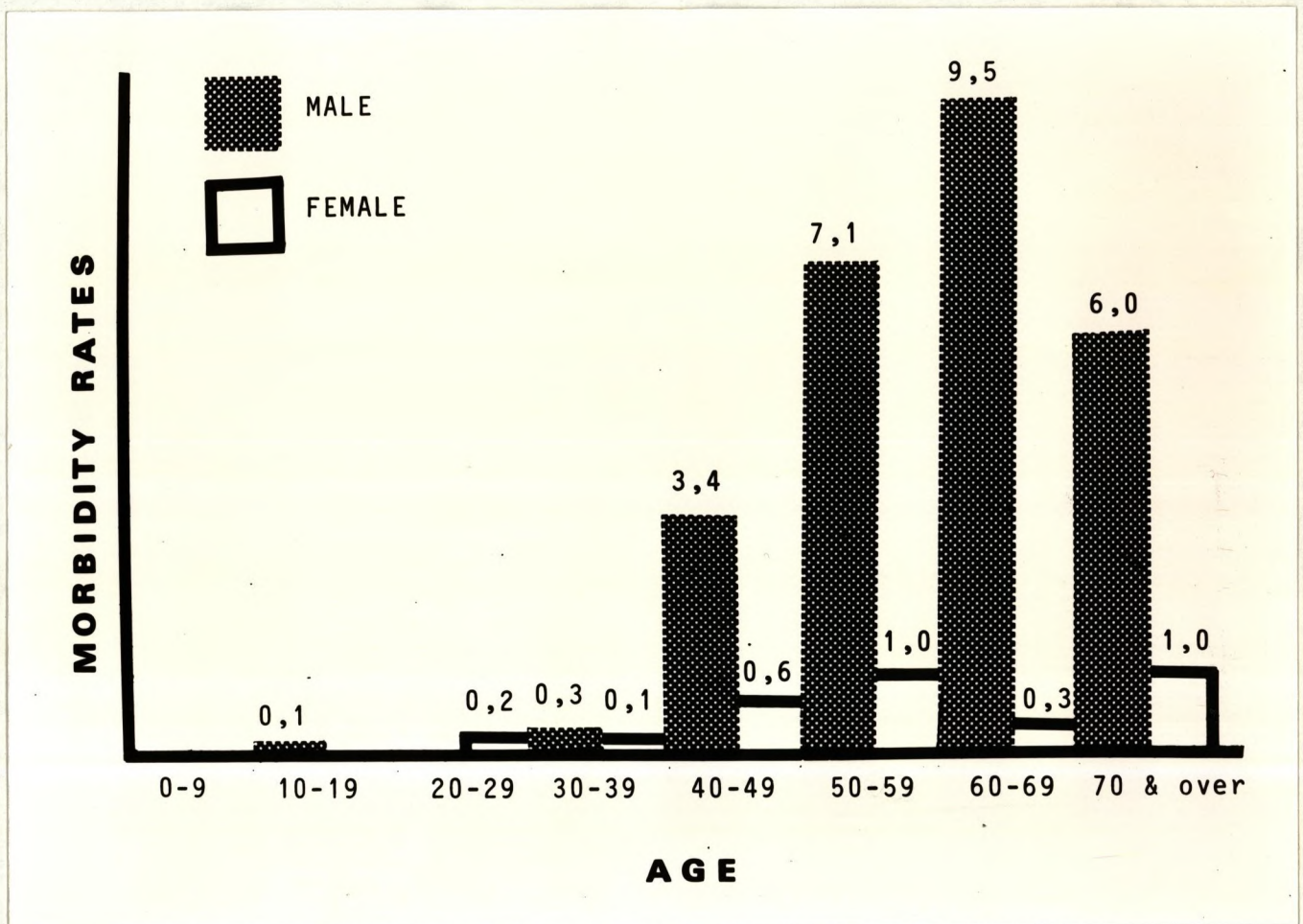
AGE STANDARDISED INCIDENCE RATES AND AGE SPECIFIC MORBIDITY RATES FOR SQUAMOUS CELL CARCINOMA OF THE GINGIVAE AND ALVEOLAR MUCOSA IN BLACK FEMALES (1971-1980)

AGE (IN YEARS)	POPULATION AT RISK (BLACK FEMALES)	NO OF PERSONS IN STANDARD POPULATION (WATERHOUSE ET AL 1976,1982)			OBSERVED INCIDENCE PER 100,000 PER YEAR $Rx = \dfrac{10^5 \times 0}{Px\ Y}$	EXPECTED CASES IN STANDARD POPULATION PER 100,000 $Ex = \dfrac{Rx\ Wx}{100,000}$			VARIANCE $Vx = \dfrac{Ex\ Wx}{Px\ Y}$		
X	Px	WORLD Wx	AFRICAN Wx	EUROPEAN Wx	Rx	WORLD Ex	AFRICAN Ex	EUROPEAN Ex	WORLD Vx	AFRICAN Vx	EUROPEAN Vx
0	19,486	2,000	2,400	1,600	-	-	-	-	-	-	-
1-4	83,021	8,000	9,600	6,400	-	-	-	-	-	-	-
5-9	96,057	10,000	10,000	7,000	-	-	-	-	-	-	-
10-14	87,162	10,000	9,000	7,000	-	-	-	-	-	-	-
15-19	87,329	10,000	9,000	7,000	-	-	-	-	-	-	-
20-24	98,202	10,000	8,000	7,000	-	-	-	-	-	-	-
25-29	84,801	10,000	8,000	7,000	-	-	-	-	-	-	-
30-34	75,247	10,000	6,000	7,000	-	-	-	-	-	-	-
35-39	63,901	10,000	6,000	7,000	-	-	-	-	-	-	-
40-44	52,240	5,000	6,000	7,000	-	-	-	-	-	-	-
45-49	41,806	5,000	6,000	7,000	0,2	0,01	0,01	0,01	0,0001	0,0001	0,0001
50-54	33,269	3,000	5,000	7,000	-	-	-	-	-	-	-
55-59	22,249	2,000	4,000	6,000	-	-	-	-	-	-	-
60-64	14,012	2,000	4,000	5,000	-	-	-	-	-	-	-
65-69	8,756	1,000	3,000	4,000	-	-	-	-	-	-	-
70-74	5,879	1,000	2,000	3,000	-	-	-	-	-	-	-
75+	6,852	1,000	2,000	4,000	-	-	-	-	-	-	-
ALL AGES	880,269	100,000	100,000	100,000	0,011	0,01	0,01	0,01	0,0001	0,0001	0,0001

STANDARDISED INCIDENCE RATES = 0,01/100,000 World Std Population

STANDARDISED INCIDENCE RATES = 0,01/100,000 African Std Population

STANDARDISED INCIDENCE RATES = 0,01/100,000 European Std Population

(Y = number of years on which rates are based: 1971-1980)

(0 = observed frequency)

STANDARD ERROR = $\sqrt{\dfrac{\varepsilon Vx}{\varepsilon Wx}}$

STANDARD ERROR = 0,01/100,000,000 (WORLD)

STANDARD ERROR = 0,01/100,000,000 (AFRICAN)

STANDARD ERROR = 0,01/100,000,000 (EUROPEAN)

(III) ICD 144 - <u>Squamous cell carcinoma of the</u>
<u>floor of mouth</u>.

Tables IX and X show the age standardised
incidence rates and age specific morbidity rates for
squamous cell carcinoma of the floor of mouth in
Black males and females on the Witwatersrand.
For males the age standardised incidence rates are:
standardised against the World standard population
1,62 per 100,000; against African standard population
0,92 per 100,000; and against European standard
population 2,31 per 100,000 per year. The corrected
rates are 1,64, 0,93 and 2,33 respectively.

For females the age standardised incidence rates
are: standardised against World standard population
0,38 per 100,000; against African standard population
0,23 per 100,000; and against European standard
population 0,51 per 100,000 per year.

Examination of the age specific morbidity rates
(Tables IX and X Figure 3) show a peak incidence
for both males and females in the seventh decade.
The disease is rare before the age of 40 with the
majority of cases occurring in the sixth, seventh
and eighth decades.

Table IX

AGE STANDARDISED INCIDENCE RATES AND AGE SPECIFIC MORBIDITY RATES FOR SQUAMOUS CELL CARCINOMA OF THE FLOOR OF MOUTH IN BLACK MALES (1971-1980)

23.

AGE (IN YEARS)	POPULATION AT RISK (BLACK MALES)	NO OF PERSONS IN STANDARD POPULATION (WATERHOUSE ET AL 1976,1982)			OBSERVED INCIDENCE PER 100,000 PER YEAR $Rx = \dfrac{10^5}{Px\ Y} \times 0$	EXPECTED CASES IN STANDARD POPULATION PER 100,000 $Ex = \dfrac{Rx\ Wx}{100,000}$			VARIANCE $Vx = \dfrac{Ex\ Wx}{Px\ Y}$		
X	Px	WORLD Wx	AFRICAN Wx	EUROPEAN Wx	Rx	WORLD Ex	AFRICAN Ex	EUROPEAN Ex	WORLD Vx	AFRICAN Vx	EUROPEAN Vx
0	21,780	2,400	2,000	1,600	-	-	-	-	-	-	-
1-4	77,397	9,600	8,000	6,400	-	-	-	-	-	-	-
5-9	85,089	10,000	10,000	7,000	-	-	-	-	-	-	-
10-14	77,398	9,000	10,000	7,000	-	-	-	-	-	-	-
15-19	91,755	9,000	10,000	7,000	-	-	-	-	-	-	-
20-24	160,778	8,000	10,000	7,000	-	-	-	-	-	-	-
25-29	137,730	8,000	10,000	7,000	-	-	-	-	-	-	-
30-34	120,815	6,000	10,000	7,000	0,1	0,01	0,01	0,01	0,0000	0,0001	0,0001
35-39	94,653	6,000	10,000	7,000	0,6	0,04	0,04	0,04	0,0003	0,0006	0,0003
40-44	76,769	6,000	5,000	7,000	2,5	0,15	0,13	0,18	0,0012	0,0008	0,0016
45-49	63,709	6,000	5,000	7,000	1,4	0,08	0,07	0,10	0,0008	0,0005	0,0011
50-54	47,296	5,000	3,000	7,000	3,4	0,17	0,10	0,24	0,0018	0,0006	0,0036
55-59	30,643	4,000	2,000	6,000	2,9	0,12	0,06	0,17	0,0016	0,0004	0,0003
60-64	19,551	4,000	2,000	5,000	9,7	0,39	0,19	0,49	0,0080	0,0019	0,0125
65-69	11,185	3,000	1,000	4,000	6,3	0,19	0,06	0,25	0,0051	0,0005	0,0089
70-74	4,720	2,000	1,000	3,000	10,6	0,21	0,11	0,32	0,0089	0,0023	0,0203
75+	4,692	2,000	1,000	4,000	12,8	0,26	0,13	0,51	0,0111	0,0028	0,0435
ALL AGES	1,125,960	100,000	100,000	100,000	0,86 (0,87)	1,62 (1,64)	0,92 (0,93)	2,31 (2,33)	0,0388	0,0105	0,0952

STANDARDISED INCIDENCE RATES = 1,62/100,000 World Std Population

STANDARDISED INCIDENCE RATES = 0,92/100,000 African Std Population

STANDARDISED INCIDENCE RATES = 2,31/100,000 European Std Population

(Y = number of years on which rates are based: 1971-1980)

(0 = observed frequency)

The observed incidence and standardised rates as corrected for cases of unknown age are shown in brackets in the relevant columns

STANDARD ERROR = $\dfrac{\sqrt{\sum Vx}}{\sum Wx}$

STANDARD ERROR = 0,20/100,000 (WORLD)

STANDARD ERROR = 0,1/100,000 (AFRICAN)

STANDARD ERROR = 0,03/100,000 (EUROPEAN)

Table X

AGE STANDARDISED INCIDENCE RATES AND AGE SPECIFIC MORBIDITY RATES FOR SQUAMOUS CELL CARCINOMA OF THE FLOOR OF MOUTH IN BLACK FEMALES (1971-1980)

AGE (IN YEARS)	POPULATION AT RISK (BLACK FEMALES)	NO OF PERSONS IN STANDARD POPULATION (WATERHOUSE ET AL 1976,1982)			OBSERVED INCIDENCE PER 100,000 PER YEAR	EXPECTED CASES IN STANDARD POPULATION PER 100,000			VARIANCE		
X	Px	WORLD Wx	AFRICAN Wx	EUROPEAN Wx	$Rx = \dfrac{10^5 \times O}{Px\, Y}$ Rx	$Ex = \dfrac{Rx\, Wx}{100{,}000}$ WORLD Ex	AFRICAN Ex	EUROPEAN Ex	$Vx = \dfrac{Ex\, Wx}{Px\, Y}$ WORLD Vx	AFRICAN Vx	EUROPEAN Vx
0	19,486	2,400	2,000	1,600	-	-	-	-	-	-	-
1-4	83,021	9,600	8,000	6,400	-	-	-	-	-	-	-
5-9	96,057	10,000	10,000	7,000	-	-	-	-	-	-	-
10-14	87,162	9,000	10,000	7,000	-	-	-	-	-	-	-
15-19	87,329	9,000	10,000	7,000	-	-	-	-	-	-	-
20-24	98,202	8,000	10,000	7,000	-	-	-	-	-	-	-
25-29	84,801	8,000	10,000	7,000	-	-	-	-	-	-	-
30-34	75,247	6,000	10,000	7,000	-	-	-	-	-	-	-
35-39	63,901	6,000	10,000	7,000	0,2	0,01	0,02	0,01	0,0001	0,0003	0,0001
40-44	52,240	6,000	5,000	7,000	0,4	0,02	0,02	0,03	0,0002	0,0002	0,0004
45-49	41,806	6,000	5,000	7,000	1,0	0,06	0,05	0,07	0,0009	0,0006	0,0012
50-54	33,269	5,000	3,000	7,000	1,2	0,06	0,04	0,08	0,0009	0,0004	0,0017
55-59	22,249	4,000	2,000	6,000	0,9	0,04	0,02	0,05	0,0007	0,0002	0,0013
60-64	14,012	4,000	2,000	5,000	1,4	0,06	0,03	0,07	0,0017	0,0004	0,0025
65-69	8,756	3,000	1,000	4,000	3,4	0,10	0,03	0,14	0,0034	0,0003	0,0064
70-74	5,879	2,000	1,000	3,000	-	-	-	-	-	-	-
75+	6,852	2,000	1,000	4,000	1,5	0,03	0,02	0,06	0,0009	0,0003	0,0035
ALL AGES	880,269	100,000	100,000	100,000	0,22	0,38	0,23	0,51	0,0088	0,0027	0,0171

STANDARDISED INCIDENCE RATES = 0,38/100,000 World Std Population

STANDARDISED INCIDENCE RATES = 0,22/100,000 African Std Population

STANDARDISED INCIDENCE RATES = 0,51/100,000 European Std Population

(Y = number of years on which rates are based: 1971-1980)

(O = observed frequency)

$$\text{STANDARD ERROR} = \sqrt{\dfrac{\Sigma Vx}{\Sigma Wx}}$$

STANDARD ERROR = 0,09/100,000 (WORLD)

STANDARD ERROR = 0,05/100,000 (AFRICAN)

STANDARD ERROR = 0,13/100,000 (EUROPEAN)

Fig. 2   Age specific morbidity rates for squamous cell
         carcinoma of the floor of mouth in Black males
         on the Witwatersrand, 1971-1980, shown as
         cases per million per year.

(IV)   ICD   145.0 - <u>Squamous cell carcinoma of the</u>

<u>buccal mucosa.</u>

In Tables XI and XII the age standardised
incidence rates and age specific morbidity rates for
squamous cell carcinoma of the buccal mucosa in Black
males and females on the Witwatersrand is shown.
For males the age standardised incidence rates are:
standardised against the World standard population
0,13 per 100,000; against African standard population
0,07 per 100,000; and against European standard
population 0,20 per 100,000 per year.

For Black females the age standardised incidence
rates are: standardised against World standard
population 0,05 per 100,000; against African standard
population 0,03 per 100,000; and against European
standard population 0,06 per 100,000 per year.

Age specific morbidity rates are depicted in
Tables XI and XII. These again show most cases
occurring after the age of 60. Surprisingly
occasssional cases occurred in the fourth decade
in both males and females.

TABLE XI

AGE STANDARDISED INCIDENCE RATES AND AGE SPECIFIC MORBIDITY RATES FOR SQUAMOUS CELL CARCINOMA OF THE BUCCAL MUCOSA IN BLACK MALES (1971-1980)

AGE (IN YEARS)	POPULATION AT RISK (BLACK MALES)	NO OF PERSONS IN STANDARD POPULATION (WATERHOUSE ET AL 1976,1982)			OBSERVED INCIDENCE PER 100,000 PER YEAR $Rx = \dfrac{10^5 \times O}{Px\ Y}$	EXPECTED CASES IN STANDARD POPULATION PER 100,000 $Ex = \dfrac{Rx\ Wx}{100,000}$			VARIANCE $V = \dfrac{Ex\ Wx}{Px\ Y}$		
X	Px	Wx WORLD	Wx AFRICAN	Wx EUROPEAN	Rx	Ex WORLD	Ex AFRICAN	Ex EUROPEAN	Vx WORLD	Vx AFRICAN	Vx EUROPEAN
0	21,780	2,400	2,000	1,600	-	-	-	-	-	-	-
1-4	77,397	9,600	8,000	6,400	-	-	-	-	-	-	-
5-9	85,089	10,000	10,000	7,000	-	-	-	-	-	-	-
10-14	77,398	9,000	10,000	7,000	-	-	-	-	-	-	-
15-19	91,755	9,000	10,000	7,000	-	-	-	-	-	-	-
20-24	160,778	8,000	10,000	7,000	-	-	-	-	-	-	-
25-29	137,730	8,000	8,000	7,000	-	-	-	-	-	-	-
30-34	120,815	6,000	6,000	7,000	-	-	-	-	-	-	-
35-39	94,653	6,000	10,000	7,000	0,1	0,01	0,01	0,01	0,0001	0,0001	0,0001
40-44	76,769	6,000	5,000	7,000	-	-	-	-	-	-	-
45-49	63,709	6,000	5,000	7,000	0,2	0,01	0,01	0,01	0,0001	0,0001	0,0001
50-54	47,296	5,000	3,000	7,000	-	-	-	-	-	-	-
55-59	30,645	4,000	2,000	6,000	-	-	-	-	-	-	-
60-64	19,551	4,000	2,000	5,000	0,5	0,02	0,01	0,03	0,0001	0,0001	0,0008
65-69	11,185	3,000	1,000	4,000	1,8	0,05	0,02	0,07	0,0013	0,0002	0,0025
70-74	4,720	2,000	1,000	3,000	2,1	0,04	0,02	0,08	0,0017	0,0004	0,0068
75+	4,692	2,000	1,000	4,000	-	-	-	-	-	-	-
ALL AGES	1,125,960	100,000	100,000	100,000	0,05	0,13	0,07	0,20	0,0033	0,0009	0,0103

STANDARDISED RATES = 0,13/100,000 World Std Population

STANDARDISED RATES = 0,07/100,000 African Std Population

STANDARDISED RATES = 0,20/100,000 European Std Population

(y = number of years on which rates are based: 1971-1980)

(0 = observed frequency)

STANDARD ERROR = $\dfrac{\sqrt{\Sigma Vx}}{\Sigma Wx}$

STANDARD ERROR = 0,05/100,000 (WORLD)

STANDARD ERROR = 0,03/100,000 (AFRICAN)
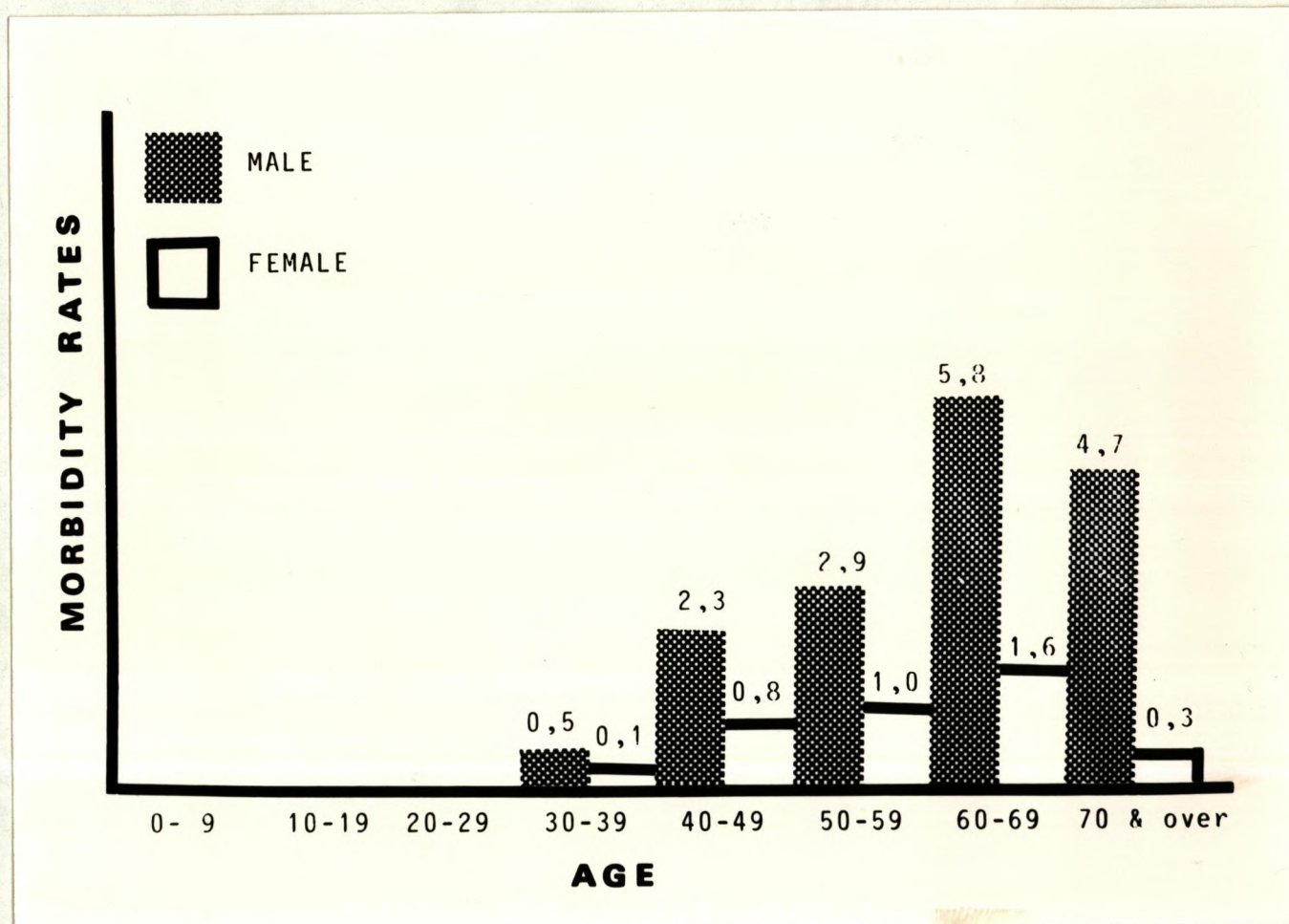
STANDARD ERROR = 0,10/100,000 (EUROPEAN)

TABLE XII

AGE STANDARDISED INCIDENCE RATES AND AGE SPECIFIC MORBIDITY RATES FOR SQUAMOUS CELL CARCINOMA OF THE BUCCAL MUCOSA IN BLACK FEMALES (1971-1980)

AGE (IN YEARS)	POPULATION AT RISK (BLACK FEMALES)	NO OF PERSONS IN STANDARD POPULATION (WATERHOUSE ET AL 1976,1982)			OBSERVED INCIDENCE PER 100,000 PER YEAR	EXPECTED CASES IN STANDARD POPULATION PER 100,000			VARIANCE		
x	Px	Wx WORLD	Wx AFRICAN	Wx EUROPEAN	$Rx = \dfrac{10^5 \times O}{Px\,Y}$	$Ex = \dfrac{Rx\,Wx}{100{,}000}$ WORLD	Ex AFRICAN	Ex EUROPEAN	$V = \dfrac{Ex\,Wx}{Px\,Y}$ WORLD Vx	Vx AFRICAN	Vx EUROPEAN
0	19,486	2,400	2,400	1,600	-	-	-	-	-	-	-
1-4	83,021	9,600	8,000	6,400	-	-	-	-	-	-	-
5-9	96,057	10,000	10,000	7,000	-	-	-	-	-	-	-
10-14	87,162	9,000	10,000	7,000	-	-	-	-	-	-	-
15-19	87,329	9,000	10,000	7,000	-	-	-	-	-	-	-
20-24	98,202	8,000	10,000	7,000	-	-	-	-	-	-	-
25-29	84,801	8,000	10,000	7,000	0,1	0,01	0,01	0,01	0,0001	0,0001	0,0001
30-34	75,247	6,000	10,000	7,000	0,1	0,01	0,01	0,01	0,0001	0,0001	-
35-39	63,901	6,000	10,000	7,000	0,2	0,01	0,01	0,01	0,0001	0,0001	0,0001
40-44	52,240	6,000	5,000	7,000	-	-	-	-	-	-	-
45-49	41,806	6,000	5,000	7,000	-	-	-	-	-	-	-
50-54	33,269	5,000	3,000	6,000	-	-	-	-	-	-	-
55-59	22,249	4,000	2,000	5,000	-	-	-	-	-	-	-
60-64	14,012	4,000	2,000	5,000	1,1	0,03	0,01	0,04	0,0010	0,0001	0,0018
65-69	8,756	3,000	1,000	4,000	-	-	-	-	-	-	-
70-74	5,879	2,000	1,000	3,000	-	-	-	-	-	-	-
75+	6,852	2,000	1,000	4,000	-	-	-	-	-	-	-
ALL AGES	880,269	100,000	100,000	100,000	0,034	0,05	0,03	0,06	0,0012	0,0003	0,0020

STANDARDISED INCIDENCE RATES = 0,05/100,000 World Std Population

STANDARDISED INCIDENCE RATES = 0,03/100,000 African Std Population

STANDARDISED INCIDENCE RATES = 0,06/100,000 European Std Population

(Y = number of years on which rates are based: 1971-1980)

(O = observed frequency)

STANDARD ERROR $= \dfrac{\sqrt{\Sigma\,Vx}}{\Sigma\,Wx}$

STANDARD ERROR = 0,035/100,000 (WORLD)

STANDARD ERROR = 0,02/100,000 (AFRICAN)

STANDARD ERROR = 0,04/100,000 (EUROPEAN)

(V) ICD 145.2x; 145.3x - <u>Squamous cell carcinoma of</u>
<u>the hard and soft palates.</u>

The age standardised incidence rates and age
specific morbidity rates for squamous cell carcinoma
of the hard and soft palates in Black males and
females on the Witwatersrand is shown in Tables XIII
and XIV. When standardised against World standard
population the age standardised incidence rates for
males is 0,61 per 100,000; against African standard
population 0,35 per 100,000; and against European
standard population 0,85 per 100,000 per year. The
corrected rates are 0,63, 0,36 and 0,87 respectively.

For females the age standardised incidence rates
are: standardised against World standard population
0,08 per 100,000; against African standard population
0,04 per 100,000; and against European standard
population 0,09 per 100,000 per year.

The age specific morbidity rates as shown in
Tables XIII and XIV and figure 3 indicate that as
for lesions in the other sites the peak incidence is
in the seventh decades with most cases occurring
after the age of 40 but with occassional cases
occurring in the fourth decade.

Table XIII

AGE STANDARDISED INCIDENCE RATES AND AGE SPECIFIC MORBIDITY RATES FOR SQUAMOUS CELL CARCINOMA OF THE PALATE IN BLACK MALES (1971-1980)

AGE (IN YEARS)	POPULATION AT RISK (BLACK MALES)	NO OF PERSONS IN STANDARD POPULATION (WATERHOUSE ET AL 1976,1982)			OBSERVED INCIDENCE PER 100,000 PER YEAR $Rx = \dfrac{10^5 \times 0}{Px\ Y}$	EXPECTED CASES IN STANDARD POPULATION PER 100,000 $Ex = \dfrac{Rx\ Wx}{100,000}$			VARIANCE $Vx = \dfrac{Ex\ Wx}{Px\ Y}$		
X	Px	Wx WORLD	Wx AFRICAN	Wx EUROPEAN	Rx	Ex WORLD	Ex AFRICAN	Ex EUROPEAN	Vx WORLD	Vx AFRICAN	Vx EUROPEAN
0	21,780	2,400	2,000	1,600	-	-	-	-	-	-	-
1-4	77,397	9,600	8,000	6,400	-	-	-	-	-	-	-
5-9	85,089	10,000	10,000	7,000	-	-	-	-	-	-	-
10-14	77,398	9,000	10,000	7,000	-	-	-	-	-	-	-
15-19	91,755	9,000	10,000	7,000	-	-	-	-	-	-	-
20-24	160,778	8,000	10,000	7,000	-	-	-	-	-	-	-
25-29	137,730	8,000	10,000	7,000	-	-	-	-	-	-	-
30-34	120,815	6,000	10,000	7,000	0,1	0,01	0,01	0,01	0,0000	0,0001	0,0001
35-39	94,653	6,000	10,000	7,000	0,2	0,01	0,02	0,01	0,0001	0,0001	0,0001
40-44	76,769	6,000	5,000	7,000	0,7	0,04	0,04	0,05	0,0003	0,0003	0,0005
45-49	63,709	6,000	5,000	7,000	0,9	0,05	0,05	0,06	0,0005	0,0004	0,0007
50-54	47,296	5,000	3,000	7,000	1,1	0,06	0,03	0,08	0,0006	0,0002	0,0012
55-59	30,645	4,000	2,000	6,000	1,6	0,06	0,03	0,10	0,0008	0,0002	0,0019
60-64	19,551	4,000	2,000	5,000	2,6	0,10	0,05	0,13	0,0020	0,0005	0,0033
65-69	11,185	3,000	1,000	4,000	3,6	0,11	0,04	0,14	0,0030	0,0002	0,0050
70-74	4,720	2,000	1,000	3,000	6,4	0,13	0,06	0,19	0,0055	0,0013	0,0121
75+	4,692	2,000	1,000	4,000	2,1	0,04	0,02	0,08	0,0017	0,0004	0,0068
ALL AGES	1,125,960	100,000	100,000	100,000	0,33 (0,34)	0,61 (0,63)	0,35 (0,36)	0,85 (0,87)	0,0145	0,0039	0,0317

STANDARDISED INCIDENCE RATES = 0,61/100,000 World Std Population

STANDARDISED INCIDENCE RATES = 0,35/100,000 African Std Population

STANDARDISED INCIDENCE RATES = 0,85/100,000 European Std'Population

(Y = number of years on which rates are based: 1971-1980)

(0 = observed frequency)

The observed incidence and standardised rates as corrected for cases of unknown age are shown in brackets in the relevant columns

STANDARD ERROR = $\sqrt{\dfrac{\Sigma Vx}{\Sigma Wx}}$

STANDARD ERROR = 0,12/100,000 (WORLD)

STANDARD ERROR = 0,06/100,000 (AFRICAN)

STANDARD ERROR = 0,17/100,000 (EUROPEAN)

Table XIV

AGE STANDARDISED INCIDENCE RATES AND AGE SPECIFIC MORBIDITY RATES FOR SQUAMOUS CELL CARCINOMA OF THE PALATE, IN BLACK FEMALES (1971-1980)

AGE (IN YEARS) X	POPULATION AT RISK (BLACK FEMALES) Px	NO OF PERSONS IN STANDARD POPULATION (WATERHOUSE ET AL 1976,1982)			OBSERVED INCIDENCE PER 100,000 PER YEAR $Rx = \dfrac{10^5 \times 0}{Px\,Y}$	EXPECTED CASES IN STANDARD POPULATION PER 100,000 $Ex = \dfrac{Rx\,Wx}{100{,}000}$			VARIANCE $Vx = \dfrac{Ex\,Wx}{Px\,Y}$		
		WORLD Wx	AFRICAN Wx	EUROPEAN Wx	Rx	WORLD Ex	AFRICAN Ex	EUROPEAN Ex	WORLD Vx	AFRICAN Vx	EUROPEAN Vx
0	19,486	2,400	2,000	1,600	-	-	-	-	-	-	-
1-4	83,021	9,600	8,000	6,444	-	-	-	-	-	-	-
5-9	96,057	10,000	10,000	7,000	-	-	-	-	-	-	-
10-14	87,162	9,000	10,000	7,000	-	-	-	-	-	-	-
15-19	87,329	9,000	10,000	7,000	-	-	-	-	-	-	-
20-24	98,202	8,000	10,000	7,000	-	-	-	-	-	-	-
25-29	84,801	8,000	10,000	7,000	-	-	-	-	-	-	-
30-34	75,247	6,000	10,000	7,000	-	-	-	-	-	-	-
35-39	63,901	6,000	10,000	7,000	-	-	-	-	-	-	-
40-44	52 240	6,000	5,000	7,000	-	-	-	-	-	-	-
45-49	41,806	6,000	5,000	7,000	0,2	0,01	0,01	0,01	0,0001	0,0001	0,0002
50-54	33,269	5,000	3,000	7,000	0,3	0,02	0,01	0,02	0,0003	0,0001	0,0004
55-59	22,249	4,000	2,000	6,000	0,4	0,02	0,01	0,02	0,0004	0,0001	0,0005
60-64	14,012	4,000	2,000	5,000	0,7	0,03	0,01	0,04	0,0009	0,0001	0,0032
65-69	8,756	3,000	1,000	4,000	-	-	-	-	-	-	-
70-74	5,879	2,000	1,000	3,000	-	-	-	-	-	-	-
75+	6,852	2,000	1,000	4,000	-	-	-	-	-	-	-
ALL AGES	880,269	100,000	100,000	100,000	0,045	0,08	0,04	0,09	0,0017	0,0004	0,0043

STANDARDISED INCIDENCE RATES = 0,08/100,000 World Std Population

STANDARDISED INCIDENCE RATES = 0,04/100,000 African Std Population

STANDARDISED INCIDENCE RATES = 0,09/100,000 European Std Population

(Y = number of years on which rates are based: 1971-1980)

(0 = observed frequency)

$$\text{STANDARD ERROR} = \sqrt{\dfrac{\Sigma V x}{\Sigma W x}}$$

STANDARD ERROR = 0,04/100,000 (WORLD)

STANDARD ERROR = 0,02/100,000 (AFRICAN)
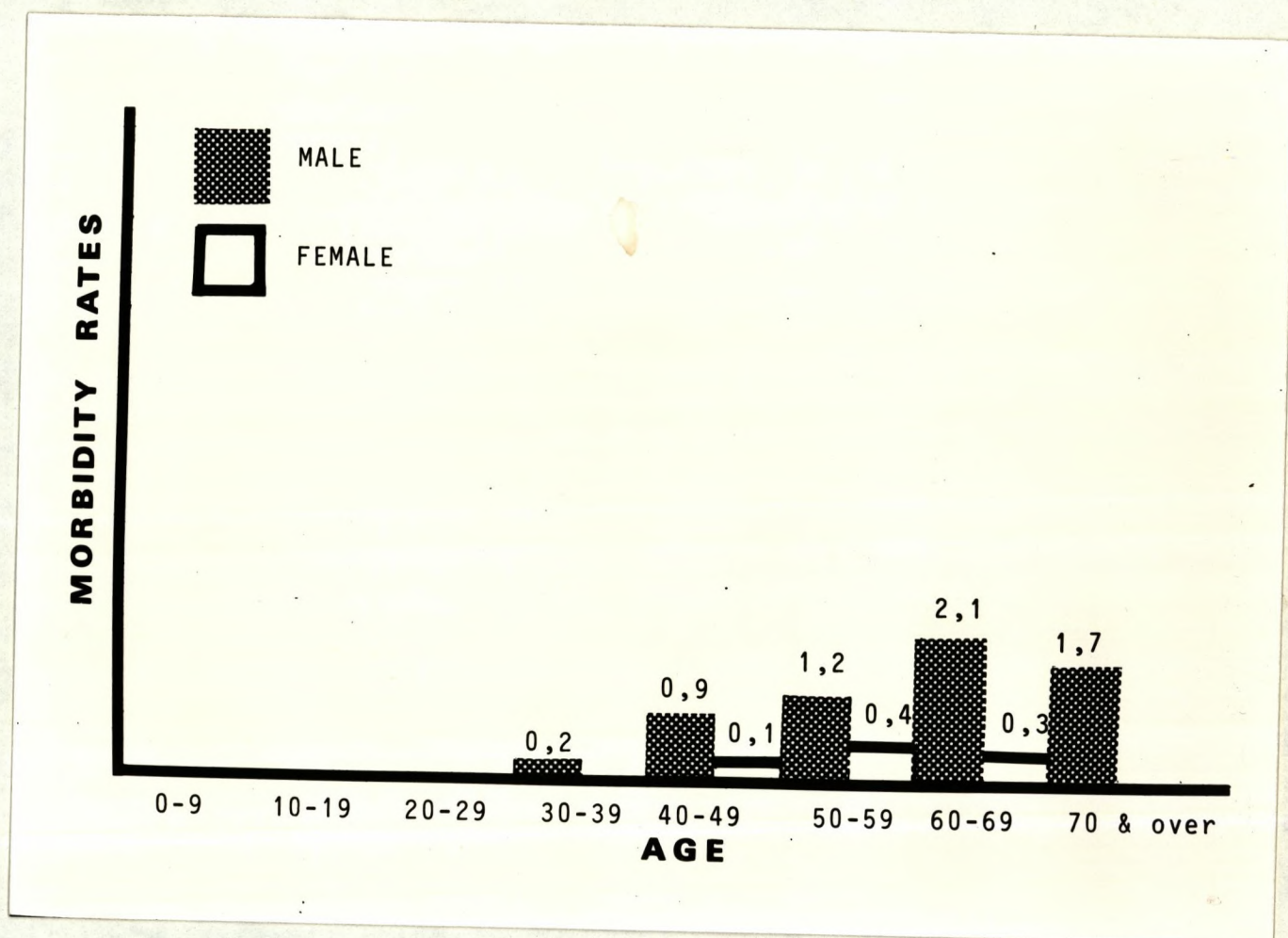
STANDARD ERROR = 0,06/100,000 (EUROPEAN)

Fig. 3 Age specific morbidity rates for Squamous cell carcinoma of the palate in Black males on the Witwatersrand, 1971-1980, shown as cases per million per year.

DISCUSSION

In attempting to determine the true incidence of
a particular form of cancer amongst a specific population
group or in a specific geographic location researchers
are able to adopt one of three methods in tracing all
new cases of the disease. Firstly the records of a
National Cancer Registry may be studied. In South Africa
such a registry does not exist. Secondly house to house
direct clinical examination of large samples of the
population may be undertaken. This is an enormously
expensive time consuming undertaking involving a huge
team of trained examiners, and does not appear to be
a feasible undertaking in the context of intra-oral
cancer. Thirdly the records of all pathology depart-
ments in which pathological material from the population
at risk is accessioned can be studied. Here the ass-
umption is being made that all patients with intra-
oral cancer would have sought clinical treatment and
that in the course of such treatment the lesion would
have been biopsied and therefore accessioned in the
records of the pathology departments. This is not an
unreasonable assumption in an area like the Wit-
watersrand where hospital treatment is readily
available to all sections of the population.

While it is true that Blacks living or working
in "White areas" of the Witwatersrand do consult private
practitioners from time to time regarding common
ailments, in the case of intra-oral and other cancers
it is virtually certain that such patients would be
referred to any one of the many Provincial Hospitals
for biopsy and treatment. For this reason only the
records of the pathology departments serving these
Provincial Hospitals were examined in this study. It
was felt unnecessary to examine the records of the
private pathology laboratories. This in any case
is in many instances an impossible task due to lack of
suitable classification systems in the records of
these laboratories.

In this manner it was felt that within reason,
all new cases of intra-oral cancer on the Witwatersrand
during the period 1971-1980 were traced. Errors are
greatly minimised by tracing new cases over as long a
period as possible ie. 10 years in this study.

Large numbers of migrant workers reside on the
Witwatersrand. Despite the fact that these workers
are not permanent residents of the Witwatersrand
they have been included in this study since they
were resident on the Witwatersrand at the time their
cancer was diagnosed.

Care must be taken to exclude cases that were referred from other parts of the country to hospitals on the Witwatersrand for diagnosis and treatment. This happens relatively frequently. It is essential therefore that in each case the residential address of the patients is checked. Regretfully in 18 cases which were recorded in the files of the various pathology departments there was no record of the patients home address. Although undoubtedly some or all of these might have qualified for inclusion in the interest of accuracy it was thought best to exclude them. Had all of these cases been included the age standardised incidence rates would have been 1,72 per cent higher for tongue lesions in males, 1,76 per cent higher for floor of mouth in males, 1,86 per cent higher for palate in males and 2,5 per cent higher for buccal mucosa in males. Thus for these categories it is possible that a maximum error ranging from 1-3 per cent is present in the calculated age standardised incidence rates. This possible error is of little significance.

The crude distribution figures shown in Table IV are very similar to the distribution figures recorded from all cases accessioned in the Department of Oral Pathology, University of the Witwatersrand (Shear 1970, Fleming et al 1982). Hence the usefulness of surveying

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the records of a single department should not be
underestimated despite the fact that the results
thus obtained cannot be interpreted as representing
the incidence of a disease.

The age standardised incidence rates calculated
in this study are summarised in Tables XV and XVI.
If we consider only those figures obtained by using
a standard World population it can be seen that the
incidence of carcinoma for all intra-oral sites is
much higher in males than females (ratio of 5,55:1).
This increased incidence in males is more marked in
the palate (7,88:1) in the gingivae (7:1) and in the
tongue (6,56:1) than in the floor of the mouth
(4,32:1) and in the buccal mucosa (2,6:1).

It is also interesting to note that in males
the incidence for tongue only (ICD 141) is higher
than for all other intra-oral sites combined (ICD 143-
145) Table XVI. For females the reverse is true.
In both cases the differences are slight.

In a recent frequency study amongst Blacks in
South Africa (Fleming 1983) male:female ratios of
9,9:1 (tongue), 8,4:1 (floor of mouth), 6,9:1
(gingivae and alveolar mucosa), 4,7:1 (palate),
2,3:1 (buccal mucosa) and 7,4:1 (all intra-oral
sites) were reported.

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The differences in the male:female ratios between
this incidence study and Fleming's (1983) frequency
study might indicate that differences in site
distribution exsist in different parts of the country
since Fleming's study included cases from all over
South Africa. On the other hand they might simply
be an indication of inherent errors in frequency
studies where standardisation of results is not possible.

TABLE XV

AGE STANDARDISED INCIDENCE RATES OF INTRA-ORAL SQUAMOUS CELL CARCINOMA
FOR BLACKS ON THE WITWATERSRAND, PER 100,000 PER YEAR. (1971-1980.)

SITE	WORLD			AFRICAN			EUROPEAN		
	M	F	M:F RATIO	M	F	M:F RATIO	M	F	M:F RATIO
TONGUE	2,69	0,41	6,56:1	1,44	0,26	5,54:1	3,78	0,52	7,27:1
FLOOR OF MOUTH	1,64	0,38	4,32:1	0,93	0,23	4,04:1	2,33	0,51	4,57:1
GING. & ALV. MUC	0,07	0,01	7,0 :1	0,05	0,01	5,0 :1	0,09	0,01	9,0 :1
BUCCAL MUCOSA	0,13	0,05	2,6 :1	0,07	0,03	2,33:1	0,20	0,06	3,33:1
PALATE	0,63	0,08	7,88:1	0,36	0,04	9,0 :1	0,87	0,09	9,67:1
TOTAL	5,16	0,93	5,55:1	2,85	0,57	5,0 :1	7,27	1,19	6,11:1

TABLE XVI

AGE STANDARDISED INCIDENCE RATES OF INTRA-ORAL SQUAMOUS CELL CARCINOMA
FOR BLACKS ON THE WITWATERSRAND, PER 100,000 PER YEAR.   (1971-1980)

SITE	WORLD			AFRICAN			EUROPEAN		
	M	F	M:F RATIO	M	F	M:F RATIO	M	F	M:F RATIO
TONGUE ICD 141	2,69	0,41	6,56:1	1,44	0,26	5,54:1	3,78	0,52	7,27:1
MOUTH ICD 143-5	2,47	0,52	4,75:1	1,41	0,31	4,55:1	3,49	0,67	5,21:1
TOTAL	5,16	0,93	5,55:1	2,85	0,57	5,0 :1	7,27	1,19	6,11:1

In comparing the age standardised rates calculated
in this study with those previously reported from
various population groups in this country (Table XVII)
it is evident that as far as Blacks are concerned the
rates in this study (Standard African Population) are
substantially lower than those reported by Oettle
and Higginson (1966) for the Johannesburg Bantu.
For the Blacks of Greater Soweto (Isaacson et al 1978)
the reported rates are lower than those recorded in
this study (Standard World Population) especially for
mouth (ICD 143-145) but more especially for both
tongue and mouth in females.

For the other population groups in South Africa
the higher rates reported in Coloureds for tongue by
Muir Grieve (1967) and Breytenbach (1979) compared
to this study (Standard World Population) are worthy
of note. The comparatively low rate for tongue, high
rate for buccal mucosa and reversal of the overall
male to female ratio in the Durban Indians as reported
by Schonland and Bradshaw (1968a and b, 1969) are certainly
indicative of the use of different aetiological agents
amongst this population group and provide an excellent
example of the value of comparing rates in plural
societies in countries such as South Africa.

Table XVII

ORAL CANCER MORBIDITY RATES PER 100,000 POPULATION PER ANNUM (SOUTH AFRICA)

AUTHOR	POPULATION AT RISK	STANDARD POPULATION USED	SITE	INDIANS		COLOUREDS		WHITES		BLACKS	
				M	F	M	F	M	F	M	F
OETTLE & HIGGINSON (1966)	JOHANNESBURG BANTU	AFRICAN	ORAL CANCER							4,1	1,5
MUIR GRIEVE (1967)	CAPE COLOURED AND WHITE		LIP			2,9	0	17,4	1,4		
			TONGUE			3,7	0,3	3,7	0,6		
			REST OF MOUTH			2,2	0,6	5,4	1,1		
SCHONLAND & BRADSHAW (1968a and b)	DURBAN INDIANS (HINDUS AND MOSLEMS)	AFRICAN	LIP	0,4	0						
			TONGUE	0,6	1,3						
		AFRICAN	REST OF MOUTH	1,9	4,8						
SCHONLAND & BRADSHAW (1969)			TONGUE	1,5	3,0						
			BUCCAL CAVITY	4,4	8,1						
BREYTENBACH (1979)	COLOUREDS OF THE CAPE PENINSULA	WORLD	TONGUE			4,7	0,6				
			FLOOR OF MOUTH			1,9	0,4				
			LIP			1,5	0,1				
			CHEEK			0,6	0,8				
			GINGIVA			1,0	0,3				
			PALATE			0,6	0,1				
ISAACSON ET AL (1978)	BLACKS OF GREATER SOWETO	WORLD	TONGUE							2,26	0,17
			MOUTH AND CHEEK							1,77	0,11
PRESENT STUDY	BLACKS OF WITWATERSRAND	WORLD	TONGUE							2,69	0,41
			FLOOR OF MOUTH							1,64	0,38
			GINGIVA & ALV. MUCOSA							0,07	0,01
			BUCCAL MUCOSA							0,13	0,05
			PALATE							0,63	0,08
			TOTAL ALL SITES							5,16	0,93
		AFRICAN	TONGUE							1,44	0,26
			FLOOR OF MOUTH							0,93	0,23
			GINGIVA & ALV. MUCOSA							0,05	0,01
			BUCCAL MUCOSA							0,07	0,03
			PALATE							0,36	0,04
			TOTAL ALL SITES							2,85	0,57
		EUROPEAN	TONGUE							3,78	0,52
			FLOOR OF MOUTH							2,33	0,51
			GINGIVA & ALV. MUCOSA							0,09	0,01
			BUCCAL MUCOSA							0,20	0,06
			PALATE							0,87	0,09
			TOTAL ALL SITES							7,27	1,19

A selection of age standardised rates from various parts of the world for tongue (ICD 141) and mouth (ICD 143-145) are compared with the rates recorded in this study. If we consider only the results using the Standard World Population, analysis of this table shows that the incidence of carcinoma of the tongue and mouth in Black males on the Witwatersrand ranks amongst the highest of those countries selected in Table XVIII being lower only than the incidence in Sao Paulo, Bombay and Singapore.

The low incidence of the intra-oral cancer in females throughout the World (except amongst the Indians of Bombay and Singapore) is clearly evident. Of the countries selected the incidence in Black females of the Witwatersrand is amongst the lowest. For tongue it is substantially lower only in the Singapore Indians, in Warsaw and in the German Democratic Republic. For mouth it is substantially lower only in the New Zealand Maoris, in Warsaw, German Democratic Republic and Osaka.

Fleming (1983) has demonstrated a peak frequency for intra-oral cancer in Black South Africans in the fifth, sixth and seventh decades with most cases in both males and females occurring in the 50-59 year old age group. He points out that his results confirm previous observations on South African Samples as well

TABLE XVIII

AGE STANDARDISED INCIDENCE RATES - INTRA-ORAL CANCER PER 100,000 POPULATION PER ANNUM

| | FROM WATERHOUSE 1976 TONGUE ICD 141 | | | | | | FROM WATERHOUSE 1976 MOUTH ICD 143-145 | | | | | | FROM WATERHOUSE 1982 TONGUE ICD 141 | | FROM WATERHOUSE 1982 MOUTH ICD 143-145 | |
| | MALE | | | FEMALE | | | MALE | | | FEMALE | | | MALE | FEM. | MALE | FEM. |
	EUROPE	WORLD	AFRICA	EUROP	WORLD	AFRICA	EUROPE	WORLD	AFRIC	EUROPE	WORLD	AFRIC	WORLD	WORLD	WORLD	WORLD
BRAZIL SAO PAULO	7,8	5,7	3,3	1,5	1,0	0,5	9,9	7,0	4,3	1,8	1,2	0,8	5,4	1,1	6,8	1,7
CANADA SASKATCH	1,9	1,3	0,7	0,6	0,4	0,3	1,9	1,3	0,7	0,8	0,5	0,4	0,9	0,5	1,6	0,7
JAMAICA KINGSTON	4,2	2,7	1,4	0,9	0,6	0,3	4,7	3,2	1,5	1,7	1,2	0,6	1,9	1,0	2,8	1,4
DETROiT WHITE	3,9	2,7	1,6	1,1	0,8	0,5	4,6	3,3	1,8	1,9	1,3	0,8	2,5	0,9	3,1	1,5
BLACK	4,5	3,3	1,8	2,1	1,5	0,9	4,5	3,3	2,0	2,0	1,4	0,8	3,1	1,1	4,1	1,8
INDIA BOMBAY	18,2	12,6	7,2	4,4	3,1	2,0	9,4	6,7	4,2	7,5	5,4	3,6	10,2	4,1	5,8	5,8
JAPAN OSAKA	1,7	1,3	0,7	1,0	0,6	0,4	1,1	0,7	0,4	0,5	0,3	0,2	1,2	0,5	1,0	0,4
GEM. DEM. REP.	0,8	0,5	0,3	0,3	0,2	0,1	0,8	0,6	0,3	0,3	0,2	0,1	0,7	0,2	0,9	0,3
POLAND WARSAW CITY	1,4	1,0	0,6	0,5	0,3	0,2	1,4	1,0	0,6	0,6	0,4	0,3	1,4	0,3	1,7	0,4
SWEDEN	0,9	0,6	0,3	0,6	0,4	0,2	1,6	1,1	0,6	0,9	0,6	0,3	0,8	0,3	1,2	0,7
U.K. BIRMINGHAM	1,6	1,0	0,6	0,6	0,4	0,2	2,3	1,5	0,8	0,8	0,5	0,3	0,8	0,4	1,4	0,6
SINGAPORE INDIAN	5,6	4,1	2,5	5,4	3,8	2,4	12,1	8,6	4,9	26,6	16,9	8,6	4,3	0,0	8,8	8,6
NEW ZEALAND MAORI	0,4	0,3	0,3	0,3	0,3	0,4	2,0	1,4	0,8	0,0	0,0	0,0	1,2	0,9	2,1	0,1
NIGERIA IBADAAN	0,8	0,6	0,3	0,6	0,4	0,2	1,6	1,2	0,7	1,2	0,9	0,6				
BULAWAYO AFRICA	0,4	0,3	0,2	0,0	0,0	0,0	6,6	4,1	2,3	0,0	0,0	0,0				
PRESENT STUDY (1971-1980)	3,78	2,69	1,44	0,52	0,41	0,26	3,49	2,47	1,41	0,67	0,52	0,31	2,69	0,41	2,47	0,52

as from other parts of the world. He further points
out that intra-oral cancer occurs in a significantly
younger age group in Blacks than in Whites particularly
amongst males and that of the Black males in his sample
33,4 per cent were under the age of 50 years compared
with only 15,6 per cent of White males. The site
distribution of his lesions was not significantly
related to the age of the patients.

Analysis of the age specific morbidity rates
obtained in this study (Tables XIX and XX) clearly
demonstrates that intra-oral cancer before the age
of fourty years is rare although occassional cases
do occur between the age of 10 and 39 years. Those
patients who develop intra-oral cancer in the second
and third decades almost certainly suffer from immune
deficiency syndromes or inherited disorders which
predispose them to the development of cancer. In
males most cases occur after the age of 60 years and
only 15,8 per cent of cases occur under the age of
50 years. This is in direct contrast to the results
reported by Fleming (1983) and does no support the
contention that intra-oral cancer occurs at a younger
age in Black males than in White males. Regrettably
age specific morbidity rates for White males on the
Witwatersrand are not available and hence direct com-
parison is not possible. In females the trends are
very similar with most cases however occuring in the
50-59 year old age group.

TABLE XIX

AGE SPECIFIC MORBIDITY RATES FOR INTRA-ORAL CANCER FOR BLACKS
ON THE WITWATERSRAND (1971-1980) PER 100,000 PER YEAR.

MALES

AGE IN DECADES	TONGUE	FLOOR OF MOUTH	BUCCAL MUCOSA	HARD AND SOFT PALATE	GINGIVA AND ALVEOLAR MUCOSA	TOTAL ALL SITES
0-9						
10-19	0,1					0,10
20-29						
30-39	0,3	0,5	0,01	0,2		1,01
40-49	3,4	2,3	0,01	0,9	0,03	6,64
50-59	7,1	2,9		1,2	0,01	11,21
60-69	9,5	5,8	0,07	2,1	0,03	17,50
70+	6,0	4,7	0,04	1,7		12,44

TABLE XX

AGE SPECIFIC MORBIDITY RATES FOR INTRA-ORAL CANCER FOR BLACKS
ON THE WITWATERSRAND (1971-1980) PER 100,000 PER YEAR.

FEMALES

AGE IN DECADES	TONGUE	FLOOR OF MOUTH	BUCCAL MUCOSA	HARD AND SOFT PALATE	GINGIVA AND ALVEOLAR MUCOSA	TOTAL ALL SITES
0-9						
10-19						
20-29	0,2					0,20
30-39	0,1	0,1	0,01			0,21
40-49	0,8	0,8	0,01	0,1	0,01	1,62
50-59	1,0	1,0		0,4		2,40
60-69	0,3	1,6	0,03	0,3		2,23
70+	1,0	0,3				1,30

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