# The Changing Pattern of Cancer Mortality in South Africa, 1949-1969

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## SUMMARY

**Cancer mortality rates for Whites, Coloureds and Asians for the period 1949 - 1969 have been analysed, and a changing pattern has been found. Some comparisons with other countries have been made, and the risk for each race group has been delineated for cancers at the commonest sites.**


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Although the Department of Census and Statistics has recorded and analysed the causes of death in South Africa for many years, it is only since 1949 that detailed figures on deaths from cancer have become available. Since then, 5 issues of *Report on Death* have been published periodically[1] giving the age and sex of persons who died from certain major diseases, which included 16 cancer groups. These are available for Whites, Coloureds and Asians, for the whole of South Africa. Compulsory registration of vital events for Blacks was introduced many years ago, but despite serious efforts on the part of the registration authorities, the Blacks are still largely reluctant to have their deaths registered, and consequently complete death statistics are not available for this population group.

A first analysis of these data was made in 1964 by the late Dr A. G. Oettlé,[2] who calculated cancer mortality rates for the whole period 1949 - 1958, for Whites, Coloureds and Asians, standardised to the United States population of 1950, and compared these with the 1955 mortality rates of United States Whites and non-Whites. In the present study, the intention is to examine the changing pattern of certain cancer mortality rates for each of the above race groups, over the period 1948 - 1969.

## MATERIAL AND METHODS

The information on deaths comes from death certificates, classified according to the International Classification of Diseases and Causes of Death. In 1949 the 7th Revision of this was adopted, and was used until 1967, after which the 8th Revision came into operation. All deaths are not necessarily medically certified, but over the past years only 1% of White deaths have been uncertified. In the case of the Coloureds, 94% of deaths were certified, while Asian deaths were practically 100% certified.

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The annual population-at-risk was calculated from the censuses held in 1946, 1951, 1960 and 1970, for each of which a race-sex-age breakdown was given.

From these two sets of information, it is possible to calculate the age-specific cancer mortality rates, that is, the number of deaths per 100 000 population in each age group. These rates are directly comparable with any other age-specific rates for the same age group. However, as there are many such age-specific rates to be compared, a standardised rate for all ages is most commonly used. This is a rate which would have occurred if the observed age-specific rates had operated in a standard population with some arbitrary proportion of people in each age group.

In 1966, the International Union against Cancer (UICC)[3] introduced 3 standard populations, varying from an 'African' population with a low proportion of old people and an intermediate 'World' population, to a 'European' population with a high proportion of old people. For the present study of cancer mortality rates, the 'World' standard population has been used.

In the 3 race groups analysed, the populations-at-risk varied over the years, as shown in Table I.

**TABLE I. ANALYSIS OF POPULATIONS-AT-RISK IN THREE RACE GROUPS**

| | 1949 | | 1969 | |
|---|---|---|---|---|
| | Male | Female | Male | Female |
| **Whites** | **1 269 750** | **1 289 425** | **1 821 240** | **1 834 983** |
| **Coloureds** | **514 856** | **514 531** | **966 891** | **996 293** |
| **Asians** | **172 210** | **159 419** | **300 725** | **301 598** |

It may be noted that the Asians form a comparatively small group, with the result that slight variations in the number of deaths each year can cause wide swings in the mortality rates, which are expressed per 100 000. In the larger groups, slight variations do not have so great an effect, and the curves over time are correspondingly smoother.

Regression lines have been calculated for each curve, to give the trend over the whole period, and the significance of this change of rate has been established at the 95% confidence limit. Where 'significant' is used in the text, it refers to this.

## RESULTS

The annual cancer mortality rate for all cancers from 1949 to 1969 for males and females and for the 3 race

groups is shown in Fig. 1. It is clear that this rate has increased markedly for White and Coloured males, has remained approximately the same for Asian males and Coloured females, and has decreased slightly for White females and markedly for Asian females. Both the increases and the decreases are significant. Further, the rate is higher for White and Coloured males than it is for the corresponding females, but Asian females have, on the whole, a higher rate than Asian males. These sex differences are confirmed by the cancer morbidity surveys carried out by Muir Grieve[4] in Cape Town (1956 - 1959) on Whites and Coloureds, and by Schonland and Bradshaw[5] (1964-1966) on Blacks and Indians in Durban.

Investigation of the age-specific cancer mortality rates indicates that, in the main, the rate increases in the White and Coloured males derive from the groups aged 35 years and upwards, these rates having risen consistently over the 21-year period, whereas the Asian males show rising rates for ages 25 - 44, and 65 years upwards, but decreased rates for the ages 45 - 64. The decrease found in Asian females appears at all age levels, whereas the slight decrease in White females comes from the age group 15 - 44. There is no consistent pattern among the Coloured females.

Inspection of the individual cancers contributing to these mortality rates shows that, in males, cancers of the stomach, lung and prostate provide approximately half the cancer deaths in all 3 race groups, with cancers of the oesophagus and colon being less important, but of interest — cancers of these 5 sites will be studied in more detail. In females, cancers of the stomach, breast, cervix and uterus are the most common, and will be discussed with cancers of the lung, colon and oesophagus. Other cancer types on which analyses are available are cancers of the mouth and buccal cavity, rectum, larynx, skin, bone and connective tissue, lymphatic tissue and leukaemia. These cancers are not considered in this study, since the rates are low and show no strong trends.

## Stomach Cancer

At the beginning of the period, in 1949, this cancer was the most common cause of cancer death in all 3 race groups and in both sexes. The change from 1949 to 1969, for both males and females, is shown in Fig. 2.

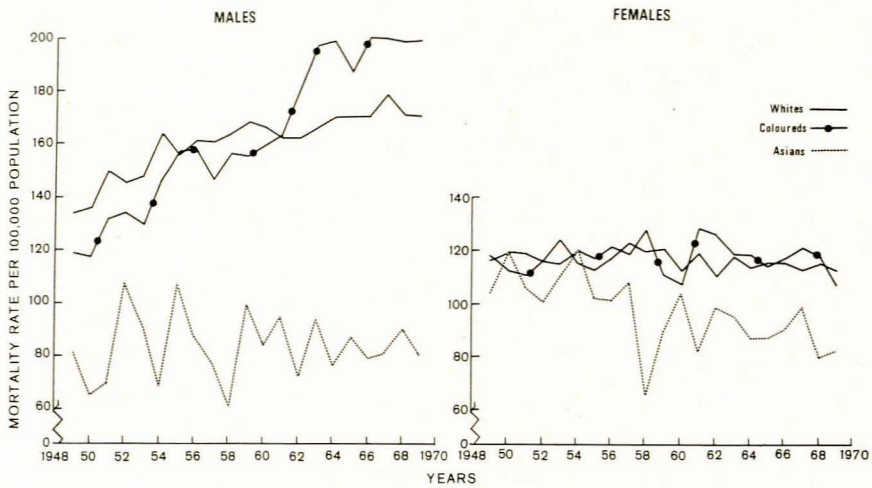


**Fig. 1. All cancers.**

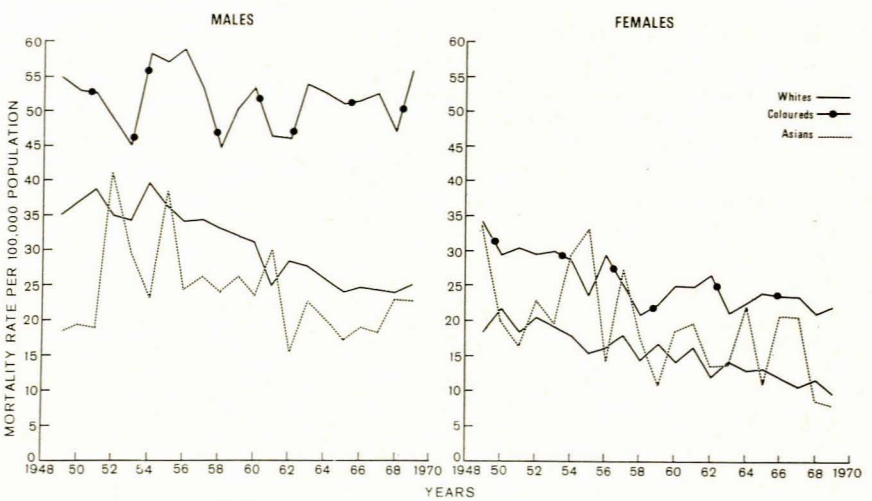


**Fig. 2. Stomach cancer.**

For 5 of the 6 groups, the rate has dropped considerably, which is in line with findings in most parts of the world. However, the Coloured males, who were at very high risk in 1949, appear to be no better off in 1969. It seems that whatever was causing this cancer in the Coloured males in 1949 is still operating at the same high level.

In all 3 race groups, males have a higher stomach cancer rate than females. In both male and female groups, the Coloureds have the highest rate, but Asian females are at a higher risk than White females. Asian males, however, are at a lower risk than White males.

## Lung Cancer

Over the 21-year period, the lung cancer rate rose rapidly in all 3 male groups, especially among Coloureds and Whites (Fig. 3).

The rate has more than doubled in White males, while in Coloured males it has increased fourfold, so that, by 1969, the rate for Coloured males was higher than that for White males. These increases are highly significant. Although a rise for Asian males is also noted, it is not significant, and the rate at the end of the period is still very low, and almost on a par with the rates for the females of all 3 groups. Among females, although the rate is generally very low as compared with males, there is a small but significant rise for both White and Coloured females.

The consumption of tobacco by South Africans ranks among the highest in the world,[2] so that the rise in the mortality rate for this cancer comes as no surprise. However, the low rate among Asian males may be related to a low consumption of tobacco by Indian males in Durban, as found by Schonland and Bradshaw.[6]

## Cancer of the Colon

Despite the rising importance of this cancer in other countries, in the 3 South African groups the mortality rate for colonic cancer has remained low and very stable for both sexes over the 21-year period. The rates are approximately the same for males and females of each race group, but in general the highest rates occur among the Whites, followed by the Coloureds, while the rate among Asians is somewhat lower (Fig. 4). The male-female ratio is unusual, as in both the cancers previously discussed there has been a preponderance of male deaths. This was also found by Gordon *et al.*[7] in American cancer mortality statistics for the period 1954 - 1956.

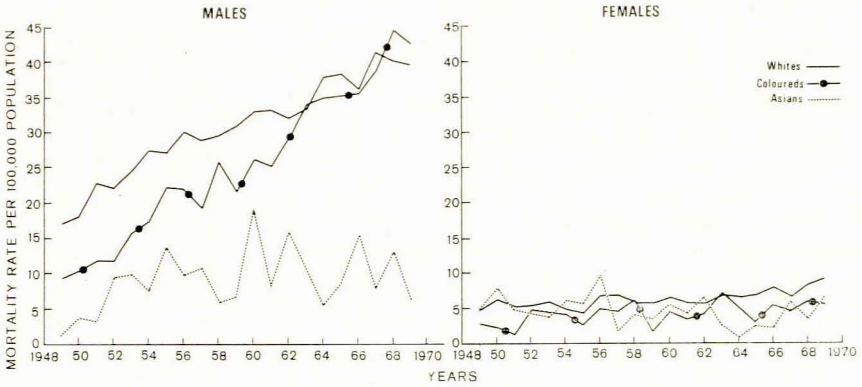


**Fig. 3. Lung cancer.**

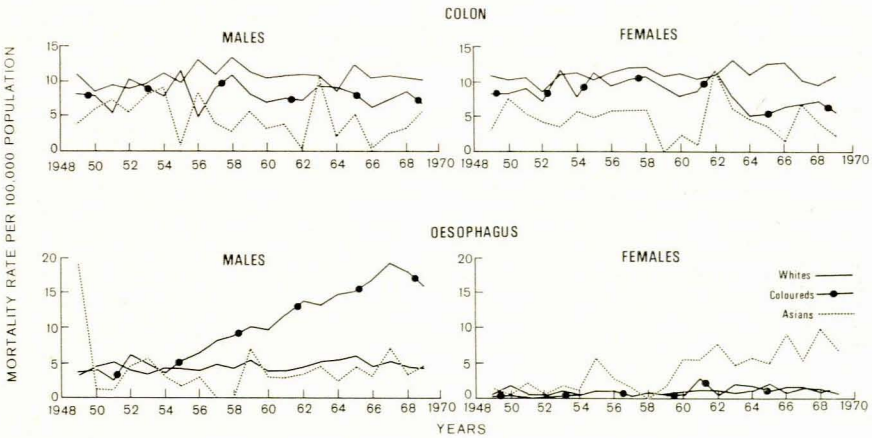


**Fig. 4. Cancer of the colon and the oesophagus.**

## Cancer of the Oesophagus

This cancer is of particular interest to South Africans, since it is the most common site of cancer found in Black males. It would appear that whatever carcinogens are causing this cancer among the Blacks, they are also affecting Coloured males, who show a highly significant, threefold increase in mortality from this cancer over the period under review (Fig. 4). This increase does not occur among Coloured females, but a rise of similar magnitude (and significance) is seen in Asian females, which confirms the findings of Schonland and Bradshaw[8] on Indian females in Durban, where an association between betel-chewing and oesophageal cancer was suggested. Among Black males, the use of pipe-tobacco is thought to be an important factor,[9] but little is known of the use of tobacco by the Coloured population.

## Breast, Uterine Cervix and Uterus (Fig. 5)

**Breast cancer.** This is the most prevalent form of cancer found in western women, and the rate for White women is consistently higher than that for Coloured and Asian women. Over the 21-year period, there is a small but significant rise in the mortality rate for White women, which is mainly contributed by those over 55 years of age. There is also a small upward trend in Coloured women, but it is neither significant nor consistent, while in Asian women there is little change. In so far as breast cancer has a direct relationship with socio-economic status and an inverse one with westernisation, the pattern shown here by the 3 races is consistent. The morbidity incidence rate found in Black women in Durban is even lower than that of Asian women, as is their socio-economic status.[5]

**Cancer of the uterine cervix.** This cancer is said to have a strong inverse association with socio-economic class, and, predictably, White women are found to have the lowest mortality rate, which has varied very little over the period. Although the rate for Asians is higher, it has also not varied to any extent. However, the Coloureds are again at high, and significantly increasing risk, which seems to apply at all age levels. Very high cervical cancer rates have been found in Black women in all parts of Southern Africa.

**Cancer of the uterus.** In conjunction with cancer of the stomach, this cancer has decreased significantly over the 21-year period. The improvement in prognosis for uterine cancer matches very well with the recorded decrease in mortality, and this has been found in many countries.[7] By the end of the period, there is very little difference in the rates for the 3 race groups.

## Cancer of the Prostate

The mortality rates for this cancer are shown in Fig. 6. In all 3 groups, the rates have increased slowly, but steadily and significantly, from 1949 to 1969. At all times, the rate for White males has been higher than that for Coloureds, which, in turn, has been higher than that for Asians. The increased rate in White males is found mainly in those over 75 years of age, but in the other 2 groups the increase is apparent from 55 years onwards.

## COMPARISON WITH OTHER COUNTRIES

Since there is no regular cancer registration in South Africa, it has only been possible to get estimates of cancer incidence by special investigations in selected areas. However, Doll,[10] using data from 8 countries that had published both incidence and mortality data, developed a method of converting mortality rates to incidence rates for some cancers. Comparisons are limited to the truncated age range 35 - 64 years, in which most cancers are relatively frequent, and the method excludes data for the oldest ages that are least likely to reflect current conditions and are least likely to be accurate.

Doll's[10] data related mainly to the period 1960 - 1962, and Figs 7 and 8 show the comparison between estimated South African truncated incidence rates (ages 35 - 64) from 1960 to 1969, and those for countries with high,

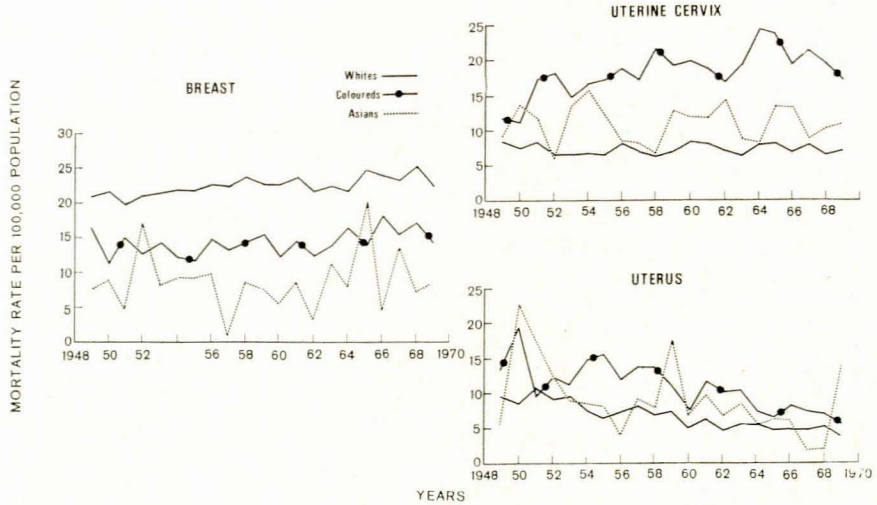


**Fig. 5. Cancer of the breast, uterine cervix and uterus.**

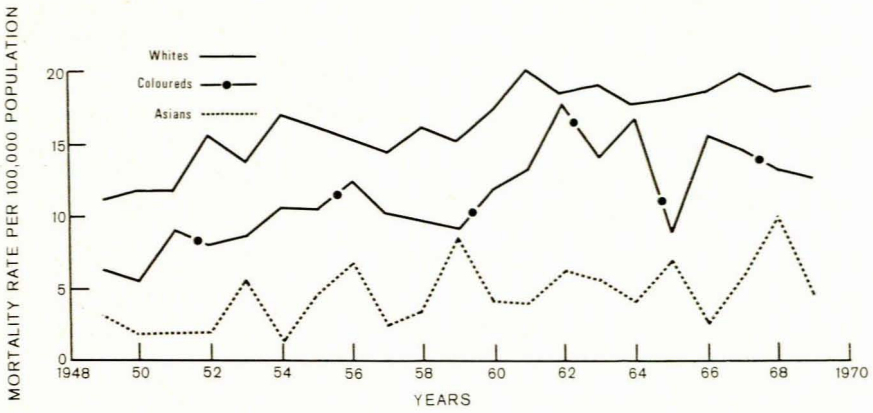


**Fig. 6. Cancer of the prostate.**

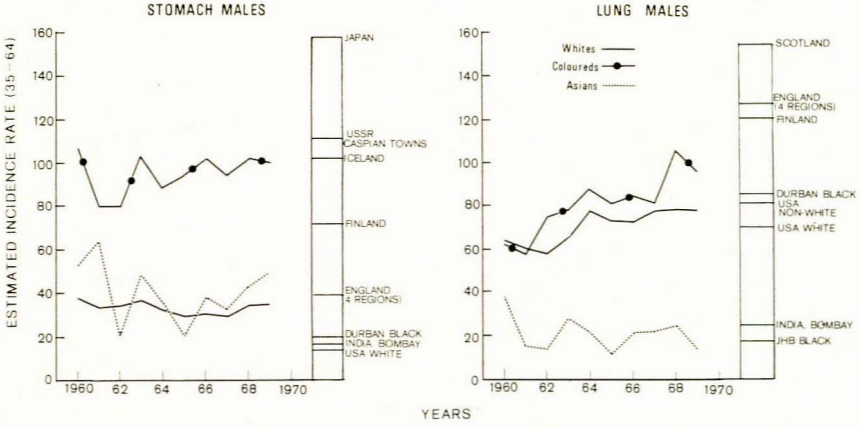


**Fig. 7. Comparison of estimated truncated incidence rates for stomach and lung cancer for males from various countries.[10]**

medium and low truncated rates. Only rates for stomach, lung and oesophageal cancers in males, and breast cancer in females are shown. It must be noted that, although these estimated incidence rates are completely comparable with other truncated incidence rates, they cannot be compared either with mortality or with incidence rates for the whole population.

Fig. 7 shows the comparisons for stomach and lung cancers. For stomach cancer, the high rate in the South African Coloured male emerges as the fourth highest known rate in the world (for this age group). It is exceeded by Japan, Caspian towns of the USSR, and Iceland. The rate for South African Whites is very close to that found in England, but much higher than that of Whites in the USA. It is interesting to see that South African Asians (85% Indians of Hindu descent, 13% of Moslem descent and 2% Chinese and other Asian nationalities) have a higher rate than Indians in Bombay, which may indicate different eating habits. However, the lowest stomach cancer rate in South Africa is found among the Blacks, and this has been confirmed by 3 local morbidity surveys (1953 - 1955 in Johannesburg,[11] 1956 - 1959 in Cape Town,[4] and 1964 - 1966 in Durban[5]).

High though the rate for lung cancer may appear among SA Coloureds and Whites, it is not as high as that found in Scotland, England and some other parts of Europe. However, it is on a par with USA rates (for both Whites and non-Whites), and, more noteworthy, also with the rate found for Blacks in Durban (1964 - 1966). The Asians have altogether a very low rate, and this corresponds with findings in Bombay, suggesting that smoking habits are similar. A very low figure shown for Johannesburg Blacks is for the period 1953 - 1955, and it is felt that the difference between the two rates for Blacks is very much a function of time, and that the increase in lung cancer in Blacks has been as catastrophic as that found in Coloureds.

The comparison for oesophageal cancer in males, shown in Fig. 8, illustrates the range of rates found for this disease. It is very high in communities round the Caspian Sea (Turkmenistan, the Ghurjev district of Kazakhstan, and Iran)[10] and also in Blacks in parts of Southern Africa. The rate for Coloured males, although rising, is not in this class, but is already higher than that found in France, which has the highest rate in Europe. It is not high in England, in USA Whites and in most of Europe, and

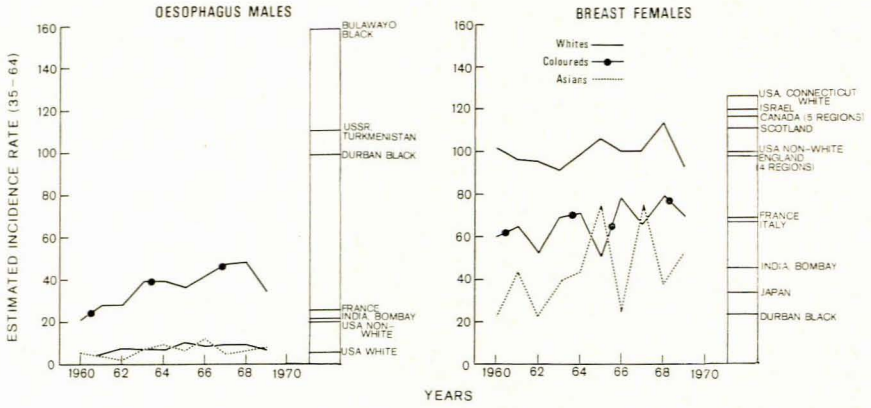


**Fig. 8. Comparison of estimated truncated incidence rates for cancer of the oesophagus in males, and breast cancer in females. Higher rates for oesophageal cancer were estimated for the following small areas: Ghurjev district, Kazakhstan: 547,2, and Butterworth, Transkei: 357,2.[10]**

this is reflected in the low rate found among SA Whites. The rate for SA Asians is rather lower than that found in Bombay, and may be related to the abandonment of the betel-chewing habit by Indian men in South Africa.

With regard to breast cancer in females, it can be seen in Fig. 8 that the 3 groups in South Africa fall easily into the high, medium and low incidence groups. The highest rates are found in USA, England, Canada and Israel, and SA Whites fall into this group, since presumably they have a similar life-style. The SA Coloureds are in the intermediate group, with many of the European countries. At the other extreme are the non-White, non-westernised groups with low rates, including Japanese, Indians from Bombay, Asians from South Africa, and Blacks from all parts of Southern Africa. It may be noted that the rate of breast cancer among Japanese immigrants to the USA is higher than among Japanese in Japan, and more particularly so in those females who immigrated before the age of 25. This would indicate that it is the way of life, rather than the ethnic group, that is important in the causation of this cancer.

## THE CHANGING CANCER PATTERN

Not only does the over-all cancer risk vary among the race groups, being greatest for Coloured males and lowest for Asian males, but for each group the most common cancers are not necessarily the same, nor have they retained their rank during the period under review. Fig. 9 shows the regression lines for cancers at the most common sites, for each group, sexes separately. These are used representationally instead of the actual curves, as it simplifies the reading of the figures. Not all the cancers previously discussed have been shown, only the 4 most common at the beginning and the 4 most common at the end of the period.

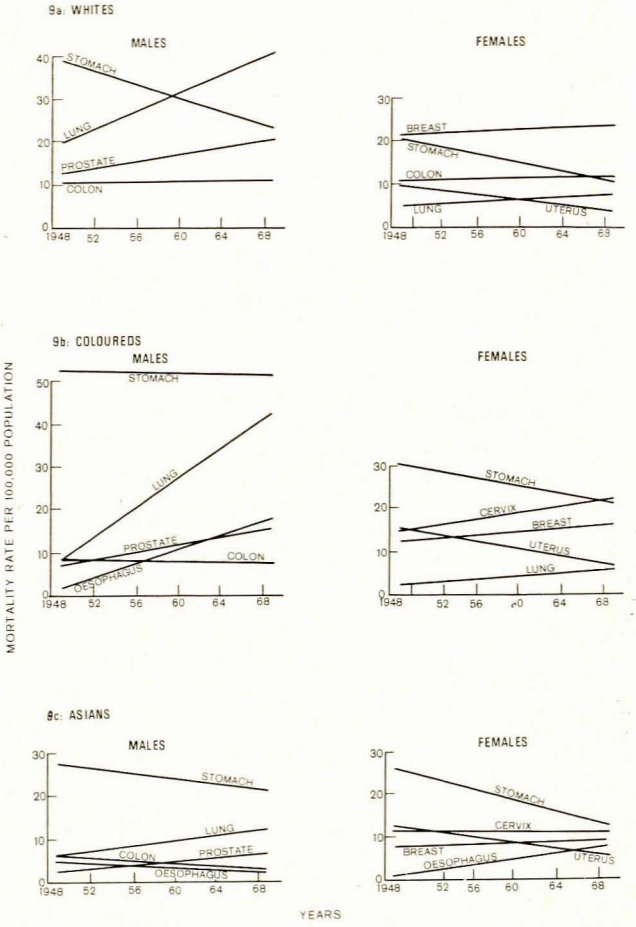


**Fig. 9. The changing cancer pattern in White, Coloured and Asian males and females.**

**Whites** (Fig. 9a). At the beginning of the period, mortality from cancer among White males was as often due to stomach cancer as to cancer of the lung, prostate and colon combined. Of these 4 cancers, only the rate of colonic cancer has remained at the same level. Cancer of the lung has almost doubled in this period and is now the most common cancer, while stomach cancer has decreased markedly, and almost approximates

the incidence of cancer of the prostate, which has been increasing slowly and steadily. The net result is a higher over-all cancer risk, attached mainly to the same 4 cancers, while the lung cancers are now nearly twice as frequent as cancers of the stomach.

The 4 most common cancers in White females at the beginning of the period were those of the breast, stomach, colon and uterus. Of these, the rates for both stomach and uterus decreased considerably during the 21-year period, while those for breast and colon increased slightly. By the end of the period, lung cancer had increased sufficiently to displace uterine cancer from the fourth place. In this group, the net over-all cancer risk decreased slightly.

**Coloureds** (Fig. 9b). The Coloured male population has the highest cancer risk in South Africa. At the start of the period, these males exhibited one of the highest stomach cancer rates in the world, and this had hardly changed by the end of the period. The rapid rate of increase in lung cancer was even greater than that found in White males, but even so had not reached the magnitude of stomach cancer by 1969. Added to this, oesophageal cancer became the third most common cancer during this period, and cancer of the prostate increased steadily. In so far as these people of mixed origin share cultural characteristics with both White and Black communities, they appear to share White susceptibility to lung cancer, Black susceptibility to oesophageal cancer, and to have their own susceptibility to stomach cancer. The over-all cancer mortality rate for Coloured males rose by 67% during the review period.

This rise does not apply to Coloured females. Although they initially showed a high stomach cancer rate, this decreased considerably, as did cancer of the uterus. However, increases were registered in cancers of the cervix, breast and lung, leaving the over-all cancer risk very much the same at the end of the period.

**Asians** (Fig. 9c). The most common cancer in Asian males was stomach cancer, both in 1949 and 1969, although the magnitude of this disease has decreased. The rates for cancers of the colon and oesophagus also decreased over this period. These decreases in cancers of the digestive system possibly reflect a change in eating and betel-chewing habits. The gradual increases in lung and prostatic cancers might be manifestations of a more western way of life. The over-all cancer risk has remained the same over the period, and is low.

In Asian women, as in White and Coloured women, cancers of the stomach and uterus are decreasing, but in this group, rates for cancers of the cervix and oesophagus are rising, more markedly so for the latter cancer. However, the decreases have been greater than the increases, and the over-all cancer risk has dropped to a level as low as that found in the Asian men.

## DISCUSSION

Mortality data are not generally favoured, owing to the diagnostic uncertainties inherent in medical certifications of death. However, until fuller information is collected from morbidity surveys and cancer registers, this is the only material available for analysis, and it has the advantage of being a continuing record, from year to year.

The following are the salient features of the changing pattern of cancer mortality rates in South African Whites, Coloureds and Asians:

(a) a considerable decrease in stomach cancer in all groups except Coloured males;
(b) a very considerable increase in lung cancer in White and Coloured males, with a small increase in White and Coloured females;
(c) an increase in oesophageal cancer in Coloured males and Asian females;
(d) a steady increase in prostate cancer in White, Coloured and Asian males;
(e) an appreciable decrease in cancer of the uterus in White, Coloured and Asian females, partially off-set by an increase in breast cancer in Whites, and by a greater increase in cancer of the cervix in Coloured females.

Despite the recognised limitations of this 21-year analysis, the alteration of cancer patterns and risks is of considerable interest, and may be of use to workers in the fields of community and preventive medicine and cancer therapy.

The fact that cancer is not a notifiable disease in the Republic of South Africa, whereas it is in many other countries, is to be regretted. As the machinery for notification of other diseases is already in existence, it would seem not at all difficult to include cancer diagnosis in the notification process. Objections to the inclusion of cancer on the notifiable list stem mainly from a reluctance on the part of the doctor to divulge to other persons information which might become known to the patient and cause him immense distress. This concern is particularly acute in respect of the White group, who are cancer-conscious, and who are usually treated by private practitioners. If these objections override the undoubted value of the information which would be obtained by cancer case notification, the value of mortality data becomes even greater. At the very least, data on cancer deaths should be regarded as essential and should be made available annually as soon as possible after processing. Furthermore, analysis of the type undertaken in this study should be made at 10-yearly intervals.

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