The Epidemiology of Ischaemic Heart Disease in the Different Ethnic Populations in Johannesburg

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SUMMARY
From an examination of death certificates of members of different ethnic populations in Johannesburg who have died of ischaemic heart disease (IHD), age-specific mortality rates have been calculated. The period examined in the case of Whites was 1971; in the case of Indians and Coloureds it was 1968 - 1971 (because of the smaller sizes of the populations); and in the case of Blacks 1968 - 1971 (because of the small number dying from IHD). Notable findings included: (i) an extremely high mortality rate among Whites (especially among the Jewish sector, undoubtedly the highest extent); (ii) an equally high or higher rate among Indians, a feature which also prevails in Indian immigrant populations elsewhere; (iii) a lower rate among Coloureds; and (iv) an extremely low rate among Blacks, as is also the case among other Black African populations. Comparative information is provided on IHD in other populations.

Epidemiology has recently been defined as 'the quantitative analysis of the circumstances under which disease processes, including trauma, occur in population groups, the factors affecting their incidence, distribution, and host responses, and the use of this knowledge in prevention and control.'

In this article, the primary intention is to summarize information on the epidemiology of ischaemic heart disease (IHD) in Johannesburg populations, which in 1971 comprised roughly 430 000 Whites (non-Jews — 370 000; Jews — 60 000), 40 000 Indians, 80 000 Coloureds and possibly 1,25 million Blacks. Additionally, for comparison, some data will be given on IHD in some populations in the past and in some contemporary populations, i.e. (i) White populations in other countries; (ii) Indians living in India and in other countries to which Indians have migrated; and (iii) Blacks living in other countries in Africa and also Blacks in the USA.

IHD IN WHITE POPULATIONS
While IHD was well known to great physicians of the past such as Heberden, Hunter (who died of angina) and Jenner, it remained very uncommon until early this century. Indeed, in Osler's Principles and Practice of Medicine, as late as the 1912 edition, it was stated that angina pectoris 'is a rare disease in the public wards of hospitals'. It was also stated that 'a consultant in active work may see a dozen or more cases a year'. Actually, it was not until 1912 that Herrick in the USA wrote the first detailed clinical description of the disease.

The great increase in IHD since then, especially within the last generation and particularly among men, is well known. In England and Wales, for example, a recent careful examination of records, which allowed for changes in the classification of heart diseases, concluded: 'The picture... is that mortality rose steeply among men, particularly among younger men, for whom the 1973 rates were about 80% higher than in 1950. Among older men the rise was about 30%. Among women, the trends were very different; mortality actually fell until the mid-1950s and rose thereafter only in the younger age groups. In fact over the whole 24 years studied there was no net increase in the death rate from heart disease among women.' In England and Wales in 1974 IHD accounted for 37% of male deaths and 18% of those in women.

Johannesburg Whites
To throw light on the local situation, with the cooperation of the Medical Officer of Health in Johannesburg, Dr R. B. Richards, and his staff, death certificate records of White, Indian, Coloured and Black persons who had died of IHD were listed. The White population, the records of which were studied for 1971, was subdivided into Jewish and non-Jewish sectors; for this differentiation I am indebted to Dr I. Segal, Gastroenterology Unit, Baragwanath Hospital, Johannesburg. For the Indian and Coloured populations, owing to their smaller sizes, records were studied for a 4-year period, 1968 - 1971. The records of Blacks were also examined over the 4-year period, in this case mainly because of the small number who had died of IHD. The classification ICD 420 was in use for the period under review — while this classification is not identical to 410 - 414, as contended in the current ICD rubric, the slight differences will not prejudice the validity of the comparisons made, or the general conclusions drawn, to any significant extent. Age-specific mortality rates for the four ethnic groups were calculated from the age distribution data for 1970 in Population Projections for the RSA: 1970 - 2020. Data on some other populations, namely those of the USA and of West Scotland (populations very prone to IHD), and of Sweden (far less prone) are included for comparison.

Johannesburg non-Jewish Whites. IHD was relatively uncommon in South Africa before 1940, and was seldom
TABLE I. AGE-SPECIFIC MORTALITY RATES FOR IHD IN JOHANNESBURG WHITES (JEWS AND NON-JEWS), INDIANS, COLOURED, BLACKS, AND OTHER POPULATIONS

<table>
<thead>
<tr>
<th>Age group</th>
<th>Population</th>
<th>Male mortality rate (100 000)</th>
<th>Female mortality rate (100 000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 - 44 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Whites, Jews</td>
<td>86</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Whites, non-Jews</td>
<td>144</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Indians</td>
<td>159</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Coloureds</td>
<td>138</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Blacks</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>87</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Scotland (West)</td>
<td>88</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Sweden</td>
<td>23</td>
<td>5</td>
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<tr>
<td>45 - 54 years</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Whites, Jews</td>
<td>473</td>
<td>166</td>
</tr>
<tr>
<td></td>
<td>Whites, non-Jews</td>
<td>444</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>Indians</td>
<td>818</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>Coloureds</td>
<td>328</td>
<td>171</td>
</tr>
<tr>
<td></td>
<td>Blacks</td>
<td>27</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>336</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>Scotland (West)</td>
<td>360</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>Sweden</td>
<td>136</td>
<td>25</td>
</tr>
<tr>
<td>55 - 64 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Whites, Jews</td>
<td>1 759</td>
<td>624</td>
</tr>
<tr>
<td></td>
<td>Whites, non-Jews</td>
<td>978</td>
<td>348</td>
</tr>
<tr>
<td></td>
<td>Indians</td>
<td>991</td>
<td>625</td>
</tr>
<tr>
<td></td>
<td>Coloureds</td>
<td>444</td>
<td>286</td>
</tr>
<tr>
<td></td>
<td>Blacks</td>
<td>45</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>910</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>Scotland (West)</td>
<td>960</td>
<td>319</td>
</tr>
<tr>
<td></td>
<td>Sweden</td>
<td>506</td>
<td>133</td>
</tr>
<tr>
<td>65 - 74 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Whites, Jews</td>
<td>4 089</td>
<td>2 315</td>
</tr>
<tr>
<td></td>
<td>Whites, non-Jews</td>
<td>1 629</td>
<td>1 024</td>
</tr>
<tr>
<td></td>
<td>Indians</td>
<td>2 534</td>
<td>1 317</td>
</tr>
<tr>
<td></td>
<td>Coloureds</td>
<td>1 029</td>
<td>536</td>
</tr>
<tr>
<td></td>
<td>Blacks</td>
<td>27</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>USA</td>
<td>2 043</td>
<td>1 010</td>
</tr>
<tr>
<td></td>
<td>Sweden</td>
<td>1 493</td>
<td>697</td>
</tr>
</tbody>
</table>

mentioned in medical journals. However, almost a generation ago Bronte-Stewart et al. drew attention to the high death rates prevalent, and more recently the very high rates for South African Whites have been ably highlighted by Wyndham.

The age-specific mortality rates from IHD in the Johannesburg non-Jewish White population are similar to those reported for the total White population in the Republic, bearing in mind that the more prone Jewish sector is excluded.

A comparison of age-specific IHD mortality rates for 1971 with those calculated from data obtained in 1959 indicates that mortality rates rose enormously during that interval. While detailed investigation of rates from 1959 up to the present is not yet complete, the impression is that rates have already reached a peak and are possibly declining (as also concluded by Wyndham); this has already occurred among the populations of USA and Australia, and also the UK.

**Johannesburg Jews.** Perhaps the most prominent finding is that IHD mortality rates for the Jewish population (men and women), except perhaps for the youngest age group studied, are exceptionally high — indeed, probably the highest out of all populations. Crude rates for Jews are about 70% higher than those for non-Jews. A similar proportion in the two populations in Johannesburg was noted in 1959, and, interestingly, has been stated to prevail at present in Manitoba, Canada, although only for Jewish men. Rates for Johannesburg Jews are much higher than those for the populations of Finland and of West Scotland, the highest rates in Europe. Excessive proneness was also found in a Jewish sector of the New York population studied in 1956. Much more remarkable, in England and Wales in 1912, when IHD was still
regarded as a 'rare' disease, it was recorded that 'Jews are particularly prone'. Currently even in Tel Aviv, the population of which includes a high proportion of non-Western (non-Ashkenazi) Jews, IHD was responsible for 37% of all deaths in 1974, exactly the same proportion reported for the population of New York City in 1976.

Miscellaneous Points of Epidemiological Interest

1. In many Western populations, differences in mortality associated with social class, so pronounced in the past, no longer prevail. In the UK IHD is now commoner in social classes IV and V.

2. The Framingham study indicated that postmenopausal women who take hormone preparations are at twice the risk of dying from IHD than women who do not.

3. Alcohol, consumed in amounts of up to about 60 ml a day (i.e. the equivalent of about 1 200 ml beer, 360 ml unfortified wine or 180 ml spirits), confers a small protective effect; more than this amount appears to promote IHD.

4. Persons who often change their jobs, or migrate from town to town frequently, are at far greater risk of developing IHD than those whose lives are more stable. Conversely, as an example of the effect of social and cultural stability, although it concerns another ethnic group, Japanese in the USA who live in a traditional manner have the same low incidence of IHD as prevails in Japan; however, the Japanese in the USA who conform most to Western culture have 3-5-fold excess incidence of IHD, a contrast which can not be accounted for by differences in major risk factors.

5. There is some evidence that, in a given community, the incidence of IHD in regular attenders of a place of worship (church, synagogue, etc.) is about half that in non-attenders.

IHD IN INDIAN POPULATIONS

Although IHD in Western countries was recognized nearly 200 years ago but described only half a century ago, the disease in India was described more than 2 500 years earlier. Mukerjee has written that classifications of heart diseases were made by Charaka and Sushruta, who belonged to the post-Vedic period which started about 800 BC, almost 400 years before the time of Hippocrates. Included in the symptoms listed was 'a sense of constriction in the precordium, stitching pain and sensations of churning or bursting or rubbing'. It is additionally interesting that the clinical features of diabetes, not mentioned at all by Hippocrates, were also described by ancient Indian physicians.

Johannesburg Indians

Age-specific mortality rates of Indians from IHD tend to be higher (in some age groups much higher) than the rates for Whites. The numbers of Indians (also Coloureds) in the different sex and age groups both at risk of and dying from IHD are much smaller than the corresponding numbers of Whites. However, it would still be permissible to conclude that the problem of IHD in the Indian population is more acute than that besetting Whites. The data on Indians are in agreement with information given in the Medical Officer of Health's report on IHD in Indians in Durban (Indian population about 350 000).

Indians in India and Other Countries

After a visit to India, Seftel considered that there was more IHD in impoverished rural Indians in India, despite the fact that their diet is largely vegetarian, than in South African urban Blacks, accustomed to a much higher standard of living and to greater westernization of diet and lifestyle. The unexpected prevalence of IHD in immigrant Indian populations, e.g. in Central and East Africa, Singapore, Fiji, the West Indies, and the UK, is well known. In London, for example, recent investigations showed that the incidence of IHD in middle-aged Asians, mainly Indians, was even higher than that in Whites. In direct contrast, the incidence of IHD in Caribbean Black immigrants in London was found to be only a tenth of that in Whites.

Puzzling Features

1. Nowadays, whereas about one-quarter or so of Whites who die of IHD are under 55 years of age, nearly half of deaths from IHD in Indians occur before that age; indeed, in one study in India the peak occurrence was in the 41-50-year age group. Among Johannesburg Indians 42% of deaths from IHD occurred in persons less than 55 years of age; for the White population the figure was 27%. In South African Indians this feature is undoubtedly linked with their significantly lower expectation of life in middle age, compared with the corresponding expectations of the White, Coloured and Black populations. In 1970, moreover, of Indians aged 50 years and over, the proportion aged 70 years and over was about half that in the White, Coloured and Black populations.

2. Interestingly, severe atherosclerosis tends to occur almost a decade later (not earlier) in Indian than in White adults.

3. The serum cholesterol level in Indian patients with myocardial infarction is relatively low. For Whites, mean figures which have been reported for various groups of patients with IHD are about 6.0-7.5 mmol/l (230-300 mg/l), but the values for Indians are 4.5-5.0 mmol/l (170-200 mg/l). In one investigation carried out in India, in fact, almost half of the patients with IHD studied had values below 4.0 mmol/l (150 mg/l).

4. In South Africa, the rise in serum insulin level after a glucose dose has been found to be significantly more marked in young Indians than in Whites, Coloureds or Blacks of the same age; indeed, this hyper-reactivity was apparent even in pre-adolescent Indian children. Clearly the unusual proneness of Indians to coronary heart disease, manifested both in India and in the numerous lands to which Indians have migrated, is partly
IHD IN SOUTH AFRICAN COLOURED POPULATIONS

Age-specific mortality rates from IHD for Coloured men and women, although much higher than those in the Black populations, are much lower than those in the White and Indian populations. Data are in accordance with information on the IHD mortality given for Cape Town Coloureds (population about 400 000) in the Medical Officer of Health’s report for 1971.26

IHD IN SOUTH AFRICAN BLACK POPULATIONS

It will be seen from Table I that the IHD mortality rates for Blacks are extremely low. In terms of numbers, out of a Johannesburg Black population of a million or more an average of 44 Blacks per annum were certified as having died of the disease during the period 1968-1971.

How does this picture agree with evidence from other sources?

IHD in Blacks in Hospital. At Baragwanath Hospital, Soweto, Johannesburg, according to Isaacson,26 IHD was virtually absent in the 1960s. Isaacson did not give data for 1971, but for 1976 he noted that 14 Blacks (10 men and 4 women, almost all over 50 years old) out of about 35 000 adult patients admitted, excluding maternity cases, died of IHD. It is noteworthy that a correspondingly extremely low mortality from IHD among Blacks in hospital in Durban has also been reported.26 As a rough estimate of the total number of Blacks dying of IHD in Soweto it would seem reasonable to double or treble the number recorded as dying at Baragwanath Hospital, to allow for the patients who died before receiving medical attention. This implies that perhaps 40 Blacks in Soweto died of IHD in 1976. Actually, this is very close to the number (51) certified as dying of IHD in that year; most of these deaths occurred in patients aged 55-74 years.

In the age group 55-64 years during 1968-1971, an annual average of 9 men were recorded as having died of IHD. On the basis that the total population of Soweto was 1 million, this age group numbered about 20 000. What would be the corresponding number of deaths from IHD among White men of the same age in a population group of the same size? Calculations suggest that in the following national populations or subpopulations the numbers would be Sweden—101; UK—141; USA (Whites and Blacks)—180; West Scotland—192; Finland—200; Johannesburg Jews—352. The extreme contrast between the negligible incidence of IHD in urban Blacks and that in Jews in Johannesburg has been emphasized previously.25,26

Information from field studies. Small series of rural dwellers aged 60 or more years (totalling 198 men and 262 women) have been examined. None had evidence of IHD, and none had experienced anginal pain (as elicited by the questionnaire of Rose23). In 12-lead ECGs there was no evidence of IHD as judged in relation to specific items in the Minnesota code, in particular the absence of Q/QS waves. Additionally, in an urban area (Soweto) a group of elderly Blacks, including almost all those aged 60 years and over living in Zola township, were investigated. A total of 145 men and 202 women were studied, and two persons, a man and a woman, showed unequivocal evidence of IHD. As a comparison, in a Finnish study of a group of men aged 55-59 years (i.e. much younger than the group of elderly Black men) angina was present in 8.2%.27 These recently undertaken observations on the rarity of IHD in Blacks support conclusions reached in earlier investigations.29,40

Reasons for the near-immunity of Johannesburg Blacks. Sefelt27 has stated that only in respect of the inexplicably high frequency of hypertension in both sexes, and of obesity in women, are serious IHD risk factors present in the adult Black population as a whole. This is true. From our own studies, however, we are convinced that there is a small segment (perhaps 5% or even 10%) of urban Black adults who, for 2 decades or more, have been exposed to all the orthodox risk factors— including hypertension, cigarette smoking, relatively high serum cholesterol levels, sedentariness, obesity and job responsibility. Recognition of the existence of this outwardly prone segment of the population renders it all the more puzzling why so far so few urban Blacks have developed IHD.

IHD in Blacks elsewhere. Current reports are unanimous on the near-absence or extreme rarity of IHD in Black African populations, e.g. in Nigeria, Ghana, Tanzania,6 Kenya, and Zambia.26 In a recent report from Ibadan, Nigeria, for example, in a 10-year period there was only 1 death from myocardial infarction in 8 000 patients admitted to hospital.28 In Lusaka not one of a series of 12 500 patients admitted had IHD.27 What of Black immigrants to Western countries? It may be reiterated that in the study of Pedoe et al.29 on different ethnic populations in London the incidence of IHD among Black Caribbean immigrants was only one-tenth of that in the White population.

In the USA, while some reports indicate little difference in the incidence of IHD in Blacks and Whites,29 other reports indicate that the disease is less common in Blacks.29

DISCUSSION

Study of the chief causes of death in populations through the ages is illuminating. In London in 1588, the year of the Spanish Armada, in the suburb of St Botolph without Aldgate, plague accounted for no less than
23.6% of deaths (the Great Plague was not until 1664). This was followed by ‘consumption’, ‘pining’ and ‘lung sickness’, ague, flux, smallpox, and ‘chibbled’. Less usual reasons for death included ‘bleach, purples, mother, toes off, thought, canker of privies, and heaving of lights’! No cause of death was given in 14.4% of cases.

In the USA in 1900, the leading cause of death among adults was tuberculosis (11%), followed by pneumonia (10%).

Nowadays, as will be appreciated, IHD is by far the leading cause of death in most Western countries. Yet it seems almost unbelievable that, actually within the lifetime of some of us, it was as rare for patients with IHD to be admitted to London hospitals (Guy’s, St Bartholomew’s, St Thomas’s, etc.) as it was for Black patients with IHD to be admitted to Baragwanath hospital in 1960-1970, when there were only 1-2 deaths annually.

He would be a bold predictor who would hazard the leading cause or causes of death a century hence. However, the most sanguine of us would simply hope that the fall in the mortality rate from IHD already noted in the USA, Australia, the UK and probably in South Africa will continue. It is also to be hoped that as a consequence of appropriate changes in environmental factors and advances in medication, the onset of IHD will occur much later in the lives of members of all the races affected.

Gratitude is expressed to Mrs E. McKibbin, Mrs B. F. Walker and Miss A. P. Martin, of the Human Biochemistry Research Unit, for their help in examining the death certificate records, and to Mrs S. Pryor, of the City Health Department, Johannesburg, for her co-operation.

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