Coronary Heart Disease and Cerebral Vascular Disease in the South African Bantu
Examination and Discussion of Crude and Age-Specific Death Rates

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At a conference on "Hormones and Atherosclerosis," held at Brighton, Utah, questions were raised concerning age-specific death rates as against crude rates from coronary heart disease and cerebral vascular disease among the South African Bantu. These people often have been cited as an example of a population among whom coronary heart disease presents no public health problem; however, cerebral vascular diseases—softening and hemorrhage—certainly occur among them, although exacting a mortality rate lower than that prevailing among white populations.1-4 The diseases in question affect primarily the middle-aged and elderly. The Bantu, as we will show, are a comparatively "young" population. What will be the effect of this characteristic on the relevant mortality pictures, and moreover, how reliable are these pictures? In addition to seeking to answer these questions, it is proposed to make certain suggestions for future research to remedy the inadequacies of present knowledge.

RELATIVE YOUTHFULNESS OF THE SOUTH AFRICAN BANTU POPULATION

Data given in Table I were calculated from information provided by the local Department of Census and Statistics7 and the Demographic Yearbook.8 The table amply demonstrates the comparative youthfulness of the Bantu. The effect of this characteristic on the relevant death rates will now be estimated.

MORTALITY FROM CORONARY HEART DISEASE

Classifications of Coronary Disease

Table II provides data on crude and age-specific death rates from diseases included in groups 420 and 420-422 in the International List of Causes of Death. Both these groups have been used in publications dealing with the subject under discussion.

Group 420 variously is taken to denote arteriosclerotic heart disease; arteriosclerotic heart disease, including coronary disease; or arteriosclerosis of the coronary arteries. For clarification, it may be of value to quote Mann, who, in his paper bearing on diet and epidemiology of coronary heart disease,9 states:

Coronary heart disease will refer to diseases of the heart caused by limitation of blood supply to the myocardium resulting from disease of the coronary arteries. Coronary heart disease must include some instances not caused by atherosclerosis of the coronary arteries, but these are presumed rare and not a cause of important error. Coronary heart disease is primarily a clinical diagnosis and comprises angina pectoris, which is a highly uncertain and subjective diagnosis, myocardial infarction, coronary occlusion (i.e. death with coronary artery lesions but without signs of infarction) and myocardial fibrosis not attributable to causes other than chronic myocardial ischemia.

Group 420-422 (also known as B.26), in
Coronary Heart Disease and Cerebrovascular Disease in Bantu

Table II reveals a number of anomalies in the

**TABLE I**  
Age Distribution of Populations

<table>
<thead>
<tr>
<th>Population or country</th>
<th>Age 45-64 years (%)</th>
<th>Age over 65 years (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johannesburg urban Bantu</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>South African whites</td>
<td>17</td>
<td>7</td>
</tr>
<tr>
<td>Japan</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Canada</td>
<td>18</td>
<td>8</td>
</tr>
<tr>
<td>New Zealand</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>U.S.A. (total population)</td>
<td>20</td>
<td>8</td>
</tr>
<tr>
<td>Sweden</td>
<td>23</td>
<td>10</td>
</tr>
<tr>
<td>England and Wales</td>
<td>24</td>
<td>11</td>
</tr>
<tr>
<td>France</td>
<td>25</td>
<td>12</td>
</tr>
</tbody>
</table>

addition to 420, includes chronic endocarditis not specified as rheumatic (421) and other myocardial degeneration (422). The group 420-422 was regarded by Yerushalmy and Hilleboe as most specifically relevant to the problem under investigation, particularly in view of certain anomalies in the data relating to Italy and Japan.

We have not included the classification 430-434 (B.27), which includes other diseases of the heart, since idiopathic heart disease not due to coronary artery disease is frequently encountered among the Bantu.

**Sources of Information**

Data on the Bantu relate exclusively to Johannesburg Bantu, and were calculated from information obtained from the Department of Census and Statistics and from the Johannesburg Public Health Department. All other data have been calculated from the following sources: *Demographic Yearbook*, *Whitaker’s Almanac*, and *Epidemiological and Vital Statistics Report of the WHO*.

For the Johannesburg Bantu, mean values for 1953-1956 are given. The other data refer to specific years between 1951 and 1954, mainly to 1953 and 1954.

For the different population groups, the mortality pictures during the periods 45-54 years of age plus 55-64 years of age differ quantitatively, but not qualitatively, from data for 45-64 years; figures for the latter period only are given.

**Comment on Death Rates**

Table II reveals a number of anomalies in the figures on the different white populations, in regard to both crude and age-specific death rates, and also in regard to the classifications used. It is not proposed to discuss these anomalies, first because the burden of the paper is not affected by them, and secondly because we are concerned primarily with the situation among the Bantu. Assuming for the moment that the data given are reliable, it will be apparent from Table II that (1) whereas crude mortality from coronary heart disease among the Johannesburg Bantu is about one twentieth of that of the local whites, the Bantu mortality rate at 45-64 years is only a seventh of that of the local whites; (2) at 45-64 years the figure for the Bantu roughly is of the same order as that in France, Italy (only if 420 classification is used), and Japan; (3) a further point which emerges is that whereas France has a more aging population than the United States, mortality from coronary heart disease in France is far lower than that in the United States.

**Reliability of Mortality Data**

The first and foremost question is, what credence, if any, can be attached to the data on the Bantu? The limitations inherent in attempting to draw conclusions from death certificates are well appreciated. Even in a country such as the United States, gross differ-
ences (twofold) in mortality rate, not completely explicable, have been noted between various states, and furthermore, Mann, in his critical examination, has reached the startling conclusion that "the available evidence indicates that the increase in coronary heart disease revealed by vital statistics is largely artificial." If serious misgivings obtain with data from a country like the United States, the question naturally arises as to what precisely is the position in countries where far less favorable conditions prevail for securing the information in question?

Among the Bantu, death certificates are required only in certain of the larger centers of population, and even there, it is questionable whether more than 90 per cent of deaths are reported. Many factors militate against obtaining accurate death certificates: the migrant character of the Bantu; the frequent uncertainty of these people of their exact age; the tendency of many doctors with little experience of disease among them to assume that sudden death, as in white people, is due to coronary heart disease; and so forth.

Necropsy Data: Dealing first with accurate sources of information, i.e., necropsy data, the most careful recent study is that of Higginson and Pepler. At Baragwanath Non-European Hospital (1,500 beds), in 1,328 postmortems, on 807 males and 521 females over 20 years of age, there were 4 deaths in each sex from coronary heart disease; total mortality from this cause therefore was 0.6 per cent. At the same hospital in 1954 and 1955, among 1,500 deaths of patients over 12 years of age, 11 (0.7 per cent) were certified as due to coronary heart disease, postmortem examinations being made in approximately one-third of these cases. Among the total Bantu population of Johannesburg (i.e. about half a million), between 1953 and 1956 there was a mean of 6,250 deaths annually, of which 45 were certified as being due to coronary heart disease, which was thus responsible for 0.7 per cent of total deaths, or 1.3 per cent of deaths over the age of 20 years. These figures for the total population provide a mortality rate far higher than would be expected on the basis of local hospital practice.

It is thus clear that although the mortality position in the Johannesburg Bantu hospital population may be regarded as reasonably accurate, the position among Johannesburg Bantu as a whole is far less certain. We know still less about rural Bantu who we suspect are even less susceptible to death from the disease than are urban dwellers. The limitations to our knowledge, while understandable, are a handicap.

Dietary Fat and Mortality in Urban Bantu: In the following populations, according to Yerushalmy and Hilleboe, the proportion of calories derived from fat is, very approximately: French, 29 per cent; Italians, 21 per cent; and Japanese, 8 per cent; the figure for urban Bantu is about 15–20 per cent. Yet, coronary heart disease mortality, although certainly low, appears to be roughly of the same order in the 45–64-year age groups of these various populations with their different contexts of diet and manner of life (perhaps the Italians should be excluded from consideration due to anomalies apparent in Table II). At first sight, for these four populations, this obvious lack of association between fat intake and coronary-heart-disease mortality (discounting for the moment errors inherent in the small numbers involved) would seem to underline still further the misgivings expressed in recent critical papers.

But the inference regarding the lack of association with the Bantu may be wholly wrong. All urban Bantu are undergoing, in varying measure, "westernization" of diet and manner of life. Conceivably, therefore, many—indeed, perhaps all—of the urban Bantu certified as dying from coronary heart disease may have been living not on their traditional diet but on a diet similar to that of local white persons. To add force to this view, it may be recalled that Trowell and Singh, among 6,500 necropsies of Kampala Africans, noted only one subject dying from coronary heart disease; but he was an African judge, obese, and living a "westernized" life.

Not only is it necessary to know accurately how many Bantu die from coronary heart disease, but it is equally necessary to learn all that is possible about the antecedents, clinical
Ryle stressed that the study of the fit should not lag behind that of the unfit. In the present instance the extreme has been reached whereby a large amount of relevant information is available on Bantu in outward good health, virtually all of whom will not die from coronary heart disease; yet our knowledge of the few Bantu who do die from this cause is negligible. In other countries, however, where mortality from coronary heart disease is low, e.g. France, surely there is as great a need to know more about both unaffected and affected portions of the population. Thus, if the French population generally, i.e. the unaffected portion, do not have low serum cholesterol levels, we wonder whether the present intense endeavors among many white populations to lower cholesterol values in the hope of warding off death from coronary heart disease will be significantly rewarding.

Securing Accurate Information on the Bantu:
It is clear that if study of the Bantu is to contribute knowledge of value on the etiology of coronary heart disease, we must have much more accurate mortality and other data on them than are available at present. What are the possible means of securing the information desired? The excellent long-term studies now being undertaken by Patterson and co-workers at London, Ontario, on inmates of institutions would be impracticable on the Bantu, since far too many inmates would be needed to obtain even two or three autopsies of patients dying from coronary heart disease. The same difficulty applies to extensive studies on random population groups of the type undertaken, for example, at Framingham, Albany, and Los Angeles for to find even two or three Bantu developing or dying from coronary heart disease over a period of two to three years would require observations on very many thousands of people.

Quite apart from reasons of finance and organization, the migratory propensity of the Bantu, even in urban areas, almost precludes the carrying out of such studies, for investigations even of relatively short duration (e.g. pregnancy) occasionally have had to be abandoned for that very reason.

There would seem to be two fairly straightforward means of investigating Bantu known to have coronary heart disease. First, there are patients who have recovered from an acute coronary episode. In Baragwanath Hospital, annually there may be 10–20 patients admitted for coronary heart disease, of whom less than half die. This method at its best would provide only a very few patients suitable for intensive study. The second source of Bantu patients with coronary heart disease may be afforded by extensive electrocardiographic (ECG) studies. On this subject Mann states:

... this (electrocardiographic evidence) is objective and almost always unequivocal. Without this evidence it is doubtful that epidemiologic analysis could be applied to heart disease statistics. It is unfortunate that many population studies of coronary heart disease, especially when carried out in medically undeveloped areas, have not made better use of this most decisive evidence of the existence of the disease.

The ECGs of apparently healthy Bantu often show striking peculiarities of the S-T segment and T wave, but no pathologic Q waves. In the occasional patient suffering from myocardial infarction, the typical ECG changes of that lesion are clearly recognizable. Given adequate resources, there should be no insuperable difficulty in carrying out ECG studies on large numbers of Bantu adults, especially the elderly, in order to isolate the small number with infarction. Very few examples will be found, but at least we will begin to learn whether the Bantu who suffer or die from this cause were living in a somewhat primitive, or in a partially or wholly westernized, manner. Conceivably no Bantu pursuing their traditional diet and manner of life die from coronary heart disease.

For etiologic research on coronary heart disease, the need for knowledge on the Bantu in both these respects, the number and the characteristics of those dying, is obvious.

MORTALITY FROM CEREBRAL VASCULAR DISEASE

Table III provides information on crude and age-specific death rates from diseases included in classification 331 and 332, and 330–334 (also known as B.22) in the International List.
TABLE III
Annual Mortality Rate of Cerebral Vascular Disease per 100,000

<table>
<thead>
<tr>
<th>Population of country</th>
<th>Classification 331-332</th>
<th>Classification 330-334</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crude rate</td>
<td>Specific rate for 45-64 age group</td>
</tr>
<tr>
<td>Johannesburg Bantu</td>
<td>26 98</td>
<td>29 108</td>
</tr>
<tr>
<td>Whites</td>
<td>66 112</td>
<td>73 128</td>
</tr>
<tr>
<td>South African whites</td>
<td>75 110</td>
<td>82 121</td>
</tr>
<tr>
<td>England and Wales</td>
<td>140 96</td>
<td>155 111</td>
</tr>
<tr>
<td>Japan</td>
<td>122 256</td>
<td>129 271</td>
</tr>
<tr>
<td>France</td>
<td>116 99</td>
<td>146 124</td>
</tr>
<tr>
<td>Italy</td>
<td>97 88</td>
<td>128 117</td>
</tr>
<tr>
<td>U.S.A. (total population)</td>
<td>91 109</td>
<td>106 127</td>
</tr>
<tr>
<td>New Zealand</td>
<td>91 112</td>
<td>105 132</td>
</tr>
<tr>
<td>Canada</td>
<td>80 90</td>
<td>95 105</td>
</tr>
<tr>
<td>Netherlands</td>
<td>70 57</td>
<td>94 68</td>
</tr>
<tr>
<td>Norway</td>
<td>62 41</td>
<td>123 77</td>
</tr>
</tbody>
</table>

of Causes of Death. Group 330 denotes subarachnoid hemorrhage; 331, cerebral hemorrhage; 332, cerebral embolism and thrombosis; 333, spasm of cerebral arteries; 334, other and ill-defined vascular lesions affecting the central nervous system.

Sources of data are the same as those for coronary heart disease (Table II).

Comment on Death Rates

Assuming for the moment that the figures given in Table III are reliable, then whereas the Johannesburg Bantu crude mortality rate is just under a third of that among the local white population, the mortality rate among the Bantu from 45-64 years is of the same order as that of many of the white populations given, and is higher than that of Netherlands and Norway.

As with Table II, Table III reveals certain anomalies between crude and age-specific rates, and between the classifications used. It is not proposed to touch on these anomalies since here again, the burden of the paper is not affected by them.

Reliability of Data

The limitations already discussed concerning accuracy of mortality data from coronary heart disease also apply in measure to mortality information on cerebral vascular disease. Thus, in Britain, Bull has stated "it is reasonable to suppose that most doctors signing death certificates all over England and Wales have difficulty in giving the Registrar General an accurate picture of the cause of death following a 'stroke.' " Bull also emphasizes that many cerebral tumors may be hidden in the figures given for "hemorrhage" and "embolus and thrombosis." Turning to a different population, the Japanese, Keys maintains that some of the numerous deaths from cerebral vascular disease in that country undoubtedly are erroneously diagnosed, death being due to coronary occlusion or ruptured syphilitic aneurysms of the aorta.

Information on the Johannesburg Bantu additional to that given in Table III is as follows. At the Baragwanath Hospital, in Higginson and Pepler's series of 532 necropsies of patients over 20 years, 70 of the deaths (13.1 per cent) were from cerebral vascular disease. At that hospital, from 1951 to 1955, according to death certificates and excluding deaths among children, cerebral hemorrhage, thrombosis, and embolism accounted for 6.1 per cent of deaths, and total cerebral vascular lesions, for 7.2 per cent of deaths. In respect to Johannesburg Bantu as a whole, in 1954, according to certificates, mortality from groups 331 and 332, and 330-334 accounted for 2.5 and 2.8 per cent, respectively, of total deaths and 4.5 and 5.1 per cent, respectively, of deaths of patients over 20 years. Concerning distribution of lesions at Baragwanath Hospital in 1955, 20 deaths were certified as from subarachnoid hemorrhage, 40 from cerebral hemorrhage, and 34 from thrombosis and embolism. Among total deaths of Johannesburg Bantu in 1954, 25 were from subarachnoid hemorrhage, 93 from cerebral hemorrhage, and 36 from thrombosis or embolism.

How reliable is the picture delineated by the information given? Local physicians have the impression that it provides a fair representation of the mortality situation prevailing, although the obvious need for more accurate data is stressed. There is little doubt that in urban and possibly in rural areas also, cerebral
vascular disease (in particular, cerebral hemorrhage) is a formidable cause of death among these people.

Further Research on the Bantu

Among the Bantu, atherosclerosis of the cerebral arteries is common and occasionally severe. The commonness of hypertension has often been reported. If the figures given for mortality from cerebral vascular disease are valid, the question arises as to why our local Bantu are so prone to succumb from this cause. Why are cerebral vessels affected more than coronary vessels by atherosclerosis? Why has hypertension apparently more influence on cerebral vascular disease than on coronary heart disease? Among rural Bantu groups there are many differences in diet, salt intake, manner of living, and so on; we believe that determining whether differences occur in cerebral vascular disease among appropriately differing Bantu population groups possibly may shed some light on the reasons for the Bantu being so liable to die from this cause.

SUMMARY

It is widely accepted that the South African Bantu very seldom die from coronary heart disease, but that cerebral vascular disease constitutes an important cause of death. How valid are these beliefs? Since the diseases mentioned primarily affect the middle-aged and elderly, and since the Bantu are a relatively young population in contrast to aging white populations, specific mortalities from 45 to 64 years have been calculated for certain Bantu, and for a few white populations for comparison.

Calculations suggest that mortality from coronary heart disease among Johannesburg urban Bantu in the 45-64-year age group, according to death-certificate data (assuming for the moment that such are valid), is, although still much lower than among most white populations, roughly of the same order as that in corresponding French, Italian, and Japanese population groups. Hence, for comparative purposes and when dealing with populations such as the Bantu, the importance of knowing age-specific as well as crude mortality rates for this disease will be obvious. Regarding the accuracy of these rates, whereas the mortality picture among the Johannesburg Bantu hospital population probably is reliable, that among the total urban population is far less certain. Still more uncertain is the position in rural areas, where deaths from this cause are believed to be very infrequent. Apart from the need for more exact knowledge of the mortality picture, it is evident that the large amount of information now available on Bantu unlikely to die from coronary heart disease must now be matched by the far more difficult task of securing antecedents as full as possible on those who do die, to learn whether affected persons were pursuing a traditional, partially, or fully westernized manner of life. Until all the combined information is available the full value of the Bantu for etiologic research will not be realized.

Calculations also suggest that for Johannesburg Bantu in the 45-64-year age group, mortality from cerebral catastrophes actually is as high as that in most white populations, and that from cerebral hemorrhage probably is higher. While it is uncertain whether this mortality picture in the Bantu is accurate quantitatively, there is no doubt that cerebral vascular disease among them is a very important cause of death. The reason why these people are so prone to die from this cause is not clear. It is suggested that study of the relevant mortality in Bantu regional groups known to differ significantly in diet, salt intake, and blood pressure may throw some light on the subject.

REFERENCES