Cancer outlook: an African perspective

A R P Walker DSc

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SUMMARY

In all western populations, mortality rates from cancer are high and even increasing: moreover, incidence rates of some cancers are also rising. As to propitiousness of preventive factors, genetic, gender, and age are beyond alteration: much the same applies to certain protective factors, e.g. late menarche, teenage pregnancy, high parity, long lactation, and greater physical activity. Influential dietary factors, i.e. intakes of energy, fat and fibre, often do not lend themselves to major alteration. Although reductions in smoking have occurred, the practice remains widespread and the intake of alcohol remains high. In developing countries, such as Africa, life-style changes are occurring and the population is incurring all risk factors mentioned. Whereas cancer is relatively uncommon in rural dwellers in developing countries, it is increasing in the huge peri-urban and urban populations due to changes in diet and way of life. Although knowledge should enable us to halve cancer's burden, hopes for meaningful changes are meagre. Survival time can be lengthened by more effective screening, especially of the very susceptible, and by further advances in treatment. Since known risk factors account for only half or less of occurrences of cancer, further rises, or, hopefully, welcome falls, could conceivably occur in the future. We must continue to try to educate the public regarding cancer avoidance: compliance by even a small proportion of those at risk could benefit huge numbers.

INTRODUCTION

Currently, there is enormous interest in the prevention and control of 'killer' diseases, i.e. coronary heart disease, cancer and stroke. Whereas, in recent years, there have been major decreases in mortality rates from the two cardiovascular diseases, this has not been the case with cancer. This paper will discuss the cancer burdens of the West and of some African populations will be discussed, the risk factors, and then the possibilities, favourable and unfavourable, for decreasing the cancer burden.

THE CANCER SITUATION IN WESTERN COUNTRIES AND IN AFRICA

Western countries

First, consider the situation in a rich western country—the USA, with a population of about 250 million. According to the American Cancer Society[1,2], 1.21 million new cases of cancer will be diagnosed in 1994. In addition, nearly 540 000 people will die from the disease this year, accounting for one in every five deaths in that country. Death rates have been increasing continuously. Thus, white men born in the 1940s are twice as likely to have cancer as those born between 1888 and 1897. In 1930, the age-adjusted national cancer death rate per 100 000 was 143; in 1990 the figure was 174. However, were lung cancer excluded, cancer mortality declined by 14% between 1950 and 1990. Authorities have attributed rises in occurrence to greater exposure to environmental cancer-causing hazards.

In Africa, one aspect of special interest to public health authorities concerns cancer incidence and mortality rates among Afro-Americans, compared with those of white Americans[1,2]. In 1985–1990 the total incidence among Afro-Americans was very high, 423 per 100 000; that for the Caucasian population was 393 per 100 000. Mortality rates were stated to be 230 per 100 000 for Afro-Americans, and 170 per 100 000 for Caucasians. Among Afro-Americans the mortality rate from cancer has doubled within the last generation or so[3]. In brief, the incidence of cancer has increased amongst Afro-Americans.

In western populations among men the commonest cancer tumour is the prostate, followed by lung and then colorectal cancer. Among women, the commonest cancers are breast, lung and colorectal. In the USA, lung cancer remains the commonest cause of death in men, followed by colorectal and prostate. Since 1987, more women have died from lung cancer than from breast cancer, and the incidence of lung cancer continues to rise. In contrast, among men the incidence of lung cancer declined during the 1980s. The report stated that in 1990, tobacco use and alcohol

Human Biochemistry Research Unit, Department of Tropical Diseases, School of Pathology of the University of the Witwatersrand, and the South African Institute for Medical Research, Johannesburg, South Africa
Correspondence to: Dr A R P Walker, South African Institute for Medical Research, P O Box 1038, Johannesburg, South Africa 2000

Table 1 **Incidence and death rates from cancer, 1986–1988 (world population per 100 000)**

Country	Incidence rate		Death rate	
	Male	Female	Male	Female
US	330	277	163	110
England	274	221	182	127
Spain	293	159	158	79
Sweden	256	235	128	98
Poland				
Rural	248	185		
Urban	206	137		

consumption accounted for 165 000 and 17 000 deaths, respectively[12].

Cancer occurrences in western populations vary (Table 1). In Scotland the mortality rates are higher than in the USA: in Sweden they are lower[4–6]. In Mediterranean countries, the incidence of cancer is relatively low. In Spain, incidence and death rates for breast and colon cancers are less than half of those in the USA.

In brief, despite variations while death rates in many countries are now relatively steady, incidence rates of many cancers are still rising. Survival has certainly improved in all western populations. In the USA, 55% of cancer patients survive for 5 years or more[7]. It is slightly less in Australia[7]. In Sweden, among patients diagnosed in 1980–1984, slightly more than 50% achieved a 5-year relative survival rate[8]: the rate was higher in women than in men. Improvement has been the most dramatic in the young, aged 20 years or less at diagnosis, with 5-year survival rates increasing in girls from 44–74%. This reflects the well-known breakthroughs in the treatments of childhood cancers. The survival situation is markedly less favourable among Afro-Americans in the USA, due in part to inferior socioeconomic circumstances and poor access to health care.

African countries

Table 2 shows the age-adjusted incidence rates per 100 000 world population for leading cancers in South Africa as reported by the South African Cancer Registry for 1988[9]. Squamous cell skin cancers are excluded, as is the case with data on western populations. Table 3 gives recent incidence rates for leading cancers for a rural African population, in Transkei[10], histopathologically based, as in the South African Cancer Registry. Comparative rates for Mali[11], Uganda[12], and The Gambia[13] are given in Table 4.

In Africa the total incidence rate/'world' population, is half or less than those of western populations. Rates are lower, in some instances considerably so, compared with rates for the African population in the USA. For liver cancer in males in The Gambia and Mali, the rates are very high, also for stomach cancer in Mali. Among females, cervix, liver, and breast, are the organs most affected. In South Africa, in the African population, oesophagus and prostate, and cervix and breast, are the principle cancers in males and females, respectively.

Table 2 **Age-adjusted incidence rates for South African males and females (world population per 100 000)**

	Males	Females
Africans	112.2	107.2
White	229.9	201.3
Coloureds*	192.2	148.1
Asians†	91.6	118.0

*Eur-African-Malay
†Almost wholly Indian

Table 3 **Five commonest histologically diagnosed cancers in Transkei, South Africa, 1986–1991 (world population per 100 000)**

Site	No.	Rate
Males		
Oesophagus	833	26.4
Oral cavity	311	9.9
Liver	269	8.5
Skin	155	4.9
Prostate	137	4.3
Females		
Cervix uteri	1116	17.5
Oesophagus	634	10.0
Breast	296	4.6
Skin	152	2.4
Liver	124	1.9

Table 4 **Cancer incidence in African populations (world population per 100 000)**

Cancer site	Mali	Uganda, Kampala	Gambia	South Africa	USA
Males					
Oesophagus	1.3	13.0	0.9	24.9	24.0
Stomach	20.4	1.5	3.1	3.9	19.4
Colon	2.3	4.2	0.3	1.5	32.7
Rectum	2.1	2.0	0.7	1.5	12.8
Liver	48.6	7.5	22.8	7.2	3.5
Lung	5.6	1.5	1.2	14.0	89.8
Prostate	4.7	12.3	1.2	14.4	72.3
Females					
Oesophagus	0.4	7.2	0.3	11.5	6.0
Stomach	10.5	2.0	1.2	2.4	9.1
Colon	1.3	2.2	0.1	1.2	27.0
Rectum	0.4	1.2	0.5	1.4	7.9
Liver	15.3	3.2	6.8	3.6	1.0
Breast	8.8	16.4	2.7	14.3	61.3
Cervix	20.8	43.6	6.4	39.2	14.7

Epidemiologically, in the changing context, from the limited longitudinal evidence available on African populations, incidence and mortality rates for cancer are rising, especially in urban dwellers[9,14]. In South Africa, while there has been some evidence of falls in cancers of the oesophagus and liver, although not of the cervix, there have been rises in cancers associated with western life-style, breast, prostate, lung, and colon-rectum. Cancer is undoubtedly going to become a major health hazard.

> Cancer will 'overwhelm' the Third World in the near future. . . Among cancer patients 90% are incurable by the time the diagnosis is made[15].

In South Africa, case-control studies indicate shorter survival times for black Africans compared with white South Africans. Mean time for black patients to reach 50% mortality for oesophageal cancer was found to be 2 months[16], compared with 18 months for white patients[7]. For breast cancer, the mean for black Africans is about 1.5 years[17], compared with 5 years or more with white patients[7]. Understandably, the disease in African patients is usually far more advanced. For example, for cervix cancer, 68% were at Stages III and IV[18]; the proportion for white women in an American study was 27%[19]. For breast cancer, corresponding proportions are 78%[17] versus 28%[20], respectively.

RISK FACTORS FOR CANCER

To what extent can salient risk factors be altered? According to the US National Cancer Institute, diet is a major influencing factor in about 35% of cancers, smoking in 30%, reproductive and sexual behaviour in 7%, alcohol in 3%, and industrial toxic hazards in 3%[21].

How much are known risk factors being altered?

Diet

In Western populations, current diets, high in energy and fat and low in fibre-containing foods, are believed to be promotive of colon, rectum, breast, and prostate cancers.

Cancer guidelines[22] urge reduction in total energy intake to attain ideal weight, that fat should supply 25–30% not 40% of energy; and dietary fibre should be increased from the present 10–12g or so to 20–30g or more daily, through increases in consumptions of cereal products, legumes, vegetables and fruit. First, as to energy intake, actually, in most countries intakes are steady or are falling only slightly[23]. Obesity is increasing in all populations. Energy from fat has fallen, from about 40%–35% in the USA, being replaced in part by polyunsaturated fats[24], whose role, regarding carcinogenesis, may not be wholly innocuous. Bread consumption, largely white, is now at an all time low, 110–120g per head daily[23], a fifth of the 500–700g eaten daily by our forefathers only a generation or two ago. In the USA only half the population have two helpings of vegetables and fruit or more per day instead of the recommended five helpings[25]. Consumption of these foodstuffs in the UK are among the lowest in Europe[23]. The World Health Organization (WHO) recommends the consumption of 400g vegetables (excluding potatoes) and fruit daily[26].

In African countries, the traditional diet is based largely on plant foods. Among rural dwellers, diets were low in energy intake: fat supplied 10–20% energy; fibre intake was 30g or more daily[27]. Nowadays, in all urban transitional Third World populations, changes in diet include rises in intakes of energy and fat, and decreases in intakes of fibre-containing foods[28].

Smoking practice

Although associated primarily with lung cancer, smoking is a risk factor for oesophageal, bladder and oropharynx cancers[29]. In the USA, smoking contributes to one death in six. In most western countries, people are smoking less. In the USA, on average, 27% males and 24% females continue to smoke[29]. Interestingly, proportions among USA doctors and nurses are now 3.3%–18.3%, respectively[30]: yet, smoking among doctors in France remains high at 61%. Internationally, between 1971 and 1981, in big industrialized nations, tobacco consumption virtually matched population growth[31]. In Japan, 61% males and 14% females smoke; tobacco television commercials occupy 104 h a week[32].

In the USA, although African men smoke 25% fewer cigarettes than Caucasians, their mortality rate is 60% higher. Rates of years of potential life lost before 65 years are twice as high for Africans than for Caucasians[33]. As to gender, for the same number of cigarettes smoked, the practice is more noxious for women than men[34].

In African countries, smoking used to be very uncommon, particularly among women. During 1971 to 1981, tobacco consumption rose considerably (41.5%), exceeding population growth (23.4%)[31]. In South Africa, nowadays, 23.7% African adolescent boys smoke, and 0.8% of the girls[35]; the proportion among African men is 60%, and among the women, 17%[36]. Smoking intensity rises with increases in socioeconomic state.

The tragedy for smokers is not only that they misunderstand about the risks, but they do not realize the benefits of stopping. In the US Nurses Study, the risk of cigarette smoking on total mortality among former smokers decreased 10 to 14 years after cessation[37], almost to that of those who have never smoked. It has been stated that 'apologists in the Tobacco Institute still staunchly defend tobacco as innocent in the causation of the disease'[38].

Alcohol

One death in six in the USA is a result of alcohol consumption. There is a causal relationship between alcohol consumption and cancer of the liver, as well as cancers of the mouth, larynx, oesophagus, and rectum[39]. In North America and Europe, alcohol consumption rose by 20–25% from 1970 to 1980, although nowadays consumption is steady or declining slightly[40]. In Finland, the USA, and other countries, regrettably, doctors and medical students are among the highest categories of consumers[41].

In Africa, alcohol has been singled out as the drug which causes most serious health and socioeconomic problems[42]. Consumption is rising in some countries, although less so in others. In South Africa, many have emphasized the enormous health cost and suffering, and the likelihood of alcohol consumption increasing[43], especially among urban Africans. While consumption of traditional cereal-based alcoholic drinks, e.g. *sorghum* beer, remains high, much is being replaced in measure by western alcoholic drinks.

Reproduction practices

Practices can be both protective and promotive. The protective concatenation of factors in breast cancer is late menarche, irregular cycles, early first child, high parity, and long lactations with associated amenorrhoea[44]. In the present urban African population in South Africa, unfortunately, transitional changes are toward earlier menarche, reproduction at a later age, smaller families, and reduced breast-feeding[45].

In contrast to the situation with breast cancer, early intercourse with multiple partners is a major risk factor for cervical cancer[46]. Rates in most African countries are extremely high[14].

Viruses and infections

Viruses may be associated with cancer through a number of different mechanisms[47]. In Africa, viruses include hepatitis B virus, which is becoming increasingly common, and is promotive of liver cancer[48]. Another is human papillomavirus, promotive of cervix cancer[46]. Of helminthic infections, schistosomiasis is significantly associated with bladder cancer in Egypt[49], and with colon cancer in China[50], although not apparently in Africa, where it is a relatively rare tumour[9].

Physical activity

A low level of physical activity increases the risk of developing certain cancers—breast, colon, and prostate. Most western populations are sloths compared with their ancestors. The sedentary character of present-day schoolchildren has already been reported[51]. A study in Shanghai reported that Standardized Incidence Ratios for prostate cancer were 1.23 for low energy expenditure and 0.92 for high energy expenditure[52]. In the *Lancet* Conference on breast cancer[53], women were encouraged to exercise 'since 5 hours or more of physical activity per week had a protective effect'. Is this really practicable?

Poverty

In combating cancer, some in the USA have asked 'Does war on cancer equal war on poverty?'[54]. African Americans incur more cancer, not essentially because they are African, but because they are poor. When adjustment is made for income and education, Africans have a lower cancer rate. In Melbourne (Australia) studies revealed that incidences of cancer of the stomach, lung and cervix, demonstrated negative socioeconomic state gradients[55]. While in western countries there is progressive improvement in socioeconomic state and associated well-being, the dichotomy between rich and poor is actually increasing[56].

In most Third World countries, especially in Africa, impoverishment is uniform, steady or even rising[57]. Help previously obtained from western agencies is diminishing, and in many countries budgets are devoting a smaller percentage to health maintenance, disease prevention, and treatment[58].

LENGTHENING SURVIVAL

The burden from cancer, aside from its prevention, could be lightened were treatments more effective and survival time lengthened.

One combative measure is screening for earlier detection. In Western countries screening for breast cancer is reported to reduce cancer mortality by as much as 30% in women of 50 years and over[59]. A screening programme for medically under-served women in Florida produced an estimated 50% decrease in mortality[60]. Interestingly, a recent study in Finland[61] showed that a careful self-examination programme could reduce mortality by 30%. Unfortunately, screening for breast cancer is expensive. In the USA, cost-effectiveness is 3000–5000 US$ per life year gained[62]. Regarding cervical screening, in the USA detection of this cancer in elderly women saved the equivalent of 6000 US$ and 3.7 years of life per 100 Papanicolaou tests[63].

In the USA, an enquiry revealed that 44% of women had not had mammography, nor 33% cervical screening. It was claimed

The study showed that women were not informed by their doctors about the benefits of regular exercise, hormone replacement treatment, and cervical smear tests. . .

There is an impact of poverty on health, and women are particularly vulnerable because of their lack of jobs that provide health insurance[64].

The costs given mean that it is almost impossible at present to undertake widespread screening in African countries. In Johannesburg, South Africa, a 'Project Screen Soweto' for cervix cancer had to be abandoned from lack of funds[65].

Although there are disappointments in the rate of progress, improvements will take place regarding the length and quality of life of the cancer patient[66]. However, at a conference reported in the *Lancet*,[53] a debate on 'This house believes that chemotherapy has a dim future' when put to a show of hands, the result was a draw.

IS THERE ANY LIKELIHOOD OF REDUCTION IN THE BURDEN FROM CANCER?

The goal of the US National Cancer Institute is to reduce cancer mortality by 50% by the year 2000[22]. Many authorities consider that large reductions are possible, although not practicable.

From the epidemiological situations described and the risk factors delineated, what are the hopes for the future? In recent years several broad assessments have been made. In his review on 'What is progress against cancer?' Adami[8] stated:

> there is still considerable controversy regarding the fundamental issue of whether any overall success has been achieved in the control of cancer. Is it realistic, useful, futile, or, indeed, naive, to expect a clear-cut answer to such a question?

In 1986, in the USA, Bailar and Smith[67] claimed that the war against cancer is being lost in spite of the progress made against several uncommon forms of the disease, improvements in palliation, and in extension of productive years of life. Their article led to enormous and sometimes bitter debate. As Adami[8] relates, some critics contended that the war against cancer began in 1972, and that recent mortality data simply measure old events—i.e., evaluation of success or of non-success against cancer has been carried out too early. It was also stated that improved methods of assessment are not being applied optimally, and that cancer has been identified more readily as a cause of death in recent years, which might have caused an upward bias in the trend. Another potentially important criticism was that the progress made among younger people might be concealed by age-standardized rates. In his contribution, Sir Richard Doll[68] concluded that the war against cancer in the young (less than 40 years) is progressing favourably well, but that there is a losing battle in the case of cancer in the middle-aged and elderly. In Sweden, where excellent records have been kept, Adami[8] stated that there was a dramatic increase in the total number of cancers between 1960 to 1988, indeed a *doubling* in the case of both male and female patients. Even age-standardized rates showed a continuing increase, 0.8% per year in men, and 0.5% in women. Hence, in these cross-sectional data with trends linked to calendar year, there is no evidence of an overall decrease. Adami[8] considered that the data suggest an increasing population exposure to carcinogenic influences.

In 1990, Bailar[69], from a re-examination of data, affirmed that the 'effort to control cancer has faded'. In their recent review, Coggon and Inskip[70] concluded that analysis of age specific death rates confirms that we are experiencing a true epidemic of cancer, considered to be attributable largely to smoking. The epidemic can be expected to decline first in men and later in women. They maintained that there is no evidence that toxic hazards such as pesticides, chemical waste, and other forms of industrial pollution have had a major impact on overall rates of cancer. Adami[8] concluded

> primary prevention remains the least glamorous but most powerful weapon in the combating of cancer and other diseases.

In his editorial, 'How do we interpret the ''bad news'' about cancer?' Miller[71], in Canada, stated that 'increases in cancer have occurred that are not solely linked to the aging of the population and to smoking patterns'. However, he maintained,

> We probably know enough already to prevent more than half of all cancers, if only we knew how to put our knowledge into effect.

Interestingly, this echoes a statement made by Muir and Sasco[72], of International Agency for Research on Cancer, in their review on 'Prospects for cancer control in the 1990s'; they concluded 'The knowledge was there—the will to change apparently was not'.

In the USA an enquiry into nutrition and cancer indicated that people with lower incomes and with lower educational levels had little understanding about cancer risk reduction[73]. However, reluctance to change is not wholly based on indifference. Long ago Benjamin Franklin wrote 'In general, mankind since the improvements in cookery, eats twice as much as nature requires'. Present trends are for food to become even more delectable. A recent study concluded that a major barrier to lowering fat intake in the UK was associated with a general failure to recognize what comprises effective dietary change[74].

In Africa, efforts to prevent cancer are very unlikely to be rewarding. In the USA, one enquiry revealed that Afro-Americans are reluctant to even attempt to lessen their risk factors, especially diet[75]. In Africa, urban populations, generally, are eating more food, especially high fat foods. Moreoever, most surveys indicate an increase in cigarette smoking, and consumption of alcohol, with the rise in

socio-economic states. However, educational endeavours for cancer prevention *must* continue, and we must also intensify screening programmes especially for cervix cancer.

WHAT IS THE OUTLOOK?

Improvements are possible but largely are impracticable. Outwardly, huge proportions of populations, at undoubted risk, would have to alter their life-style significantly. There are, however, a number of considerations, some insufficiently appreciated, which caution against excessive despondency.

All risk factors for cancer are not known

The causes of cancer, as with those of all degenerative diseases, are multifactorial, and many factors, as indicated, remain unelucidated. Hence, it would be incorrect to consider that because *known* risk factors can only be minimally or slightly reduced, a meaningful fall in cancer occurrence is unlikely. Known risk factors in breast cancer can explain only 40% of the variance[76]. This is so for other important degenerative diseases. Thus, in coronary heart disease, the greatest western 'killer', known risk factors appear to explain only 28–41% of the disease's variance[77]. Energy intake explains only a small proportion of cases of obesity, and sugar intake explains very little of the variance in dental caries; the same applies to salt intake and hypertension.

Evidence supportive of the incompleteness of our knowledge of risk factors is provided by the numerous puzzles which prevail in the epidemiology of individual cancers. Thus, Spanish women have only a half of the incidence of breast cancer compared with American women in Connecticut[6]. In Poland, the incidence of colon cancer is only a third of that in Canada[6]. Moreover, remarkably, similar perplexities prevail *within* communities. There is a large difference in the incidence of cancer of the pancreas between *adjacent* counties in Scotland[78]: in oesophageal cancer in certain regions in China[79]: and in colon cancer incidence in two districts in Sydney, Australia[80]. In each of these situations, the causes of the differences are not known.

One implication of this lack of knowledge is that there will be instances of rises, and of falls, in incidence and mortality rates from particular cancers which cannot be fully accounted for. For example the reasons for the rise in western populations in melanoma are not fully explicable[81]. Why is it that when Japanese migrate to California, their subsequent rise in colon cancer is so large that their new incidence rate *exceeds* that of inhabitants of the host country?[82] Neither are the major reductions in the incidence and mortality rates from gastric cancer fully explained[83]. In Japan, despite increasing westernization of diet, it is puzzling that there actually have been *falls* in mortality rates from breast and prostate cancers, entirely contrary to what would have been predicted[84].

The foregoing indicate that within communities, unexpected falls in cancer occurrence *could* take place, with little or no change in the known risk factor situation. The information given also implies that, within a given community, when risk factors for a particular cancer are very widespread, there is a large element of time and chance regarding which individual becomes a cancer patient. Ashworth[85] has written 'A serious criticism of research endeavour is that so little attention is paid to those who do not get the disease. . .' i.e. heavy smokers who do not get lung cancer. Somewhat in the same vein, Higginson[86] wrote 'carcinogenic influences in colorectal cancer may be so widespread in the community that the development of cancer may depend on differences in individual susceptibility', or, as Burkitt[87] has put it, to 'the luck of the draw'. Clearly, a concatenation of factors must be in operation which initiate and precipitate carcinogenesis. In the view of the US Council on Scientific Affairs:

> The key to the diet/cancer puzzle may lie in nutrient interactions and in individual response to dietary factors, determined in turn by genetic, physiologic, and life-style factors. Given the rapid strides being made in furthering the understanding of the biochemistry and molecular biology of cancer, it may be possible to look forward to the day when optimal dietary and life-style guidelines can be tailored on a specific individualized basis[88].

Who needs to take avoiding action most?

In all communities there are segments of persons genetically, and in terms of known risk factors, who are in major peril. However, not *all* such persons need to make radical changes. In *Hamlet*, Shakespeare wrote 'desperate situations by desperate remedies are relieved, or not at all'. The need for almost all people at considerable risk to amend their lifestyle would apply only if all individuals are equally reactive to risk factors, and equally responsive to their lessening. This is not the case. Stephen *et al.*[89] showed that there were enormous variations in bowel behaviour in a series of individuals who were consuming the same diet. Other studies have noted the wide range in faecal pH value. In this particular connection, Thornton[90] postulated that it may be possible to eat a high fat and a low fibre diet with impunity provided one's colon is sufficiently acidified. What factors regulate faecal pH?[91] How influential is diet in this respect? How important is the constitutional factor? In brief, while some people, especially those genetically compromised, may have to make huge changes in lifestyle to attain protection, others may have to change far less. Identification of people at greatest peril would be facilitated by the establishment of series of markers for each type of cancer, possibly in terms of chromosonal[92], hormonal,

enzymatic, and other levels. In Japan, tumour classification, involving a battery of tests, have been reported as adequately assessing the risk of cancer developing in apparently healthy persons[93].

Which Western community demonstrates major cancer prevention? Is emulation possible?

Amid the many reasons for depression, it could be asked, what characterizes a very low risk western population? Is there one? One very apposite population is the Mormon community. In an investigation made on 'Health practices and cancer mortality among active California Mormons'[94], it was found that middle-aged high priests adhering to three health practices (never smoking, engaging in regular physical activity and getting proper sleep), had remarkably low Standard Mortality Ratios (relative to general American population): 34 for all cancers, 14 for cardiovascular diseases, and 22 for all causes. The particular group studied had more than attained the goal for the year 2000. In a more recent study in Utah, for the period 1971–1985, for all causes of cancer the rate for males was 24% less in Mormons than in non-Mormons[95]. In the case of smoking-associated cancers, rates were 50% and 60% lower in Mormon males and females. While the latter findings are relatively explicable, other data given are puzzling. No major dietary differences were found between Mormons and non-Mormons. For breast cancer, no single factor was found to explain the lower rate in Mormon women. Arising from these and other observations, it was concluded that apart from differences in cigarette smoking, 'other factors, mostly unidentified, are causing variation at cancer sites'. Nevertheless, these two studies indicate that prevention in a western society, in measure, is feasible.

CONCLUSION

A sceptic might say that in both developed and developing populations, expectations of life at birth have never been higher. Moreover, it has been calculated that in western populations were all cases of cancer prevented, or all patients totally healed, it would add only about 2 years of life to average survival time in the community. These facts, however, do not minimize the fact that cancer is a fearful and formidable disease and that attempts to reduce risk factors, at least by those at severe risk, could make them far less vulnerable. Compliance, even by a small proportion of national populations could save the lives of huge numbers of potential patients. It is illuminating that at the recent *Lancet* Conference[53], Devitt insisted that breast cancer is only a manifestation of a widespread disorder: 'have we missed the forest (widespread problem) by focusing on a tree (breast cancer)'. A powerful argument for the preventive changes, dietary and non-dietary, advocated, as Doll[96] has stressed, is that they are the self-same changes that are being urged for the avoidance of coronary heart disease, stroke, and other degenerative diseases. Hopefully, any attempts at control could add to the number of disease-free years, an attainment coveted by everyone.

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