Review Article

Nutritional status and food security in Sub-Saharan Africa: Predictions for 2020

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The subject of the future regarding nutritional status and food security, and of their ramifications in terms of nutrition-related disorders/diseases in Sub-Saharan African (SSA) populations, is a complex one. As well as social unrest, a country's socioeconomic situation may affect food availability and, crucially, influence the generally low proportions of the Gross National Product devoted to health services. Additional determinants include changes in the roles of non-dietary adverse factors (i.e. smoking practice, alcohol consumption, physical inactivity) and of infections (i.e. gastroenteritis, malaria, tuberculosis and, particularly, HIV). As to future health in 2020, major increases in socioeconomic status are very unlikely; in fact, there has been a deterioration in some countries with food shortages affecting nutrition status and food security. However, with some measures of prosperity there are likely to be decreases in family size and falls in the proportions of children born with low birthweights or with protein-energy-malnutrition (PEM), and of children lying under the 5th percentile of growth reference standards. Simultaneously, though. there will be variable rises, especially in urban dwellers, in the occurrence of hypertension, diabetes, cardiovascular disease and certain cancers. Improvements in the health status of both children and adults are likely to be strongly affected by whether HIV infection can be controlled or whether it becomes rampant.

Key words: Sub-Saharan Africa, stunting, micronutrient deficiencies, food security, nutritional status.

Introduction

At present there is considerable interest and challenge in the numerous fields of health — medical, sociological and others — regarding how far populations have come in the world-wide quest for improved health and for longer survival times. What are likely to be the outlooks in the coming millennium? How much does improvement depend on the socioeconomic state and on the availability of State services, and how much does it depend on the attitude and responses of individuals?

In Sub-Saharan countries, the subject of nutritional status and of food security radically affects the lives of approximately 400 million people. As to the present state of affairs, in an editorial in *Lancet* on 'A good turn for Africa, please', the following was stated:

> SubSaharan Africa has 38 of the world's 63 low-income countries (< US$700 per head annual income) and 40% of its 500 million people have less than US$1 a day to live on. The International Decade of Water Supply and Sanitation (1981–90) came and went, but 52% of Africans still do not have access to safe water, and 68% have no proper sanitation. Not surprisingly, the health statistics are correspondingly bad. For instance, some 50 million preschool children have protein-energy-malnutrition (PEM), and maternal mortality ranges from 62 to 1000 per 100 000 live births.[1]

Numerous questions require addressing: What exactly are the desirable health goals? What are the backgrounds and influencing factors? What are the present health statistics, with special reference to nutrition-related disorders/diseases? What predictions have been made? Are they likely to be fulfilled?

Goals

What is desired is simply to lessen morbidity and mortality from reproduction, from the disorders/diseases of poverty and from communicable diseases. It is also equally desirable to attain some measure of control over the development of disorders/diseases that are linked with lifestyle practices. The aims are not wholly to lengthen survival time but, rather, to increase the years of 'wellness' experienced.

Influencing factors

Understandably, a highly significant factor influencing health status is the extent of the unrest caused by war conditions, which prevail in many African countries. Another factor of primary importance is the socioeconomic state of populations. In all developed populations, alas, the rich are getting richer and the poor, poorer.[2] This situation will undoubtedly prevail in developing populations.

All African countries are short of money with consequent severe restrictions on health promotion and practices. For example, in Nigeria only one-tenth of the population can afford to seek help at clinics and hospitals.[3] In Uganda, the equivalent of US$3 a head is being spent annually on total health services, compared with the US$17 required for the

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repayment of their national debt.[4] In Kenya, cuts in spending have evoked a rise in sexually transmitted diseases and a fall in the rates of clinic use, with increases in the spread of HIV and AIDS.[5] In Harare, Zimbabwe in recent years, both infant and under-5 years of age mortality rates have doubled.[6] In South Africa, the intensifying of primary health care, *inter alia*, has augmented burdens on the tertiary health services.[7]

With regard to State/community health services, to what extent are they used by the public? Far less than they should be; yet, this prevails even in rich countries such as the USA.[8] Further, when primary health care recommendations to the public are made by health authorities (e.g. implementing control over diet, reducing the practice of smoking, decreasing alcohol consumption, increasing physical activity), to what extent are they adopted by individuals? Over-eating, when possible, is now the rule world-wide.[9] Smoking practice is rising in all African populations, in males far more than in females.[10] Alcohol consumption is also rising, and follows the rapid urbanization occurring in some countries.[11] As to physical activity, in South Africa approximately half of the population now live in urban areas; consequently, their level of activity has fallen considerably.[7]

The burden of infections of malaria,[12] tuberculosis,[13] and in particular of HIV and AIDS,[14] all of which are increasing, is having, and will continue to have, tremendous influence, directly and indirectly, on the health/ill-health of African populations. In SSA in one rural hospital in Kwa-Zulu Natal, South Africa, AIDS cases constituted 0.2% of total admissions in 1991 but by 1997 the proportion had risen 43-fold to 4.0%.[15] As a further indication, in Southern Africa the proportions of antenatal mothers infected are reported to be 26% in South Africa,[7] and 45% in Zimbabwe.[16] Because of the almost invariable staff shortages and the huge numbers of patients who attend clinics and hospitals, scant time can be devoted to primary health care education.

Situations regarding nutrition-related disorders/diseases

Primary vital statistics

Knowledge of vital and other health statistics is limited. In a survey made on adults in south west Nigeria over a period of 3 years, it was found that half of the causes of death were unknown.[17] Infant mortality rates vary tremendously; in recent years there have been major falls. In Cape Town, the rate per 1000 live births has decreased to 25–35.[18] In The Gambia, the proportion of children dying under 5 years of age has fallen from 33 to 15%.[19] In the Continent, maternal mortality rates per 100 000 vary from 62 to 1000.[1] Survival time in Southern Africa is approximately 63 years, which is 10–15 years lower than that in developed populations.[20] However, in populations severely affected by HIV infection, as in Zimbabwe, survival time has recently fallen sharply to 47 years.[21]

Protein energy malnutrition and lesser growth for age

The most recent global health policy, aimed at health for all in the 21st century, has identified 10 global health targets.[22,23] The first two concern seeking improvement in the nutritional status of vulnerable groups (i.e. children and pregnant women) in order to reduce childhood stunting and maternal and child mortality rates. Stunting reflects poor health and nutritional status in children; it also reflects the health quality of an entire population.[24]

Lesser growth for age is widespread and is a major health concern in Africa. A recent report indicates that 38.6% of preschool children are stunted and 27.4% are underweight for age.[24] Thus, 44.6 million children are stunted and 31.6 million are underweight.[25] The highest prevalences of stunting and underweight are found in Eastern Africa, 47.0 and 31.0%, respectively, and in Western Africa, 37.9 and 32.8%, respectively. Prevalences of stunting and underweight are lower in Northern Africa, where they are 25.4 and 11.3%, respectively. While there are limited data in Southern Africa, statistics indicate that the prevalence of stunting lies between 22.9 and 30.3%, and underweight between 9.3% and 26.2%. South Africa has the lowest prevalence of stunted, 22.9%, and underweight, 9.3%, in preschool children in African countries.[26]

The key issues affecting future PEM in SSA are population growth and food supply. Africa is the only continent where population growth rates (currently 3.1%) have not yet started to decline.[27] Additionally, there is very slow progress towards increasing per capita food supplies, and there is continued pressure on agricultural resources and the environment.[28] Consequently, there will be increasing difficulty in meeting food requirements.

It has been predicted that in the SSA population of approximately 400 million, 32% will be suffering from undernutrition by the year 2010, compared with only 4–12% in other developing countries (e.g. India and Latin American countries).[27] Per capita food supplies are projected to be at, or above, 3000 calories per day in North African countries, and at the relatively low level of 2170 calories/day in SSA.[29] This situation holds serious implications for the coming generation. A primary outcome of undernutrition is growth failure, which occurs chiefly during intra-uterine life and the first 3 years of life.[30] Growth failure can have profound social and economic implications, including poor cognitive performance;[31] reduced cellular and non-specific immunity; reduced productivity and income;[32] reduced lean body mass and work capacity;[33] and increased morbidity and mortality.[34]

Micro-nutrient deficiencies

In developing countries, only iodine deficiency has shown a marked decrease globally from 28.9 to 13.7%.[35] In SSA, all but four countries have implemented salt iodization programs for which, of course, continuous monitoring is required.[35]

Vitamin A deficiency remains a major health hazard in SSA.[36,37] National surveys have indicated that 13.4% of preschool children in Lesotho and 8.0% in Swaziland have low serum retinol values, less than 0.35 μmol/L. Marginal vitamin A status was reported to be high in Namibia (20.4%), South Africa (33%)[26] and Swaziland (54%).[37] A primary reason why vitamin A deficiency needs addressing is the higher prevalences of respiratory and diarrhoeal diseases in vitamin A deficient individuals, who also show a higher mortality rate.[38–40] It is well documented that infectious diseases are the leading cause of death in children.[41]

Strategies used globally to combat vitamin A deficiency have included the provision of vitamin A supplements to young children and mothers; increasing the regular con-

sumption of vitamin A-rich foods through dietary diversification; and measures to fortify commonly eaten foods.[42] Currently, 43 out of 64 countries, half of which are in SSA, are adding vitamin A supplementation programs to national immunization days. Consequently, at least 60% of children have had at least one dose of vitamin A in the last 6 months.[42]

Iron deficiency is still regarded as the most common nutritional deficiency worldwide.[43,44] In SSA, it has been estimated that 42% of females of child-bearing age have iron deficiency anaemia,[45] and 56% of children are anaemic.[46] In South Africa, one in every five children is anaemic and one in every 500 are severely anaemic.[26] Anaemia and poor iron status were found to be more prevalent in urban areas.[26]

Infants and young children are the most adversely affected by iron deficiency, largely associated with their faster growth rate. Deficiency, if not addressed, could lead to anaemia, which is associated with impaired development of mental and physical coordination skills in young children, and impaired school achievement in older children.[44,47] Where malaria and various parasitic infections are prevalent, anaemia may arise from additional factors.[44,48,49]

Iron deficiency anaemia in SSA is generally treated by the administration of iron supplements to infants and pregnant women, via the health system; namely, on national immunization days and on occasion of antenatal visits. However, improvement is hindered by poor access to health-care services, inefficient assessment of iron status, inadequate dosage and duration of iron supplements, and non-compliance and monitoring problems.

As to the combating of both iron and vitamin A deficiencies by fortification of common foods,[50] traditionally, the procedure was not regarded as a practical solution for dealing with micronutrient deficiencies in Africa because of the limited centralized processing of staple foods.[50,51] Recently, however, commercial fortification has become a reality in some African countries and it is likely that this process will continue and extend to the rest of SSA in the next decade. Currently, Zimbabwe is fortifying certain brands of maize meal and flour with micronutrients, including iron and folate. In South Africa, margarine is fortified with vitamins A and D; moreover, the Department of Health plans to select other appropriate vehicles for fortification. In Namibia, a leading maize miller is fortifying maize meal with vitamins A, B complex and iron. In Zambia, sugar is fortified with vitamin A. In Nigeria, legislation for the mandatory fortification of flour exists, although no effective monitoring is done. In Kenya, two brands of cooking fat are fortified with vitamin A as an initiative by the production companies themselves.

The prevalence of folic acid and zinc deficiencies remains largely unknown.[35] Folic acid deficiency may contribute to the high prevalence of anaemia occurring in pregnant African women. Zinc deficiency may contribute significantly to the high prevalence of stunting in young children.[51]

In brief, it is unlikely that there will be much improvement regarding inadequate food intake (with its ramifications of low-birthweight infants and underweight and stunted children) in Africa over the next 20 years unless there is a dramatic change in the current balance between population growth and food supply/production. However, there are increasing nutritional initiatives to address micronutrient deficiencies and it is possible that both vitamin A and iron deficiencies may be substantially reduced by 2020.

Overweight and obesity

Two generations ago in rural African adult populations there was no gain in weight with age.[52] There is now rising weight for age, more so among women than among men. Increases are more marked in urban than in rural dwellers.[9] Using the criterion of body mass index (BMI) ≥ 30, prevalences of obesity in Mauritius[53] and in Cape Town have been reported as 15.0 and 34.4%, respectively.[54] In men, the prevalence in Cape Town was 6.0%.[54]

In African children, as in South African children, prevalences are still low, ranging from 0 to 4%.[55–57] In other developing countries, prevalence among children aged 3–9 years range between 7 and 10%.[58] The possibility of an association between stunting in childhood and being overweight in later life has been raised.[58]

In Western populations, disease risks and costs increase substantially with increased BMI. The risk of hypertension for moderately obese 45–54-year-old men is roughly two-fold higher than it is for their non-obese peers.[59] For type 2 diabetes the risk is almost three-fold higher. Lifetime risks for coronary heart disease (CHD) and stroke are similarly elevated. Life expectancy is reduced by 1 year. In the USA, observations have shown that the adverse sequelae of obesity are more severe in men than in women, and in the white compared with the African-American population.[60,61]

Hypertension

In the past in rural African populations, as with weight, there was no rise in blood pressure with age.[52] Since then, rises have occurred and have been higher in urban as opposed to rural areas.[62] Using World Health Organization (WHO) criteria, mean prevalence in Durban is 28%[63] and in Cape Town it is 23%;[64] these proportions are higher than that in the white population, where it is 22%.[54] The proportion in Nairobi, Kenya has been given as 11%.[65] In the USA, in contrast to the situation with obesity, the ill-effects of hypertension are more severe in African Americans than in the white population.[66]

Diabetes

In rural areas diabetes was in the past absent and, indeed, still is in certain African countries.[67,68] In Durban, South Africa prevalences in adults have been reported to be 2.3% in men and 5.2% in women.[69] In a white population, the proportions have been given as 3.8% in men and 3.9% in women.[70]

Cardiovascular diseases

Coronary heart disease is still virtually absent in rural dwellers[71] and even in urban dwellers; in Soweto, South Africa the disease accounts for less than 0.5% of total deaths.[72,73] Cerebral vascular disease, previously very low in rural ares, still has a low prevalence in certain countries[74] but is beginning to increase.[75] Considerable increases in cardiovascular diseases have been predicted in developing populations by 2020.[76]

As an indication of change, in a recent study on African female university students, very few in the age group younger than 24 years exhibited risk factors for chronic dis-

eases. However, those in the age group of 24–35 years had significantly higher values for BMI, waist-to-height ratio, waist circumference, and blood pressure.[77]

Diet-related cancers

In rural areas, common cancers seen at hospitals are those of the cervix, oesophagus and liver; those of the colon–rectum, breast and prostate, in measure diet-related, are near absent.[78,79] Yet, the latter are increasing in urban areas.[80]

Discussion

For populations in Sub-Saharan Africa, from the present nutrition/health/ill-health situations described, what are likely to be the improvements by 2020? What predictions can be made?

In seeking enlightenment, one approach is to consider the corresponding situations with other less privileged populations who have recently become westernized in behaviour. The scenarios are depressing. For example, the Maoris in New Zealand,[81] and the Aboriginals in Australia,[82] despite being minority populations within Western populations, now have higher mortality rates for almost all chronic diseases of lifestyle compared with those of the respective white populations. The same disadvantage prevails in the US regarding African-Americans compared with white Americans.[83] Furthermore, in each of the populations mentioned, survival time is still a decade or more shorter than that of the respective white population. Doubtless, the major cause is linked to the far lower socioeconomic state of the minority populations cited. It would be incorrect, however, to consider that a great increase in financial resources and support is absolutely indispensable for meaningful improvement to occur. In order to illustrate what can be done, in three rural villages at Gomoa, Ghana[84] the involvement of the communities and the application of a combination of primary health-care interventions resulted in the infant mortality rate falling from 114 to 40 per 1000 live births in a 3-year period.[84] In Nigeria, in Ojirami-Ugbo, a village where the 'God of Cleanliness' is worshipped and where there are strenuous cleanliness measures, personal and environmental, the prevalence of helminths in children was found to be only half of that in a neighbouring village.[85] The most striking example is afforded by Kerala which, despite being one of India's poorest provinces, has the best health statistics in the country; this is attributable to community cooperation and education.[86]

From these considerations, what predictions may be made regarding Sub-Saharan African populations? It is likely that the demographic surge being experienced will augment pressure for migration and urbanization, movements expected to burgeon in the next 20 years.[27] With a measure of increase in prosperity, there are likely to be increases in the chronic diseases of lifestyle such as obesity, hypertension and diabetes mellitus,[87] resulting from changes in practices, particularly in regard to dietary intake.

Nutritionally, households in rural Africa spend at least two-thirds of their budgets on food, with their diet largely based on starchy crops (i.e. cereals, roots and tubers).[88] Urbanization will tend to cause a shift in the composition of dietary staples. This already prevails in West Africa where there has been a shift from locally produced coarse grains such as millet and sorghum to imported wheat and rice.[88] Increased intakes of energy, fat and sugar are also likely, as have already taken place in urbanized populations in South Africa. For example, among African adults in Cape Town there has been a decrease in intake of cereal products and a rise in the consumption of dairy produce, meat, fruit and vegetables, fat and non-basic items.[89] Among young African women students, urban women consume significantly more sugar and confectionery and significantly less legumes and maize meal than do rural women.[90]

Despite all of the disadvantages discussed, if there was greater co-operation between the State, community and individuals with regard to nutritional status and food security, disorders/diseases of nutritional deficiency and imbalance could well decrease. As to those disorders/diseases associated with nutritional sufficiency or excess, there is little chance of their control.

Finally, in numerous countries a long-term factor of preeminent importance, apart from unrest, is HIV. The issue of whether it can be controlled or whether it becomes even more rampant will have far-reaching consequences, not only on health/ill-health generally, and the services involved, but also on family life and in other sociological respects, and in economic situations.

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