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Evidence of nutrition transition in Southern Africa

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Nutrition transition is characterised by shift to highly refined diets high in fat, salt and caloric sweeteners and low in fibre in rapidly growing economies. Dietary shifts occur almost concurrently with demographic and epidemiologic shifts, urbanisation and industrialisation and together contribute to increased prevalence of nutrition related (NR)-non-communicable disease (NCR). The emergence of nutrition transition in Southern Africa countries (SAC) was examined using anthropometric, NCD prevalence, and food consumption data. The findings reveal growing prevalence of overweight and obesity (OWOB) across SAC, with national prevalence estimated between 30 and 60 % in all but two SAC. Overweight prevalence in excess of 60 % has been reported in some sub-population groups. Hypertension prevalence of at least 30 % has also been reported. Further, the prevalence of OWOB and hypertension in many SAC exceeds that of HIV and is often at par with stunting in children. NCD are equally serious public health problems as stunting and HIV. Collectively, NR-NCD explain 20–31 % of mortality for Botswana, South Africa, Swaziland, Mozambique and Zambia. At least 72 % of adults in SAC have fewer servings of fruit and vegetable servings daily than recommended. Additionally, adults in SAC do poorly in physical activity; 31–75 % do not exercise regularly. Not surprisingly, 15–40 % of adults in SAC have at least three risk factors of CVD. SAC are grappling with NR-NCD which threaten to surpass infectious diseases burden. SAC are at various levels in interventions for moving their populations to stage 5, but there is room for much improvement.

Nutrition transition: Non-communicable disease

The United Nations Statistic Division geographically places Botswana, Lesotho, Namibia, Swaziland and South Africa in one group named Southern Africa. For the purposes of the present paper therefore, focus will only be on these countries; however where available data from proximal countries will be provided for comparison purposes. It is therefore important to note that in some publications Southern Africa has geographically been used to refer to all African countries south of the Cunene and Zambezi rivers[1]. The latter definition includes both Zambia and Zimbabwe. Perhaps the widest scope of Southern Africa would be that of the Southern African Development Community which presently includes ten other African countries in addition to Botswana, Lesotho, Namibia, Swaziland and South Africa[2].

It is estimated that Southern Africa, as defined by United Nations (Country Grouping code 018) is home to about sixty-one million people[3] (2013), showing a four million increase since 2010. With the exception of South Africa and Botswana, which are classified as upper middle income countries, all Southern Africa countries (SAC) are classified as lower middle income countries by both the World Bank[4,5] and the United Nations[3]. In total 58 % of the population of SAC reside in urban areas. This proportion is highest for South Africa (62 %) followed by Botswana (60 %). Being at at-least lower middle income status, SAC have less favourable health and development indicators in general compared with western countries, but fare better compared with other African countries. Expectedly, therefore

Abbreviations: NCD, non-communicable disease; OWOB, overweight and obesity; SAC, Southern African countries.

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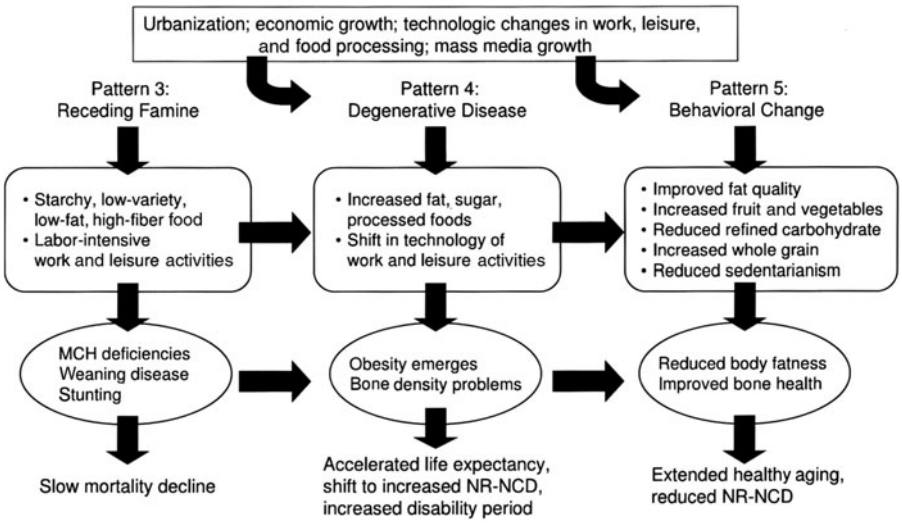

Fig. 1. Nutrition transition. Reproduced with permission from Popkin and Gordon-Larsen[7]. MCH, maternal and child health; NR-NCD, nutrition related non-communicable disease.

SAC carry both a significant burden of infectious diseases as other developing countries and the same is true with respect to poverty, preventable childhood illnesses and child malnutrition. Additionally, there is a growing concern with regard to the emergence of nutrition transition and associated maladies. In the present paper the authors use anthropometric data, non-communicable disease (NCD) data, and food consumption patterns to examine the emergence of nutrition transition in SAC.

What is the nutrition transition?

Nutrition transition refers to the characteristic dietary and lifestyle changes as well as demographic and epidemiological shifts in countries experiencing rapid economic and social development. As articulated by Popkin[6], Popkin and Gordon-Larsen[7] and supported by others, nutrition transition develops over time and has five fairly distinct phases, but most countries are between phases 3 and 5[6–8] (Fig. 1). With respect to dietary changes the general trend is the abandonment of wholesome traditional and predominately plant-based diets at stage 3 to highly refined food typically high in energy, saturated fats, salt and simple sugars/caloric sweeteners at stage 4[6]. The latter is typically referred to as western diet and together with the decreased levels of physical activity at this stage are linked to urbanisation and industrialisation. As shown in pattern 3 of the model, Popkin and Gordon-Larsen[7] argue that dietary and physical activity changes typical during the nutrition transition occur concurrently or are preceded by demographic and epidemiological shifts. The most notable changes with regard to demographic shifts are the reduction in birth and mortality rates between stages 3 and 4. With regard to the epidemiological shifts, there is the dominance of diet related NCD at stage 4. This is a shift away from the dominance of communicable diseases and maternal and child nutrition deficiencies at stage 3. Stage 5 follows concerted efforts and requisite behavioural change to redress the degenerate stage 4 dietary and lifestyle behaviours.

According to this model SAC, especially Botswana and South Africa are believed to be trekking rapidly from Stage 3 to stage 4 of the nutrition transition[9], although in some countries there are intra country differences[10]. Consistent with the nutrition transition theory, dietary shift in SAC have occurred concurrently with the adoption of sedentary lifestyles, and rural–urban migration. Consequent to these shifts the burden of NCD and other degenerative diseases have been documented in both urban and rural areas of SAC.

Urbanisation

Common among countries that have experienced nutrition transition is the rapid rate of urbanisation. It is in this context that urbanisation in SAC is assessed in the present paper. Population trends since 2000 are displayed in Fig. 2. Urban dwellers in SAC are estimated to constitute between 30 and 60 % of the population in each country[11]. Botswana and South Africa are the most urbanised countries compared with other SAC and countries adjacent to Southern Africa with over 60 % of their populations residing in urban centres[11]. There is a considerable increase given that in 1995 about 20–40 % of the population resided in urban centres in all SAC, but South Africa, at that time had about 51 % of the population in urban centres[12]. Furthermore, annual population growth rates of 4–5 % are not uncommon in major cities in SAC. In 2011 the growth rates of major cities in SAC stood at 5·1 % for Gaborone, Swakopmund 4·8 %, Bulawayo 4·1 % and 4·6 % for Harare[13]. Additionally, projections suggest that this trend is likely to occur even beyond 2030; with projected urban and peri-urban population of 150 million by 2020 and an excess of 200 million people by 2030.

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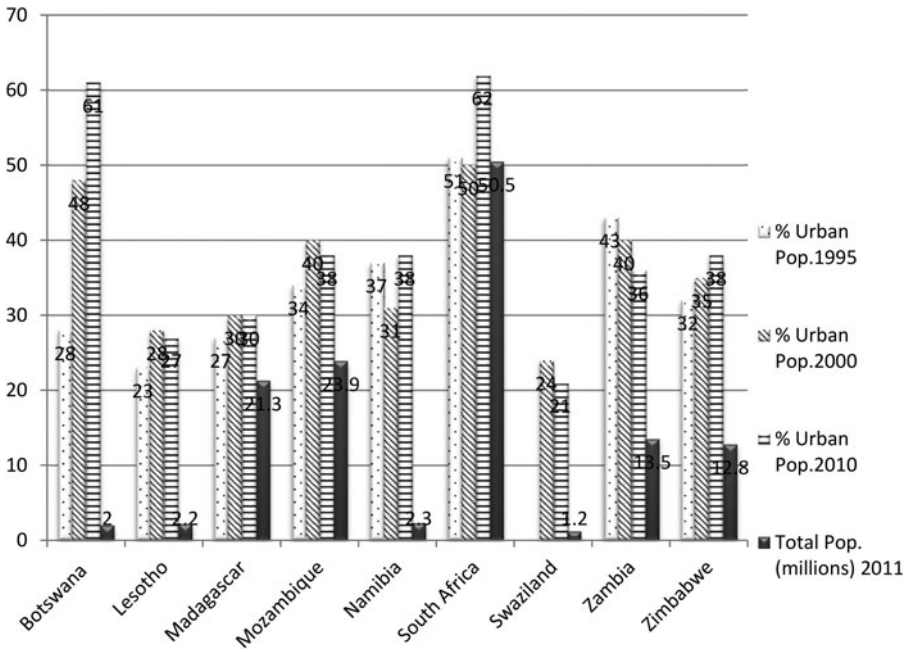

Fig. 2. Urban population (Pop.) trends in selected African countries[11,12].

The rapid urbanisation in SAC influences obesity and associated NCD in several ways. First in urban centres people are acculturated into less healthful dietary patterns as is the case in terms of nutrition transition, because people migrating into cities do not always find better living opportunities and their food choices are often restricted to less favourable cheaper options. Rapid urbanisation is directly correlated with the emergence of urban poverty, which together with food insecurity has been confirmed in eleven SAC. In some of these cities over 60 % of urban households were found to be severely foods-insecure, with the most affected being Manzini (79 %), Harare (72 %), Lusaka (69 %), Cape town (68 %), Maseru (65 %) and Gaborone (63 %)[13,14]. Due to poverty and adoption of urban diets, the urban-poor's diet is markedly low in diet quality. They tend to be high in fats and edible oils but low in complex carbohydrates, fibre and micronutrient rich foods such as fruit and vegetables and animal sources[15]. It is therefore not surprising that though overweight and obesity (OWOB) tends to be high in socio-economically advantaged subpopulations the rate of the increase of OWOB can be at par if not higher among the urban poor[16]. Thus rapid urbanisation, urban poverty and adoption of low quality energy dense diets typical of urban centres additively predispose people to OWOB.

Although undoubtedly urbanisation plays a major role in dietary shifts, rural areas are not spared[17]. Ease of communications between rural and urban areas, the sprawling of urban centres into adjacent rural communities, relational ties between urban and rural dwellers, the penetration of rural areas by multinational supermarkets[18] and many other factors have blurred the rural–urban divide with regard to dietary shifts. This is not a new phenomenon because dietary shifts in rural areas have long been documented[17]. Further while it is common in many disciplines to contrast urban and rural dwellers on many issues there is evidence that issues affecting urban and rural dwellers are not as starkly different as is often thought to be[19].

Overweight and obesity

OWOB, as defined by WHO[20], has not always been a major problem in SAC and other developing countries. On the contrary, underweight and stunting especially in the under-fives has been and is, in some countries continuing to be a significant problem. In recent decades however, the prevalence of OWOB has been high and rising in SAC[21]. Where available, estimates obtained between 2007 and 2012 through the WHO Country Step Surveys in SAC place the prevalence of overweight between 40 and 60 % in adults aged 25–64 years[22]. While a good indicator overall, aggregate estimates hide some disparities between urban and rural areas, ethnicities and men and women[21,23–26]. Disaggregated estimates show that women are hard hit, with estimates of overweight ranging over 50 % in all SAC. While earlier studies suggest that OWOB is more serious in urban areas, recent estimates show that the gap is shrinking[27]. Rural areas are not without these problems. In Botswana in particular, the difference in the prevalence of OWOB in adults in cities/towns (43·1 %), urban villages (39·9 %) and rural areas (33·9 %) is very small[28]. Similar observations have been made in other SAC.

Worldwide OWOB is not only a problem in adults but in children too[29]. Assessment of OWOB in children and adolescents in SAC is constrained by the paucity of literature, but where available, data suggest that there

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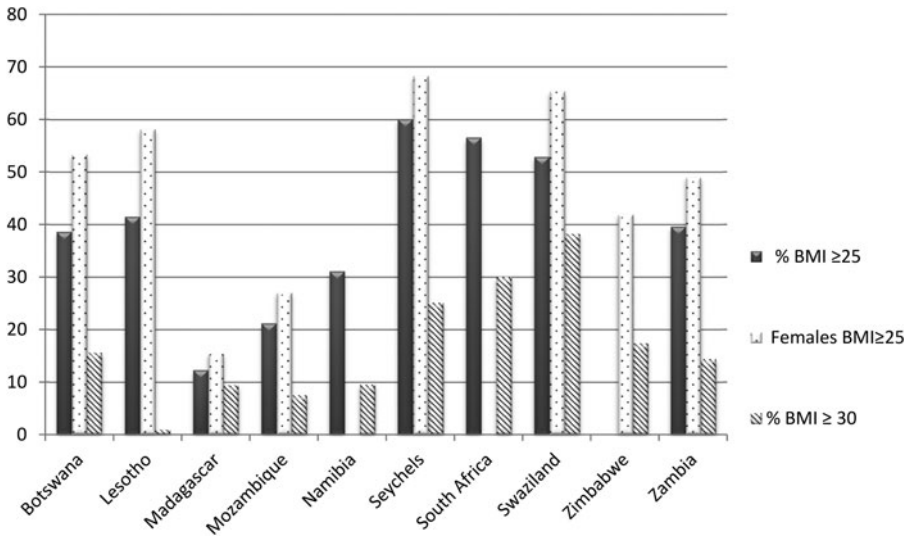

Fig. 3. Prevalence of overweight and obesity in Southern Africa Countries and proximal countries. For Zimbabwe estimates are for adults aged at least 20 years[22,31,32]; For South Africa estimates are for participants aged at least 15 years.

is reason for concern[25,26,30]. The major concern with OWOB in children is that they have increased risks of NCD. Among the youth, prevalence of overweight across Southern Africa is estimated at 12·9 % (Fig. 3). Although most studies in children tend to focus on under nutrition recent studies show that SAC have to contend with both over nutrition and under nutrition in children[33,34]. The prevalence of both forms of malnutrition are high[35]. The South African Youth Risk Behaviour Study in 2002 found that 17·2 % of adolescents were overweight and 4·2 % were obese. In the same group 9·0 % were underweight while 11·4 % were stunted[36]. In Botswana estimates of OWOB in adolescents was estimated at between 13 and 27 %, respectively[25]. Further, if by 20–24 years, the prevalence of overweight is already at 21 %, as Letamo[28] has shown using the Botswana National demographic health data, then it is clear that much of the problem precipitating OWOB starts very early in life. As in adult studies, prevalence of OWOB is influenced by socio-economic status, dietary habits, ethnicity, cultural backgrounds and urbanisation[25,26,37–39].

There is need for more studies in OWOB in children and adolescents in the region because the high proportion of stunting in the under-fives, with prevalence rates exceeding 20 % (Botswana 21 %; South Africa 27 %, Namibia 29 %, Swaziland 31 %, Lesotho 41 %) in all SAC and their adjacent countries (Madagascar, Mozambique 43 %; Zambia 45 %, Zimbabwe 32 %)[40] suggest that there is need for concern as these stunted children are at much greater risk of OWOB during adulthood as the evidence and pathways linking stunting in children with adulthood OWOB is very strong[31].

Nutrition related non-communicable diseases

With the WHO documented increasing prevalence of OWOB in SAC it is not surprising that the prevalence of NCD should also be increasing. The WHO steps surveys for Botswana, Lesotho and Swaziland have shown that hypertension and risk of CVD are major problems. Unfortunately many affected adults are not aware of their risks. As shown in Fig. 4, over 30 % of adults aged 25–64 years have elevated blood pressure (>140/90 mmHg). A further 10–15 % have blood pressure of at least 160/100 mmHg. Similar observations are not available for Namibia and South Africa but judging by the prevalence of hypertension in proximal countries, the situation in these countries is unlikely to be any different. The same WHO step surveys show that in Botswana, Lesotho and Swaziland between 30 and 40 % of adults aged 25–64 years have at least three risk factors of nutrition NCD, among which low consumption of fruit and vegetables and inadequate physical activity are the most common (Fig. 5).

Dietary changes

The rapid rate of urbanisation and increased communication between developed nations and developing countries have contributed significantly to the marked dietary changes in developing countries. This dietary acculturation has led to increased consumption of food away from home as well as increased consumption of convenience foods commonly called take aways. Both factors seem to favour consumption of foods high in saturated and trans-fats, refined carbohydrate, simple sugars, salt, animal source food and processed foods at the expense of more wholesome plant food[6,23,42,45] much to the deterioration of health. While there are several plausible ways in which changes in dietary habits can be explored, we chose to use changes in consumption of edible oils, sugar and sweeteners to demonstrate dietary shifts from wholesome traditional foods in Southern Africa. These foods were selected in part because they contribute significantly to empty energies. Secondly the

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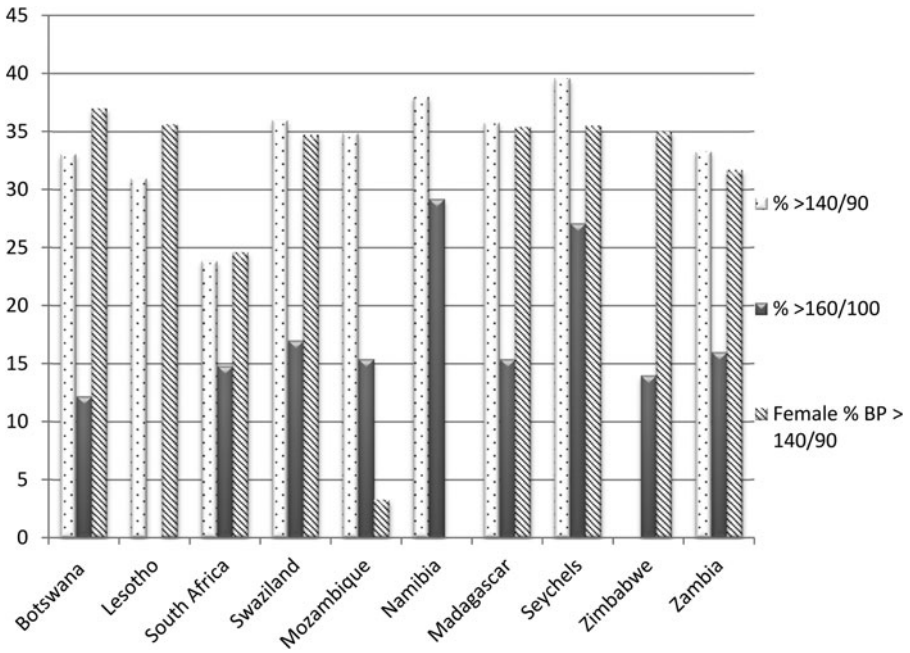

Fig. 4. Prevalence of elevated blood pressure (BP) in adults aged 25–64 years. South Africa data is for age group 15 years and older. Also used cut point of 140/90 and 160/95 mmHg[32]. Namibia estimates were urban estimates and included participants aged at least 18 years. Zimbabwe estimates were for urban women aged at least 25 years[22,42,43].

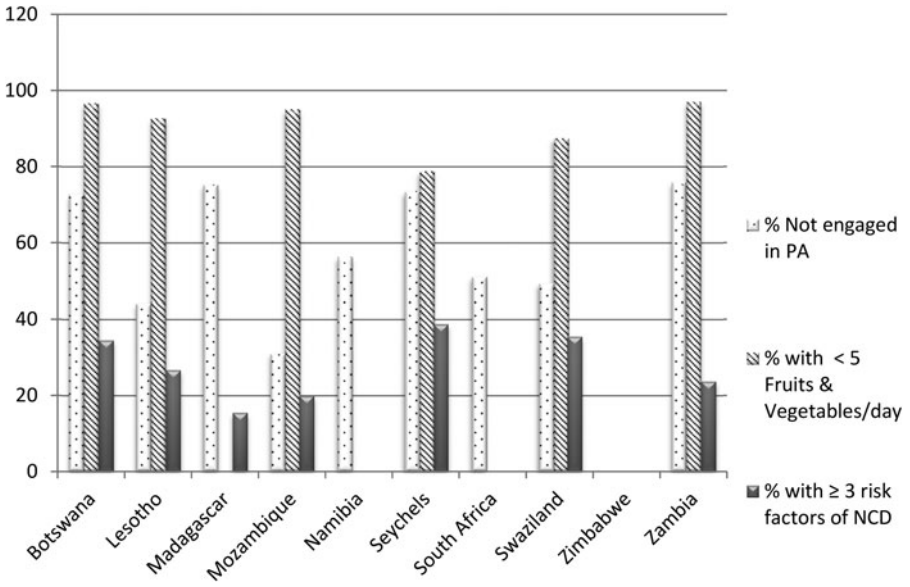

Fig. 5. Prevalence of risk factors of non-communicable diseases (NCD) in Southern African countries. Estimates for Namibia and South Africa are from sources other than the WHO step surveys[22,43,44]. PA, physical activity.

consumption of edible oils and sugar/sweeteners increases with increasing income. Further, increased consumption of both foods is independently associated with increased incidence of over nutrition and associated degenerative diseases.

The FAO[46] reports that global consumption of edible oils has increased over time. A significant share (60 %) of this increase is attributed to edible oil consumption in developing countries. Increased consumption of edible oil is therefore not a feature of developed nations only, but a global problem as has already been stated[46]. Global consumption of vegetable oils has been increasing steadily[46,47]. Not only is there an increase in production of vegetable oil globally, but there are more efficient and

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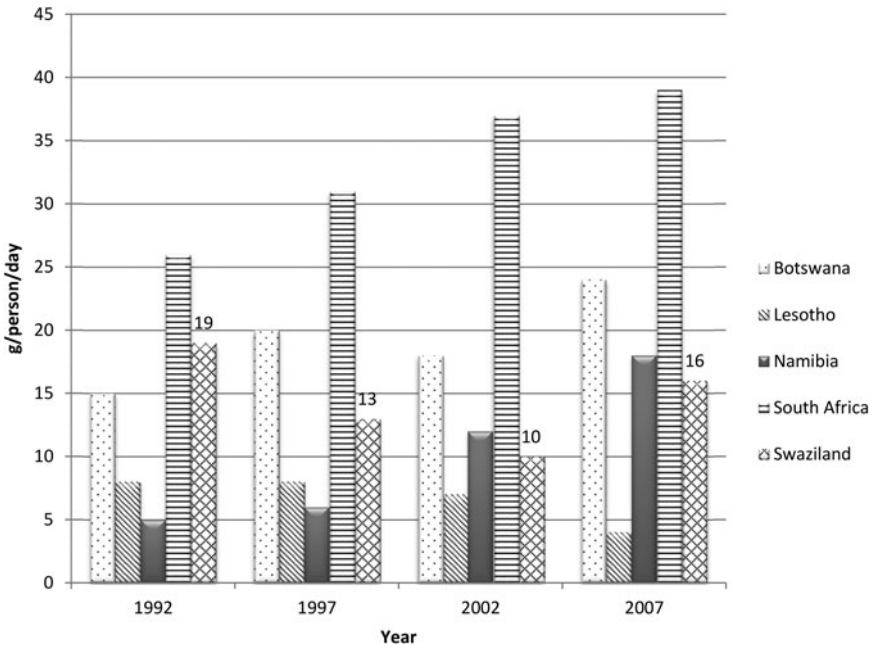

Fig. 6. Vegetable oil consumption trends in Southern Africa countries from 1992 to 2007[48].

economical vegetable oil processing methods than in previous years.

As is evident in Fig. 6 the consumption of edible oil is also high in SAC. In Botswana in particular, sunflower oil consumption per person has increased from 3·4 g/d in 1992 to 18·0 g/d in 2007[48]. In South Africa, sunflower oil consumption is also high, but between 1992 and 2007 a slight decline from 16·3 to 14·6 g/person per d was recorded. In general vegetable oil consumption in most counties in the region is relatively high[48]. Of late studies that have assessed dietary diversity and/or household food insecurity have shown that fats and oils are the most represented food groups in the diet[14,49]. In addition the consumption of foods prepared in fats/oils is also high, especially when meals are consumed away from home[50]. Canola oil, in particular, is seen to have the advantages of containing a higher amount of *n*-3 (linolenic acid) and *n*-6 (linoleic) fatty acids and to be low in saturated fatty acids. In 2012/2013 the global canola oil consumption amounted to 23·6 million metric tons, up from 11·2 million metric tons in 1995/1996.

Per-capita consumption of sugar

Global sugar consumption is reported to increase by about 1·5–2 % per annum. The 2009/2010 consumption of sugar was forecast to increase to 169 million tons. Within the same period the annual sugar consumption in the SAC region increased to 3·8 million tons, which is very high given the population of SAC[51]. While the WHO recommends that sugar intake should be <10 % of total energy intake, sugar consumption in urban areas of South Africa exceeds recommended levels[52]. Trends for sugar and sweetener consumption in SAC are displayed in Fig. 6[48]. As displayed, Botswana, South Africa and Swaziland have the highest sugar/sweetener consumption in the region, ranging from 80 to 108 g/person daily. However, Namibia and South Africa registered a decline in *per capita* sugar consumption during this period as shown in Fig. 6[48]. Within countries, the consumption of sugar is much higher in urban areas compared with rural areas[53] and in some subpopulation groups such as school children and adolescents[54], high socio-economic status groups and the elderly among others. Furthermore, in South Africa, sugar intake is especially higher in school age children. The main drivers for sugar consumption in children include soft drinks, sweets, concentrated drinks, socio-economic status and ethnicities[54]. Sugar consumption in South Africa in particular is highest compared with other countries in the region. Further, contributory factors for sugar consumption are similar to those observed in some first world countries[55].

Estimates of sugar consumption increase substantially when consumption is estimated on the basis of raw sugar equivalence. Between 1992 and 2007 for example, daily consumption in terms of raw sugar equivalent was estimated at 99 g/person for Swaziland, 94 g/person for Namibia, 84 g/person for South Africa[48] (Fig. 7). These estimates notwithstanding the most common form of sugar consumed in some countries is table sugar, followed by sweetened concentrated drinks, jams, cookies, sweetened soft drinks, sweets and breakfast cereals[54]. In some studies, the elderly have been reported to use about eight teaspoons of table sugar in tea daily[56]. Consumption of food away from home is also a contributory factor in sugar consumption. High sugar consumption is deleterious to health. In particular, increased sugar intake is associated with

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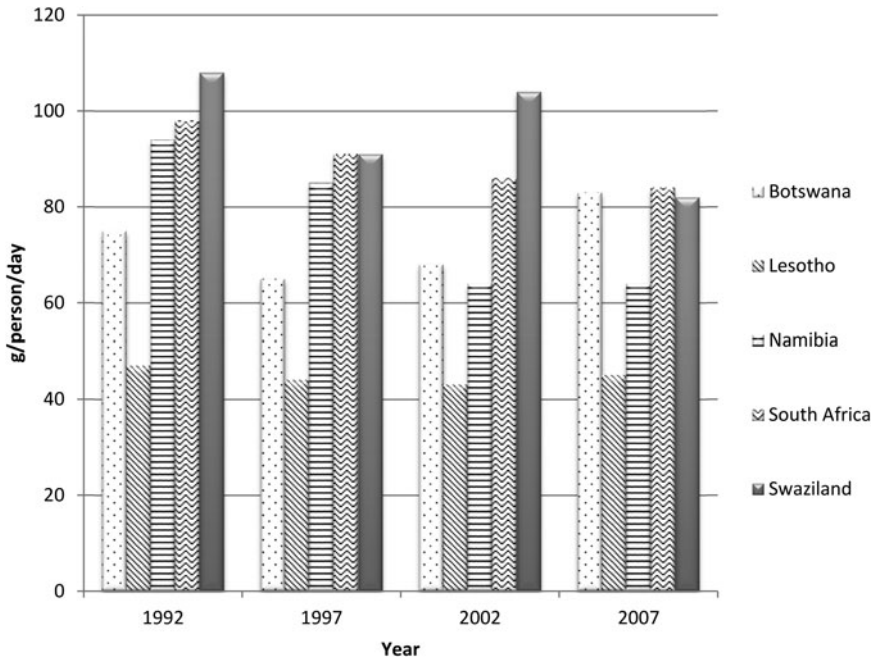

Fig. 7. Sugar and sweeteners consumption trends in Southern Africa countries between 1992 and 2007[48].

several diet-related chronic diseases such as diabetes, CVD, obesity, dental caries, and hyperactivity in children[57]. With increasing consumption of sugar in the region, the health problems relating to increased sugar consumption are bound to increase[56]. It can be concluded that the high consumption of oil and sugar is attributed to the fact that these foods are readily available and there is no traditional replacement for oil and sugar as is the case with other foods[58].

Conclusion

Examination of dietary data, OWOB and NCD prevalence data, as well as the extent of urbanisation in SAC clearly suggests that these countries are trekking to stage 4 of the transition. As explained in the nutrition transition model, the degenerative outcomes of stage 4 can be redressed by behavioural change as shown in stage 5. The actions proposed in stage 5 include reduction of dietary fat, added sugars and improved physical activity. While these changes have to happen at individual level to realise extended healthy ageing and reduced diet-related NCD, there is need for facilitative mechanisms at national levels.

SAC are at different levels with regard to stage 5. Some countries like Botswana are just beginning to focus on NCD prevention and control programmes that intend to prioritise legislation, policies and activities for reducing diet related NCD risk factors[59]. Namibia is possibly a step ahead in that already the country is implementing an NCD programme that focuses on delaying mortality and promoting healthy ageing of people. The programme focuses on the global strategy on diet, physical activity and healthy lifestyle[60]. Countries further along in promoting facilitative mechanisms for requisite behavioural changes include Swaziland and South Africa in that they have several initiatives in place. In both countries their programmes target school children, with the aim of assisting schools in providing children with more opportunities to make healthy eating choices[61]. Supportive regulations on mandatory reductions in salt added to processed foods have been passed and are implemented in South Africa. In addition the private sector in South Africa is taking part in the fight against nutrition related NCD through various incentives, one of which is cash back incentives on healthy food purchase[62]. Clearly there are efforts to promote and encourage behavioural changes, but given the scope of the obesity and nutrition related NCD problem there is need for more coordination in the region.

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Conflicts of Interest

None.

Authorship

M. L., N. G. and T. S. contributed to the concept paper drafted by M. N. All authors substantially contributed to this paper.

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