

## 'BE ACTIVE' — PHYSICAL ACTIVITY FOR HEALTH IN SOUTH AFRICA

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The Food-Based Dietary Guideline 'Be active' provides a general and widely understood message that regular physical activity is 'health promoting'. When considered in the South African context, where chronic disease and risk factor prevalences are relatively high and physical activity participation is unexpectedly low, this guideline is not only appropriate, but once implemented, may impact significantly on the overall population attributable risk due to an inactive or sedentary lifestyle. Successful implementation of the guideline depends, in part, on interpreting the effective dose-response, associated with specific morbidity outcomes. Expert consensus recommends that individuals accumulate 30 minutes of moderate to vigorous activity on most days. This amount of exercise is associated with a more than 1.5 - 2-fold reduction in, for example, cardiovascular disease mortality. This document addresses the potential barriers to widespread adoption of physical activity at a community level, and individual barriers to participation. Furthermore, we review a theoretical framework known as the 'stages of change' model, to contextualise the stages that individuals undergo when adopting some lifestyle change, such as physical activity.

The Food-Based Dietary Guidelines (FBDGs) have been developed with the aim of making evidence-based nutrition and lifestyle messages to the public accessible, understandable, generalisable, acceptable in a cross-cultural context, and feasible. Furthermore, these messages are formulated to be positive rather than punitive or negative. One of the more important and widely understood messages is encouragement to participate in regular, lifestyle physical activity. The guideline 'Be active' is based on the now well-established link between physical activity and lowered risk of all-cause mortality, as well as mortality and morbidity associated with many chronic diseases of lifestyle. The American College of Sports Medicine (ACSM) and the United States Centers for

Disease Control (CDC) now recommend that individuals should attempt 'to accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week'.<sup>1</sup> The salient part of these ACSM/CDC recommendations is the concept 'to accumulate', which indicates that the exercise dose may consist of physical activity 'taken' in smaller units of time; yet a similar health risk reduction may be expected.<sup>2</sup> In addition, this message is compatible with an increasing focus on lifestyle or habitual physical activity, structured around household and gardening activities, transport and leisure-time.

The guideline 'Be active' is important, firstly, because there is a substantial and increasing burden of chronic disease in the South African population. Secondly, there is evidence that although South Africa is a 'sporting nation', reported levels of physical activity in urban populations are comparable with those of more developed countries. The focus of this document is: (i) to examine the burden of chronic disease and associated risk factors in the 'target' population; (ii) to provide the evidence base for the efficacy and effectiveness of physical activity in changing this disease burden; and (iii) to highlight the challenges and opportunities for implementing this guideline at individual, group, and population-based levels.

### THE BURDEN OF CHRONIC DISEASES OF LIFESTYLE IN SOUTH AFRICA

South Africa is a country of many contrasts, in which various communities are undergoing rapid epidemiological, nutritional and demographic transition.<sup>3,4</sup> As a consequence of this transition, chronic diseases of lifestyle coexist with communicable diseases associated with undernutrition and lower socio-economic conditions. Recent studies suggest that chronic diseases of lifestyle accounted for 28.5% of deaths of all South Africans between the ages of 35 and 64 years and that more than 56% of all South Africans between the ages of 15 and 64 years have at least one modifiable risk factor for chronic diseases of lifestyle.<sup>5</sup> In the recent National Demographic and Health Survey (DHS) conducted in 1998, the prevalences of risk factors such as hypertension and obesity, were comparable with figures for developed countries (Table I).<sup>6-13</sup>

There are few national data available on the prevalence of physical inactivity, particularly in communities undergoing demographic transition. However, in two cross-sectional studies of urban black South Africans living in the Western Cape, between 30% and 40% of men and women reported no physical activity in either occupation or leisure time, and a further 40 - 60% reported minimal-to-moderate activity.<sup>6-13</sup> Furthermore, in a recent cross-sectional study of a peri-urban community in the Western Cape, physical inactivity was associated with increased diabetes prevalence, and had a relative risk of 1.72 (95% CI: 1.06; 2.81,  $P < 0.03$ ).<sup>14</sup> 'Vulnerable groups' reporting the lowest levels of activity in this study

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**Table I. Prevalence (%) of chronic diseases of lifestyle risk factors in adult South Africans (age-adjusted against a world population, using high-risk cut-off points<sup>6-13</sup> and unpublished data from the DHS)\***

	Hypertension	High serum cholesterol	Type 2 diabetes	Obesity	Smoking (cigarettes regularly)
Cut-off point	BP > 160/ 95	> 6.5 mmol/l	WHO criteria	> 30 BMI	Daily or weekly
Age group	≥ 15 yrs	15 - 64 yrs	30 - 65 yrs	≥ 15 yrs	≥ 15 yrs
<b>Men</b>					
Black	12.9	1.1	8.0	9.0	33.9
Coloured	14.9	17.4	10.8	9.7	54.9
Indian	18.7	20.2	13.0	8.6	47.7
White	20.6	25.6	2.2	19.8	33.4
Total men	14.1	6.2	8.0	10.1	36.2
<b>Women</b>					
Black	15.7	2.3	8.0	29.0	5.0
Coloured	22.7	16.2	10.8	25.3	40.6
Indian	20.5	17.0	13.0	21.0	9.0
White	18.5	26.0	2.8	26.3	26.6
Total women	16.1	9.0	8.0	27.9	11.1
Total South Africans	15.7	7.8	8.0	19.2	22.9

BMI = body mass index.

\*These data were compiled for draft Guidelines for the Prevention and Management of Overweight and Obesity by KS Steyn.

include: young women (15 - 24 years), as well as men and women over the age of 55 years. More recently, a survey conducted on transitional African communities in the North-west Province of South Africa (THUSA study, Transition and Health during Urbanisation of South Africans) by Kruger *et al.*<sup>15</sup> demonstrated that inactivity, independently of the degree of urbanisation, was associated with increasing obesity levels ( $P = 0.0007$ ). These data provide the basis for the rationale underpinning the 'Be active' guideline.

#### EVIDENCE BASE ON WHICH GUIDELINE 'BE ACTIVE' HAS BEEN FORMULATED

As previously mentioned, physical inactivity is now recognised as a major risk factor for the non-communicable diseases (NCD) such as: hypertension, cardiovascular disease, diabetes and cancer. Current recommendations for participation in physical activity are based on the ACSM/CDC guidelines, 'to accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week'.<sup>1</sup> The basis of the recommendation for regular physical activity is that there is a plausible biological argument for an effect. Physical activity appears to be 'protective' for chronic diseases, acutely lowering serum triglyceride concentrations, improving tissue sensitivity to insulin, increasing fibrinolytic activity, decreasing clotting activity, increasing high-density lipoprotein (HDL) cholesterol concentrations and lowering blood pressure.<sup>1,3</sup> Furthermore, in many instances physical activity increases bone mineral density, and helps to maintain a healthy body weight. In the longer term, physical activity has been shown to lower the overall risk of all-cause mortality in men between the ages of 45 and 84 by 18%.

The effects of physical activity on risk for chronic disease can also be observed in a dose-dependent manner. In many studies, the benefits of exercise are greater with increasing frequency, duration or intensity. However, the dose-response is not linear. There are greater health benefits in changing from a completely sedentary lifestyle to becoming moderately active than in the change from moderate to very active exercise.<sup>16</sup>

Lee *et al.*,<sup>17-19</sup> using the Harvard alumni cohort of more than 17 000 original subjects, compared the potential benefits of both vigorous and non-vigorous exercise for lowering the risk of all-cause mortality, during a period of follow-up lasting, in some cases, up to 30 years. (After adjustments were made for smoking, obesity and other potential confounders, vigorous physical activity levels were found to be 'protective', whereas non-vigorous activity was not significantly or inversely associated with mortality rate.

Lee and colleagues<sup>19</sup> also compared the relative risk associated with continuous exercise, lasting for at least 30 minutes, or activity broken up into smaller 15-minute periods. They found that there was a significant inverse relationship between the average duration of exercise sessions and coronary heart disease risk during 5 years of follow-up. However, the effect of duration was no longer significant if adjusted for total energy expenditure. Thus, the total energy expenditure, and not the duration of each physical activity episode, predicted risk benefit, and partially corroborates these ACSM/CDC recommendations.

Moreover, research suggests that the broader guideline of 'accumulating 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week' is more widely accepted, and individuals are more adherent, than

when following the traditional guidelines of 20 - 60 minutes of vigorous activity at least 3 times per week. Weyer *et al.*<sup>20</sup> found that overweight women following the ACSM/CDC guidelines for a period of 16 weeks lost more weight, and were twice as compliant as a control group, or a group following the more rigid, traditional guidelines.

The intensity, frequency and/or duration of exercise that may be regarded as protective for morbidity and mortality will also vary depending on the purpose for which the activity is undertaken, the disease outcome under consideration, baseline levels of physical activity, age, gender and other possible confounders, such as smoking, and family history of disease.

### EXPECTED HEALTH BENEFITS OF EFFECTIVE IMPLEMENTATION OF 'BE ACTIVE' GUIDELINE

The expected health benefits of regular participation in physical activity have been extensively reviewed.<sup>1,21</sup> There is now substantial evidence that regular physical activity is associated with a lowered risk for chronic disease of lifestyle. The strength of this evidence is that it is both consistent (demonstrated in many different studies over time) and robust, demonstrated in a variety of different populations and age groups, to similar effect.<sup>22</sup>

We can interpret the potential health benefits of widespread adoption of physical activity by considering both the relative risk and the population attributable risk associated with sedentary living. The relative risk provides an indication of the comparative risk for chronic disease in the sedentary v. exercising population (as a ratio) but provides no insight into the magnitude of the effect. The population attributable risk (PAR %), on the other hand, represents the number or proportion of cases of disease that may theoretically have been prevented if those individuals who were sedentary had been regularly physically active.

Colditz<sup>21</sup> recently reviewed the burden of disease associated with inactivity, including chronic diseases, such as coronary disease, hypertension, cancer, gall bladder disease and osteoporosis (Table II). Sedentary living is associated with a

1.2 - 2-fold higher relative risk of these chronic conditions. If we assume that approximately 29% of the USA population report no leisure time physical activity, the population attributable risk or the percentage of cases associated with inactivity ranges from 5% for breast cancer to 22% for coronary heart disease. Farrell *et al.*<sup>23</sup> considered the impact of low fitness levels as a 'proxy' for low levels of habitual physical activity, on cardiovascular disease mortality, in relation to other known risk factors such as smoking, obesity, hypertension, hypercholesterolaemia, and elevated blood glucose concentrations. The relative risk for cardiovascular disease mortality was 1.7 (95% CI: 1.3 - 2.3) for low fitness levels and was comparable with, if not higher than, the relative risk for smoking, hypertension, etc.

However, to form a more realistic basis of comparison, one would need to compare the prevalence of the risk factor (smoking v. inactivity) in a community, and the extent to which the risk factor was modifiable. In addition, one would have to consider the possible effect of attrition or relapse. In general, the relapse rate for physical activity may be lower than that for smoking cessation and weight loss, and in many communities, the prevalence of inactivity is higher than that of smoking. This makes physical activity an ideal target for public health intervention.

### PRACTICAL IMPLEMENTATION OF 'BE ACTIVE' GUIDELINE IN SOUTH AFRICA — CHALLENGES AND OPPORTUNITIES

The successful implementation of the 'Be active' guideline is dependent, in part, on identifying and addressing barriers to physical activity participation in the population, in general and on an individual basis. Sparling *et al.*<sup>24</sup> suggest that an 'ecological perspective' be adopted, to consider the interaction between individual characteristics, which are both psychological and biological, and environmental factors, which include societal norms and physical activity, in order to better understand and formulate targeted, population-based interventions. Pate *et al.*<sup>1</sup> and King *et al.*<sup>25</sup> summarised individual barriers to physical activity. These barriers may be demographic, e.g. age and gender are associated with physical activity participation. Women and older persons are less likely to participate in vigorous, leisure-time physical activity.<sup>25,26</sup> Further, socio-economic status and education are usually inversely related to leisure-time physical activity levels. Alternatively, certain negative health behaviours, such as obesity and smoking, are associated with sedentary living and reduced participation in physical activity. Thus, 'the adoption of regular exercise is linked, in some groups, to the knowledge of, and belief in, the health benefits of physical activity'.<sup>3</sup>

From an implementation perspective, perceived lack of time is one of the most common reasons given for low levels of exercise participation.<sup>25,26</sup> In a random survey of 320 working

**Table II. Relative risk and population attributable risk (PAR %) for inactivity for various chronic diseases\***

Condition	Relative risk	PAR %
Type 2 diabetes	1.5	12%
CHD	2	22%
Hypertension	1.5	12%
Gall bladder disease	2	22%
Cancer		
Breast	1.2	5%
Colon	2	22%
Osteoporotic fractures	2	18%

\*Modified from Colditz.<sup>21</sup>

adults in urban Lagos, Nigeria,<sup>27</sup> the most commonly cited barriers to participation in physical activity were work commitments (31%) and lack of time as a result of commuting (26%). At an environmental level, Bauman *et al.*<sup>28</sup> recently described the 'coastal effect'. Adult Australians living in close proximity to coastal regions were 27% more likely to report levels of physical activity compatible with reduced risk for chronic diseases of lifestyle than those living inland. These studies highlight the importance of considering environment and accessibility as determinants of physical activity when formulating public health policy using physical activity as a vehicle for health promotion.<sup>29</sup>

On an individual level, self-efficacy is recognised as the strongest determinant of adoption of a physically active lifestyle.<sup>30</sup> Self-efficacy may be defined as 'one's confidence in one's ability to exercise or to become physically active'.<sup>3</sup> Self-efficacy may be influenced, both positively and negatively, by prior experiences and through the experience and verbal support of family or friends, or by a change in physiological status, as well as the perception of health and well-being.<sup>30</sup> Thus, family participation and social support are also important determinants of physical activity behaviour.<sup>29</sup>

There is now evidence to support an existing theoretical framework as to how individuals adopt exercise behaviour. The transtheoretical or 'stages of change' model is an integrated model which incorporates the individual's intention to change his/her lifestyle, along with his/her expressed 'readiness' for change. This model involves techniques such as: raising awareness of the health benefits of physical activity, re-evaluating one's self and one's environment, creating support networks, and developing a system of reinforcement, and self-management. Central to this model, as with the others, is the concept of self-efficacy.<sup>29,31</sup>

The five stages of change include:

- pre-contemplation (individuals who are sedentary and have no intention to change, have no knowledge of the problem, or are in denial of any need to change)
- contemplation (individuals who have expressed an intention or desire to change or to become more physically active)
- preparation (individuals who have managed to make or incorporate small changes in physical activity behaviour)
- action (individuals who have become regularly physically active)
- maintenance (individuals who are engaging in regular activity or in whom regular activity has become established).

Recent studies suggest that 'readiness' for change is a significant determinant of adoption of a physically active lifestyle or the likelihood of achieving the action/maintenance stages of exercise. Steptoe *et al.*<sup>32</sup> studied the impact of lifestyle

behavioural counselling in more than 880 patients attending 20 primary health care centres in the UK. The odds ratio of moving to the action/maintenance stages for physical activity for those who had received counselling was 1.89 (95% CI: 1.07 - 3.36) compared with the control groups. These and other data suggest that the primary care setting may be opportune for providing targeted support for persons who may be contemplating changes in physical activity. However, Podl *et al.*<sup>33</sup> found that less than 25% of family physicians surveyed in Ohio ( $N = 138$ ; 4 215 visits) spent time counselling about exercise. Of those who did counsel on exercise, the mean time spent in consultation was 0.78 minutes (ranging from 0.33 to 6.00 minutes). Doctors who were themselves physically active were more likely to raise the topic of physical activity for health with their patients.<sup>34</sup> Thus, in devising public health initiatives around physical activity, it may be important to focus on educating and motivating the health care providers.

In real terms, the co-ordination of physical activity initiatives for health promotion in South Africa has been fragmented, with little emphasis on sustainability. There is a lack of basic infrastructure and facilities in many communities; physical education within the public school system is under threat, particularly in historically disadvantaged communities; there is a high prevalence of urban violence and risk to personal safety; and the current focus for government health expenditure is on the delivery of primary health care.<sup>324</sup> As such, the majority of South Africans studied in various regional cross-sectional surveys report low-to-moderate levels of participation in physical activity, and fail to meet the ACSM/CDC recommendations of '30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week'.

### Lower barriers and increasing participation — community development models

The development of successful, community-based physical activity interventions in communities undergoing transition relates in part to overcoming cultural, socio-demographic, physical and financial barriers to participation. Effectiveness data are available for only a relatively small number of community-based interventions for lifestyle and physical activity, in transitional communities. One example of such a programme is PATHWAYS, a church-based programme for weight loss designed for African-American women. PATHWAYS relied on volunteer lay leadership, and as a church-based programme, already lowered some of the barriers to participation. Physical activity was promoted via home-based walking and recreational activity. Women randomised into active groups lost more weight, and reported physical activity levels increased significantly, compared with the controls (who were recruited but placed on a waiting list).

One example of a regional initiative aimed at increasing

broad-based participation in physical activity in South Africa is the Community Health Intervention Programmes (CHIPs), a joint venture between a privately funded, non-profit academic institution and a national insurance company. The CHIPs project exists to promote health through the medium of regular physical activity. The project has several programmes, targeting and responding to the needs of, for example, older adults from community centres or a school-based programme for primary school children, both of which have been shown to be highly sustainable, and have had a measurable impact on health status and fitness.

The programmes employ a two-fold strategy: education to increase awareness regarding the risk for developing chronic diseases of lifestyle, and regular physical activity to encourage adherence and self-efficacy in making healthier lifestyle choices. The programmes are run at central venues in the community, reducing barriers to participation such as distance and cost.<sup>73</sup> This is achieved by using a participatory approach for community development, incorporating a consultation phase and a training phase for peer-group leaders, followed by a phase of co-implementation of programmes. Co-implementation takes place for 3 months, after which time the programme staff withdraw and ownership of programmes is transferred to the community. Community participants become owners of the project upon completion of a training and capacity-building process, thus helping to secure sustainability.

## DISCUSSION AND CONCLUDING REMARKS

In this review, we have highlighted the evidence-based argument for the role of physically active lifestyles in promoting health and lowering the burden of chronic diseases of lifestyle. Although the guideline 'Be active' specifically targets adults, regular physical activity is equally beneficial for older adults. Moreover, the lifestyle patterns that support the development of chronic disease are established in childhood. Therefore, the guideline may be extended and is appropriate for school-going children. Perhaps the most important concern is the successful and widespread adoption of this guideline, which can be facilitated by identifying and addressing barriers within communities, and by characterising 'readiness to change' in individuals. Primary health care practitioners, community leaders, and parents will have a significant role to play in creating an awareness of 'how much exercise is enough' to prevent or attenuate chronic diseases of lifestyle.

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