INAUGURAL LECTURE

of

Prof Andries Monyeki

PHYSICAL ACTIVITY AND HEALTH IN CHILDREN: HOW MUCH DO WE KNOW?

11 April 2013

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PHYSICAL ACTIVITY AND HEALTH IN CHILDREN: HOW MUCH DO WE KNOW?

AN INAUGRUAL LECTURE

BY

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PHYSICAL ACTIVITY AND HEALTH IN CHILDREN: HOW MUCH DO WE KNOW?

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1. INTRODUCTION

South Africa is a country of numerous paradoxes. South Africa deservedly celebrated the success of hosting the 2010 Soccer World Cup, and recently the AFCON 2013, but the reality is that South African most definitely are not yet winning the fight against epidemics of physical inactivity and overweight among the children (McQuaide, 2008). Consequently, both physical inactivity and overweight are found to associate with substantial risk quadruple burden of diseases–a combination of poverty-related infectious diseases, lifestyle-related non-communicable disease (NCDs) and violence-related trauma, thus creating a vicious circle (Nickolic *et al.,* 2011). NCD is a medical condition or disease which by definition is non-infectious and non-transmissible among people, accounting for millions of death globally each year. NCDs, are sometimes mischaracterised as a diseases of the affluent because we have the concept that as people get richer, they do more unhealthy things and these diseases follows. But in actual fact NCDs affect people from different stratums (The NCD Alliance, 2011).

In a recent Lancet series (2012), it was reported that the world now has the largest cohort of 1.8 billion young people in history of which 1.5 billion are from developing countries (George *et al.,* 2012). It was further indicated that young people are confronted with numerous challenges like insufficient physical activity and unhealthy diet which may lead to an array of negative physical changes such as high blood pressure and overweight/obesity, which can trigger NCDs like cardiovascular diseases, diabetes, and cancers in adulthood (World Bank, 2011). It is projected that by 2030 (*Figure 1*), developing countries will have eight times more deaths attributed to NCDs than developed countries (Nickolic *et al.,* 2011).

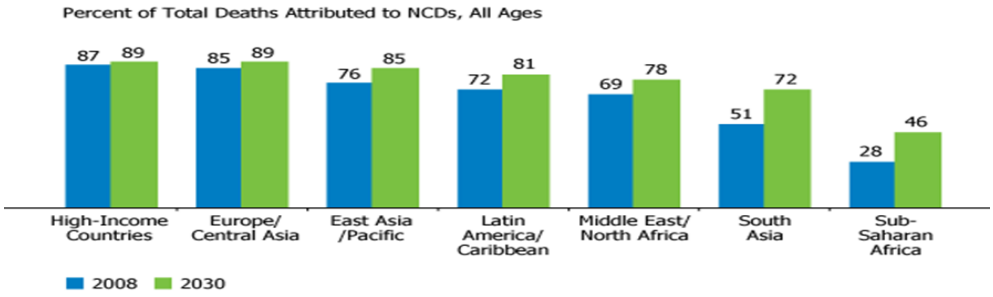

Figure 1: Percentage of total deaths attributed to NCDs, All ages (Adapted from Baldwin & Amato, 2012)

In Baldwin and Amato (2012) fact sheet, it was reported with an alarm that NCD-related mortality is occurring at earlier ages in developing countries: 29 percent of NCD-related deaths in developing countries occur before age 60, compared with 13 percent in developed countries. For example, Engelgau *et al.* (2011) revealed that the average age of the first-time heart attack sufferer in South Asia is 53, six years younger than the world average. NCDs are now affecting more people who are in their prime economically productive years, and these deaths are frequently preceded by years of disability.

Four diseases, cardiovascular diseases, cancers, diabetes, and chronic respiratory diseases, are responsible for the majority of NCD-related illness and death. These four, along with mental illness, will cost the developing world $21 trillion over the next two decades (Bloom *et al.,* 2011). In the report by Statistics South Africa in 2005 for the period 1997 to 2003 regarding the national cause-of-death it was revealed that 20% of deaths in the 35–64 year age group were a result of chronic lifestyle diseases (Statistics South Africa, 2005). In a comparative risk-assessment study by Norman *et al.* (2007) regarding to factors contributing to deaths in South Africa, it was reported that high blood pressure was ranked second, tobacco smoking third, alcohol harm fourth, high body mass index (BMI) fifth, high cholesterol seventh, diabetes eighth and physical inactivity ninth. Steyn (2007) reported that South African health services spend 8 billion Rand per annum involving direct and indirect costs related to lifestyle diseases such as heart disease and stroke.

According to the World Bank, more than half of the NCDs burden could be avoided through health promotion and prevention initiatives (World Bank, 2011). Relying solely on treatment options to combat NCDs is very costly, particularly in developing countries where governments and health infrastructures are unprepared to respond to this growing problem. For example, the report by Statistics South Africa of 2008 (Statistics SA, 2009) indicated that one third (11.2 million) of the total population of 48.7 million South African received social grants which indicate that a large percentage of the population are exposed to poor socioeconomic condition. A focus on strengthening protective factors and earlier investment in prevention of NCDs among young people is therefore essential (Baldwin & Amato, 2012). According to Bloom *et al.* (2011), educating young people about what constitutes nutritious food and an active lifestyle and then enabling them to consume a healthy diet, take part in sports activities, and live in a safe and sustainable environment, are the potential means to save billions of rands/dollars in spending on chronic diseases. Booth and Gordon (2000) alluded that we know of no single intervention with greater promise than physical exercise to reduce the risk of virtually all chronic disease simultaneously. As such, a focus on adolescence is important because is the time during which NCDs risk behaviours manifest and solidify; the longer they go unaddressed, the harder they are to change (Khan *et al,* 2012).

It is against this background that this presentation was aimed to discuss the importance of regular participation in physical activity and the consequences of inactivity through analysing the following aspects: The concept physical activity; The double burden of under- and over-nourishment in South African children; epidemiological studies on physical activity and non-communicable diseases; Are South African children active or fit enough?; Why children are not physically active/fit?; Is it necessary for children to be physically active and fit?; Is there a need for health-related physical activity and Physical Education programmes in the school curriculum?. These discussions will be followed by my own contributions in the field, and end with conclusions and recommendations.

2. WHAT IS PHYSICAL ACTIVITY?

Physical activity as an umbrella term is defined as "any bodily movement produced by skeletal muscles that results in energy expenditure (Caspersen *et al.,* 1985; Caspersen *et al.,* 1998; Biddle *et al.,* 1998). This broad term means that physical activity includes all forms of activity, such as walking or cycling for everyday journeys, active play, work-related activity, active recreation such as physical exercise in the gymnasium, dancing, gardening or competitive sport, and that ***inactivity*** is time spent doing things that do not markedly increase energy expenditure. ***Physical exercise*** on the other hand is defined as a subset of physical activity that is "planned, structured, and repetitive bodily movements done to improve or maintain one or more components of physical fitness" (Caspersen *et al.,* 1985; Caspersen *et al.,* 1998; Biddle *et al.,* 1998). ***Physical fitness*** is a set of attributes related to a person's ability to perform physical activities that require aerobic fitness, endurance, strength, or flexibility and is determined by a combination of regular activity and genetically inherited ability (Caspersen *et al.,* 1985). ***Sport*** is another sub-set of physical activity that involves structured competitive situations guided by rules, although it is often used in a wider context to include both exercise and leisure-time activities. Some fitness components are related to sports performance while others are considered health-related fitness outcomes (Livingstone *et al.,* 2003). ***Health-related physical fitness (HRPF)*** is defined as "any form of physical activity that benefits health and functional capacity without undue harm or risk" (Foster, 2000; Gregory & Lowe, 2000; Oja & Borms, 2004). These health-related physical fitness (HRPF) components include cardiovascular endurance, muscular endurance or strength, body composition and flexibility, which, to varying extents, reflect genetic inheritance and gender, as well as levels of physical activity (Livingstone *et al.,* 2003; Kemper, 2011).

Physical activity epidemiology is a specific branch of behavioural epidemiology. The term ***epidemiology*** is derived from the Greek words *epidemia* ("on people") and *-ology* ("to study"). Despite the existence of several definitions of epidemiology; a modern-day definition of ***epidemiology*** is the study of the distributions and determinants of diseases and disability in a population (Mausner & Bahn, 1974; Dishman *et al.,* 2004).

3. WHAT IS HEALTH?

Health does not represent merely the absence of diseases, but can be defined in many ways, in part because health can be related to physical, mental, emotional, social, and spiritual aspects of our lives (Bouchard & Katzmarzyk, 2010). According to Maimonides (1990) ***"anyone who lives sedentary life and does not exercise .... even if he eats good foods and take care of himself according to proper medical principles – all his days will be painful ones and his strength shall wane....."*.** Many people think of good health as the absence of sickness or disease. This may in part be true, but it doesn't give the whole picture. According to Nieman (1998), good health might be better defined as the presence of

"sufficient energy and vitality to accomplish daily tasks and active recreational pursuits without undue fatigue". As such people who are generally healthy and physically active tend to contract infectious disease less often, and they tend to be able to fight off infectious disease better than those who are sedentary (Jackson *et al.,* 2004).

4. THE DOUBLE BURDEN OF UNDER- AND OVER- NOURISHMENT IN SOUTH AFRICAN CHILDREN

South Africa is faced with the double burden of the co-existence of under- and over-nutrition in the same household, family or community. Underweight and obesity are among the top ten leading risk factors for the global burden of disease (WHO, 2002). Bradshaw and colleagues (2006) reported that South Africa has a high prevalence of both infectious diseases related to under-nutrition and of non-communicable diseases (NCDs) related to obesity and over-nutrition. The number of overweight or obese children has doubled since 1990 in Africa. Overweight or obesity is defined as an abnormal or excessive fat accumulation to the extent that it may have adverse effects on the health and well-being of the individual (WHO, 2011). Obesity refers to excess total adipose tissue in the body, usually expressed as fat weight or percentage of body fat (Bouchard & Katzmarzyk, 2010).

It is imperative to indicate that no one is exempted from the upsetting effects of one or more chronic diseases. According to Booth and Gordon (2000), is that if an individual does not suffer directly from chronic disease, they mostly likely suffer indirectly as a result of the stress of care giving to others, the death of family members or friends, and/or increased health costs. The research findings in 2010 estimated that globally that about 43 million children under the age of 5 years were overweight, and 35 million of these were living in developing countries (De Onis *et al.,* 2010; Rossouw *et al.,* 2012).

In South Africa the overweight or obesity in children and adolescents are on the increase, and the prevalence varies with, age, gender and population group (Mukuddem-Petersen & Kruger, 2004; Rossouw *et al.,* 2012). A study by Mamabolo *et al.* (2011) on township adolescents in the North West Province indicated that 8.1% of the children were overweight/obese and the prevalence in girls was higher compared to boys (X^2 =6.08, p=0.048). Research findings from Mpumalanga reported overweight and obesity prevalence in boys and girls to be reaching 20%-25% in late adolescent girls (Kimani-Murage *et al.,* 2010). The South African Primary Schools Anthropometric Survey and The Health of the National Study, estimated an increase in overweight to be from 1.2% to 13% and obesity from 0.2% to 3.3% over a period from 1994 to 2004 (Rossouw *et al.,* 2012). Malnutrition on the other hand is found to be another contributing factor to double the burden of disease in South African children and adolescents. In a study by Monyeki (2006), on the Ellisras rural children stunting was 6%, wasting 3% and underweight 6%. A paradoxical long-term consequence of stunting is the possible existence of a link with fatness or obesity (Sawaya & Roberts, 2003).

5. EPIDEMIOLOGICAL STUDIES ON PHYSICAL ACTIVITY AND CHRONIC DISEASES OF LIFESTYLE

Epidemiological studies established that physical inactivity increases the incidence of at least 17 unhealthy conditions, almost all of which are chronic disease or considered risk factors for chronic diseases (Booth & Gordon, 2000). Sedentary lifestyles as a component of inactivity is the most common causes of morbidity and mortality coronary heart disease, stroke, obesity, hypertension, type II diabetes, allergies and several cancers, and are close to over taking tobacco as the leading cause of preventable death (Mokdad *et al.,* 2004). Intentional physical activity is linked to protective effect against the above mentioned non-communicable diseases and has been widely reported in people of all ages (Strong *et al.,* 2005; Jonker *et al.,* 2006; Ruitz *et al.,* 2007; Ortega *et al., 2011*).

It is been reported that low muscular strength and cardiorespiratory fitness in adults are stronger predictors of both cardiovascular and all-cause mortality than any other established risk factors (Myers *et al.,* 2002). In the AVENA study, results showed significant associations between cardiorespiratory fitness and plasma lipid profile (Mesa *et al.,* 2006), inflammatory status (Warnberg, 2006) and abdominal adiposity (Ortega *et al.,* 2010). In a review study by Monyeki and Kemper (2007), it was reported that physical fitness is the maintenance of basic body functions to get through day-to-day activities around the home and work place. Cardiorespiratory endurance or the body's capacity to use oxygen efficiently is often considered the most important health-related component of physical fitness (Malina, 1996). In a study by Monyeki *et al.* (2005), children with a high BMI or SSF were less able to hang (bent arm hang) for longer time, hence were slow runners in 1600m.

Overweight and obesity during childhood and adolescence can give rise to lack of confidence, negative self-perception and depression (Israel & Ivanova, 2002; Doak *et al.,* 2006). In a study by Monyeki *et al.* (2009), it was reported that overweight and obesity significantly influence scholastic and athletic competency, physical self-concept and social acceptance.

6. ARE SOUTH AFRICAN CHILDREN ACTIVE / FIT ENOUGH?

Physical inactivity is the fourth leading risk factor for global mortality (WHO, 2011a). At least 60% of the world's population fails to complete the recommended amount of physical activity required to induce health benefits, with high levels of inactivity found in virtually all developed and developing countries. Findings from the First Youth Risk Behaviour Survey in South Africa (Reddy *et al.,* 2003), reported that PA levels among South African children have declined over the past decades and fewer than half of children and adolescents aged 5 to 17 are sufficiently active to obtain optimal growth and development (Figure 2).

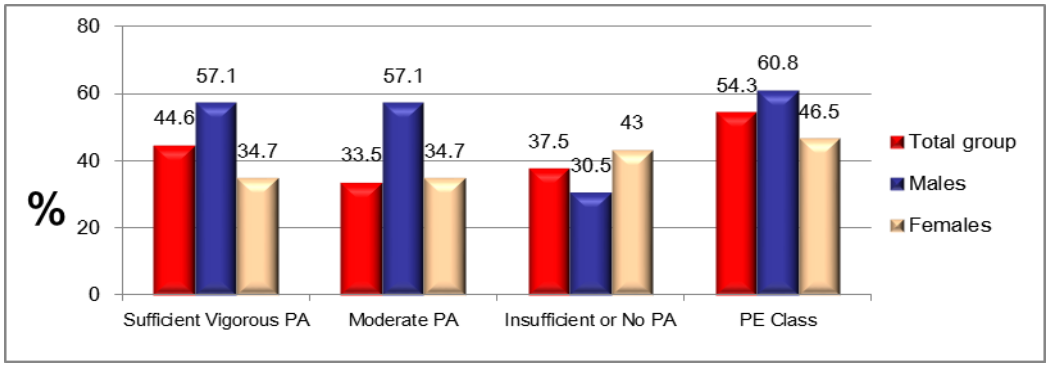

Figure 2: Results on physical activity for the first Youth Risk Behaviour Survey in South Africa (Adapted from Reddy et al., 2003)

Additionally, it was revealed that more males (57.1%) than females (34.7%) participated in sufficient vigorous physical activity. The results also showed that learners who engaged in vigorous activity during an average physical education class (such as soccer, running, rugby, netball, basketball or cricket) was 52.8%. Significantly, more males (60.8%) than females (46.5%) engaged in vigorous activity during an average physical education class.

In rural Ellisras children, Monyeki *et al.* (2005) reported that physical activity levels are high since in this rural area walking is the primary mode of transportation because of the lack of resources to pay for commercial transportation.

7. WHY ARE CHILDREN NOT PHYSICALLY ACTIVE / FIT?

Children today are thought to be less physically active than in previous generations due to increased time devoted to sedentary activities in recent decades (Rey-Lopez *et al.,* 2008). It is assumed that the decline in physical activity from childhood through adolescence will persist into adulthood (Anderson *et al.,* 2005; Nelson *& Gordon-Larsen,* 2006; Telema & Yang, 2000).

The quotation from Anthony Brandt that *"Other things may change us, but we start and end with family"* is deemed relevant in the context of constraints to participation in physical activity. Inactivity is associated with numerous barriers amongst others:

Lack of parental support: In a review of 29 studies by Sallis *et al.* (2000), in children, 38% of the findings showed significant positive relationship between parental physical activity and child activity levels. International researchers revealed that overweight or obesity in childhood and adolescence dramatically increased when both parents are overweight or obese (Li *et al.,* 2007).

Lack of time, interest and motivation: A study by Tumussiime (2004) on Rwandian students revealed the constraints for not participating in physical activity as, *'I want to do other things with my time and there are other interesting things to do'.* In a more recent study by Shirinde and colleagues (2012), on 15 to 16 year-old children attending farm schools in Alma-Vaalwater area, it was reported that 'lack of time', 'to do work/school work' and 'lack of skills' as the three dominant barriers for participating in regular physical activity.

Environmental and social factors: Environmental factor in one way or the other plays a significant role in the prevalence of overweight or obesity as well as physical inactivity. A study by Lennox *et al.* (2007) on adolescents reported that, *'lack of money and family responsibilities'* were barriers to participation in physical activity. Shirinde and colleagues (2012) indicated *'lack of available opportunities'* as a barrier for physical activity participation. A study by Tumussiime (2004) on Rwandian students revealed the barriers for not participating in physical activity as *'I do not have right equipment to exercise'*. Lack of proper Physical Education in school curriculum was found to be a barrier for physical activity participation (Naicker, 2008). An increase in the use of cars for short journeys has also been associated with declining physical activity level (WHO, 2011). In rapidly growing large cities of the developing world, physical inactivity is a particular problem. Evidence suggests that in these environments inactivity is linked to (WHO, 2011); population over-crowding, increased poverty, increased levels of crime, high-density traffic, low air quality, and lack of parks, sidewalks and sports / recreation facilities.

8. IS IT NECESSARY FOR CHILDREN TO BE PHYSICALLY ACTIVE / FIT?

Physical Activity on Growth and Development: Physical activity contributes to normal growth and development as well as health and well-being across the lifespan (Borms, 1986; Hills *et al.,* 2007). It should be noted that during the first 5 years of life, changes in health and motor-related fitness are influenced by growth and maturation (Malina *et al.,* 2004; Hills *et al.,* 2007). As such, it is difficult to isolate the specific aspects of regular physical activity on health and fitness status from inherent adjustments in growth and development during childhood (Hills, 1995). Meredith *et al.* (1991) alluded that during childhood and adolescence, nutrition and physical activity influence the growth and development of numerous body tissues, including body fat, skeletal muscle tissue and bone.

It has been reported that during puberty physical activity can maximise peak bone mass (PBM) (Kohrt *et al.,* 2004; Borer, 2005; Vicente-Rodriguez, 2006; Miles, 2007). It has been suggested that desirable patterns of habitual physical activity if established during the early years of life and sustained across the lifespan may provide the greatest likelihood to impact on mortality and longevity (Paffenbarger *et al.* 1986; Hills *et al.,* 2007).

Effects of Physical Activity on Body Composition: Physical activity is thought to increase lean body mass through increasing the mass of skeletal muscle. It has been highlighted that structural changes also take place in the muscle whereby they increase in capillary density and also the potential for glycogen storage (Miles, 2007). Physical activity can also modify body composition favourably by reducing fat mass even when an exercise programme produces no loss in body weight, and enhance substantial reductions in abdominal subcutaneous and visceral fat (Mesa *et al.,* 2006; McArdle *et al.,* 2007). A study by Broeder *et al.* (1997) has shown that 12 weeks of both resistance and endurance training can produce significant decreases in fat mass and percentage body fat. Theoretically, 30 minutes of moderate physical activity per day is equivalent to approximately 1500kcal/week, which translate to a loss of 2.1% or 1.8% body fat for men and women, respectively (Elder & Robberts, 2007 as quoted in Miles, 2007).

Effects of Physical activity on the NCDs: Physical activity plays an important role in the prevention of a range of non-communicable diseases (NCDs) across the lifespan. Furthermore, physical activity plays important roles in the promotion of social and psychological well-being, and assists in the development and adoption of healthy behaviour (WHO, 2011). The health benefits associated with a physical active lifestyle in children include weight control, lower blood pressure, improved psychological well-being (Strong *et al.,* 2005; Mciza *et al.* 2007; Kemper, 2011), and a predisposition to increased physical activity in adulthood hence increased life expectancy and decreased risk of cardiovascular disease (CVD).

Physical Activity on Psycho-social factors: Organised physical activity has repeatedly been shown to be associated with numerous physical, mental, and social benefits (Findlay *et al.,* 2009). For instance, children who participate in sports have been shown to be at lower risk for obesity (Atlantis *et al.,* 2006; Tremblay *et al.,* 2003), less likely to engage in risky health behaviours (Pate *et al.,* 2000), have higher self-esteem (Marsh *et al.,* 1995; Tremblay *et al.,* 2000) and be more accepted by peers (Chase & Dummer, 1992) than those who do not participate in sports.

9. IS THERE A NEED TO HAVE PHYSICAL ACTIVITY AND HEALTH-RELATED FITNESS PROGRAMME IN THE SCHOOL CURRICULUM?

Research has revealed a significant positive relationship between participation in physical activity or health-related physical fitness and academic performance (Blom *et al.,* 2011). Shephard (1997) reported that children who are engaged in Physical Education had higher scores in mathematics, but lower scores in English (their second language) despite the removal of 33 minutes from mathematics instruction and none from English. In a study by Blom *et al.* (2011) statistically significant positive correlation between fitness and standardized scores in Language Arts and Maths and significant negative relationship with school absences controlled for gender, race, and socioeconomic status were found. Physical Education contributes to children's confidence and self-esteem; enhances social development by preparing children to cope with competition and collaboration. It is increasingly being used as a tool in development, including recovery from trauma and conflict; and encouragement for school attendance and retention (ICSSPE, 2010).

It was reported that better self-esteem or self-image (Nelson & Gordon-Larsen, 2006; Kirkcaldy *et al.,* 2002) and body image (Brown & Evans, 2002) are associated with high levels of physical activity (Trudeau & Shephard, 2008). From a review by Trudeay and Shepherd (2008), it was established that many studies have linked school sport or physical activity programmes with other psychological outcomes, such as school satisfaction and social connectedness, regardless of ethnic group. According to Libbey (2004) both school connectedness and school satisfaction are regarded as important factors in preventing drop-out from school.

10. MY OWN CONTRIBUTIONS

My research efforts in this profession have made significant impacts in the areas of ***growth and motor development, undernourishment, overweight, and health-related physical activity (selected findings are highlighted)***:

A research study in the Ellisras Longitudinal Study examining a group of 7-9 years old children reported gender and age differences in motor performance in which girls performed better than boys in flexibility, plate tapping and balance whilst boys outperformed girls in the strength test of standing broad jump. Motor performance showed improvement with age (Monyeki *et al.,* 2001). Furthermore, in 2003 findings in a same sample revealed the prevalence of stunting to be 6% for boys and girls and wasting to be 7% in boys and 5% in girls. Additionally, findings from this study showed lower physical fitness regarding muscle power, flexibility and balance among the undernourished children (Monyeki *et al., 2003).*

In 2005, a research study investigating body composition and physical fitness of undernourished South African rural primary school children showed that the normal nourished children performed significantly better than undernourished children in sit and reach and plate tapping, while the undernourished ones performed better in bent arm hang and endurance run (1600m run). Further, in this study it was reported that high BMI in the undernourished population should be interpreted as a measure of muscle mass rather than the well-known fact of an indication of fatness. This was due to the fact that the undernourished children in the study with high BMI were able to jump further and sprint faster (Monyeki *et al., 2005).* Monyeki *et al.* (2007) indicated that physical fitness that requires a high energy flux over a short period of time was affected by malnutrition associated with muscle wasting, whereas having a low weight appeared to be the more crucial factor for a good performance on other fitness items in malnourished population.

The study on the anthropometric and physical fitness of youth soccer players from a township area in Potchefstroom showed that the U-12, U-14 and U-16 players performed poorly in endurance run. Senior players were more advanced in dribbling and juggling than players at the low classification levels of participation. All players performed very low with regard to estimated VO_2max (Monyeki *et al.,* 2010). Based on this study it was suggested that it takes at least 10 years for an athlete to achieve excellent performance (Monyeki *et al.,* 2010).

In the baseline data of five years Physical Activity and Health Longitudinal Study (PAHLS) published in the BMC Public Health in 2012, it was found that 35.9% out of the total group were underweight and 13.7% overweight. Boys were more underweight (44%) than girls (30.7%). The prevalence of overweight was 8% in boys and 17.3% in girls. The results showed that children with high physical fitness had lower odds ratio (OR) for being overweight than children with low physical fitness. Furthermore, it was found that overweight girls with low physical fitness performed worse than the boys in physical fitness (Monyeki *et al.,* 2012).

11. CONCLUSIONS

From an overview of scientific literature it can be concluded that physical activity plays a major role in promoting an individual health and well-being on the one hand while on the other hand inactivity is often associated with substantial number of non-communicable diseases leading to severe economic burden. Physical activity is an umbrella term encompassing numerous activities, which ultimately results in numerous health benefits. It was also clear from the studies reviewed that South African children are inadequately active. Inactivity was found to be associated with a number of constraints such as lack of parental support, inconducive environment, too much screen time (TV), and lack of Physical Education in schools. It also became clear that regular participation in physical activity is beneficial to growth and development as it decreases fatness and helps in the prevention and management of NCDs. Furthermore, importance of physical activity and health-related physical fitness such as cognitive development, academic performance, character building, reduction in disruptive behaviour and social development as well as drop-out from educational programmes in the school curriculum were highlighted.

12. RECOMMENDATIONS

It is recommended that:

- Individuals should take a bold step by regularly engaging in physical activity at least 60 minutes a day, three times a week and see positive changes that can be incurred through physical activity *"magic tablet"* in their life;
- Parents should act as role models with regard to drastically reducing TV viewing time and engaging regularly in physical activity;
- Parents should support their children to participate in sport;
- The government should take a bold step in re-introducing Physical Education in schools and ensure that it enjoys at least 2 hrs of teaching time per week. The Department of Basic Education should realise that Education is not all about Mathematics and Science, but about all-round development of well-balanced children as a means of building a healthy nation. As such, the Department of Higher Education and Training should ensure that tertiary institutions produce well trained physical educators. The implementation of all these will help the South African government to meet the Millennium Goal on NCDs as well as the UNESCO's and WHO's declaration on healthy lifestyle;
- Partnership among all stakeholders in promoting physical activity across the lifespan should be encouraged;
- Advocacy and awareness campaigns regarding physical activity should be instituted and sustained in communities;

- Government should promote and encourage active lifestyle among children by creating conducive environment;
- The Department of Health also has an important role to play. The department should include a clause in the National Health Plan which will serve as an incentive to encourage participation in regular physical activity across life span;
- The Department of Sport and Recreation South Africa in collaboration with the Department of Basic Education should be commended for the introduction of magnificence Wednesday sport in schools, but the sustainability of this programme should be scrutinised and monitored primarily due to lack of qualified personnel in schools to run the programme; and
- More advocacy campaigns are required at communities, schools, private sectors and government levels to implement awareness programmes on the needs and benefits of regular participation in physical activity and health and well-being. Efforts should be made at all public and private establishments to have a weekly KEEP ACTIVE programmes.

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THANK YOU

You do a lot in your days and I appreciate your attention as we work together to fight this "growing" pandemic.

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